

ILLINOIS INSTITUTE OF TECHNOLOGY

THIS IS **IIT**

Bulletin:
Undergraduate Programs
2012–2014



Undergraduate Degree Programs

Illinois Institute of Technology offers degree programs in the following areas of study:

College of Architecture

Architecture (ARCH)

Armour College of Engineering

Aerospace Engineering (AE)
Architectural Engineering (ARCE)
Biomedical Engineering (BME)
Chemical Engineering (CHE)
Civil Engineering (CE)
Computer Engineering (CPE)
Electrical Engineering (EE)
Engineering Management (EMGT)
Materials Science and Engineering (MSE)
Mechanical Engineering (ME)

School of Applied Technology

Industrial Technology and Management (INTM)
Information Technology and Management (ITM)

College of Psychology

Psychology (PSYC)

College of Science and Letters

Applied Mathematics (AMAT)
Applied Physics (APHY)
Biochemistry (BCHM)
Biology (BIOL)
Chemistry (CHEM)
Computer Information Systems (CIS)
Computer Science (CS)
Humanities (HUM)
Journalism of Technology, Science, and Business (JTSB)
Molecular Biochemistry and Biophysics (MBB)
Physics (PHYS)
Physics Education (PED)
Political Science (PS)
Professional and Technical Communication (PTC)
Social Sciences (SS)
Sociology (SOC)

Stuart School of Business

Business Administration (BA)

IIT offers graduate degree programs in areas of Applied Technology, Architecture, Business, Design, Engineering, Financial Markets, Law, Mathematics and Science Education, Psychology, Public Administration, the Sciences, and Technical Communication. See the current *IIT Bulletin: Graduate Programs* for a detailed listing of graduate programs or visit the website www.iit.edu/graduate.college. For descriptions of law programs and courses, see the *Chicago-Kent College of Law Bulletin* or visit the website www.kentlaw.edu.

IIT offers Reserve Officer Training Corps (ROTC) programs designed to develop officers for the Air Force, Army, Marines, and Navy.

IIT offers programs leading to secondary education certification in science and mathematics.

Foreword for the IIT Undergraduate 2012-2014 Bulletin

Purpose of the IIT Undergraduate Bulletin

This bulletin describes the academic programs and resources, policies, procedures, and student services in effect at the time of publication. It is a primary source of information for undergraduate students, faculty, and administration.

General information regarding the history of the university, the setting of the campus, and campus life is also included. These sections can be used by prospective students and others to gain an understanding of the university as a whole.

The programs described in this bulletin are applicable to those students who enter IIT in the academic years 2012–2014. Students follow the programs described in the bulletin in effect at the time of their first registration.

Changes in programs and policies often occur before a new bulletin is published. A faculty advisor from the student's major department is the best source for current curriculum information. The Office of Undergraduate Academic Affairs can refer students to the appropriate administrative office for current policies and procedures. Many policies in this bulletin are also found at www.iit.edu/registrar.

Illinois Institute of Technology is a multicultural community that values and respects its members. We take pride in the fact that our faculty, staff, and students come from various backgrounds and all parts of the world, and we welcome their diverse perspectives and contributions. It is our policy to provide a working and learning environment in which faculty, staff, and students are able to realize their full potential as productive members of the IIT community.

To this end, IIT affirms its commitment to equal opportunity and nondiscrimination in employment and education for all qualified individuals regardless of race, religion, color, national origin, gender, age, sexual orientation, gender identity, disability, applicable veteran status, or any other characteristic protected by applicable federal, state, or local law. Further, IIT is committed to taking affirmative action to increase opportunities at all levels of employment and to increase opportunities for participation in programs and activities by all faculty, staff, and students.

Every member of the IIT community: faculty, staff, and student, is expected to cooperate fully in meeting these goals.

Any student, applicant, or employee of Illinois Institute of Technology who believes that he or she has received inequitable treatment because of discrimination violating IIT's stated policy of equal opportunity in employment and in education should communicate, either in writing or in person, with the Director, Equal Employment Opportunity and Affirmative Action, IIT Tower, Illinois Institute of Technology.

For descriptions of graduate programs and courses, see the *IIT Bulletin: Graduate Programs* or visit the website www.iit.edu/graduate_college. For descriptions of law programs and courses, see the *Chicago-Kent College of Law Bulletin* or visit the website www.kentlaw.iit.edu.

The information in this bulletin is subject to change without notice. Changes will be duly published. See www.iit.edu.

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Table Of Contents

| | |
|---|-----|
| Foreword | 1 |
| Calendar | 3 |
| IIT Profile | 5 |
| Undergraduate Admission | 10 |
| Financial Aid | 15 |
| Student Accounting | 18 |
| Living Expenses | 21 |
| Academic Programs | 23 |
| Undergraduate Curricula | 24 |
| General Education Requirements | 25 |
| Departmental Curricula | 26 |
| Minors | 162 |
| Special Programs | 166 |
| Course Descriptions | 178 |
| Academic Policies and Procedures | 264 |
| Campus Resources | 274 |
| Officers, Administration, and Faculty | 283 |
| Board of Trustees | 284 |
| Administration | 286 |
| Faculty | 294 |
| Faculty Emeritus | 308 |
| Maps and Directions | 310 |
| Index | 313 |

IIT Academic Calendar for Fall

| | 2012 | TENTATIVE* | |
|---|-------------|-------------------|-------------|
| | | 2013 | 2014 |
| Fall Classes Begin | Aug 20 | Aug 19 | Aug 18 |
| Last Day to Add/Drop with 100% Tuition Refund | Aug 31 | Aug 30 | Aug 29 |
| Labor Day – No Classes | Sept 03 | Sept 02 | Sept 01 |
| Fall Degree Conferral Applications Due | Sept 10 | Sept 09 | Sept 08 |
| Homecoming Weekend | Sept 22 | Sept 28 | Sept 27 |
| Spring & Summer Incomplete Grades Due | Oct 01 | Sept 30 | Sept 29 |
| Fall Break Day | Oct 08 | Oct 07 | Oct 06 |
| Midterm Grades Due | Oct 19 | Oct 18 | Oct 17 |
| Spring & Summer Class Schedule Published | Oct 22 | Oct 21 | Oct 20 |
| Last Day to Withdraw | Oct 29 | Oct 28 | Oct 27 |
| Spring Registration Begins | Nov 05 | Nov 04 | Nov 03 |
| Thanksgiving Break Begins | Nov 21 | Nov 27 | Nov 26 |
| Last Day of Fall Classes | Dec 01 | Nov 30 | Nov 29 |
| Final Exams Begin | Dec 03 | Dec 02 | Dec 01 |
| Final Grades Due at Noon | Dec 12 | Dec 11 | Dec 10 |
| Fall Degree Conferral Date | Dec 15 | Dec 14 | Dec 13 |

IIT Academic Calendar for Spring

| | 2013 | TENTATIVE* | |
|---|-------------|-------------------|-------------|
| | | 2014 | 2015 |
| Spring Classes Begin | Jan 14 | Jan 13 | Jan 12 |
| Martin Luther King Day – No Classes | Jan 21 | Jan 20 | Jan 19 |
| Last Day to Add/Drop with 100% Tuition Refund | Jan 25 | Jan 24 | Jan 23 |
| Spring Degree Conferral Applications Due | Feb 04 | Feb 03 | Feb 02 |
| Fall Incomplete Grades Due | Feb 25 | Feb 24 | Feb 23 |
| Commencement RSVPs Due | March 01 | March 01 | March 01 |
| Midterm Grades Due | March 15 | March 14 | March 13 |
| Spring Break Week Begins | March 18 | March 17 | March 16 |
| Fall Class Schedule Published | March 25 | March 24 | March 23 |
| Last Day to Withdraw | April 01 | March 31 | March 30 |
| Summer & Fall Registration Begins | April 08 | April 07 | April 06 |
| Graduate Salute Days Begins | April 22 | April 28 | April 27 |
| Last Day of Spring Classes | May 04 | May 03 | May 02 |
| Final Exams Begin | May 06 | May 05 | May 04 |
| Final Grades Due at Noon | May 15 | May 14 | May 13 |
| Spring Degree Conferral Date | May 18 | May 17 | May 16 |

* Dates subject to change. See www.iit.edu/registrar for current information.

Calendar

IIT Academic Calendar for Summer

| | 2013 | TENTATIVE* | |
|---|---------|------------|---------|
| | | 2014 | 2015 |
| Session A & D Classes Begin | May 20 | May 19 | May 18 |
| Memorial Day – No Classes | May 27 | May 26 | May 25 |
| Session A Last Day to Add/Drop with 100% Tuition Refund | May 29 | May 28 | May 27 |
| Session D Last Day to Add/Drop with 100% Tuition Refund | May 29 | May 28 | May 27 |
| Summer Combined Session Degree Conferral Applications Due | May 31 | May 30 | May 29 |
| Session B Classes Begin | June 03 | June 02 | June 01 |
| Session A Midterm Grades Due | June 07 | June 06 | June 05 |
| Session B Last Day to Add/Drop with 100% Tuition Refund | June 12 | June 11 | June 10 |
| Session A Last Day to Withdraw | June 15 | June 14 | June 13 |
| Session B & D Midterm Grades Due | June 28 | June 27 | June 26 |
| Session A Last Day of Classes/Exams | June 29 | June 28 | June 27 |
| Independence Day – No Classes | July 04 | July 04 | July 03 |
| Session C Classes Begin | July 02 | July 01 | June 30 |
| Session A Final Grades Due at Noon | July 03 | July 02 | July 01 |
| Session B Last Day to Withdraw | July 06 | July 05 | July 04 |
| Session C Last Day to Add/Drop with %100 Tuition Refund | July 06 | July 05 | July 04 |
| Session D Last Day to Withdraw | July 13 | July 12 | July 11 |
| Session C Midterm Grades Due | July 19 | July 18 | July 17 |
| Session C Last Day to Withdraw | July 27 | July 26 | July 25 |
| Session B Last Day of Classes/Exams | July 27 | July 26 | July 25 |
| Session B Final Grades Due at Noon | July 31 | July 30 | July 29 |
| Session C & D Last Day of Classes/Exams | Aug 10 | Aug 09 | Aug 08 |
| Session C & D Final Grades Due at Noon | Aug 14 | Aug 13 | Aug 12 |
| Summer Combined Session Degree Conferral | Aug 17 | Aug 16 | Aug 15 |

* Dates subject to change. See www.iit.edu/registrar for current information.

Colleges of Illinois Institute of Technology

Armour College of Engineering

Natacha DePaola
Carol and Ed Kaplan Armour Dean of Engineering
Perlstein Hall, Suite 224
10 W. 33rd St.
Chicago, IL 60616
312.567.3009
www.iit.edu/engineering

Armour College is named for IIT's predecessor, Armour Institute of Technology, which was established in 1892 on the site of the present IIT Main Campus.

The following departments comprise Armour College: Biomedical Engineering; Chemical and Biological Engineering; Civil, Architectural and Environmental Engineering; Electrical and Computer Engineering; and Mechanical, Materials and Aerospace Engineering.

College of Architecture

Wiel Arets
Incoming Dean
S.R. Crown Hall
3360 S. State St.
Chicago, IL 60616
312.567.3230
www.iit.edu/arch

The program in architecture was established at Armour Institute of Technology, one of IIT's predecessors, in 1895. In 1938, the program came under the directorship of the world-renowned architect and educator Ludwig Mies van der Rohe. The College is housed in S.R. Crown Hall, a National Historic Landmark, one of Mies' most significant buildings, and a major contribution to Chicago's rich architectural heritage. The College emphasizes applied studio work under the instruction of practicing architects; the study of architectural theory; interdisciplinary learning; digital technologies; sustainability; design/build; and international study.

College of Science and Letters

R. Russell Betts
Dean
220 Engineering 1 Building
10 W. 32nd St.
Chicago, IL 60616
312.567.3800
www.iit.edu/csl

The College of Science and Letters traces its roots to the Lewis Institute, founded in 1895. The Lewis Institute joined with Armour Institute of Technology in 1940 to form the current Illinois Institute of Technology. The College of Science and Letters offers some 50 academic specializations in seven departments: Applied Mathematics; Biological and Chemical Sciences; Computer Sciences; Humanities; Mathematics and Science Education; Physics; and Social Sciences.

College of Psychology

M. Ellen Mitchell, Ph.D.
Dean
252 Life Sciences Building
3105 S. Dearborn St.
Chicago, IL 60616
312.567.3500
www.iit.edu/psych

Established in 1995, the College of Psychology is noted for its applied graduate programs in clinical, industrial/organizational, and rehabilitation psychology. It offers an undergraduate program that is focused on psychology as a science linked to the professions. The Bachelor of Science degree in Psychology has three optional specialty tracks from which to choose: Culture, Conflict, and International Relations; Psychology of Emerging Technologies; and the Human Environment.

School of Applied Technology

C. Robert Carlson
Dean
Daniel F. and Ada L. Rice Campus
201 E. Loop Rd.
Wheaton, IL 60187
630.682.6000
www.iit.edu/applied_tech

The School of Applied Technology offers technology-oriented training and education for working professionals. Courses are taught by IIT professors and industry professionals with significant working, teaching, and research experience in their fields. The IIT School of Applied Technology offers education and training in a wide variety of formats including degree, non-degree, certificate, credit, and non-credit programs; corporate training; short courses; and seminars ranging from a few hours to several days in length. Completion of all IIT School of Applied Technology non-credit courses will result in the assignment of Continuing Education Units (CEU) fully accredited by the International Association for Continuing Education and Training (IACET).

The IIT School of Applied Technology offers undergraduate degree programs in Information Technology and Management and Industrial Technology and Management; graduate programs in Information Technology and Management, Cyber Forensics and Security, and Industrial Technology and Operations; an undergraduate certificate in Manufacturing Technology and Management; graduate certificates in a variety of topic areas in information technology; Professional Engineer (PE)/ Engineering Intern (EI) Review courses and continuing education courses for Professional Engineers; educational programs for international students with integrated English as a Second Language (ESL) training; and a wide variety of non-credit semester-length and short courses in all disciplines. Through IIT Online, the IIT School of Applied Technology markets and manages online delivery of IIT degree and non-degree educational offerings in all disciplines.

Stuart School of Business

Harvey Kahalas
Dean
IIT Tower 18th Floor
10 W. 35th Street
Chicago, IL 60616
312.906.6500
www.stuart.iit.edu

The Stuart School of Business was established in 1969 with a gift from IIT alumnus and Chicago financier Harold Leonard Stuart. The School places an emphasis on the relation between business and technology and cross-disciplinary education. Stuart offers an AACSB-accredited undergraduate program – the Bachelor of Science in Business Administration. Its graduate programs include the Master of Business Administration (M.B.A.), Master of Science in Environmental Management and Sustainability, Master of Science in Finance, Master of Science in Marketing Communications, a J.D./M.B.A., and an M.S. Design/M.B.A. The School houses the Center for Financial Markets, the Center for Strategic Competitiveness, the Center for Sustainable Enterprise, and the Center for Management of Medical Technology.

Graduate Education at IIT

The objective of graduate education at IIT is to provide programs that enhance students' fundamental knowledge of their chosen field.

Furthermore, IIT seeks to educate and mentor graduate students to function in a global community with an appreciation of the economic, environmental, and social forces

that impact professional choices.

To strengthen IIT's leadership role in higher education, emphasis is placed on the core research competencies and enhancing partnerships with industry, government laboratories, and academic and research institutions.

Graduate College

Ali Cinar
Dean
301 Main Building
3300 S. Federal St.
Chicago, IL 60616
312.567.3024
www.iit.edu/graduate_college

The Graduate College coordinates the programs of advanced study offered by the academic units of the University. The College consists of the following offices: Office of the Dean and Vice Provost for Research; Office of Sponsored Research and Programs; Office of Research Compliance and Proposal Development; Graduate Enrollment; Graduate Academic Affairs; Office of Graduate Admission; and the Office of Editorial Assistance (Thesis Examiner). The dean chairs the Graduate Studies Committee and the Research Council, sets minimum standards for graduate students, represents the University in national forums for graduate education, and serves as an advocate for promoting graduate education and research across the University.

Chicago-Kent College of Law

Harold J. Krent
Dean
Downtown Campus
565 W. Adams St.
Chicago, IL 60661
312.906.5000
www.kentlaw.iit.edu

Chicago-Kent College of Law is the second oldest law school in Illinois. When it joined the University in 1969, IIT became the first major institute of technology to include law among its disciplines.

Chicago-Kent offers programs leading to the degrees of Juris Doctor, Master of Laws, and Doctor of the Science of Law, and participates in joint-degree programs with IIT Stuart School of Business and the University of Illinois-Chicago.

Institute of Design

Patrick F. Whitney
Dean
Fourth Floor
350 N. LaSalle St.
Chicago, IL 60654
312.595.4900
www.id.iit.edu

Since its founding as the New Bauhaus in 1937, the IIT Institute of Design has grown into the largest full-time graduate-only design program in the U.S. with over 150 students from around the world. The school offers professional Master of Design degrees in communication design, interaction design, product design and development, strategic design, systems, thinking, and use research; a dual Master of Design/M.B.A. degree program with the IIT Stuart School of Business; and the Master of Design Methods, a nine-month executive program in design methods for innovation. The Institute of Design also offers a Ph.D. in Design, the country's first such program, created in 1991.

Accreditation

IIT is accredited by the Higher Learning Commission of the North Central Association of Colleges and Schools.

Commission URL:

www.ncahlc.org

Commission Telephone: 312.263.0456

Specific professional curricula are accredited by the Engineering Accreditation Commission and the Computing Accreditation Commission of the Accreditation Board for Engineering and Technology, American Psychological Association, Council on Rehabilitation Education, American Bar Association, Association of American Law Schools, The Association to Advance Collegiate Schools of Business, and National Architectural Accrediting Board.

IIT History and Campuses

IIT's traditions span more than a century of innovation and educational leadership. IIT came into being in 1940 with the merger of Armour Institute of Technology (founded in 1892) and Lewis Institute (founded in 1896).

Today, the University has several campuses and offers degree programs through the College of Architecture, Armour College of Engineering, Chicago-Kent College of Law, Institute of Design, School of Applied Technology, College of Psychology, College of Science and Letters, and Stuart School of Business.

The 120-acre Main Campus is located three miles south of the central business district in Chicago, and is internationally known for its architecture. The Master Plan of the campus and many of its 50 buildings were developed by Ludwig Mies van der Rohe, one of the 20th century's most influential architects.

IIT's Downtown Campus, at 565 W. Adams St., in the West Loop business district, houses the Chicago-Kent College of Law and the Stuart School of Business. A shuttle bus provides transportation between the Main and Downtown campuses.

The Institute of Design, 350 N. LaSalle St., is in an outstanding downtown location and state-of-the-art facility.

The Daniel F. and Ada L. Rice Campus, at 201 E. Loop Road in Wheaton, IL, is IIT's west-suburban location. Graduate and upper-division undergraduate courses and degree programs are available at the Rice Campus with

evening and Saturday classes and via courses broadcast live through IIT Online.

The School of Applied Technology offers degree programs in information technology and management, industrial technology and management, non-credit short courses, and information technology training programs.

IIT was one of the first institutions in the Chicago area to offer distance education by delivering live course lectures to remote students via microwave as early as 1977. Over the years, IITV delivered countless hours of courses and programming to as many as 72 corporate and non-corporate locations, like Motorola and Argonne National Lab. IITV became IIT Online and continues that strong tradition of televised delivery with video lecture capture as the distinctive hallmark of an IIT Online course delivered over the internet. Through IIT Online, academic departments now offer 28 distance education degree and certificate programs to the IIT community around the world.

The Moffett Campus, in southwest-suburban Bedford Park, IL, houses the Institute of Food Safety and Health (IFSH), a multidisciplinary food safety operation facility, which is funded by the U.S. Food and Drug Administration and supported by the food industry. Established with a gift from CPC International, Inc., the campus has enabled the University to develop academic programs in food safety and technology. Courses leading to Master's degrees and certificate programs in food safety and technology and in food process engineering are offered at this facility.

A Snapshot of the IIT Community

Enrollment (Fall 2011)

| | |
|---------------|-----------------------|
| Undergraduate | 2,714 students |
| Graduate | 3,999 students |
| Law | 1,074 students |
| Total | 7,787 students |

Student Demographics

| | |
|---------------|-----|
| Male | 63% |
| Female | 37% |
| Minority* | 17% |
| International | 43% |

| | |
|-----------------------|------|
| Countries of Origin | 100 |
| Student/Faculty Ratio | 11:1 |

Degrees Awarded 2010-2011

| | |
|--------------------------------|--------------|
| Bachelor | 545 |
| Master and Professional Master | 1487 |
| Law | 332 |
| Ph.D. | 80 |
| Total | 2,444 |

* Includes African American, Asian American, Hispanic American, and Native American.

Undergraduate Admission

Undergraduate Admission

Classification of Students

The Office of Undergraduate Admission is responsible for admission decisions for all undergraduate students: full-time and part-time, non-degree and degree-seeking, ROTC, post baccalaureate, Joint Program, dual admission, Shimer College, and summer transfer students.

Students should contact:

Office of Undergraduate Admission
10 W. 33rd St.
Perlstein Hall 101
Chicago, IL 60616
Telephone: 312.567.3025
Outside Chicago: 800.448.2329
Fax: 312.567.6939
E-mail: admission@iit.edu
Online application: apply.iit.edu
Web: admission.iit.edu

Classification

A student registered for 12 semester hours or more is classified as a full-time student. A student registered for less

than 12 semester hours is classified as a part-time student.

Acceptance of Admission/Enrollment Deposit

To accept IIT's offer of admission, all students must return the Enrollment Form which is sent to every admitted student. Full-time students must submit a non-refundable \$300 matriculation deposit. This deposit is

credited to the student's account and will go toward the cost of attendance. The enrollment form may be found at www.iit.edu/undergrad-admission/enrollment.form.php.

New Student Fee

First time undergraduate students are charged a one-time fee to cover the costs of orientation activities for their first

term of enrollment.

Campus Locations

Students can take courses at either the Main Campus or the Daniel F. and Ada L. Rice Campus in Wheaton, a Chicago suburb. The Main Campus has the most extensive offering of day and evening classes. The Rice Campus offers evening classes, most of which start at 6:25 p.m. The majority of undergraduate courses taught at the Rice Campus are 300- and 400-level courses both in information technology and management and in industrial technology and management.

IIT Online produces, delivers, and supports university courses, lectures and programs using educational technology. Through IIT Online, academic departments offer 28 distance education degree and certificate programs to the IIT community around the world. Please note that undergraduate students must have departmental approval to register in online course sections. To see if a particular course or program is offered in any given semester, please check with your department or visit www.iit.edu/iit_online.

Application as a First-Year Student

Special programs and scholarships have specific deadlines and supplemental applications. See admission.iit.edu for details. Students have until May 1 (National Candidates' Reply Date) to accept IIT's offer of admission. To accept IIT's offer of admission, a student must return the Enrollment Form, which is sent to every admitted student, and a non-refundable matriculation deposit by the above dates.

Applicants must submit a completed application, transcripts from all high schools attended, transcripts of all colleges (where applicable), standardized test scores (ACT or SAT I), and a letter of recommendation. International students should see additional requirements in the International Student section. The application is available online at apply.iit.edu.

Standardized Test Scores for First-Year Students

All students are required to submit scores from either the College Entrance Examination Board's Scholastic Aptitude Test (SAT I Reasoning) or the American College Test (ACT). The tests may be taken at any time, but preferably early in the high school senior year. Applicants for

the spring semester (all majors except architecture) must have taken the SAT I or ACT by the preceding November. IIT will consider SAT II tests in math and science but does not require them for admission or scholarship applications.

High School Requirements for First-Year Students

Graduates from an accredited high school applying for admission must present evidence that they have completed a minimum of 16 units of high school work. Most admitted students exceed this minimum. A unit may be defined broadly as the study of a major subject for one academic year in high school.

High school studies should provide a sound background for college study. Preparation in mathematics, for example, must have sufficient depth in geometry, trigonometry, and especially in algebra, to permit applicants for science

and engineering programs to immediately begin the study of college-level calculus and analytical geometry.

A background in English must prepare a student to write well and to read intelligently and analytically, with depth and sensitivity of comprehension.

Required:

- Four years of English
- Four years of mathematics
- Two years of science, including lab*

* Material should include two of the following areas: Biology, Chemistry, or Physics.

College Coursework Taken While Still in High School

IIT will accept college coursework taken while still in high school from other accredited universities and colleges, provided that the courses are comparable in nature, content, and level to those offered at IIT. Grades must be equivalent to a C or higher. Grades of C- are not acceptable for trans-

fer credit. A maximum of 36 applicable semester hours will be accepted. Transcripts of all college work are required to be submitted as part of the application for admission to the Office of Undergraduate Admission, regardless of the transferability of credits.

Undergraduate Admission

Application as an International Student

International students are those who are neither citizens nor permanent residents of the United States. Though the required admission documents can vary depending upon individual circumstances, all international applicants must submit a completed application for admission, official transcripts in the native language, certified English translation

of all transcripts, TOEFL or IELTS scores, and an affidavit of financial support. Please read appropriate application requirements for first-year or transfer students.

Prospective applicants should carefully read the description of requirements on the IIT website: **apply.iit.edu**.

Application as a Transfer, Visiting, or Exchange Student

The Office of Undergraduate Admission is responsible for admission decisions for transfer, visiting, and exchange students. Transfer, visiting, and exchange students may apply for the fall or spring term in all majors. See **admission.iit.edu** for deadlines.

The transfer application may be obtained by contacting the Office of Undergraduate Admission or visiting

apply.iit.edu. Students must submit the IIT Transfer Application, transcripts for all colleges and universities attended, a personal statement, and a letter of recommendation to the Office of Undergraduate Admission.

International students should see additional requirements in the International Student Section.

Requirements for Transfer Students

Transfer applicants must be in good academic standing at their previous college(s) to be considered for admission to IIT. Admission is based upon a cumulative grade point average (GPA) and individual grades in all classes that apply to the major selected. A minimum cumulative GPA of 3.00 is recommended for transfer consideration. Students on academic probation, or who have been dismissed for academic or other reasons, will not be considered for

transfer. Students must also be in good financial standing at all previous colleges attended.

Transfer applicants with fewer than 30 hours of transferable graded college coursework must submit high school transcripts and SAT I or ACT scores as part of their application.

Application as a Non-Degree-Seeking Student

Applicants who are taking courses for the following reasons will be limited to part-time enrollment:

- Taking courses for professional development.
- Taking courses prior to being admitted to a graduate program.
- Taking courses to transfer to another institution.

A non-degree-seeking student must be admitted to IIT. Admission is based on prerequisite coursework or other preparation necessary for the intended course. Non-degree-seeking students follow the same application procedures as transfer students.

Application for Summer School Admission

Students who attend another college or university and wish to enroll for summer courses at IIT with the intention of transferring the credits to their home institution must submit the following to the IIT Office of Undergraduate Admission:

- Summer School Application.
- A transcript and/or a letter of good standing that indicates completion of the prerequisites for the requested course(s) at IIT.

Additionally, students should check with their home institutions to determine the equivalencies for specific courses and the policies and procedures required to transfer IIT courses.

Transfer of College-Level Credit Transfer Credit

Official credit evaluations are completed only after a student is admitted to IIT. Courses may be acceptable for transfer from accredited colleges and universities, provided they are comparable in nature, content, and level to those offered at IIT. Credit may also be accepted, based on appropriate documentation, for DANTES, military experience, and CLEP (see page 266). IIT does not grant credit for vocational courses or life/work experience. In addition, technology courses will not be accepted in any engineering program. IIT will accept up to 36 hours of college coursework taken while still in high school from other accredited universities and colleges.

All college transcripts are to be submitted as part of the application for admission to the Office of Undergraduate Admission, regardless of the transferability of credits.

A maximum of 68 applicable semester hours of transfer credit is permitted from a two-year college. There is no maximum number of hours of transfer credit from a four-year college; however, the final 45 semester hours of any degree program must be completed at IIT. Transfer credit will be accepted for courses completed with the equivalent of a grade C or better. A grade of C- is not acceptable for transfer credit. Grades from transfer courses are not included in the IIT cumulative or major grade point average. In certain instances, the academic department must approve transfer credit if a long period of time has elapsed since the course was completed.

Contact the Office of Undergraduate Academic Affairs (ugaa@iit.edu) regarding the transfer of courses from any college or university.

Advanced Placement Examinations

IIT will award credit for CEEB Advanced Placement (AP) examinations. Credit will vary by test score. A complete

list of acceptable AP scores and IIT course equivalents may be found at www.iit.edu/ugaa.

International Baccalaureate Program

Students holding an International Baccalaureate (I.B.) diploma or who have successfully completed I.B. examinations may be awarded credit according to the following policies: college credit will be awarded for higher-level (HL) exams with a score of 4 or better; a maximum of 10 semester

hours of credit for each HL exam can be awarded; no credit is granted for work completed at the subsidiary level (SL). Scores should be sent to the Office of Undergraduate Admission.

General Certificate of Education Examination - Advanced Level and Advanced Subsidiary Level

College credit will be awarded for General Certification of Education (GCE) examinations with a grade of A, B, C, D, and E. A maximum of 10 semester hours of credit can be

awarded for each advanced level (A-level) examination. A maximum of five semester hours of credit can be awarded for each advanced subsidiary level (AS-level) examination.

Placement Testing

Placement testing is done prior to first enrollment. For students entering in the fall semester, placement tests are scheduled in the summer preceding matriculation. For students entering in the spring semester, placement tests are scheduled immediately preceding matriculation. Placement tests are only used for placing students into the appropriate courses. Test results do not appear on the student's official academic record and no academic credit is awarded.

Students are required to take up to three placement exams.

- All new first-year and transfer students are required to take the mathematics placement test. Advanced Placement credit and transfer credit for MATH 151 – Calculus I will still be awarded.
- All new first-year and transfer students who have neither Advanced Placement credit nor transfer credit for COM 101 – University Writing, or Com 111 – Writing in the University for Non-Native Students are required to demonstrate writing proficiency in one of two ways. They may either pass the writing placement exam prior to enrollment or receive a C or better in COM 101 or COM 111 during their first year of attendance.
- Students in chemical engineering who have neither Advanced Placement credit nor transfer credit for CHEM 124 - General Chemistry are required to take the chemistry placement test.

Immunization and Proof of Immunity

Illinois Institute of Technology is required to collect student immunization records and provide this information to the Illinois Department of Public Health, or its designated representative, in the event of a health emergency or compliance audit. All immunization documents submitted to IIT become the property of the University. Unless required to do so by law, IIT will not release student immunization records to any third party. Limited exemptions from showing proof of immunity can be accepted with official supporting documentation. In accordance with public

health law, anyone with an exemption may be excluded from campus in the event of a health emergency. Additional proof of immunity for specific health conditions is required of international students who are not otherwise exempt. Students who do not comply with these requirements prior to, or during their first term of study, will be prevented from registering for subsequent terms. Questions regarding the immunization policy should be directed to the Student Health and Wellness Center at 312.567.7550 or www.iit.edu/student_health.

Financial Aid

Website: www.iit.edu/financial_aid

Comprehensive Aid Program

IIT administers a comprehensive financial aid program, which includes federal, state, and institutional funds for full- and part-time undergraduate students. Federal programs include grants, loans, and work-study employment. State programs include grant funds. Most federal and state

funds are based on demonstrated financial need. Institutional funds include need-based grants and loans, as well as merit scholarships based on academic and service achievements.

Student Eligibility Requirements to Receive Federal and State Financial Assistance

Students must be U.S. citizens or eligible non-citizens and be enrolled in a degree-seeking program at least half-time (six credit hours or more per semester) and demonstrate academic progress towards graduation to receive federal and state aid. Satisfactory academic progress (SAP) includes a minimum grade point average and sufficient credit

hours earned each semester towards the completion of a degree program. IIT has an established SAP policy in compliance with federal and state regulations. Failure to comply with IIT's SAP policy will lead to a student losing their eligibility for financial assistance. *International students are not eligible for federal financial aid.*

Federal Financial Aid Application Process

All students applying for financial assistance need to complete the Free Application for Federal Student Aid (FAFSA). This application is available at www.fafsa.ed.gov beginning January 1 of the academic year in which the student plans to attend. The IIT Title IV School code is **001691**. The priority date for financial aid consideration at IIT is March 15. All students who file the FAFSA receive a Student Aid Report (SAR) when the FAFSA is complete. All federal financial assistance is awarded on an annual basis. Students should be aware that a FAFSA must be filed each academic year. The amount of

financial aid that a student receives each year depends on demonstrated financial need and the availability of funds. Students applying for federal financial aid will be required to submit tax information upon request.

New first-year students should not wait for a final admission decision before filing the FAFSA due to the March 15 deadline for complete financial consideration. For the same reason, new transfer students should not wait for a final admission decision before filing an original or renewal FAFSA.

Determining Financial Need For Assistance

Financial need is the difference between a student's total annual cost of attendance at IIT and the amount the student and the student's family are expected to contribute toward the cost of education. The total cost of attendance at IIT includes tuition, mandatory fees, room and board, books and supplies, transportation, and personal expenses. The amount the student and family are expected to contribute is called the expected family contribution (EFC).

The U.S. Department of Education has established the formula used to calculate the EFC, based on the FAFSA information provided by a student and family. The EFC is subtracted from the cost of attendance and what is left over is considered to be the demonstrated need for financial assistance. One of the principles of need-based assistance is that students and their families are expected to help pay some of the cost of education.

Financial Aid

Federal Financial Aid Programs

To be considered for all federal financial aid programs, students must submit a FAFSA.

Federal Pell Grant

The federal Pell Grant is a federal grant that does not have to be repaid. Pell Grants are awarded only to undergraduate students who have not earned a Bachelor's or profes-

sional degree. Pell Grants are awarded based on demonstrated financial need. Students apply for a Pell Grant by filing the FAFSA.

Federal Supplemental Educational Opportunity Grant (FSEOG)

The FSEOG is a federal grant that does not have to be repaid. This grant is for undergraduate students who demonstrate exceptional financial need. FSEOG funds are limited

and awarded on a first-come, first-serve basis. The final need criteria for this award are determined each year by the Office of Financial Aid.

Federal Perkins Loan

The federal Perkins Loan is a low-interest federal loan for undergraduate students with exceptional financial need. This loan is made with governmental funds and serviced by IIT. No interest is charged while the student is enrolled in school. When a student leaves school or drops below half-time, the loan enters a nine-month interest-free grace

period before the student begins repayment. Once repayment begins, the loan accrues 5% of the principal each year. Perkins Loan funds are limited and awarded on a first-come, first-serve basis. The final need criteria for this award are determined each year by the Office of Financial Aid.

Federal Work Study

Federal Work Study (FWS) provides funding for jobs for undergraduate students with demonstrated financial need. Students awarded FWS can earn money to help pay educational expenses and are responsible for finding employment. Students can work either on or off campus. Off-campus jobs will be with private, non-profit organizations or public agencies that provide community service work. Students awarded FWS are paid at least the current fed-

eral minimum wage or higher, depending on the type of work performed. Students are paid by the hour and receive a paycheck. FWS students cannot work more than 20 hours per week during the academic year and may not work during their scheduled class times. FWS positions are advertised through the Office of Financial Aid on the website http://www.iit.edu/financial_aid/student_employment/.

Direct Loan Programs

IIT participates in the Direct Loan program with the Department of Education. Interest rates for the loans in this program are determined each year on July 1. Loan rates are fixed once a student receives the funds in a given academic year. Direct Loans must be repaid over a scheduled

period of time after the student leaves school or drops below half-time. The funds for these loans come from the federal government. Below are the types of Direct Loan programs offered at IIT.

Federal Direct Stafford Loans (Subsidized and Unsubsidized)

The subsidized Stafford Loan is awarded based on demonstrated financial need and students do not accrue interests on the principal while in school. The unsubsidized Stafford Loan is a non-need based loan. Interest accrues from the time the student receives the loan funds. Students have

the option of paying the interest during school or having the interest added to the principal after graduation or if dropping to less than half-time enrollment. Both Stafford Loans are charged an origination fee (up to 3%) each year before the loan disburses to the student.

Federal Direct Parent Loans

PLUS loans enable parents with a good credit history to borrow money to help pay educational expenses for their dependent undergraduate student. PLUS loans cannot be taken in a student's name. If a parent is denied for this

loan, they may reapply with an endorser. If a parent is not approved for the loan, the Office of Financial Aid may offer additional unsubsidized Stafford Loan funds to a student.

State Financial Aid Programs

Illinois Student Assistance Commission (ISAC) Financial Aid Programs Monetary Award Program (MAP)

This program is for undergraduate Illinois residents and provides grant assistance that does not have to be repaid. To receive a MAP Grant, a student must demonstrate financial need, be a resident of Illinois, and be enrolled at an Illinois institution. The MAP Grant can only be applied to

mandatory tuition and fees and is awarded on a per-credit-hour basis. A student can receive the MAP Grant for up to a maximum of 135 credit hours. All students awarded the MAP Grant must provide proof of Illinois residency.

Institutional Financial Aid Programs

Most undergraduate students at IIT receive some sort of institutional support, based on merit or need. The Office of Undergraduate Admission awards IIT funds up front to new admits and the Office of Financial Aid administers the renewal of scholarships each year. Generally, scholarships are awarded for up to four years of study. Students must be full

time (at least 12 hours each term) to receive IIT scholarship funds and must maintain satisfactory academic progress as defined in the IIT Undergraduate Bulletin. Some IIT scholarships have additional requirements and will be specified to the student at the time of awarding.

Veterans' Educational Benefits

The Illinois Institute of Technology proudly participates in Montgomery GI Bill and Yellow Ribbon Program. Veterans who wish to process VA benefits at IIT can find all relevant information at http://www.iit.edu/financial_aid/policies/veteran_benefits.shtml. Veterans enrolling for the first time should contact the veteran representative in the Office of the Registrar, by emailing veterans@iit.edu or calling 312.567.3100. The veteran must also inform the univer-

sity Veterans Affairs representative of any change in credit hours within a term or of future enrollment plans. If a veteran drops a course or withdraws from school completely, his or her allotment may be reduced or withdrawn. The veteran must report immediately the exact termination date to the Veterans Affairs representative. Veterans must maintain reasonable academic progress according to university standards. Failure to meet minimum-progress criteria can result in a cessation of educational benefits.

Student Accounting Financial Responsibility

By registering for courses at Illinois Institute of Technology the student accepts financial responsibility for payment in full of the student account plus, if necessary, any additional costs which may be incurred by the University in the collection of these debts. Late payment fees will be applied to past due accounts. Failure to pay a past due debt may result in the debt being listed with the State Comptroller's

Offset Program, the account being referred to a collection agency, and other authorized legal debt collection procedures. Under such circumstances, the student is responsible for all fees and costs incurred by the University in the collection of the past due debt, including collection fees and/or attorney fees.

Charges

All university mandatory and non-mandatory charges are published regularly. The official university publication of current tuition, fees, and other charges for all students, except students of the IIT Chicago-Kent College Of Law, can

be found at www.iit.edu/bursar on the Tuition and Fees page under Billing. All other published tuition and fee information should be considered an estimate and not the official published rates.

Tuition-Undergraduate

Undergraduates registered for 12-24 credit hours are considered full-time and will be charged at the full-time tuition rate. Undergraduates registered for fewer than 12 credit

hours are considered part-time and will be charged at a per-credit-hour, part-time tuition rate.

Other Fees and Charges

A student may incur other fees and charges that are both mandatory and non-mandatory. Please refer to the Undergraduate Admission section of the bulletin for information

related to enrollment deposits and new student fees. For a complete current listing of all charges and fees, go to www.iit.edu/bursar and select Tuition and Fees.

Parking Fee

All students who park in campus parking lots must register their cars with Access Card and Parking Services and pay a parking fee at the beginning of the semester. For cur-

rent fees, students should contact Access Card and Parking Services at www.iit.edu/~parking or 312.567.8968.

Student Health Insurance

All students who are either registered for 9 or more credit hours or occupants of IIT residence halls are required to purchase the basic student health insurance policy, or submit proof of equivalent insurance before the end of the first week of classes. All students who are here on an F1 or J1 visa and are registered for at least one (1) class, participants in the co-op program, research or teaching assistants, or occupants of IIT residence halls are required to purchase the basic student health insurance. The premium for the basic insurance will be added to the student tuition bill. To avoid this charge, submit proof of

comparable coverage to the IIT Student Health and Wellness center. For information on submitting a waiver, visit www.iit.edu/student_health/insurance. Students on an F1 or J1 visa may only waive IIT's coverage with proof of U.S. employer-provided insurance. Once a waiver is accepted, it will be valid through the student's continued enrollment at IIT. Other students, spouses, and dependants of students may participate in the student health program if desired. Students should consult the Student Health and Wellness Center in the IIT Tower, Suite 3D9-1, or call 312.567.7550 for further details.

E-bills

You will not receive a paper bill. You will not receive a bill through the U.S. Postal Service. All bills will be posted to your online account. You will receive an email notification when your bills are ready to view online. Registered Authorized Users will receive email notifications as well. Students may access their accounts 24 hours a day, 7 days a week online.

A student is responsible for reading all official communications sent to their IIT email regarding their student account. A student is responsible for routinely reviewing their student account online.

Payment of Tuition, Room and Board, and Other Fees and Charges

Tuition and fees, less any anticipated financial aid awards, is considered a student's out-of-pocket responsibility. The due date for all out-of-pocket payments will be posted each semester on the official university calendar and at **www.iit.edu/bursar**. All out-of-pocket payments must be paid by the due date.

Payment plan information can be found at **www.iit.edu/bursar**. The deadline to enroll in a plan will be posted each semester on the official university calendar and at **www.iit.edu/bursar**.

Please see www.iit.edu/bursar/payments for options and instructions related to making payment.

Rejected Payments

If IIT receives notification that a payment has been rejected for any reason, the returned amount will be charged to the student account along with a \$50.00 returned check fee. Payments rejected due to insufficient funds must be replaced with a cashier's check, money order, or credit card. Payments rejected due to invalid routing and/or account

information or a closed account may be replaced with another electronic check from a different account. Following a second rejected payment, the University will no longer accept personal or electronic checks. All subsequent payments must be made by cashier's check, money order, or credit card.

Outstanding Debts/Financial Holds

A restrictive hold is placed on a student's record when that student is delinquent in fulfilling his or her financial obligation to the university. A student is considered delinquent when his or her account is not paid in full according to established University policies and by posted payment due dates. Students with outstanding university debt may be

suspended from current classes. Students whose accounts are not current will not be allowed to register or attend classes for any subsequent term. No diploma, certificate of attendance, letter of completion, or transcript of academic record will be issued until all financial obligations have been met.

Tuition Adjustment Policy

Under exceptional circumstances such as withdrawal for involuntary military service, serious illness or injury, or action by the University, consideration may be given by the University for the issuing of a credit or refund for unused tuition. Consideration will be given upon written request to the Office of Undergraduate Academic Affairs for un-

dergraduate students or the Office of Graduate Academic Affairs for graduate students. Payments for charges other than tuition will remain the responsibility of the student. Students should consult **www.iit.edu/registrar** for the last day to add or drop without a penalty.

Student Accounting

Financial Aid Refunds

You must enroll in direct deposit to receive your student refund. Refunds from financial aid credits are processed throughout the semester. We will email you whenever we process a refund for you, provided you are enrolled in direct deposit. There is no fee for receiving your refund via direct deposit.

For a full explanation of the University's policies and procedures related to refunding student account credit balances, refer to www.iit.edu/bursar/credits_and_refunds.

Title IV Federal Loan Authorizations

Health insurance fees, parking charges, and other items on a student bill cannot be automatically paid with Title IV Federal Loan funds. Students may authorize the University to pay these fees with Title IV Federal Loan funds by completing a Title IV Authorization form on the myIIT

portal and checking the "Pay Non-Institutional Charges" box. **Students who do not complete this Title IV Authorization may receive a refund and still owe IIT money.**

Living Expenses

Unmarried Students

The University's residence halls provide facilities for room and board for undergraduate and graduate men and women. First-year students not living with their families must live in the residence halls. Housing for first-year students is guaranteed through June 1. Residence hall contracts are made for the full academic year, from the first week of classes in August until commencement in May.

Charges for room and board for 2012 range from \$9,233 to \$22,042 for the academic year. When a student submits a contract for campus housing, an itemized list of available campus accommodations and rates will be provided. For more information, see the Residence and Greek Life website: www.iit.edu/housing.

Meals

Students living in residence halls contract for a variety of meal plans. Meal plans and meals on a cash basis are avail-

able to non-residents. For more information, see the Residence and Greek Life website: www.iit.edu/housing.

Housing Prepayment Fee

An initial \$600 nonrefundable payment, which applies in full to charges for room and board, must be submitted to the director of housing by June 1 for fall semester applicants

or by December 1 for spring semester applicants. Housing prepayment is only required of returning students.

Commuting Students

A student living at home and commuting will spend an estimated annual average of \$2,000 on living costs at home and

for meals on campus, and approximately \$1,800 for travel.

Miscellaneous Expenses

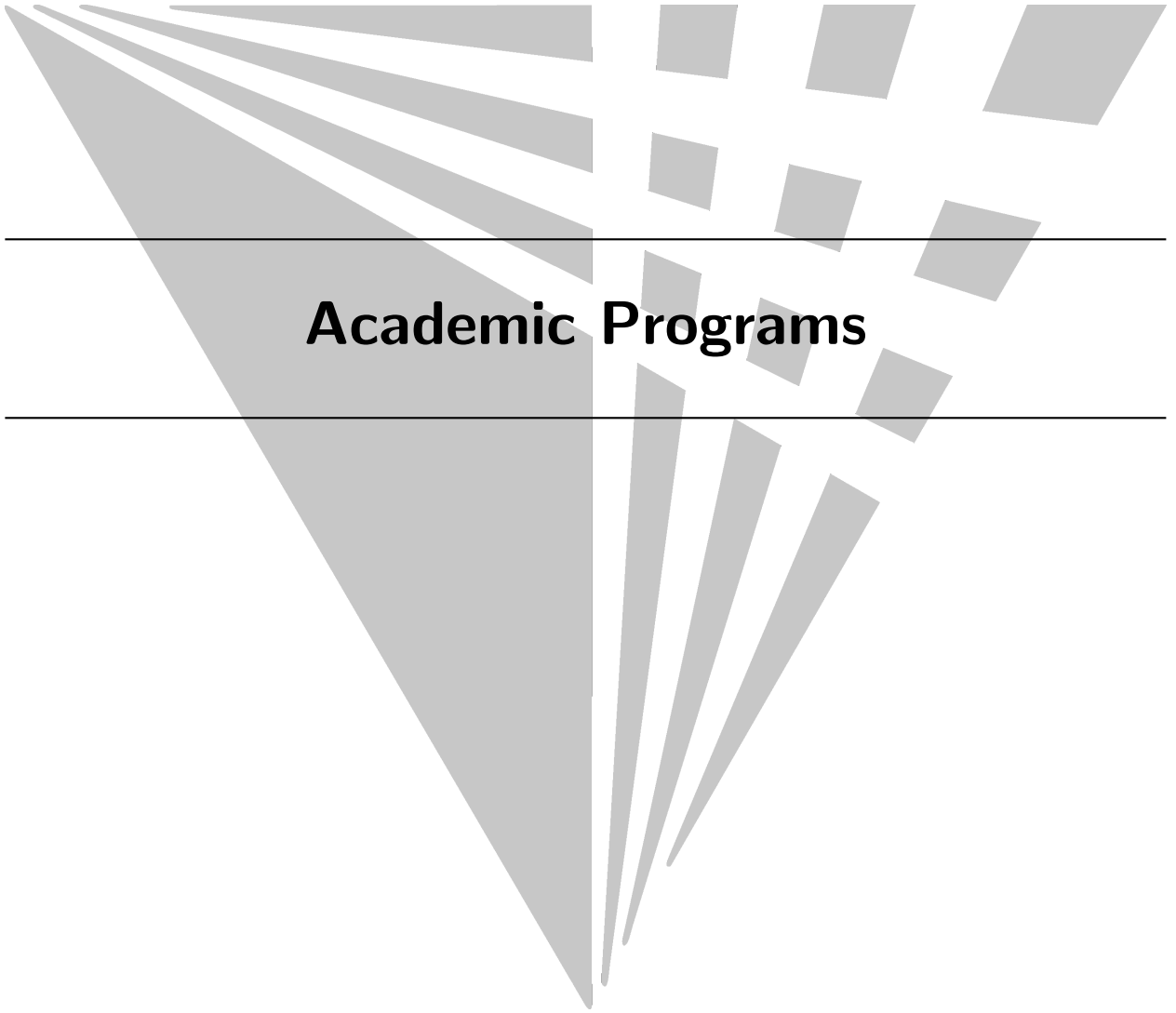
Miscellaneous personal and recreational expenses are estimated at \$2,100 for the academic year. These figures are

used in computing the official financial aid budget.

Married Students

There is availability in Carman Hall apartments for undergraduate and graduate students who are married, living with a domestic partner, or have legal guardianship of a dependent. Carman provides furnished studio and one-bedroom with den apartments. Contract rates range from

\$4,497 to \$6,577 per semester. All utilities are included, as well as internet, cable, and 5-digit dialing. The room reservation process of Carman Hall is available online at www.iit.edu/housing. Apartments are offered in the order that online applications are received.



Academic Programs

Undergraduate Curricula at IIT

IIT combines excellence in academic preparation for professional careers with opportunities for practical experience in the major branches of engineering, the sciences, mathematics, architecture, computer science, business, and liberal arts.

General education requirements are described on page 25. Specific degree requirements are described in the departmental listings beginning on page 26. For minors, see pages 162–165.

Undeclared Majors

Students who are unsure of their career choices may enter IIT as undeclared or open majors. During the first year of study, undeclared majors take required general education courses in science, mathematics, computer science, humanities, and social science. These courses provide the foundation for nearly all of IIT's major programs.

Because general education courses apply to all majors, most students may wait as late as the sophomore year to declare their major and still graduate on time.

Department, Degrees, and Certificates

Applied Mathematics Department

- Bachelor of Science in Applied Mathematics

College of Architecture

- Bachelor of Architecture

Biological and Chemical Sciences Department

- Bachelor of Science in Biochemistry
- Bachelor of Science in Biology
- Bachelor of Science in Chemistry
- Bachelor of Science in Molecular Biochemistry and Biophysics
- Certificate in Premedical Sciences

Biomedical Engineering Department

- Bachelor of Science in Biomedical Engineering

Stuart School of Business

- Bachelor of Science in Business Administration

Chemical and Biological Engineering Department

- Bachelor of Science in Chemical Engineering

Civil, Architectural, and Environmental Engineering Department

- Bachelor of Science in Civil Engineering
- Bachelor of Science in Architectural Engineering
- Bachelor of Science in Engineering Management
- Certificate in Engineering Graphics and CAD

Computer Science Department

- Bachelor of Science in Computer Science
- Bachelor of Science in Computer Information Systems

Electrical and Computer Engineering Department

- Bachelor of Science in Electrical Engineering
- Bachelor of Science in Computer Engineering

Humanities Department

- Bachelor of Science in Humanities
- Bachelor of Science in Journalism of Technology, Science, and Business
- Bachelor of Science in Professional and Technical Communication

Industrial Technology and Management Department – School of Applied Technology

- Bachelor of Industrial Technology and Management
- Certificate in Industrial Technology and Management

Information Technology and Management Department – School of Applied Technology

- Bachelor of Information Technology and Management

Mathematics and Science Education Department

- Mathematics and Science Education Secondary Science or Mathematics Teaching Certification

Mechanical, Materials, and Aerospace Engineering Department

- Bachelor of Science in Mechanical Engineering
- Bachelor of Science in Materials Science and Engineering
- Bachelor of Science in Aerospace Engineering

Physics

- Bachelor of Science in Applied Physics
- Bachelor of Science in Physics
- Bachelor of Science in Physics Education

College of Psychology

- Bachelor of Science in Psychology
- Certificate in Industrial Training

Social Sciences Department

- Bachelor of Science in Political Science
- Bachelor of Science in Social Sciences
- Bachelor of Science in Sociology

General Education Requirements

The general education program is designed to ensure that all IIT graduates have a basic understanding of certain essential areas of knowledge. *The general education program sets minimal requirements.* Most degree programs require additional courses in these areas. These additional course requirements may be found in the departmental listings.

General education requirements will not be waived. Substitutions may be considered upon written request to the Office of Undergraduate Academic Affairs. Approval will be granted only to individual students and then, only under extraordinary circumstances.

A. Writing and Communications

IIT recognizes the importance of critical thinking, writing, and oral communication in all academic pursuits and in professional practice. IIT is therefore committed to a campus-wide program that engages students in the practice of written and oral communication in all disciplines. This program includes the following components:

1. Students who have not received transfer or AP credit for COM 101 at IIT must take the IIT English Proficiency Examination before beginning classes at IIT. Within their first year at IIT, students who do not pass the IIT English Proficiency Examination must demonstrate basic writing proficiency by passing a composition course at IIT. This requirement applies to all students enrolling for an undergraduate degree.

2. Students must complete a minimum of 42 credit hours of courses with a significant written and oral communication component, identified with a **(C)** in this bulletin, with a minimum distribution as follows:

15 hours in major courses.

15 hours in non-major courses.

Full-time students should enroll in two **(C)**-designated courses, and part-time students should enroll in one **(C)**-designated course each academic year.

3. Students must seek help from the IIT Writing Center (see page 281) when referred by course instructors or academic advisors.

B. Mathematics: Five credit hours

The five credit hours must be of MATH 119 or above. BUS 221 and PSYC 203 also satisfy this requirement.

C. Computer Science: Two credit hours

All students must take CS 104, 105, 110, 115, 116, 201, ARCH 125, ITM 311, or a computer science course at the 200-level or above.

D. Humanities and Social or Behavioral Sciences:

21 credit hours, subject to minimum requirements in each area as specified below:

1. Humanities: a minimum of nine credit hours. Courses that satisfy this requirement are marked with an **(H)** in this bulletin. The courses must be distributed as follows:

- (a) All students must take HUM 102, 104, or 106.

- (b) At least two courses marked with an **(H)** at the 300-level or above. Students may use foreign language courses at the intermediate- and advanced-level to fulfill 300-level requirements.

2. Social or Behavioral Sciences: a minimum of nine credit hours. Courses that satisfy this requirement are marked with an **(S)** in this bulletin. The courses must be distributed as follows:

- (a) At least one course at the 300-level or above.

- (b) Courses from at least two different fields.

- (c) At least six credits in a single field.

E. Natural Science or Engineering:

11 credit hours

This component may be satisfied by courses in engineering, biology, chemistry and physics, or by courses in architecture and psychology marked with an **(N)**. These courses must be distributed as follows:

1. Two sequential natural science or engineering courses in a single field. (CHEM 124 with MS 201 satisfies this requirement.)

2. At least one natural science or engineering course in a second area.

F. Introduction to the Profession:

Two credit hours

All students must complete these courses in their first year. Students entering with 30 hours or more of transfer credit may have this requirement waived with departmental approval. If waived, the total credit hours required for the degree must still be satisfied.

G. Interprofessional Projects (IPRO):

Six credit hours

Students will participate in at least two Interprofessional Project experiences. These projects develop communication, teamwork, and leadership skills, as well as an awareness of economic, marketing, ethical, and social issues within the framework of a multidisciplinary team project. The project teams will be integrated across academic programs and at different levels within programs. Students who complete an ROTC minor are exempt from one of the two IPRO requirements.

Applied Mathematics

Department Website: www.iit.edu/csl/am

Engineering 1 Building
10 W. 32nd St.
Chicago, IL 60616
312.567.8980

Chair

Fred J. Hickernell

Associate Chair and Director of Undergraduate Studies

Gregory Fasshauer

Applied mathematics is mathematics created in response to problems in science, engineering, and society. Applied mathematicians work on a wide variety of topics, such as the methods for multi-criteria decision making (requiring probability/statistics, analysis, optimization) and the analysis of liquid flow around solids (including computational methods and analysis). Undergraduate study in applied mathematics at IIT incorporates foci in four areas of modern applied mathematics: applied analysis, computational mathematics, discrete applied mathematics, and stochastic analysis. These areas of study both support IIT's broad range of professional degree programs and comprise a specialized Bachelor of Science (B.S.) degree in Modern Applied Mathematics.

The objectives of the Applied Mathematics program are to prepare students for careers that utilize mathematics to address problems in science, engineering, and society and to prepare students for graduate study in mathematics.

A faster and, if preferred, more research-oriented program leading to a dual Bachelor of Science/Master of Science in Applied Mathematics is also an option, especially for incoming students who have taken advanced courses in high school, or students who are keen on doing research and continuing for graduate studies.

Students also have the option of completing the following co-terminal degrees that enable a student to complete both degrees in five years:

- Bachelor of Science in Applied Mathematics and Master of Science in Computer Science
- Bachelor of Science in Applied Mathematics and Master of Computer Science

These programs allow students to complete a dual degree in a shorter time period, to apply through a simplified admission process, and to receive some financial incentives. See page 166 or go to www.iit.edu/csl/am for more information.

Students with an applied mathematics background are prepared for jobs in the insurance industry, electronics and computer manufacturing businesses, logistic companies, pharmaceutical firms, etc. The program's flexibility allows students to assemble a portfolio of courses that will satisfy both intellectual needs and career preparation.

The degree program includes a required minor consisting of five related courses (at least 15 semester hours) in an area outside of applied mathematics. A minor in business, computer science, or one of the engineering disciplines prepares the student to enter the job market in business or government.

Faculty

Professors

T. Bielecki, J. Duan, W. Edelstein, G. Fasshauer,
F. Hickernell

Associate Professors

A. Adler, R. Ellis, H. Kaul, X. Li, A. Lubin,
M. Pelsmajer

Assistant Professors

I. Cialenco, L. Kang, S. Li

Visiting Professor

I. G. Ivanov

Visiting Assistant Professors

H. Feng, M. Nieweglowski

Senior Lecturers

D. Maslanka, C. Tier, F. Weening

Lecturer

J. Erickson

Faculty Emeritus

B. Bernstein, G. Byrne, T. Erber, M. Frank, B. Heller,
F. McMorris, H. Pearson, A. Sklar, E. Stueben

Joint Appointments

Professors

S. Nair (Mechanical, Materials, and Aerospace
Engineering), E. Reingold (Computer Science),
D. Rempfer (Mechanical, Materials, and Aerospace
Engineering)

Bachelor of Science in Applied Mathematics

| Required Courses | Credit Hours |
|---|--------------|
| Applied Mathematics Requirements MATH 100, 151, 152, 230, 251, 252, 332, 350, 400, 402, (430 or 454), 475 | 42 |
| Applied Mathematics Electives* | 18 |
| Humanities and Social Sciences Requirements For general education requirements, see page 25. | 21 |
| Minor Requirement Five related courses from an area outside of applied mathematics. | 15 |
| Interprofessional Projects | 6 |
| Computer Science Requirements (Two of CS 104, 115, 116) or (CS 105 and 201) | 4 |
| Science Requirement PHYS 123 | 4 |
| Science Electives | 9 |
| Free Electives | 9 |
| Total Hours | 128 |

* Applied mathematics electives are to be chosen after consultation with an academic advisor. Student goals, interests, and course availability should be determining factors in this selection process. The optional specializations on pages 29–31 may also serve as a guide to applied mathematics elective selection.

Applied Mathematics Curriculum

| Semester 1 | Credits |
|---|-----------|
| MATH 100 Introduction to the Profession | 3 |
| MATH 151 Calculus I | 5 |
| CS 104 Introduction to Computer Programming for Engineers | 2 |
| Science Elective | 3 |
| Humanities 100-level Elective | 3 |
| Total Hours | 16 |

| Semester 2 | Credits |
|---|-----------|
| MATH 152 Calculus II | 5 |
| MATH 230 Introduction to Discrete Mathematics | 3 |
| CS 115 Object-Oriented Programming I | 2 |
| PHYS 123 General Physics I | 4 |
| Social Sciences Elective | 3 |
| Total Hours | 17 |

| Semester 3 | Credits |
|---|-----------|
| MATH 251 Multivariate and Vector Calculus | 4 |
| MATH 332 Elementary Linear Algebra | 3 |
| Minor Elective | 3 |
| Science Elective | 3 |
| Humanities or Social Sciences Elective | 3 |
| Total Hours | 16 |

| Semester 4 | Credits |
|---|-----------|
| MATH 252 Introduction to Differential Equations | 4 |
| MATH 350 Intro to Computational Mathematics | 3 |
| Minor Elective | 3 |
| Science Elective | 3 |
| Social Sciences Elective | 3 |
| Total Hours | 16 |

| Semester 5 | Credits |
|-------------------------------|-----------|
| MATH 430 Applied Algebra | 3 |
| OR | 3 |
| MATH 454 Graph Theory | 3 |
| MATH 475 Probability | 3 |
| Applied Mathematics Elective* | 3 |
| Minor Elective | 3 |
| Humanities Elective (300+) | 3 |
| Free Elective | 3 |
| Total Hours | 18 |

| Semester 6 | Credits |
|-------------------------------|-----------|
| MATH 402 Complex Analysis | 3 |
| Applied Mathematics Elective* | 3 |
| Applied Mathematics Elective* | 3 |
| IPro Elective I | 3 |
| Minor Elective | 3 |
| Total Hours | 15 |

| Semester 7 | Credits |
|---------------------------------|-----------|
| MATH 400 Real Analysis | 3 |
| Minor Elective | 3 |
| Applied Mathematics Elective* | 3 |
| Social Sciences Elective (300+) | 3 |
| Free Elective | 3 |
| Total Hours | 15 |

| Semester 8 | Credits |
|-------------------------------|-----------|
| IPro Elective II | 3 |
| Applied Mathematics Elective* | 3 |
| Applied Mathematics Elective* | 3 |
| Humanities Elective (300+) | 3 |
| Free Elective | 3 |
| Total Hours | 15 |

Total Credit Hours **128**

* Applied mathematics electives are to be chosen after consultation with an academic advisor. Student goals, interests, and course availability should be determining factors in this selection process. The optional specializations on pages 29–31 may also serve as a guide to applied mathematics elective selection.

Applied Mathematics Specializations

In addition to the general B.S. degree in Applied Mathematics, the department offers six special five-course sequences that may be used as a guide for the selection of mathematics electives and will prepare the student for a career in:

- business/finance,
- education,
- industrial research, or
- graduate school.

Choosing any of the following specializations is optional.

Specialization in Mathematical Finance

Program advisor: T. Bielecki

Students who choose this specialization may qualify for admission to the Master of Mathematical Finance program – a collaborative program between the Stuart School of Business and the Applied Mathematics department. The objective of the MMF program is to provide individuals interested in pursuing careers in the finance industry with advanced education in theoretical, computation, and business aspects of relevant quantitative methodologies.

A **Business or Entrepreneurship minor** is required (see pages 162–165).

Students must take:

MATH 475 Probability
 MATH 476 Statistics
 MATH 478 Numerical Methods for Differential Equations
 MATH 481 Introduction to Stochastic Processes
 MATH 485 Introduction to Mathematical Finance

MATH 475 is required for all applied mathematics majors. The other four courses count toward MATH electives.

Closely related courses which are recommended as additional electives include:

MATH 461 Fourier Series and Boundary Value Problems
 MATH 477 Numerical Linear Algebra
 MATH 483 Design and Analysis of Experiments
 MATH 486 Mathematical Modeling
 MATH 489 Partial Differential Equations

Specialization in Math Education

Program Advisor: G. Fasshauer

Completion of the following 24-credit-hour **Mathematics and Science Education minor** will prepare students for the Illinois State Certification in Secondary Mathematics (grades 6-12) and Secondary Science: Biology, Chemistry, Physics (grades 6-12).

MSED 200 Analysis of Classrooms
 MSED 250 Middle and Secondary Curriculum/Foundations
 MSED 300 Instructional Methods/Strategies I
 MSED 320 Inquiry and Problem Solving in Mathematics and Science
 MSED 350 Informal Education Practicum and Seminar
 MSED 400 Instructional Methods/Strategies II
 MSED 450 Professional Internship

Students must take five of the following courses:

MATH 300 Perspectives in Analysis
 MATH 410 Number Theory
 MATH 420 Geometry
 MATH 430 Applied Algebra
 MATH 453 Combinatorics
 MATH 454 Graph Theory
 MATH 475 Probability
 MATH 476 Statistics
 MATH 486 Mathematical Modeling

MATH 430 or 454, and 475 are required for all applied mathematics majors. The other courses count toward MATH electives.

Specialization in Applied Analysis

Program advisor: J. Duan

Applied analysis is one of the foundations for interdisciplinary applied mathematics. The principles of analysis are applied to such areas as partial differential equations, dynamical systems, and numerical analysis. The basic framework, concepts, and techniques of modern mathematical analysis are essential for modeling, analysis, and simulation of complicated phenomena in engineering and science.

Students must take:

MATH 400 Real Analysis

MATH 402 Complex Analysis

MATH 461 Fourier Series and Boundary Value Problems

MATH 488 Ordinary Differential Equations and Dynamical Systems

MATH 489 Partial Differential Equations

MATH 400 and 402 are required for all applied mathematics majors. The other three courses count toward MATH electives.

Closely related courses which are recommended as additional electives include:

MATH 405 Iteration and Chaos

MATH 478 Numerical Methods for Differential Equations

MATH 486 Mathematical Modeling

Recommended minors include: Physics or an engineering minor.

Specialization in Computational Mathematics

Program Advisor: X. Li

The use of computation/simulation as a third alternative to theory and experimentation is now common practice in many branches of science and engineering. Many scientific problems that were previously inaccessible have seen tremendous progress from the use of computation (e.g., many-body simulations in physics and chemistry, simulation of semi-conductors, etc.). Researchers and scientists in these areas must have a sound training in the fundamentals of computational mathematics and become proficient in the use and development of new algorithms and analytical techniques as they apply to modern computational environments.

Students must take:

MATH 350 Introduction to Computational Mathematics

MATH 435 Linear Optimization

OR

MATH 461 Fourier Series and Boundary Value Problems

MATH 476 Statistics

MATH 477 Numerical Linear Algebra

MATH 478 Numerical Methods for Differential Equations

MATH 350 is required for all applied mathematics majors. The other four courses count toward MATH electives.

Closely related courses which are recommended as additional electives include:

MATH 405 Iteration and Chaos

MATH 435 Linear Optimization*

MATH 461 Fourier Series and Boundary Value Problems*

MATH 484 Regression and Forecasting

MATH 486 Mathematical Modeling

MATH 488 Ordinary Differential Equations and Dynamical Systems

MATH 489 Partial Differential Equations

*Only if not already counted as a required course.

Recommended minors include: Artificial Intelligence, Computational Structures, or Software Engineering.

Specialization in Discrete Applied Mathematics

Program Advisor: M. Pelsmajer

Discrete applied mathematics is a fairly young branch of mathematics and is concerned with using combinatorics, graph theory, optimization, and portions of theoretical computer science to attack problems in engineering as well as the hard and soft sciences.

Students must take:

MATH 332 Elementary Linear Algebra

MATH 430 Applied Algebra

MATH 435 Linear Optimization

MATH 453 Combinatorics

MATH 454 Graph Theory

MATH 332 and MATH 430 or 454 are required for all applied mathematics majors. The other three courses count toward MATH electives.

Closely related courses which are recommended as additional electives include:

MATH 405 Iteration and Chaos

MATH 410 Number Theory

MATH 431 Applied Algebra II

Recommended minors include: Artificial Intelligence, Computational Structures, or Computer Networking.

Specialization in Stochastics

Program Advisor: I. Cialenco

Stochastics at IIT includes traditional statistics (the methods of data analysis and inference) and probability (the modeling of uncertainty and randomness). However, also included are other areas where stochastic methods have been becoming more important in recent years such as stochastic processes, stochastic integration, stochastic dynamics, stochastic partial differential equations, probabilistic methods for analysis, mathematical finance, discrete mathematics, and computational methods for stochastic systems.

Students must take:

MATH 475 Probability

MATH 476 Statistics

MATH 481 Introduction to Stochastic Process

MATH 485 Introduction to Mathematical Finance

MATH 488 Ordinary Differential Equations and Dynamical Systems

MATH 475 is required for all applied mathematics majors. The other four courses count toward MATH electives.

Closely related courses which are recommended as additional electives include:

MATH 453 Combinatorics

MATH 483 Design and Analysis of Experiments

MATH 484 Regression and Forecasting

MATH 486 Mathematical Modeling

Applied Mathematics Dual Degree Program

Dual Bachelor of Science (B.S.)/Master of Science (M.S.) in Applied Mathematics

A typical Master of Science (M.S.) degree requires two years after completion of the Bachelor of Science (B.S.) degree. This dual degree program can potentially reduce the time to complete an M.S. degree by up to at least a year for select students with sufficient AP or transfer credits. The program requires that students complete the credit-hour requirements for both degrees. However, by taking advantage of credits already earned when entering IIT, a student can - instead of graduating from IIT in less than four years with only a B.S. degree - stay at IIT for four-and-a-half to five years and take graduate-level courses that will be counted toward earning a graduate degree. The core and course requirements for each of the degrees are not affected by this dual degree option.

Some advantages of the combined degree program are:

- Provide talented students an opportunity to obtain both a B.S. and an M.S. degree within five years, cutting the length of an M.S. degree by up to at least one year.
- Offer students a chance to link advanced undergraduate coursework with graduate coursework.
- Provide students with research opportunities during their early years of study.
- Prepare academically strong students for a Ph.D. program in Applied Mathematics or Mathematics at an elite graduate school.
- Offer an enhanced academic environment with accelerated learning.
- Simplify the graduate admissions procedure.

Admission and Continuation

Students satisfying the following requirements are eligible to apply to the dual B.S./M.S. program:

- The student must have completed four semesters of full-time study in the B.S. program, or have accumulated at least 80 credit hours toward the degree (including transfer credits).
- The student must have an overall GPA of 3.25 or better.
- The student must have an applied mathematics major GPA of 3.50 or better.

Applications must be accompanied by an official transcript and three letters of recommendation. At least two letters of recommendation must come from applied mathematics

faculty members. These two letters shall attest to readiness and probable success in completing the graduate program. GRE scores are not required for this dual degree program. Applications are reviewed and processed by the graduate director of the department.

A student must maintain a graduate GPA of 3.00 or better in order to continue the combined program. A student in the program may choose to obtain a B.S. degree only and not complete the requirements of the M.S. degree. In that case, the credit hours in graduate-level math courses will be counted toward the B.S. degree requirements as applied mathematics electives or as free electives.

Financial Assistance

Students may be offered research assistantships at any time during the program. Students in the program will be eligible for all scholarships and financial aid packages for undergraduates, as long as they have not completed their B.S. degree. They are eligible for dean's fellowships when they have obtained the equivalent credit requirement for a B.S. degree and still have at least 18 credit hours to complete

the combined degree program. They can also apply for financial loans for graduate students once they obtain the B.S. degree. Furthermore, students in the program can apply for external funding. For example, they can apply for an NSF graduate fellowship in their fourth year, and fifth year in the five-year program.

B.S./M.S. Dual Degree in Applied Mathematics Program

For the four-and-half-year program, it is assumed that the student has completed 17 semester hours of AP credit. In order to be specific, for the provided sample program on page 34 it is also assumed that these AP credits correspond to MATH 151, MATH 152, PHYS 123, and a three-credit-hour science elective course.

For the five-year program, it is assumed that the student has completed eight semester hours of AP credit. In order to be specific, for the provided sample program on page 35 it is also assumed that these AP credits correspond to MATH 151 and a three-credit hour science elective course.

Students may finish earlier by taking courses in summer terms. For the five-year program, a summer term is included in the sample curriculum. Students may also participate in the research projects being carried out in the

department, possibly MATH 491 (undergraduate independent study), and continuing with MATH 591 (M.S. thesis).

There are a few dual-delivery courses in the Applied Mathematics department, such as MATH 477/577, MATH 478/578, etc. Students in the program are not allowed to take these dual-delivery courses at both the 400-level and 500-level.

For the graduate degree, students must take at least two sequences out of four core areas, which are Applied Analysis (MATH 500/501), Discrete Applied Mathematics (MATH 553/554), Computational Mathematics (MATH 577/578), and Stochastics (MATH 540 and (543 or 544 or 545)).

B.S./M.S. Dual Degree in Applied Mathematics Program ($4\frac{1}{2}$ Years)

This sample program assumes the student receives Advanced Placement (AP) credit for MATH 151, MATH 152, PHYS 123, and a three-hour science elective for a total of 17 credit hours.

| Semester 1 | Credits | Semester 2 | Credits |
|---|------------|---|-----------|
| MATH 100 Introduction to the Profession | 3 | MATH 230 Introduction to Discrete Mathematics | 3 |
| MATH 251 Multivariate and Vector Calculus | 4 | MATH 350 Intro to Computational Mathematics | 3 |
| MATH 252 Introduction to Differential Equations | 4 | CS 116 Object-Oriented Programming II | 2 |
| CS 115 Object-Oriented Programming I | 2 | Minor Elective | 3 |
| Humanities 100-level Elective | 3 | Science Elective | 4 |
| or Social Sciences Elective | 3 | Social Sciences Elective | 3 |
| Total Hours | 19† | Total Hours | 18 |

| Semester 3 | Credits | Semester 4 | Credits |
|--|-----------|-------------------------------|-----------|
| MATH 332 Elementary Linear Algebra | 3 | MATH 402 Complex Analysis | 3 |
| MATH 400 Real Analysis | 3 | Applied Mathematics Elective* | 3 |
| MATH 475 Probability | 3 | Applied Mathematics Elective* | 3 |
| Minor Elective | 3 | Minor Elective | 3 |
| Science Elective | 3 | Humanities (300+) | 3 |
| Humanities or Social Sciences Elective | 3 | IPRO Elective I | 3 |
| Total Hours | 18 | Total Hours | 18 |

| Semester 5 | Credits | Semester 6 | Credits |
|---------------------------------|-----------|-------------------------------------|-----------|
| Core Sequence I–A** | 3 | Core Sequence I–B** | 3 |
| MATH 430 Applied Algebra | 3 | Applied Mathematics Elective* | 3 |
| OR | | Applied Mathematics Elective (500+) | 3 |
| MATH 454 Graph Theory | 3 | Minor Elective | 3 |
| Applied Mathematics Elective* | 3 | Free Elective | 3 |
| Minor Elective | 3 | IPRO Elective II | 3 |
| Social Sciences Elective (300+) | 3 | Total Hours | 18 |
| Total Hours | 15 | | |

| Semester 7 | Credits | Semester 8 | Credits |
|-------------------------------------|-----------|-------------------------------------|-----------|
| Core Sequence II–A** | 3 | Core Sequence II–B** | 3 |
| Applied Mathematics Elective* | 3 | Applied Mathematics Elective (500+) | 3 |
| Applied Mathematics Elective* | 3 | Applied Mathematics Elective (500+) | 3 |
| Applied Mathematics Elective (500+) | 3 | Humanities Elective (300+) | 3 |
| Free Elective | 3 | Free Elective | 3 |
| Total Hours | 15 | Total Hours | 15 |

| Semester 9 | Credits |
|--------------------|-----------|
| Graduate Course | 3 |
| Graduate Course | 3 |
| MATH 591 MS Thesis | 3 |
| Total Hours | 12 |

Total Credit Hours **162**

* Applied mathematics electives are to be chosen after consultation with an academic advisor. Student goals, interests, and course availability should be determining factors in this selection process.

** Students must complete two of the following core sequences: Applied Analysis (MATH 500/501), Discrete Applied Mathematics (MATH 553/554), Computational Mathematics (MATH 577/578), and Stochastics (MATH 540 and (543 or 544 or 545)).

† Students must have approval from the dean of the College of Science and Letters to take more than 18 credit hours in a semester.

B.S./M.S. Dual Degree in Applied Mathematics Program (5 Years)

This sample program assumes the student receives Advanced Placement (AP) credit for MATH 151 and a three-hour science elective for a total of eight credit hours.

| Semester 1 | Credits | Semester 2 | Credits |
|---|------------|---|-----------|
| MATH 100 Introduction to the Profession | 3 | MATH 230 Introduction to Discrete Mathematics | 3 |
| MATH 152 Calculus II | 5 | MATH 251 Multivariate and Vector Calculus | 4 |
| CS 115 Object-Oriented Programming I | 2 | CS 116 Object-Oriented Programming II | 2 |
| Humanities 100-level Elective | 3 | PHYS 123 General Physics I | 4 |
| Social Sciences Elective | 3 | Social Sciences Elective | 3 |
| Science Elective | 3 | Total Hours | 16 |
| Total Hours | 19† | | |
| Summer | Credits | | |
| MATH 252 Introduction to Differential Equations | 4 | | |
| Total Hours | 4 | | |
| Semester 3 | Credits | Semester 4 | Credits |
| MATH 332 Elementary Linear Algebra | 3 | MATH 350 Intro to Computational Mathematics | 3 |
| MATH 430 Applied Algebra | 3 | MATH 402 Complex Analysis | 3 |
| OR | 3 | Applied Mathematics Elective* | 3 |
| MATH 454 Graph Theory | 3 | Minor Elective | 3 |
| Applied Mathematics Elective* | 3 | Humanities or Social Sciences Elective | 3 |
| Minor Elective | 3 | Humanities Elective (300+) | 3 |
| Science Elective | 4 | Total Hours | 18 |
| Total Hours | 16 | | |
| Semester 5 | Credits | Semester 6 | Credits |
| MATH 400 Real Analysis | 3 | Applied Mathematics Elective* | 3 |
| MATH 475 Probability | 3 | Applied Mathematics Elective* | 3 |
| Applied Mathematics Elective* | 3 | Applied Mathematics Elective (500+) | 3 |
| Minor Elective | 3 | Minor Elective | 3 |
| Social Sciences Elective (300+) | 3 | Free Elective | 3 |
| Total Hours | 15 | IPRO Elective I | 3 |
| | | Total Hours | 18 |
| Semester 7 | Credits | Semester 8 | Credits |
| Core Sequence I–A** | 3 | Core Sequence I–B** | 3 |
| Core Sequence II–A** | 3 | Core Sequence II–B** | 3 |
| Applied Mathematics Elective* | 3 | Humanities (300+) | 3 |
| Minor Elective | 3 | Free Elective | 3 |
| Free Elective | 3 | IPRO Elective II | 3 |
| Total Hours | 15 | Total Hours | 15 |
| Semester 9 | Credits | Semester 10 | Credits |
| Graduate Course | 3 | Graduate Course | 3 |
| Graduate Course | 3 | Graduate Course | 3 |
| Graduate Course | 3 | MATH 591 MS Thesis | 3 |
| Total Hours | 9 | Total Hours | 9 |
| Total Credit Hours | 162 | | |

* Applied mathematics electives are to be chosen after consultation with an academic advisor. Student goals, interests, and course availability should be determining factors in this selection process.

** Students must complete two of the following core sequences: Applied Analysis (MATH 500/501), Discrete Applied Mathematics (MATH 553/554), Computational Mathematics (MATH 577/578), and Stochastics (MATH 540 and (543 or 544 or 545)).

† Students must have approval from the dean of the College of Science and Letters to take more than 18 credit hours in a semester.

College of Architecture

College Website: www.iit.edu/arch

S.R. Crown Hall
3360 S. State St.
Chicago, IL 60616
312.567.3230

Incoming Dean

John H. and Jeanne M. Rowe Chair
Wiel Arets

Associate Dean

Robert Krawczyk

Assistant Dean

R. Stephen Sennott

Through its deep commitment to a rigorous architectural education and its historic contributions to the legacy of modernism, the IIT College of Architecture enjoys an unparalleled international reputation. The College is one of the largest and most international architecture schools in the United States, with over 800 students from fifty countries and more than 100 faculty members. With a pedagogy based in the synthesis of practice and research, IIT offers the professional, five-year Bachelor of Architecture (B.Arch.). Accredited by the National Architectural Accrediting Board (NAAB), this well-established degree program prepares architects to apply communication, analytical, and professional skills to provide inventive solutions to a broad range of design problems.

Drawing strength from a lineage that reaches back to the Bauhaus, the faculty and curriculum of the College are committed to the material culture of the built environment, to a sophisticated integration of technology and design, and to a deep engagement with professional practice. Through education, research, and practice, the College extends this lineage by its work on a full range of contemporary issues, including sustainability, global urbanization, material and structural advances, design-build integration, digital modeling and fabrication, and design theory and criticism. The students, faculty, and alumni foster an academic environment that is intellectually stimulating, professionally challenging, committed to innovation, and international in scope.

The objectives of the B.Arch. program prepare architects to respond to increasingly complex global conditions, within cities and beyond. Informed by humanist ideals, our graduates combine technical expertise and environmental awareness to design and execute individual buildings and sensitively planned landscapes at any scale, in any material. Consisting of tenured faculty and practicing architects, our teachers are committed to training and educating a diverse student body for a broad range of professional career opportunities in architecture, related design professions, and the construction industry. The curriculum emphasizes digital applications (including Building Information Management), advanced technologies, design and theory, landscape architecture and its relationship to architecture, development and design/build, sustainability and planning, and history/theory/criticism.

Integrating advanced digital technology and design studio training, our program prepares our graduates to:

- Design functional, compelling buildings to meet the needs of a complex, changing world.
- Work collaboratively with allied professionals (engineering, landscape architecture, construction management, planning) to produce quality built environments.
- Take leadership roles throughout their lives to support design excellence, develop technical expertise, advance professional practice, practice ethical integrity, and promote respect for the architect in contemporary society.
- Consider all aspects of the built environment to insure a sustainable and planned integration of architecture with the natural environment and its resources.

To understand architecture in its global context, IIT students are encouraged to travel outside the United States to study modern and historic buildings. Students in their fourth year of B.Arch. studies may pursue several study abroad opportunities. In fall and spring, the College offers a semester of studio and architecture electives in Paris. Student financial aid remains intact for this IIT program. Students admitted to the Paris Program combine their Paris studio and courses with travel throughout Europe as they complete projects derived from contemporary urban landscapes. Students may apply to study abroad programs offered in architecture programs at other universities throughout the world. The College is expanding relations to partner schools of architecture throughout the world. Each semester, a few advanced studios have been situated for a month in Asia and South America. Students should discuss study abroad options with their academic advisors, assistant dean, the College's director of international affairs, and the International Center.

IIT's campus is a unique exemplar of the modernist design solutions pioneered by Ludwig Mies van der Rohe and his colleagues, solutions that transformed the urban spaces and skylines of the world. The College of Architecture continues to be housed in three Mies buildings, including S.R. Crown Hall, his masterpiece and one of the most significant buildings of the 20th century, and the Minerals and Metals Building, which has recently been converted into a fully-equipped 10,000-square-foot fabrication shop for students and faculty. IIT's long history of excellence in architecture continues today. Two noteworthy buildings opened in 2003: the McCormick Tribune Campus Center designed by Pritzker Prize-winning architect Rem Koolhaas and the State Street Village residences by Helmut Jahn. As one of the world's greatest cities for the study of architecture, landscape, and architectural engineering, Chicago and its active profession reinforce the College's educational mission. Our teachers are both practitioners and educators.

With a demonstrated legacy of excellence, the IIT College of Architecture seeks to become a force for designing built environments of high quality through the incorporation of planning, technology, materials, space, and formal gener-

ation. The responsible integration of these attributes is promoted to accentuate the historical, social, cultural, and environmental imperatives requisite to better society.

Faculty

Professors

W. Arets (Incoming), D. Denison, M. Elnimeiri, R. Krawczyk, P. Land, H. Mallgrave, D. Robertson, J. Ronan

Associate Professors

F. Flury, E. Kultermann, G. Schipporeit, A. Takeuchi, C. Wetzel

Assistant Professors

M. Brown, S. Keller, P. Osler, C. Rockey

Studio Professor

R. Krueck

Studio Associate Professors

T. Brock, T. Brown, S. Conger-Austin, J. Desalvo, P. Endres, M. Felsen, T. Kearns, S. Kibler, T. McLeish, J. Miller, K. Nagle, R. Nelson, A. Peluso, P. Pettigrew, B. Riley, A. Schachman, A. Wood

Studio Assistant Professors

C. Humer, L. Johnson, M. Mattson, A. Tinucci

Faculty Emeritus

D. Sharpe, S. Utsunomiya

Mies van der Rohe Visiting Professor

Werner Sobek

Morgenstern Visiting Critics

Murcutt (2004), deVries (2005), Chipperfield (2006), Herreros (2007), Park (2008), Endres (2009), Fujimoto (2011), Bruder (2012), James (2012)

Adjunct Professors

R. Babbin, J. Baird, S. Brubaker, R. Clark, B. Geiger, T. Guen, T. Hoepf, C. Liakakos, J. Lupinos, A. Mazurek, A. Metter, T. Oslund, D. Peterson, F. Phillips, C. Ross Barney, T. Roszak, R. Smietana, T. Surjan, E. Uhler, R. Wimer, J. Womak, D. Woodhouse

Adjunct Associate Professors

S. Anand, R. Blender, J. Brooke, J. Clair, J. Danly, M. Glynn, C. Goldsmith, A. Greven, G. Grzeslo, M. Herman, M. Klaeschen, J. Krehbiel Pieracci, J. Kriegshauser, G. Lehman, J. Manaves, A. Paradiso, K. Puller, T. Schmidt, S. Sennott, K. Sierralta, A. Weir, A. Williams, B. Williams, A. Yurko

Adjunct Assistant Professors

A. Attali, M. Chadha, R. Cooley, W. Emmick, C. Forneris, G. Gibson, D. Greenberg, J. Hogue, J. Issa, K. Jones, J. Klymson, L. Kowalczyk, C. Kujawa, D. Larkin, D. LeFevre, H. Shojaie, L. Sorrell

Part-time Faculty

B. Balogh, P. Blanding, C. Carlyle, R. Cedro, A. Clark, I. Giles, J. Hall, L. Leong, K. Lutsky, B. Lynch, K. Mills, R. McNulty, M. McKinney, M. Mitchell, P. Natke, B. Norsman, C. Parente, J. Park, C. Yetken

Professional Degrees

The undergraduate professional degree program at IIT has always been a comprehensive five-year accredited Bachelor of Architecture (B.Arch) degree. The curriculum provides the fundamental body of knowledge required by the profession within a coordinated three-year foundation studio sequence. Each of the three years is team taught to horizontally integrate all courses within each year and vertically sequence learning experiences. This professional background prepares students for the last two years of advanced design studios focused on spatial awareness, comprehensive building design, and the design of large building complexes.

IIT has also taken a leadership role in addressing the

responsibilities of professional education for the 21st century's global workplace. While technical proficiency will always be necessary, IIT recognizes that colleges must also educate students to work as part of teams, to communicate well, and to understand the economic, social, ethical, environmental, and international context of their profession. Faculty broaden the upper-level studios to resemble real-world interdisciplinary projects. This emphasis on holistic learning, when combined with a new global vision and advanced computer and communication technology, positions IIT and the College of Architecture on the leading edge of architectural education.

Accreditation

In the United States, most state registration boards require a degree from an accredited professional degree program as a prerequisite for licensure. The National Architectural Accrediting Board (NAAB), which is the sole agency authorized to accredit U.S. professional degree programs in architecture, recognizes three types of degrees: the Bachelor of Architecture, the Master of Architecture, and the Doctor of Architecture. A program may be granted a six-year, three-year, or two-year term of accreditation, depending on the extent of its conformance with established educational standards.

The College of Architecture has two NAAB accredited degrees: the Bachelor of Architecture and the Master of Architecture professional degree programs. Both hold six-year terms of accreditation with the NAAB.

The four-year pre-professional degree, where offered, is not accredited by NAAB. The pre-professional degree is useful to those wishing a foundation in the field of architecture as preparation for either continued education in a professional degree program or for employment options in fields related to architecture. (The College does not offer this four-year pre-professional degree.)

Bachelor of Architecture

| Required Courses | Credit Hours |
|--|--------------|
| Architecture Requirements ARCH 100, 109, 110, 113, 114, 125, 201, 202, 226, 305, 306, 403, 404, 413, 417, 418, 419, 420, 423 | 84 |
| Building Science and Structural Requirements ARCH 230, 334, 335 | 9 |
| Art and Architectural History Requirements AAH 119, 120, ARCH 321 | 9 |
| Architectural History Elective | 3 |
| Architecture and Urbanism Requirements AURB 201, 465 | 6 |
| Mathematics Requirements MATH 119, 122 | 6 |
| Physics Requirement PHYS 200 | 4 |
| Humanities and Social Sciences Requirements For general education requirements, see page 25. | 21 |
| Interprofessional Projects (2) | 6 |
| Architecture Electives (7) | 21 |
| Total Hours | 169 |

Architecture Curriculum

| Semester 1 | Credits |
|---------------------------------------|-----------|
| ARCH 113 Architecture Studio I | 6 |
| ARCH 100 Introduction to Architecture | 3 |
| ARCH 109 Freehand Drawing I | 2 |
| MATH 119 Geometry for Architects | 3 |
| Humanities 100-level Elective | 3 |
| Total Hours | 17 |

| Semester 2 | Credits |
|--|-----------|
| ARCH 114 Architecture Studio II | 6 |
| ARCH 110 Freehand Drawing II | 2 |
| MATH 122 Introduction to Mathematics II | 3 |
| ARCH 125 Introduction to Architectural Computing | 3 |
| Humanities or Social Sciences Elective | 3 |
| Total Hours | 17 |

| Semester 3 | Credits |
|---|-----------|
| ARCH 201 Architecture Studio III | 5 |
| AAH 119 History of World Architecture I | 3 |
| ARCH 226 Architectural Computing | 3 |
| PHYS 200 Basic Physics for Architects | 4 |
| Total Hours | 15 |

| Semester 4 | Credits |
|--|-----------|
| ARCH 202 Architecture Studio IV | 6 |
| ARCH 230 Architecture and Structure | 3 |
| AAH 120 History of World Architecture II | 3 |
| AURB 201 Elements of Urbanism | 3 |
| Social Sciences Elective | 3 |
| Total Hours | 18 |

| Semester 5 | Credits |
|--|-----------|
| ARCH 305 Architecture Studio V | 6 |
| ARCH 403 Building Systems for Architects I | 3 |
| ARCH 423 Architectural Programming | 3 |
| ARCH 334 Frame Structural System and Steel | 3 |
| ARCH 321 History of Modern Thought | 3 |
| Total Hours | 18 |

| Semester 6 | Credits |
|--|-----------|
| ARCH 306 Architecture Studio VI | 6 |
| ARCH 404 Building Systems for Architects II | 3 |
| ARCH 335 Reinforced Concrete/Continuous Struct | 3 |
| AURB 465 Principles of Urbanism | 3 |
| Architecture Elective | 3 |
| Total Hours | 18 |

| Semester 7 | Credits |
|----------------------------------|-----------|
| ARCH 417 Architecture Studio VII | 6 |
| Architecture Elective | 3 |
| Architecture Elective | 3 |
| History of Architecture Elective | 3 |
| Social Sciences Elective | 3 |
| Total Hours | 18 |

| Semester 8 | Credits |
|-----------------------------------|-----------|
| ARCH 418 Architecture Studio VIII | 6 |
| IPRO Elective I | 3 |
| Architecture Elective | 3 |
| Humanities Elective (300+) | 3 |
| Total Hours | 15 |

| Semester 9 | Credits |
|---------------------------------|-----------|
| ARCH 419 Architecture Studio IX | 6 |
| IPRO Elective II | 3 |
| Architecture Elective | 3 |
| Architecture Elective | 3 |
| Social Sciences Elective (300+) | 3 |
| Total Hours | 18 |

| Semester 10 | Credits |
|---------------------------------|-----------|
| ARCH 420 Architecture Studio X | 6 |
| ARCH 413 Architectural Practice | 3 |
| Architecture Elective | 3 |
| Humanities Elective (300+) | 3 |
| Total Hours | 15 |

Total Credit Hours 169

Academic Standards

The Bachelor of Architecture is a professional degree, accredited by NAAB. The IIT curriculum must comply with the NAAB's Conditions for Accreditation, which define minimum standards of knowledge in professional education. The College alone is responsible for maintaining professional standards, high academic quality, and the purposeful integration and sequencing of general education and prerequisite courses to meet the NAAB's criteria for student performance. These criteria encompass two levels of accomplishment: understanding and ability. In meeting these criteria, the College prepares students for the profession and its practice. Students are expected to monitor their degree progress and work closely with their academic advisor to insure they are complying with academic requirements while meeting College and university standards.

With the Office of Undergraduate Academic Affairs, the College routinely evaluates degree progress and academic standards for all architecture students. When student performance repeatedly falls below College and university academic standards, students may be placed on academic probation or dismissed. The studio sequence is the core of the curriculum. Students may continue their studio enrollment only when all prerequisite courses are satisfactorily completed.

To maintain academic and professional standards, the College may restrict or postpone a student's studio enrollment under any of the following conditions: failure of any prerequisite studio, unmet prerequisite courses (general education or support courses), university academic probation, or if a student's studio GPA falls below 2.25. Students and their advisors are notified each semester if these conditions arise.

Transfer Students

Transfer students admitted to the College of Architecture are expected to complete the equivalent of at least three years of IIT's five-year B.Arch. degree. Depending on their previous studio and architecture courses, they will begin their studio sequence at IIT in one of the foundation studios—years one, two, or three. Transfer credit is awarded based upon an evaluation of general education and architecture courses by the Office of Undergraduate Academic Affairs. Transfer credit for architecture courses is determined by an individual portfolio review conducted by Col-

lege faculty. Portfolios must include examples of student work, official course descriptions, a course syllabus, and supporting documents. Studio placement will depend not only on previous studio work, but also upon the completion of all prerequisite courses in related subjects such as math, physics, structures, and digital design. The last six studios must be taken at IIT. Students attending a four-year university who have completed three years of coursework are discouraged from applying to IIT as a B.Arch. transfer student.

Visiting Students

Non-degree visiting students who wish to transfer to IIT and complete a B.Arch. degree must re-apply for admission as a transfer student. Upon admission, they will follow the same requirements for studio placement and transfer

credit as all transfer students. Visiting students seeking one semester of study are encouraged to apply for the fall semester only.

Specializations in Architecture

The global practice of architecture invites students to develop an extensive background in related areas of expertise. Within the required curriculum, students may select from studios and architecture electives to satisfy an area of specialization. Working with their academic advisors, students are encouraged to identify a specialization in their second or third year of study in order to plan the appropriate sequence of courses. Credit requirements (15 credit hours)

for each specialization are met by a combination of required core courses, advanced studios, and architecture electives. Prior approval for electives is required. In addition to the established specializations, a student may also propose a self-directed specialization in a relevant architectural subject. With the equivalent of 15 credits, a self-directed specialization must be approved by the student's advisor and the College.

Architectural History and Theory

In addition to the required elective in the history of architecture, students must take:

AAH 119 History of World Architecture I
AAH 120 History of World Architecture II
ARCH 321 Contemporary Architecture

Students must also select three elective history of architecture courses (AAH, ARCH, or LA) approved by the advisor.

Architecture and Urbanism

This specialization is under review. See your academic advisor or the assistant dean of the College.

Design Build

This specialization is under review. See your academic advisor or the assistant dean of the College.

Digital Design

ARCH 125 Introduction to Architectural Computing
ARCH 226 Architectural Computing
ARCH 427 Advanced Architectural Computing

Students must also select three elective digital courses approved by the advisor.

Landscape Architecture

This specialization requires 15 credit hours. Students must take one landscape architecture studio (ARCH 417, ARCH 418, ARCH 419, or ARCH 420).

Students must also take nine credit hours from the following: LA 501, LA 502, LA 565, LA 566, ARCH 443, ARCH 445, or an approved ARCH 497 course which must have a landscape architecture focus.

Minors and Architecture Electives

College of Architecture students may pursue a minor in another department; however, the requirements for a minor must be met in addition to the curricular requirements for the Bachelor of Architecture degree. Requirements for architecture electives are most often met by courses offered in the College of Architecture. When deemed appropriate by an advisor or a dean, and in consultation with the Of-

fice of Undergraduate Academic Affairs, a select number of courses from other departments may serve as an architecture elective. These have included ID courses in architectural photography or selected CAE courses related to construction management or civil and architectural engineering. Students should consult with their academic advisor early in their program of study.

Change of Major to Architecture (B.Arch.)

Students admitted to IIT in another major are asked to petition the College of Architecture for admission to the professional degree program. In addition to the Change of Major Form, students are required to submit a personal statement and meet with designated College of Architec-

ture staff to initiate their application and discuss the requirements of the five-year degree. Students must have a minimum cumulative GPA of 3.00 at IIT for consideration. Admission is for the fall semester only due to the studio sequence.

Optional Programs

Bachelor of Architecture (B.Arch.)/Master of Business Administration (M.B.A.)

Architects recognize the importance of business skills in their profession. Recognizing the 21st century's concerns with environmental management and sustainable design issues, IIT offers young architects a unique opportunity for advanced graduate study in the Stuart School of Business.

IIT students completing the requirements for the B.Arch. degree may also earn the M.B.A. degree by completing an approved set of courses established by their academic advisors and appropriate deans in the College of Architecture and the Stuart School of Business. Thus, qualified architecture students may earn their B.Arch. and the M.B.A. in approximately six-and-a-half years, rather than the usual seven years. When including a summer term, the M.B.A. will typically require one-and-a-half more years of study.

Students considering the B.Arch./M.B.A. dual-degree program should consult with undergraduate advisors in both

programs early in their academic career.

Students will be required to apply for admission to the graduate M.B.A. program, providing Graduate Management Admission Test (GMAT) scores and all other necessary application materials. Professional experience in the business world is not required for consideration, allowing B.Arch. students to pursue their M.B.A. degree without interruption. Formal application should be completed prior to the end of the seventh semester of the B.Arch. program. Upon admission, B.Arch. students could successfully complete up to four M.B.A. courses, or 12 credits, before joining the program on a full-time basis. These courses are typically basic core courses for which there are no prerequisites. The Stuart School M.B.A. advisors would be able to identify these courses and offer appropriate advice to the B.Arch students upon their admission to the program.

Bachelor of Architecture/Master of Civil Engineering Double-Degree Option

Qualified students enrolled at IIT may earn both the Bachelor of Architecture and the Master of Civil Engineering (M.C.E.) degrees. They must complete preparatory courses for the M.C.E. prior to entry into the combined program. Students who anticipate entry into the combined program and who intend to specialize in structural engineering must successfully complete the following courses as part of their undergraduate program in architecture:

MATH 151, MATH 152, MATH 251, PHYS 123, MMAE 200, MMAE 202, CAE 303, CAE 304, CAE 307, CAE 310, CAE 431, and CAE 432.

Students who anticipate entering into the program should seek advising in the Department of Civil and Architectural Engineering and the College of Architecture early in their studies at IIT.

Study Abroad

Architects practice in all parts of the world. Study abroad has a long and important history in the training of architects. The importance of foreign study to architectural education is unassailable. The College's desire is to make this essential experience central to each of our students' education. To prepare IIT students for this global exchange, the College of Architecture encourages study abroad and international studies so that our students may examine architecture in a new physical and cultural setting.

The College supports several ways for students to study abroad for a single semester, a summer semester, or an entire academic year. Architecture students may enroll in the College's one-semester Paris Program (fall or spring) or summer study abroad courses, participate in an advanced

studio situated in an international city, or enroll in another university's study abroad program. Each global opportunity combine studio-based design work with travel, site visits, and collaborative design with local architects and students.

The College offers numerous summer study abroad courses, open to all College of Architecture students in any year of study.

To join study abroad programs at other universities in the United States or other countries, students work with their academic advisor and IIT's International Center staff for admission and pre-approval of courses in architecture and other subjects, including foreign languages.

Biological and Chemical Sciences

Department Website: www.iit.edu/csl/bcs

Life Sciences Building
3101 S. Dearborn St.
Chicago, IL 60616
312.567.3480

Acting Chair

Grant Bunker

Executive Associate Chair – Biology

Thomas Irving

Executive Associate Chair – Chemistry

Ishaque Khan

Associate Chair – Biology

Tanya Bekyarova

Associate Chair – Chemistry

Maria Tanner

In an ever more technological world, a substantive understanding of the sciences is a requirement for many professions, including careers in science, education, the health professions and, increasingly, areas such as law and business. In the latter cases, a technical background can serve as a unique and sought-after qualification.

The Department of Biological and Chemical Sciences offers traditional Bachelor of Science (B.S.) degrees in each area of Biology and Chemistry as well as interdisciplinary B.S. degrees in Biochemistry, and Molecular Biochemistry and Biophysics (M.B.B.). All programs serve as a solid foundation for entry into graduate and medical schools and for jobs in both the government and the private sector. They are also designed to fulfill the requirements for our special medical and optometry degree programs.

The department also provides specialized B.S. degree programs that integrate the sciences with law, business, and secondary education. These include programs which offer joint admission to IIT Chicago-Kent College of Law, the Stuart School of Business Financial Markets Program, and the Department of Mathematics and Science Education.

Students also have the option of completing the following co-terminal degrees that enable a student to complete both degrees in five years:

- Bachelor of Science in Biochemistry and Master of Biology with Biochemistry specialization
- Bachelor of Science in Biochemistry and Master of Science in Biology with Biochemistry specialization
- Bachelor of Science in Biochemistry and Master of Food Safety and Technology
- Bachelor of Science in Biology and Master of Biology
- Bachelor of Science in Biology and Master of Science in Biology
- Bachelor of Science in Biology and Master of Food Safety and Technology
- Bachelor of Science in Biology and Master of Computer Science
- Bachelor of Science in Biology and Master of Science in Computer Science

These programs allow students to complete a dual degree in a shorter time period, to apply through a simplified admission process, and to receive some financial incentives. See page 166 or go to www.iit.edu/csl/bcs for more information.

Details of the traditional programs, as well as the specialized degree programs, can be found on the following pages, the Department of Mathematics and Science Education section (pages 121–122), and in the Special Programs section (pages 166–175).

Faculty

Biology Faculty

Professors

T. Irving, D. McCormick, R. Mehta, B. Stark

Associate Professors

A. Howard, N. Menhart, J. Orgel, J. Xiang, W. Zhang

Assistant Professor

M. Dushay

Research Professor

J. Wan

Research Associate Professor

A. Lee

Research Assistant Professors

O. Antipova, B. Burton-Freeman, I. Edirisinghe,
S. Grove, C. Zhang

Senior Lecturers

T. Bekyarova, C. Krikorian, K. Spink

Faculty Emeritus

H. Bretz, J. Erwin, N. Grecz, R. Roth, D. Webster

**Joint Appointment
Professor**

T. Irving (Physics and Biomedical Engineering)

**Joint Appointment
Associate Professor**

A. Howard (Physics)

Chemistry Faculty

Professors

M. I. Khan, P. Lykos, B. Mandal

Associate Professors

H. Chong, X. Guan, R. Wang

Assistant Professors

B. Cage, A. Hock, A. Unni

Industry Professor

D. Nguyen

Lecturers

M. Tanner, B. Zion

Faculty Emeritus

W. Eisenberg, R. Filler, P. Johnson, K. Schug

Biochemistry

The degree program in Biochemistry is intended to prepare students for entrance into post-baccalaureate programs in the health professions or the basic sciences. Biochemistry is becoming an increasingly popular career path for many scientists as the basic scientific fields of chemistry and biology

intertwine. The program in Biochemistry will offer students a strong foundation in both the biological and chemical sciences with opportunities to construct their degree program to best suit their interests.

Bachelor of Science in Biochemistry

| Required Courses | Credit Hours |
|---|----------------|
| Biology Requirements BIOL 100, 107, 109, 115, 117, 210, 214, 445, 446, (451 or CHEM 451), 495 | 23/25 |
| Chemistry Requirements CHEM 124, 125, 237, 239, 240, 247, 343, 344, (451 or BIOL 451), 485 | 28/31 |
| Biochemistry Requirements BIOL 401, 402, 404 | 9 |
| Technical Electives | 11/12 |
| Physics Requirements PHYS 123, 221 | 8 |
| Mathematics Requirements MATH 151, 152, 251, 425 | 17 |
| Interprofessional Projects | 6 |
| Computer Science Requirement CS 105 | 2 |
| Humanities and Social Sciences Requirements For general education requirements, see page 25. | 21 |
| Total Hours | 127/129 |

Biochemistry Curriculum

| Semester 1 | Credits |
|---|-----------|
| BIOL 100 Introduction to the Profession | 2 |
| BIOL 107 General Biology | 3 |
| BIOL 109 General Biology Laboratory | 1 |
| CHEM 124 Principles of Chemistry I | 4 |
| MATH 151 Calculus I | 5 |
| Total Hours | 15 |

| Semester 2 | Credits |
|-------------------------------------|-----------|
| BIOL 115 Human Biology | 3 |
| BIOL 117 Human Biology Laboratory | 1 |
| CHEM 125 Principles of Chemistry II | 4 |
| MATH 152 Calculus II | 5 |
| Humanities 100-level Elective | 3 |
| Total Hours | 16 |

| Semester 3 | Credits |
|---|-----------|
| BIOL 214 Genetics | 3 |
| CHEM 237 Organic Chemistry I | 4 |
| PHYS 123 General Physics I | 4 |
| MATH 251 Multivariate & Vector Calculus | 4 |
| CS 105 Intro to Computer Programming I | 2 |
| Total Hours | 17 |

| Semester 4 | Credits |
|---------------------------------------|-----------|
| BIOL 210 Microbiology | 3 |
| CHEM 239 Organic Chemistry II | 3 |
| CHEM 240 Organic Chemistry Laboratory | 2 |
| PHYS 221 General Physics II | 4 |
| Social Sciences Elective | 3 |
| Total Hours | 15 |

| Semester 5 | Credits |
|--|-----------|
| CHEM 343 Physical Chemistry I | 3 |
| BIOL 445 Cell Biology | 3 |
| CHEM 247 Analytical Chemistry | 3 |
| Technical Elective | 3 |
| Humanities or Social Sciences Elective | 3 |
| Total Hours | 15 |

| Semester 6 | Credits |
|--------------------------------|-----------|
| CHEM 344 Physical Chemistry II | 4 |
| CHEM 485 Chemistry Colloquium | 1 |
| MATH 425 Statistical Methods | 3 |
| IPro Elective I | 3 |
| Technical Elective | 3 |
| Social Sciences Elective | 3 |
| Total Hours | 17 |

| Semester 7 | Credits |
|--|--------------|
| BIOL 401 Introductory Biochemistry | 3 |
| BIOL 446 Cell Biology Lab | 3 |
| BIOL 495 Biology Colloquium | 1 |
| Technical Elective | 3 |
| BIOL 451 Literature in Biology | 2/3 |
| OR | |
| CHEM 451 Modern Techniques in Chem Lit | 3 |
| Humanities Elective (300+) | 3 |
| Total Hours | 15/16 |

| Semester 8 | Credits |
|----------------------------------|--------------|
| BIOL 402 Metabolic Biochemistry | 3 |
| BIOL 404 Biochemistry Laboratory | 3 |
| IPro Elective II | 3 |
| Technical Elective | 2/3 |
| Humanities Elective (300+) | 3 |
| Social Sciences Elective (300+) | 3 |
| Total Hours | 17/18 |

Total Credit Hours 127/129

Biology

The undergraduate Biology degree at IIT provides excellent preparation for the health professions, including medicine, osteopathic medicine, and dentistry. In addition, the rigorous program prepares graduates for careers in biotechnology, biochemistry, patent law, and environmental science.

Graduates are also prepared for immediate entry into positions in industrial, medical, and other research laboratories and for graduate programs in biotechnology, cell biology,

biochemistry, genetics, and molecular biology.

The objectives of IIT's biology major are to give students strong training in the areas of modern cell biology, genetics, biochemistry, microbiology, and physiology, supported by a solid foundation in mathematics and the physical sciences. In addition, the biology major is designed to give students broad opportunities to study advanced topics in biology, both in the classroom and by participating in undergraduate research projects.

Bachelor of Science in Biology

| Required Courses | Credit Hours |
|--|--------------|
| Biology Requirements BIOL 100, 107, 109, 115, 117, 210, 214, 225, 401, 402, 404, 430, 445, 446, 451, 495 (2) | 40 |
| Biology Electives | 12 |
| Interprofessional Projects | 6 |
| Mathematics Requirements MATH 151, 152, 425 | 13 |
| Chemistry Requirements CHEM 124, 125, 237, 239, 247 | 18 |
| Physics Requirements PHYS 123, 221, 224 | 11 |
| Computer Science Requirement CS 105 | 2 |
| Humanities and Social Sciences Requirements For general education requirements, see page 25. | 21 |
| Free Elective | 3 |
| Total Hours | 126 |

Bachelor of Science in Biology with Secondary Education Teaching Certification

Many students will be interested in education with a strong math- and science-based curriculum, especially with a growing need for science educators nationwide. Students will earn a Bachelor of Science degree in Biology and a teaching certification through the Math and Science Education department.

Students may substitute 12 credits of biology electives, one credit of biology colloquium, and three credits of free electives with MSED courses. Also, students may substitute Biology 403 for Biology 401 and 402.

MSED 450 is an internship and must be taken full time with no other contemporaneous courses, resulting in tight course scheduling. Students are advised to indicate their interest as soon as possible and seek advising specific to

this program from both the Biological and Chemical Sciences and the Math and Science Education departments.

Students must take the following to qualify for teaching certification:

- MSED 200 Analysis of Classrooms (Practicum and Seminar)
- MSED 250 Middle and Secondary School Curriculum/Foundations
- MSED 300 Instructional Methods/Strategies I
- MSED 320 Inquiry and Problem Solving in Mathematics and Science
- MSED 350 Informal Education Practicum and Seminar
- MSED 400 Instructional Methods/Strategies II
- MSED 450 Professional Internship

Biology Curriculum

| Semester 1 | Credits |
|---|-----------|
| BIOL 100 Introduction to the Profession | 2 |
| BIOL 107 General Biology | 3 |
| BIOL 109 General Biology Laboratory | 1 |
| CHEM 124 Principles of Chemistry I | 4 |
| MATH 151 Calculus I | 5 |
| Total Hours | 15 |

| Semester 2 | Credits |
|-------------------------------------|-----------|
| BIOL 115 Human Biology | 3 |
| BIOL 117 Human Biology Laboratory | 1 |
| CHEM 125 Principles of Chemistry II | 4 |
| MATH 152 Calculus II | 5 |
| Humanities 100-level Elective | 3 |
| Total Hours | 16 |

| Semester 3 | Credits |
|--|-----------|
| BIOL 214 Genetics | 3 |
| CHEM 237 Organic Chemistry I | 4 |
| PHYS 123 General Physics I | 4 |
| Social Sciences Elective | 3 |
| Humanities or Social Sciences Elective | 3 |
| Total Hours | 17 |

| Semester 4 | Credits |
|----------------------------------|-----------|
| BIOL 210 Microbiology | 3 |
| BIOL 225 Microbiology Laboratory | 2 |
| CHEM 239 Organic Chemistry II | 3 |
| PHYS 221 General Physics II | 4 |
| Humanities Elective (300+) | 3 |
| Total Hours | 15 |

| Semester 5 | Credits |
|------------------------------------|-----------|
| BIOL 401 Introductory Biochemistry | 3 |
| BIOL 430 Animal Physiology | 3 |
| CHEM 247 Analytical Chemistry | 3 |
| PHYS 224 General Physics III | 3 |
| Social Sciences Elective | 3 |
| Total Hours | 15 |

| Semester 6 | Credits |
|--|-----------|
| BIOL 402 Metabolic Biochemistry | 3 |
| BIOL 404 Biochemistry Laboratory | 3 |
| IPro Elective I | 3 |
| CS 105 Intro to Computer Programming I | 2 |
| MATH 425 Statistical Methods | 3 |
| Humanities Elective (300+) | 3 |
| Total Hours | 17 |

| Semester 7 | Credits |
|----------------------------------|-----------|
| BIOL 451 Literature in Biology | 2 |
| BIOL 445 Cell Biology | 3 |
| BIOL 446 Cell Biology Laboratory | 3 |
| BIOL 495 Biology Colloquium | 1 |
| Biology Elective | 3 |
| Biology Elective | 3 |
| Total Hours | 15 |

| Semester 8 | Credits |
|---------------------------------|-----------|
| BIOL 495 Biology Colloquium | 1 |
| IPro Elective II | 3 |
| Biology Elective | 3 |
| Biology Elective | 3 |
| Social Sciences Elective (300+) | 3 |
| Free Elective | 3 |
| Total Hours | 16 |

Total Credit Hours **126**

Chemistry

Chemistry is the study of the miniaturized world of atoms and molecules. Chemists analyze the structure of this world of chemicals, discover the forces that govern chemical changes, and invent chemical reactions which create new molecules and materials for the benefit of mankind. For example, most of the clothes we wear and the containers that hold our food are made of synthetic fibers and polymers that were conceived and developed by chemists. Life-saving pharmaceuticals are designed and synthesized by chemists. The development of insecticides, cosmetics, fragrances, fertilizers, and high-tech materials are other examples of the impact of chemistry on society. The objective of the IIT undergraduate program in Chemistry is to provide rigorous education in the fundamental areas of chemical theory and chemical experimentation. Students become well trained for industrial careers in research and development, chemical analysis, or chemical manufacturing and

marketing. The opportunity for participation in an original research project also provides the necessary experiences for entrance into graduate school in one of the chemical sciences. In addition, the IIT program in Chemistry provides excellent pre-professional training for careers in medicine (see page 56 and www.iit.edu/~premed), law, business, and other areas of science and healthcare. IIT has developed a very flexible curriculum which, in addition to our standard Bachelor of Science degree in Chemistry, gives students the option of selecting an area of chemical emphasis such as biological, pharmaceutical, polymer, materials, chemical physics, or chemical education. Students learn not only the basic science of chemistry but also the practical aspects of the discipline and its numerous applications. The IIT Bachelor of Science degree in Chemistry is approved by the American Chemical Society Committee on Professional Training.

Coursework

The first stage of undergraduate training provides a solid foundation in all of the five basic areas of chemistry (analytical, inorganic, organic, physical and biochemistry). Most of these courses include required laboratory work. These laboratories provide extensive practical exposure to each of these areas and experience with modern chemical instrumentation such as nuclear magnetic resonance spectroscopy, infrared spectroscopy, and gas and high-pressure liquid chromatography. Concurrently, students take courses to strengthen their understanding of mathematics and physics. Students are invited and encouraged to

attend weekly chemistry colloquia where lectures are given by prominent chemists from industrial, governmental, and academic laboratories. In the second stage, students take advanced and specialized courses which focus on career interests. An integral part of this stage is a research project under the supervision of a member of the chemistry faculty. This research may lead to a senior thesis. Students may receive certification of their Bachelor of Science degree in Chemistry through the American Chemical Society (www.acs.org) by selection of appropriate chemistry electives.

Optional Degree Programs in Chemistry

Because of the diversity of interests of students in chemistry and the increasing interdisciplinary impact of chemistry in other areas, IIT offers optional degree programs in Chemistry. Each degree program maintains the five basic core areas of chemistry while at the same time providing options to prepare students to enter an operationally well-recognized career path. Students can elect the traditional Bachelor of Science degree in Chemistry where they choose their own technical electives or focus on one of the following six options:

- Bachelor of Science in Chemistry with emphasis in Biological Chemistry
- Bachelor of Science in Chemistry with emphasis in Pharmaceutical Chemistry
- Bachelor of Science in Chemistry with emphasis in Polymer Chemistry
- Bachelor of Science in Chemistry with emphasis in Materials Chemistry
- Bachelor of Science in Chemistry with emphasis in Chemical Physics
- Bachelor of Science in Chemistry with emphasis in Chemical Education

Biological and Chemical Sciences

Bachelor of Science in Chemistry

| Required Courses | Credit Hours |
|---|----------------|
| Chemistry Requirements CHEM 100, 124, 125, 237, 239, 240, 247, 321, 343, 344, 415, 416*, 434, 451, 485(2)*, two CHEM electives*** (six credit hours) | 54 |
| Technical Electives** | 15 |
| Biology Requirement BIOL 401 or BIOL 403 | 3/4 |
| Mathematics Requirements MATH 151, 152, 251, 252 | 18 |
| Physics Requirements PHYS 123, 221 | 8 |
| Computer Science Requirement CS 105 | 2 |
| Humanities and Social Sciences Requirements For general education requirements, see page 25. | 21 |
| Interprofessional Projects | 6 |
| Total Hours | 127/128 |

* CHEM 416 and 485 are not required for students pursuing the Bachelor of Science in Chemistry degree with emphasis in Chemical Education.

** Requires approval by the advisor. One of the technical electives must be BIOL 107 or BIOL 115. This course must be taken before the student enrolls in BIOL 401 or BIOL 403.

*** Students may choose from CHEM 410, CHEM 450, CHEM 454, CHEM 455, CHEM 470, CHEM 487, and CHEM 500+ level courses. Students planning on taking CHEM 487 must complete CHEM 450 in a previous semester and are only required to take one semester of CHEM 485.

Chemistry Curriculum

| Semester 1 | Credits |
|---|-----------|
| CHEM 100 Introduction to the Profession | 2 |
| CHEM 124 Principles of Chemistry I | 4 |
| CS 105 Intro to Computer Programming I | 2 |
| MATH 151 Calculus I | 5 |
| Humanities 100-level Elective | 3 |
| Total Hours | 16 |

| Semester 2 | Credits |
|-------------------------------------|-----------|
| CHEM 125 Principles of Chemistry II | 4 |
| MATH 152 Calculus II | 5 |
| PHYS 123 General Physics I | 4 |
| Social Sciences Elective | 3 |
| Total Hours | 16 |

| Semester 3 | Credits |
|---|-----------|
| CHEM 237 Organic Chemistry I | 4 |
| CHEM 247 Analytical Chemistry | 3 |
| MATH 251 Multivariate and Vector Calculus | 4 |
| PHYS 221 General Physics II | 4 |
| Humanities or Social Sciences Elective | 3 |
| Total Hours | 18 |

| Semester 4 | Credits |
|---|-----------|
| CHEM 239 Organic Chemistry II | 3 |
| CHEM 240 Organic Chemistry Lab | 2 |
| MATH 252 Introduction to Differential Equations | 4 |
| Technical Elective* | 3 |
| Humanities Elective (300+) | 3 |
| Total Hours | 15 |

| Semester 5 | Credits |
|--------------------------------|-----------|
| CHEM 343 Physical Chemistry I | 3 |
| CHEM 321 Instrumental Analysis | 4 |
| IPro Elective I | 3 |
| Technical Elective* | 3 |
| Social Sciences Elective | 3 |
| Total Hours | 16 |

| Semester 6 | Credits |
|---------------------------------|-----------|
| CHEM 344 Physical Chemistry II | 4 |
| CHEM 434 Spectroscopic Methods | 4 |
| Chemistry Elective*** | 3 |
| CHEM 485 Chemistry Colloquium** | 1 |
| Humanities Elective (300+) | 3 |
| Total Hours | 15 |

| Semester 7 | Credits |
|---|--------------|
| CHEM 415 Inorganic Chemistry | 3 |
| BIOL 401 Introductory Biochemistry | |
| OR | 3/4 |
| BIOL 403 Biochemistry Lecture | |
| CHEM 451 Modern Techniques in Chem Literature | 3 |
| Technical Elective* | 3 |
| Technical Elective* | 3 |
| Total Hours | 15/16 |

| Semester 8 | Credits |
|---|-----------|
| Chemistry Elective*** | 3 |
| IPro Elective II | 3 |
| CHEM 485 Chemistry Colloquium** | 1 |
| CHEM 416 Inorganic Chemistry Laboratory** | 3 |
| Technical Elective* | 3 |
| Social Sciences Elective (300+) | 3 |
| Total Hours | 16 |

Total Credit Hours 127/128

* Requires approval by the advisor. One of the technical electives must be BIOL 107 or BIOL 115. This course must be taken before the student enrolls in BIOL 401 or BIOL 403.

** CHEM 416 and 485 are not required for students pursuing the Bachelor of Science in Chemistry degree with emphasis in Chemical Education.

*** Students may choose from CHEM 410, CHEM 450, CHEM 454, CHEM 455, CHEM 470, CHEM 487, and CHEM 500+ courses. Students planning on taking CHEM 487 must take CHEM 450 in a previous semester and are only required to take one semester of CHEM 485.

Optional Chemistry Degree Program Course Requirements

Students choosing to pursue one of the optional degree programs below must take the following prescribed courses as technical electives. Detailed sample curricula

are available for each of the degree programs, see: www.iit.edu/csl/che/programs/undergrad.

Bachelor of Science in Chemistry with Emphasis in Biological Chemistry

Program Advisor: N. Menhart

Biological chemistry is the study of the structure, composition, and chemical reactions of substances found in living systems. This option provides the necessary link between chemistry and biology which allows students to learn both the theory and technical skills required to initiate and successfully complete scientific problems at the interface of these two disciplines. The biological chemistry option is particularly well suited for students interested in the molecular basis of medicine. The option provides all the necessary background material required for admission to any medical, osteopathic, or veterinary school in the country.

Students must take:

BIOL 210 Microbiology Lectures
BIOL 225 Microbiology Laboratory
BIOL 214 Genetics
BIOL 402 Metabolic Biochemistry
BIOL 445 Cell Biology
BIOL 446 Cell Biology Laboratory

Bachelor of Science in Chemistry with Emphasis in Pharmaceutical Chemistry*

Program Advisor: H. S. Chong

Pharmaceutical chemistry is an area of chemistry focused on the development of new drugs used to prevent, cure, or relieve symptoms of disease. Modern medical practice relies on an enormous armamentarium of drugs that block, counteract, or lessen the debilitating effects of disease. The pharmaceutical chemistry option emphasizes the synthesis and characterization of pharmaceuticals as well as the relationship between the structure of the drug to its biological activity.

Students must take:

CHEM 455 Advanced Organic Chemistry
CHEM 531 Tactics of Organic Synthesis
CHEM 539 Introduction to Pharmaceutical Chemistry
BIOL 402 Metabolic Biochemistry
CHEM 497 Special Problems

Bachelor of Science in Chemistry with Emphasis in Polymer Chemistry*

Program Advisor: B. Mandal

A polymer is a chain of small molecules linked together to form a larger single molecule. Chemists make polymers because of their unique properties which they impart to products such as paints and adhesives, drug delivery systems, and artificial skin. The polymer chemistry option emphasizes the techniques involved in the synthesis and characterization of polymeric materials.

Students must take:

CHEM 455 Advanced Organic Chemistry
CHEM 470 Introduction to Polymer Chemistry
CHEM 535 Advanced Polymer Chemistry
CHEM 537 Polymer Chemistry Laboratory
CHEM 542 Polymer Characterization and Analysis

* Students interested in pursuing the Pharmaceutical Chemistry or Polymer Chemistry degree option must submit a formal letter of intent to a program advisor by the end of their second year. To insure adequate performance in CHEM 455 and graduate-level organic chemistry courses, students should have completed CHEM 237 and CHEM 239 with grades of B or better. Students must also take the American Chemical Society placement examination in organic chemistry after they complete CHEM 239. The results will be used for advising and tracking purposes.

Bachelor of Science in Chemistry with Emphasis in Materials Chemistry

Program Advisor: M.I. Khan

Materials chemistry is focused on the preparation and characterization of pure chemicals or chemical systems that have some unique function. This function can be dependent on the material's optical, electronic, magnetic, or catalytic properties. The materials chemistry option draws from all five of the basic areas of chemistry to lay the foundation for understanding the synthesis, structure, characterization, and applications of materials. A particularly strong emphasis at IIT is programmatic access to advanced X-crystallographic instrumentation to study the structure of inorganic-based materials in the solid state.

Students must take:

MS 201 Materials Sciences
 MMAE 486 Principles of Ceramics
 PHYS 437 Solid State Physics
 CHEM 470 Introduction to Polymer Chemistry

Students also select one course from the following:

MMAE 465 Electrical, Magnetic and Optical Properties
 of Materials
 PHYS 415 Solid State Electronics

Bachelor of Science in Chemistry with Emphasis in Chemical Physics

Program Advisors: R. Wang/P. Lykos

Chemical physics is focused on the development of theoretical constructs and experimental methodologies to infer the properties of bulk matter from a molecular prospective. Chemical physicists seek to unravel varied mysteries such as how proteins fold, how nanostructures form and behave, and how small molecules interact with cell membranes. The chemical physics option provides a solid foundation in chemistry with extensive coursework in physics and mathematics allowing students to make connections using the language of mathematics and the laws of physics to solve chemical problems.

Students must take:

PHYS 308 Classical Mechanics I
 PHYS 401 Statistical Physics
 PHYS 405 Fundamentals of Quantum Theory I
 PHYS 410 Molecular Biophysics
 PHYS 440 Computational Physics

Students also select one course from the following:

PHYS 412 Modern Optics and Lasers
 PHYS 413 Electromagnetism I
 PHYS 437 Solid State Physics

Bachelor of Science in Chemistry with Emphasis in Chemical Education

Program Advisors: N. Lederman

There is a national need for teachers with a rigorous training in chemistry. The chemical education option not only leads to the Bachelor of Science degree in Chemistry but also enables a student to obtain a science teaching certificate through our Department of Mathematics and Science Education (see pages 121–122 and www.iit.edu/csl/msed).

Students must also take:

MSED 200 Analysis of Classrooms (Practicum and Seminar)
 MSED 250 Middle and Secondary School Curriculum/Foundations
 MSED 300 Instructional Methods/Strategies I
 MSED 320 Inquiry and Problem Solving in Mathematics and Science
 MSED 350 Informal Education Practicum and Seminar
 MSED 400 Instructional Methods/Strategies II
 MSED 450 Professional Internship

Molecular Biochemistry and Biophysics

Why should a biologist know about physics and chemistry? Why should physicists and chemists know about biology? Just ask some of IIT's faculty who are using x-ray synchrotron radiation science to study proteins and their molecular structures. This research may lead to the important advances in understanding the causes of a number of diseases.

Molecular Biochemistry and Biophysics (MBB) is an interdisciplinary major, combining studies in biology, chemistry, and physics. Its objectives are to give students solid training in the areas of modern cell biology, genetics, and biochemistry while also providing a strong background

in mathematics and the physical sciences. In this way the MBB degree will provide each student with the skills needed to succeed as a professional in biology as the field becomes increasingly dependent on new technologies.

Through this curriculum, students will discover the essential building blocks of life, how they fit together, how they work, and the physical methods for exploring them. With its quantitative emphasis encompassing all the sciences, this program is a great way to prepare for careers in medicine or medical research. It is also one of the majors that is part of the honors medical programs with Rush University.

Bachelor of Science in Molecular Biochemistry and Biophysics

| Required Courses | Credit Hours |
|--|----------------|
| Biology Requirements BIOL 100, 107, 109, 115, 117, 210, 214, 225, 401, 402, 404, 430, 445, 446, 451, 495 (2) | 40 |
| Chemistry Requirements CHEM 124, 125, 237, 239, (247 or PHYS 300), 343, (344 or PHYS 348) | 24/26 |
| Physics Requirements PHYS 123, 221, 223, 410 | 15 |
| Interprofessional Projects | 6 |
| Mathematics Requirements MATH 151, 152, 251, (252 or PHYS 240), 425 | 20/21 |
| Computer Science Requirement CS 105 | 2 |
| Humanities and Social Sciences Requirements For general education requirements, see page 25. | 21 |
| Total Hours | 128/131 |

Molecular Biochemistry and Biophysics Curriculum

| Semester 1 | Credits | Semester 2 | Credits |
|---|--------------|---|--------------|
| BIOL 100 Introduction to the Profession | 2 | BIOL 115 Human Biology | 3 |
| BIOL 107 General Biology | 3 | BIOL 117 Human Biology Laboratory | 1 |
| BIOL 109 General Biology Laboratory | 1 | CHEM 125 Principles of Chemistry II | 4 |
| CHEM 124 Principles of Chemistry I | 4 | MATH 152 Calculus II | 5 |
| MATH 151 Calculus I | 5 | Humanities 100-level Elective | 3 |
| Total Hours | 15 | Total Hours | 16 |
| Semester 3 | Credits | Semester 4 | Credits |
| PHYS 123 General Physics I | 4 | PHYS 221 General Physics II | 4 |
| CHEM 237 Organic Chemistry I | 4 | CHEM 239 Organic Chemistry II | 3 |
| BIOL 214 Genetics | 3 | BIOL 210 Microbiology | 3 |
| MATH 251 Multivariate and Vector Calculus | 4 | BIOL 225 Microbiology Laboratory | 2 |
| CS 105 Intro to Computer Programming I | 2 | IPRO Elective I | 3 |
| Total Hours | 17 | Social Sciences Elective | 3 |
| | | Total Hours | 18 |
| Semester 5 | Credits | Semester 6 | Credits |
| BIOL 445 Cell Biology | 3 | BIOL 430 Animal Physiology | 3 |
| PHYS 223 General Physics III | 4 | PHYS 240 Computational Science | |
| CHEM 247 Analytical Chemistry | | OR | 3/4 |
| OR | 3/4 | MATH 252 Introduction to Differential Equations | |
| PHYS 300 Instrumentation Lab | | PHYS 348 Modern Physics | |
| CHEM 343 Physical Chemistry I | 3 | OR | 3/4 |
| Humanities or Social Sciences Elective | 3 | CHEM 344 Physical Chemistry II | |
| Total Hours | 16/17 | Social Sciences Elective | 3 |
| | | Humanities Elective (300+) | 3 |
| | | Total Hours | 15/17 |
| Semester 7 | Credits | Semester 8 | Credits |
| BIOL 451 Literature in Biology | 2 | BIOL 402 Metabolic Biochemistry | 3 |
| BIOL 401 Introductory Biochemistry | 3 | BIOL 404 Biochemistry Laboratory | 3 |
| PHYS 410 Molecular Biophysics | 3 | BIOL 495 Biology Colloquium | 1 |
| BIOL 446 Cell Biology Laboratory | 3 | MATH 425 Statistical Methods | 3 |
| BIOL 495 Biology Colloquium | 1 | IPRO Elective II | 3 |
| Humanities Elective (300+) | 3 | Social Sciences Elective (300+) | 3 |
| Total Hours | 15 | Total Hours | 16 |

Total Credit Hours 128/131

Post-Baccalaureate Premedical Program

The purpose of the Post-baccalaureate Premedical Program is to meet the needs of college graduates who have decided to pursue a medical education but who have taken none or only some of the basic science courses required for admission to medical school. The objective of the program is to

provide rigorous education in all areas of the premedical sciences which are required for admission to any medical, osteopathic, or veterinary school in the country. Students who satisfactorily complete the program will be awarded a Certificate in Premedical Sciences.

Coursework

Students sufficiently prepared in mathematics and English who enter the program in the fall semester can expect to complete the program in two years. The third year is known as the "glide year." This is the year between completing the program and entering medical school. For most students, the glide year provides the opportunity to take additional courses or to deepen their exposure to medicine through full-time employment in a clinical setting or in the arts and sciences:

- One year of college English, including a significant amount of expository writing .
 - One year of college mathematics, beyond precalculus, including at least one term of calculus. Statistics is recommended as the second mathematics course.
 - One year of general physics, including laboratory.
 - One year of general chemistry, including laboratory.
 - One year of organic chemistry, including laboratory.
 - One year of biology, including laboratory, with significant emphasis in molecular and cellular biology.
-

Advising and Support

On the main campus of Illinois Institute of Technology there are a number of advisors who constitute the Premedical Advisory Committee, see: www.iit.edu/~premed. Post-baccalaureate Premedical students will be assigned an advisor who will be available to counsel them as they plan their program of study and as they prepare their applications to medical school. A number of academic support services will be made available to students in the Post-baccalaureate Premedical Program. In the University's Academic Resource Center, students can meet with tutors at no expense for additional help in their premedical courses. In the Premedical Office, support staff will collect and send letters of recommendation to medical schools. Each year the Premedical Office and the IIT Honors Medical Society host a number of events specifically for premedical students including special seminars of medical interest and forums in which current students can learn from ex-

periences of those who have already taken the MCAT or been admitted to medical school. The Princeton Review offers MCAT preparatory courses at reduced cost to IIT students in the spring semester each year. Post-baccalaureate Premedical students are invited and encouraged to attend weekly colloquia in the biological, chemical, and physical sciences and in other departments offering seminars of medical interest. Finally, IIT's location in the city of Chicago is a special advantage to students in the Post-baccalaureate Premedical Program. The city is home to six medical schools and numerous hospitals and medical research centers. It is also home to the American Medical Association. This concentration of medical practice will provide IIT Post-baccalaureate Premedical students with a wide variety of opportunities to gain experience in both clinical settings and in medical research through volunteer service and paid employment.

Academic Standards

Medical schools expect successful applicants to possess excellent grounding in the premedical sciences. The quality of a student's preparation is measured by the grades earned in premedical courses. For this reason, IIT Post-baccalaureate Premedical students will be held to high academic standards. At a minimum, students must maintain a cumula-

tive GPA of 3.00 to remain in the program. Likewise, medical schools have high expectations about an applicant's character. Students in the IIT Post-baccalaureate Premedical Program are expected to conduct themselves with honesty and integrity inspiring confidence in their abilities to assume the responsibilities of medical practice.

Admissions Eligibility

The student must hold the degree of Bachelor of Arts or Science from an accredited college or university in the United States or an equivalent degree from an institution outside the United States. At a minimum, successful applicants must possess a cumulative undergraduate GPA of 3.00. In most cases, students will not be eligible for admission if

they have applied to medical school previously or have completed their premedical preparation elsewhere within the last five years. This is not a remedial program. Students must submit a complete application package to the Office of Undergraduate Admission for full consideration.

Certificate in Premedical Sciences*

| Required Courses | Credit Hours |
|---|--------------|
| Chemistry Requirements CHEM 124, 125, 237, 239, 240 | 17 |
| Biology Requirements BIOL 107, 109, 115, 117 | 8 |
| Mathematics Requirements MATH 151, PSYC 203 or MATH 425 | 8 |
| Physics Requirements PHYS 123, 221 | 8 |
| Total Hours | 41 |

* Students who complete all of these courses (or their equivalents) with a GPA of 3.00 will be awarded a Certificate in Premedical Sciences. A minimum of 15 credit hours must be completed at IIT to be awarded the Certificate in Premedical Sciences.

Premedical Sciences Curriculum

| Semester 1 | Credits |
|------------------------------------|-----------|
| CHEM 124 Principles of Chemistry I | 4 |
| PHYS 123 General Physics I | 4 |
| MATH 151 Calculus I | 5 |
| Clinical Volunteer Service | 0 |
| Total Hours | 13 |

| Semester 2 | Credits |
|--|-----------|
| CHEM 125 Principles of Chemistry II | 4 |
| PHYS 221 General Physics II | 4 |
| PSYC 203 Undergrad Stats for Behavioral Sciences | 3 |
| OR | 3 |
| MATH 425 Statistical Methods | 3 |
| Clinical Volunteer Service | 0 |
| Total Hours | 11 |

| Semester 3 | Credits |
|-------------------------------------|----------|
| CHEM 237 Organic Chemistry I | 4 |
| BIOL 107 General Biology | 3 |
| BIOL 109 General Biology Laboratory | 1 |
| Research Volunteer Service | 0 |
| Total Hours | 8 |

| Semester 4 | Credits |
|---------------------------------------|----------|
| CHEM 239 Organic Chemistry II | 3 |
| CHEM 240 Organic Chemistry Laboratory | 2 |
| BIOL 115 Human Biology | 3 |
| BIOL 117 Human Biology Laboratory | 1 |
| Research Volunteer Service | 0 |
| Total Hours | 9 |

Total Credit Hours 41

Prepare and take MCAT in April.

Summer Session: Submit Medical School Applications

Semesters 5 & 6 – The Glide Year –

The following courses are recommended but not required:

BIOL 214 Genetics

BIOL 401 Introductory Biochemistry

BIOL 402 Metabolic Biochemistry

BIOL 430 Animal Physiology

BIOL 445 Cell Biology

BIOL 451 Biological Literature

Full-time employment in health care or in medical research is strongly encouraged during this year.

Other Degree Programs in Biological and Chemical Sciences

Beyond the traditional degree programs, the department offers several specialized programs designed for students who are interested in studying science and who wish to pursue

a postgraduate education. Detailed programs of study for each of the programs listed below are available from the department.

Research Honors Program

This program is specifically designed for students who plan to pursue an advanced research degree. The program of study is based on the traditional degrees but is accelerated to include a full year of research experience in a faculty research lab, culminating in a senior thesis. In addition,

students selected for this program may have guaranteed stipends for the summers after their sophomore and junior years in addition to any other scholarships that have been awarded.

Combined B.S./M.D. Program

For detailed information, see page 170.

Honors Law Program

Students in any of the Biological and Chemical Sciences programs are eligible for this program (see page 169). For students in biology or chemistry, this is a seven-year pro-

gram which can be accelerated under special conditions approved by the student's advisor.

Five-Year Financial Markets Program

This program combines an undergraduate science degree with the Master of Science in Financial Markets. The five-year combined B.S./M.S. program guarantees admission to the Master's program, provided the student maintains an

undergraduate GPA of 3.00 and obtains a satisfactory score on the GMAT. Students enrolled in any of the Biological and Chemical Sciences programs are eligible for this program.

Biomedical Engineering

Department Website: www.iit.edu/engineering/bme

Wishnick Hall Suite 314
3255 S. Dearborn St.
Chicago, IL 60616
312.567.5324

Chair

David Mogul

Mission

The mission of the Biomedical Engineering undergraduate program at IIT is to educate students in the fundamentals of biomedical engineering. This foundation consists of a broad exposure to the chemical, mathematical, physical, and biological sciences, coupled with the appropriate technical and engineering skills to be able to fill diverse professional roles in industry, graduate school, and the medical professions.

Biomedical Engineering at IIT

Biomedical engineering is an interdisciplinary major in which the principles and tools of traditional engineering fields, such as mechanical, materials, electrical, and chemical engineering, are integrated with the chemical, physical, and biological sciences. Together, they are applied towards a better understanding of physiological processes in humans or towards the solution of medical problems. Engineering will continue to play an increasingly important role in advancing medical treatment, developing biotechnology, and improving health-care delivery. By its very nature, biomedical engineering is expansive and requires a broad and integrated foundation in the physical, chemical, mathematical, and biological sciences.

Program Outcomes and Objectives

At the undergraduate level, the department offers a four-year engineering curriculum leading to a Bachelor of Science (B.S.) in Biomedical Engineering.

Our graduates will attain the following program outcomes by the time of their graduation:

- An ability to apply knowledge of mathematics, science, and engineering to the solution of biomedical engineering problems.
- An ability to design and conduct experiments as well as to analyze and interpret data.
- An ability to design a biomedical engineering system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.

- An ability to function on multi-disciplinary teams.
- An ability to identify, formulate, and solve engineering problems.
- An understanding of professional and ethical responsibility.
- An ability to communicate effectively based upon analytical and critical thinking skills.
- The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
- A recognition of the need for and an ability to engage in life-long learning.
- A knowledge of contemporary issues relevant to biomedical engineering.
- An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
- An understanding of biology and physiology, and the capability to apply advanced mathematics, science, and engineering to solve the problems at the interface of engineering and biology.
- The ability to make measurements on and interpret data from living systems, addressing the problems associated with the interaction between living and non-living materials and systems.

Our educational objectives describe the following qualities and performance of our alumni:

- Our alumni apply quantitative, analytic, and critical thinking skills to solve biomedical engineering problems in industry, graduate, or professional graduate programs.
- Our alumni employ biomedical engineering laboratory skills in industry, graduate, or professional graduate programs.
- Our alumni employ written and oral communication skills in interaction with health care professionals, engineers, or scientists in industry, graduate, or professional graduate programs.
- Our alumni work in teams in industry, graduate, or professional graduate programs.
- Our alumni exhibit the responsibility and ethics of a professional engineer in industry, graduate, or professional graduate programs.

Faculty

Professors

N. DePaola, V. Turitto

Associate Professors

K. Arfanakis, E. Brey, D. Kamper, J. Kang-Mieler,
D. Mogul, P. Troyk

Assistant Professor

G. Papavasiliou

Research Professor

B. Trommer

Research Assistant Professor

Z. Demou

Senior Lecturer

B. Haferkamp

Faculty Emeritus

R. Arzbaeher

Joint Appointments

Professors

A. Cinar (Chemical and Biological Engineering),
T. Irving (Biological and Chemical Sciences and
Physics)

Areas of Specialization (Tracks)

The Biomedical Engineering program has three areas of specialization (or tracks): cell and tissue engineering, medical imaging, and neural engineering. While distinct in their concept, these areas share core exposure to the physical,

chemical, biological, and engineering sciences. Thus, there is potential for considerable crossover among the areas at the upper-division level. This is indicated by the track course options.

Medical School Admission

For information regarding admission to medical schools, see page 171 or go to www.iit.edu/~premed.

Cell and Tissue Engineering

This area involves the more recent attempts to understand and attack biomedical problems at the microscopic level and to use such knowledge to begin to “engineer” replacement tissues and organs from individual cells. Knowledge of anatomy, biochemistry, and the mechanics of cellular and sub-cellular structures is necessary in order to understand disease processes and to be able to intervene at very specific sites. With such knowledge a number of approaches have been or are being developed. These range from the development of miniature devices to deliver compounds that can stimulate or inhibit cellular processes at precise target locations in order to promote healing or inhibit disease formation and progression to the newer techniques that have produced replacement skin and one day will produce heart valves, coronary vessels, and even whole hearts. This area also includes the development of artificial materials used for

implantation. Understanding the properties and behavior of living material is vital in the design of implant materials. The use of placing materials in the human body for healing or repair has been practiced for over 100 years, but it remains one of the most difficult tasks faced by the biomedical engineer. Certain metal alloys, ceramics, polymers, and composites have been used as implantable materials. Biomaterials must not only function normally over the lifespan of the recipient but also be nontoxic, non-carcinogenic, chemically inert, stable, and sufficiently strong to withstand the repeated forces of a lifetime. Few materials meet all such specifications. Newer biomaterials are being developed which incorporate proteins or living cells in order to provide a truer biological and mechanical match for the living tissue.

Bachelor of Science in Biomedical Engineering: Cell and Tissue Engineering Track

| Required Courses | Credit Hours |
|--|--------------|
| Biomedical Engineering Core Requirements BME 100, 200, 310, 315, 320, 330, 405, 419, 420, 490 | 21 |
| Cell and Tissue Engineering Requirements CS 115, MMAE 200, MS 201, ECE 215, CHEM 237, 239, CHE 202, ENVE 426, BME 301, 335, 418, 482, two BME electives (six credit hours) | 42 |
| Mathematics Requirements MATH 151, 152, 251, 252 | 18 |
| Physics Requirements PHYS 123, 221 | 8 |
| Chemistry Requirements CHEM 124, 125 | 8 |
| Biology Requirements BIOL 115, 117, 430 | 7 |
| Interprofessional Projects | 6 |
| Humanities and Social Science Requirements For general education requirements, see page 25. | 21 |
| Total Hours | 131 |

Biomedical Engineering Curriculum: Cell and Tissue Track

| Semester 1 | Credits | Semester 2 | Credits |
|--|-----------|-------------------------------------|-----------|
| BME 100 Introduction to the Profession | 3 | BIOL 115 Human Biology | 3 |
| CS 115 Object-Oriented Programming I | 2 | BIOL 117 Experimental Biology | 1 |
| CHEM 124 Principles of Chemistry I | 4 | CHEM 125 Principles of Chemistry II | 4 |
| MATH 151 Calculus I | 5 | MATH 152 Calculus II | 5 |
| Humanities 100-level Elective | 3 | PHYS 123 General Physics I | 4 |
| Total Hours | 17 | Total Hours | 17 |

| Semester 3 | Credits | Semester 4 | Credits |
|---|-----------|---|-----------|
| ECE 215 Circuit Analysis I | 3 | BME 200 BME Applications of MATLAB | 1 |
| MATH 252 Introduction to Differential Equations | 4 | MATH 251 Multivariate and Vector Calculus | 4 |
| MMAE 200 Introduction to Mechanics | 3 | MS 201 Materials Science | 3 |
| Social Sciences Elective | 3 | PHYS 221 General Physics II | 4 |
| Humanities or Social Sciences Elective | 3 | Social Sciences Elective | 3 |
| Total Hours | 16 | Total Hours | 15 |

| Semester 5 | Credits | Semester 6 | Credits |
|--|-----------|--|-----------|
| BME 315 Instrumentation Laboratory | 2 | BME 301 Biofluid Mechanics | 3 |
| BME 330 Analysis of Biosignals and Systems | 3 | BME 310 Biomaterials | 3 |
| CHE 202 Material and Energy Balances | 3 | BME 320 Biofluids Laboratory | 1 |
| CHEM 237 Organic Chemistry I | 4 | BME 335 Thermodynamics of Living Systems | 3 |
| ENVE 426 Statistical Tools for Engineers | 3 | CHEM 239 Organic Chemistry II | 3 |
| IPRO Elective I | 3 | BME Elective* | 3 |
| Total Hours | 18 | Total Hours | 16 |

| Semester 7 | Credits | Semester 8 | Credits |
|--------------------------------|-----------|---------------------------------|-----------|
| BIOL 430 Animal Physiology | 3 | BME 420 Design Concepts in BME | 3 |
| BME 405 Physiology Laboratory | 2 | BME 490 Senior Seminar | 1 |
| BME 408 Reaction Kinetics | 3 | IPRO Elective II | 3 |
| BME 419 Introduction to Design | 2 | BME Elective* | 3 |
| BME 482 Mass Transport for BME | 3 | Humanities Elective (300+) | 3 |
| Humanities Elective (300+) | 3 | Social Sciences Elective (300+) | 3 |
| Total Hours | 16 | Total Hours | 16 |

Total Credit Hours **131**

* BME elective must be a 300+ level engineering course in BME, ECE, CHE, MMAE, or CAE.

Medical Imaging

This area combines knowledge of unique physical properties of electromagnetic and acoustic energy with high-speed electronic data processing, signal analysis, and rapid display to generate an image of a body part or, more recently, of a bodily function. Often, these images can be obtained with minimal or completely noninvasive procedures, making them less painful and more readily repeatable than invasive techniques. Moreover, many of the devices require

no ionizing radiation doses, thereby lessening the danger of secondary radiation effects on the patient. The students learn the theoretical bases underlying the common forms of medical imaging, such as magnetic resonance imaging (MRI), computerized axial tomography scanning (CAT-scan), positron emission tomography (PET), and the limitations and the applicability of such techniques.

Bachelor of Science in Biomedical Engineering: Medical Imaging Track

| Required Courses | Credit Hours |
|--|----------------|
| Biomedical Engineering Core Requirements BME 100, 200, 310, 315, 320, 330, 405, 419, 420, 490 | 21 |
| Medical Imaging Requirements CS 115, 116, ECE 215, 216, 437, 481, BME 309, 438, 443, 445, PHYS 224 or CHEM 237, ENVE 426, MATH 333 or CHEM 239, two BME electives (6 credit hours) | 43/44 |
| Mathematics Requirements MATH 151, 152, 251, 252 | 18 |
| Physics Requirements PHYS 123, 221 | 8 |
| Chemistry Requirements CHEM 124, 125 | 8 |
| Biology Requirements BIOL 115, 117, 430 | 7 |
| Interprofessional Projects | 6 |
| Humanities and Social Science Requirements For general education requirements, see page 25. | 21 |
| Total Hours | 132/133 |

Biomedical Engineering Curriculum: Medical Imaging Track

| Semester 1 | | | Credits | Semester 2 | | | Credits |
|--------------------------|--|--|-----------|--|--|--|--------------|
| BME 100 | Introduction to the Profession | | 3 | BIOL 115 | Human Biology | | 3 |
| CS 115 | Object-Oriented Programming I | | 2 | BIOL 117 | Experimental Biology | | 1 |
| CHEM 124 | Principles of Chemistry I | | 4 | CHEM 125 | Principles of Chemistry II | | 4 |
| MATH 151 | Calculus I | | 5 | MATH 152 | Calculus II | | 5 |
| Humanities | 100-level Elective | | 3 | PHYS 123 | General Physics I | | 4 |
| Total Hours | | | 17 | Total Hours | | | 17 |
| Semester 3 | | | Credits | Semester 4 | | | Credits |
| CS 116 | Object-Oriented Programming II | | 2 | BME 200 | BME Applications of MATLAB | | 1 |
| ECE 215 | Circuit Analysis I | | 3 | ECE 216 | Circuit Analysis II | | 3 |
| MATH 252 | Introduction to Differential Equations | | 4 | MATH 251 | Multivariate and Vector Calculus | | 4 |
| PHYS 221 | General Physics II | | 4 | PHYS 224 | Thermal and Modern Physics | | |
| Social Sciences Elective | | | 3 | OR | | | 3/4 |
| Total Hours | | | 16 | CHEM 237 | Organic Chemistry I | | |
| | | | | Humanities or Social Sciences Elective | | | 3 |
| | | | | Humanities Elective (300+) | | | 3 |
| | | | | Total Hours | | | 17/18 |
| Semester 5 | | | Credits | Semester 6 | | | Credits |
| BME 309 | Biomedical Imaging and Sensing | | 3 | BME 310 | Biomaterials | | 3 |
| BME 315 | Instrumentation Laboratory | | 2 | BME 320 | Fluids Laboratory | | 1 |
| BME 330 | Analysis of Biosignals and Systems | | 3 | BME 443 | Biomedical Instrumentation/Electronics | | 3 |
| ENVE 426 | Statistical Tools for Engineers | | 3 | BME 445 | Quantitative Neural Function | | 3 |
| MATH 333 | Matrix Algebra and Complex Variables | | | BME Elective* | | | 3 |
| OR | | | 3 | Social Sciences Elective | | | 3 |
| CHEM 239 | Organic Chemistry II | | | Total Hours | | | 16 |
| IPEO Elective I | | | 3 | | | | |
| Total Hours | | | 17 | | | | |
| Semester 7 | | | Credits | Semester 8 | | | Credits |
| BIOL 430 | Animal Physiology | | 3 | BME 438 | NeuroImaging | | 3 |
| BME 405 | Physiology Laboratory | | 2 | BME 420 | Design Concepts in BME | | 3 |
| BME 419 | Introduction to Design | | 2 | BME 490 | Senior Seminar | | 1 |
| ECE 437 | Digital Signal Processing | | 3 | ECE 481 | Image Processing | | 3 |
| IPEO Elective II | | | 3 | Humanities Elective (300+) | | | 3 |
| BME Elective* | | | 3 | Social Sciences Elective (300+) | | | 3 |
| Total Hours | | | 16 | Total Hours | | | 16 |

Total Credit Hours 132/133

* BME elective must be a 300+ level engineering course in BME, ECE, CHE, MMAE, or CAE.

Neural Engineering

This area uses fundamental and applied engineering techniques to help solve basic and clinical problems in the neurosciences. At the fundamental level it attempts to understand the behavior of individual neurons, their growth, signaling mechanisms between neurons, and how populations of neurons produce complex behavior. Such information has broad application to a better understanding of

the communication that occurs between the various parts of the nervous system and the brain. For example, such an understanding can be applied to the development of replacement parts for impaired neural systems, such as the auditory, visual, and motor systems as well as achieving a better understanding of how normal and diseased systems work.

Bachelor of Science in Biomedical Engineering: Neural Engineering Track

| Required Courses | Credit Hours |
|--|----------------|
| Biomedical Engineering Requirements BME 100, 200, 310, 315, 320, 330, 405, 419, 420, 490 | 21 |
| Neural Engineering Requirements CS 115, ECE 211, 213, 218, BME 309, 443, 445, 438, ENVE 426, MATH 333 or CHEM 237, technical elective or CHEM 239, three BME electives (nine credit hours) | 43/44 |
| Mathematics Requirements MATH 151, 152, 251, 252 | 18 |
| Physics Requirements PHYS 123, 221 | 8 |
| Chemistry Requirements CHEM 124, 125 | 8 |
| Biology Requirements BIOL 115, 117, 430 | 7 |
| Interprofessional Projects | 6 |
| Humanities and Social Science Requirements For general education requirements, see page 25. | 21 |
| Total Hours | 132/133 |

Biomedical Engineering Curriculum: Neural Engineering Track

| Semester 1 | | Credits | Semester 2 | | Credits |
|-------------------------------|--|--------------|---------------------------------|--|-----------|
| BME 100 | Introduction to the Profession | 3 | BIOL 115 | Human Biology | 3 |
| CS 115 | Object-Oriented Programming I | 2 | BIOL 117 | Experimental Biology | 1 |
| CHEM 124 | Principles of Chemistry I | 4 | CHEM 125 | Principles of Chemistry II | 4 |
| MATH 151 | Calculus I | 5 | MATH 152 | Calculus II | 5 |
| Humanities | 100-level Elective | 3 | PHYS 123 | General Physics I | 4 |
| Total Hours | | 17 | Total Hours | | 17 |
| Semester 3 | | Credits | Semester 4 | | Credits |
| ECE 211 | Circuit Analysis I | 4 | BME 200 | BME Applications of MatLab | 1 |
| ECE 218 | Digital Systems | 3 | ECE 213 | Circuit Analysis II | 4 |
| MATH 252 | Introduction to Differential Equations | 4 | MATH 251 | Multivariate and Vector Calculus | 4 |
| Social Sciences | Elective | 3 | PHYS 221 | General Physics II | 4 |
| Humanities or Social Sciences | Elective | 3 | Social Sciences | Elective | 3 |
| Total Hours | | 17 | Total Hours | | 16 |
| Semester 5 | | Credits | Semester 6 | | Credits |
| BME 309 | Imaging and Sensing | 3 | BME 310 | Biomaterials | 3 |
| BME 315 | Instrumentation Laboratory | 2 | BME 320 | BioFluids Laboratory | 1 |
| BME 330 | Analysis of Biosignals and Systems | 3 | BME 443 | Biomedical Instrumentation/Electronics | 3 |
| MATH 333 | Matrix Algebra and Complex Variables | 3/4 | BME 445 | Quantitative Neural Function | 3 |
| OR | | | BME Elective* | | 3 |
| CHEM 237 | Organic Chemistry I | 3 | CHEM 239 | Organic Chemistry II | 3 |
| IPRO Elective I | | 3 | OR | | |
| ENVE 426 | Statistical Tools for Engineers | 3 | Technical Elective | | 3 |
| Total Hours | | 17/18 | Total Hours | | 16 |
| Semester 7 | | Credits | Semester 8 | | Credits |
| BIOL 430 | Animal Physiology | 3 | BME 420 | Design Concepts in BME | 3 |
| BME 405 | Physiology Laboratory | 2 | BME 438 | NeuroImaging | 3 |
| BME 419 | Introduction to Design | 2 | BME 490 | Senior Seminar | 1 |
| IPRO Elective II | | 3 | BME Elective* | | 3 |
| BME Elective* | | 3 | Social Sciences Elective (300+) | | 3 |
| Humanities Elective (300+) | | 3 | Humanities Elective (300+) | | 3 |
| Total Hours | | 16 | Total Hours | | 16 |

Total Credit Hours **132/133**

* BME elective must be a 300+ level engineering course in BME, ECE, CHE, MMAE, or CAE.

Stuart School of Business

Department Website: www.stuart.iit.edu

IIT Tower, 18th Floor
10 W. 35th Street
Chicago, IL 60616
312.906.6500

Dean

Harvey Kahalas

Associate Deans

Siva K. Balasubramanian
John Bilson

Through its unique emphasis on project courses designed to supplement a rigorous business core curriculum, the undergraduate business program helps prepare a new generation of men and women who are qualified to develop their own entrepreneurial entities or to lead the companies and organizations of the future. The innovative “hands-on” approach of the curriculum allows students to begin working on “real world” problems from their first semester onward rather than waiting until they graduate. This innovative educational experience results in unique value propositions for our students, faculty, and partners.

The Bachelor of Science in Business Administration (B.S.B.A.) not only offers specializations in marketing and

finance, but also allows students to go beyond these traditional fields to select a specialization in any department, or school, within IIT that approves the specialization. Such specializations could include applied mathematics, chemistry, construction management, information technology, life sciences, logistics, material sciences, etc.

This distinctive program is designed to educate students to deal with the problems of an increasingly complex business environment. In conjunction with the IIT general education requirement, with its focus on mathematics, computer science, and natural sciences, the business curriculum helps students gain practice of business administration and preparation for the next economy.

The objectives of this program are to provide future business owners, managers, and leaders with:

- A solid technological foundation for the new and emerging business environment.
- A fundamental grounding in the core competencies of business including accounting, economics, finance, marketing, management, and social skills.
- An understanding of the interdisciplinary nature of management in today’s complex businesses, which compete in the global economy.

Faculty

Professors

S. Balasubramanian, J. Bilson, M. Erramilli, E. Geisler, J. Goldhar, M. Hassan, H. Kahalas, M. Ong, K. Tourk

Associate Professors

M. Bariff, N. Khalili, J. Liao

Assistant Professors

S. Anand, W. Ashton, L. Cai, A. Chakravarti, R. Cooper, E. Durango-Cohen, Y. Fang, S. Kang, D. Richardson, N. Sabbaghi, J. Sun, B. Van Vliet, L. Wagman, H. Wang, T. Wu

Clinical Professor

J. Twombly

Clinical Associate Professor

C. Hamilton

Clinical Assistant Professor

D. Ehrlich

Industry Professor

M. Gorham

Industry Associate Professor

R. Ramanan

Visiting Professor

A. McWilliams

Senior Lecturers

R. Bonaccorsi, S. Bredine, R. Calia, T. Cooper, S. Peters, M. Rybak, S. Weiss

Instructor

G. Chaudoin

Faculty Emeritus

T. Calero, J. Chung, T. Knowles, S. Smith, N. Thomopoulos

Bachelor of Science in Business Administration

The Bachelor of Science in Business Administration provides a solid foundation in business fundamentals along with a basic grounding in science. Core business competencies include accounting, economics, statistics, finance, business law, marketing, management, entrepreneurship, and leadership. Students also take a specialization that

allows them to develop a depth of knowledge in a business field or another field of their choosing. Currently available business specializations are in finance and marketing, while specializations outside of business can be developed to meet the special needs of a student.

Bachelor of Science in Business Administration

| Required Courses | Credit Hours |
|---|--------------|
| Business Requirements BUS 100, 211, 212, 221, 301, 305, 321, 341, 351, 361, 371, 467, 468, 480, ECON 151, 152 | 48 |
| Project Courses BUS 103, 104, 203, 204, 303, 304, 403, 404 | 8 |
| Specialization Courses | 15 |
| Mathematics Requirements MATH 151 or (MATH 148 and MATH 149) | 5 |
| Science Requirements | 12 |
| Humanities and Social Science Requirements For general education requirements, see page 25. | 21 |
| Computer Science Requirement CS 105 or CS 110 | 2 |
| Interprofessional Projects Strongly recommended one IPRO elective to be IPRO 397 or an entrepreneurial IPRO. | 6 |
| Free Electives | 9 |
| Total Hours | 126 |

Business Administration Curriculum

| Semester 1 | Credits |
|---|-----------|
| BUS 100 Introduction to Business | 3 |
| BUS 103 Ideation: What Are My Interests | 1 |
| ECON 151 Making Strategic Decisions in the Marketplace | 3 |
| MATH 151 Calculus I | 5 |
| CS 105 Intro to Computer Programming I | 2 |
| Humanities 100-level Elective | 3 |
| Total Hours | 17 |

| Semester 2 | Credits |
|--|-----------|
| BUS 104 Needs Analysis and Opportunity Analysis Aligned with My Interests | 1 |
| BUS 221 Analytics for Informed Decision-Making | 3 |
| ECON 152 Understanding and Competing in the Global Marketplace | 3 |
| Science Elective | 3 |
| Humanities or Social Sciences Elective | 3 |
| Social Sciences Elective | 3 |
| Total Hours | 16 |

| Semester 3 | Credits |
|---|-----------|
| BUS 203 Identification and Evaluation of Prospective Consumers | 1 |
| BUS 211 Measuring and Assessing Entity Financial Performance | 3 |
| BUS 301 Designing and Structuring the Organization for Strategic Decision-Making | 3 |
| Science Elective | 3 |
| Science Elective | 3 |
| Humanities Elective (300+) | 3 |
| Total Hours | 16 |

| Semester 4 | Credits |
|--|-----------|
| BUS 204 Identification and Evaluation of Competitive Advantage | 1 |
| BUS 212 Managerial Decision-Making and Control | 3 |
| BUS 305 Contemporary Design of Business Processes and Business Models | 3 |
| BUS 341 Business Law for Entrepreneurs in the Modern Global Economy | 3 |
| BUS 351 Effective Financial Decision-Making | 3 |
| Science Elective | 3 |
| Total Hours | 16 |

| Semester 5 | Credits |
|--|-----------|
| BUS 303 Financial Analysis: Pro-Forma Financial Statements | 1 |
| BUS 321 Quantitative Models for Effective Decision-Making | 3 |
| BUS 361 Entrepreneurial Thinking and Practice in a Complex Organization | 3 |
| BUS 371 Strategies for Reaching New Markets | 3 |
| Specialization Elective* | 3 |
| Social Sciences Elective | 3 |
| Total Hours | 16 |

| Semester 6 | Credits |
|---|-----------|
| BUS 304 Financial Valuation: How Much is it Worth? | 1 |
| BUS 467 Managing Entrepreneurial Enterprise and the Global Marketplace | 3 |
| Specialization Elective* | 3 |
| Specialization Elective* | 3 |
| IPRO Elective I** | 3 |
| Humanities Elective (300+) | 3 |
| Total Hours | 16 |

| Semester 7 | Credits |
|---|-----------|
| BUS 403 Developing a Strategically Competitive Business Plan | 1 |
| BUS 468 Creating and Managing the Sustainable Entrepreneurial Enterprise | 3 |
| IPRO Elective II** | 3 |
| Specialization Elective* | 3 |
| Social Sciences Elective (300+) | 3 |
| Free Elective | 3 |
| Total Hours | 16 |

| Semester 8 | Credits |
|--|-----------|
| BUS 404 Selling Your Business Plan | 1 |
| BUS 480 Strategic Management and Design Thinking for the Next Economy | 3 |
| Specialization Elective* | 3 |
| Free Elective | 3 |
| Free Elective | 3 |
| Total Hours | 13 |

Total Credit Hours **126**

* At least 15 semester hours in a designated specialization.

** Strongly recommend one IPRO elective be IPRO 397 or an entrepreneurial IPRO.

Chemical and Biological Engineering

Department Website: www.iit.edu/engineering/chbe

Perlstein Hall Suite 127
10 W. 33rd St.
Chicago, IL 60616
312.567.30230

Interim Chair

Satish J. Parulekar

The department offers leading edge research and education programs in Chemical Engineering and Biological Engineering. These programs are aimed to prepare engineers for the technological challenges of the 21st century by providing students with:

- Fundamental knowledge and design capability in chemical, biological, and environmental engineering, food process engineering, and pharmaceutical engineering.
- Advanced research programs in core competency areas.
- Understanding of ethical, economic, and social issues that influence technology choices.
- Leadership and communication skills.
- Life-long learning capabilities.

The objective of the undergraduate program is to educate chemical engineering students and prepare them for career in professional practice and/or for advanced studies at the

graduate level. The program specifically aims to develop a new breed of engineers who are not only well schooled in the basics and fundamentals of chemical and biological engineering, but who also possess the skills necessary for success in today's workplace. In recognition of the recent shift of the chemical engineering profession into a more prominent involvement in biotechnology and biological engineering, the department has redesigned the undergraduate curriculum in order to ensure that its graduates will possess additional knowledge and skills in biology and biological engineering as predicated by the changing needs of industry.

B.S., M.S., Professional Master's, and Ph.D. degree programs are offered in Chemical Engineering. A Professional Master's degree is offered in Biological Engineering. M.S. and Professional Master's degree programs are also offered in Food Process Engineering and Chemical Engineering/Computer Science. The department also offers a B.S./M.D. program in Engineering and Medicine (see page 170) and a combined undergraduate/graduate law program (see page 169).

Faculty

Professors

J. Anderson, H. Arastoopour, A. Cinar, S. Parulekar, J. Prakash, J. Schieber, F. Teymour, D. Venerus, D. Wasan

Associate Professors

J. Abbasian, D. Chmielewski, V. Perez-Luna, V. Ramani

Assistant Professor

N. Karuri

Research Professor

A. Nikolov

Research Assistant Professor

K. Krishnamurthy

Visiting Professor

F. Segovia

Visiting Assistant Professor

T. Indei

Senior Lecturer

N. Aderangi

Faculty Emeritus

B. Bernstein, D. Gidaspow, R. Selman

Adjunct Faculty

R. Anderson, O. Khalil

Teaching Professors

Duvall, Tatara

Joint Appointments Professors

H. Arastoopour (Mechanical, Materials, and Aerospace Engineering), A. Cinar (Biomedical Engineering), J. Schieber (Physics)

Chemical Engineering

Chemical engineering is concerned with the design, development, and management of facilities that convert raw materials into useful products. The engineer must assume responsibility for the economical use of the raw materials, preservation of the environment, and profitability of the operation. The Chemical Engineering program has been

designed to provide both the engineering competence and the professional skills necessary to succeed in this endeavor. In order to achieve this objective, the curriculum incorporates coursework in both of these areas throughout the four-year duration of the program.

Coursework

The Chemical Engineering curriculum emphasizes basic knowledge and applications of transport processes, thermodynamics and kinetics of processes, automatic control, and design, as well as fundamental sciences, mathematics, and engineering sciences. Design experience is spread across the curriculum, beginning with the Introduction to the Profession courses. Equipment design is emphasized in courses such as Fluid Mechanics, Heat and Mass-Transfer Operations, Thermodynamics, and Chemical Reaction Engineering. Control-system design is practiced in the Pro-

cess Control course. Process modeling, simulations and optimization are discussed and practiced in Transport Phenomena, Process Modeling and System Theory, Numerical and Data Analysis, Statistical Tools for Engineering, and Process Control courses. The capstone design courses (Chemical Process Design I & II) integrate these design concepts and practice process design and optimization. In addition to engineering competence, the program also examines the economic, environmental, and societal implications of chemical engineering.

Professional Training

Professional training is stressed in the design of the Chemical Engineering curriculum. Because engineering is largely a team effort, the department develops the individual's ability to work effectively as a team member. Group projects are assigned starting with the Introduction to the Profession course. Laboratory course and capstone design course projects are conducted by teams of students. The laboratory work is designed to reinforce the concepts developed in the lectures and to show the application of chemical engineering principles to the solution of real-world problems.

Because individual attention is so important to the student's growth, laboratory sections are small and a high-level of personal contact between student and instructor is maintained. Students are encouraged to become involved with state-of-the-art research projects at the undergraduate level. The industry/university co-op program is available to students who would like to use one or more extra semesters any time after their sophomore year to work on an internship in industry.

Specialized Programs

In addition to the core curriculum, special programs exist to accommodate students who want to develop more extensive background in related areas. With their exposure to a wide range of industrial applications and problems, students are better equipped to make a decision to explore an area of interest in depth. Professional specializations are available in:

- Energy/Environment/Economics (E³)
- Environmental Engineering
- Polymer Science and Engineering
- Bioengineering
- Process Design and Operation

Students may also choose a minor program (see pages 162–165). All students must include in their minor program, or as a technical elective, CHE 426 (Statistical Tools for Engineers) or at least one three-credit-hour engineering science course. Students who plan to go to graduate school are advised to take CHE 535 (Applications of Mathematics to Chemical Engineering) as a technical elective.

Bachelor of Science in Chemical Engineering

| Required Courses | Credit Hours |
|---|--------------|
| Chemical Engineering Requirements CHE 100, 101, 202, 301, 302, 311, 317, 351, 406, 418, 423, 433, 435, 439, 451, 494, 496 | 46 |
| Mathematics Requirements MATH 151, 152, 251, 252 | 18 |
| Physics Requirements PHYS 123, 221 | 8 |
| Chemistry Requirements CHEM 125, 237, 239, 343, 344 | 18 |
| Computer Science Requirement CS 104 or CS 105 | 2 |
| Electrical and Computer Engineering Requirement ECE 211 or 218 | 3 |
| Humanities and Social Sciences Requirements For general education requirements, see page 25. | 21 |
| Technical Electives | 9 |
| Interprofessional Projects | 6 |
| Total Hours | 131 |

Chemical Engineering Curriculum

| Semester 1 | Credits |
|---|-----------|
| CHE 100 Introduction to the Profession I | 2 |
| MATH 151 Calculus I | 5 |
| CHEM 125 Principles of Chemistry II* | 4 |
| CS 104 Introduction to Computer Programming for Engineers | |
| OR | 2 |
| CS 105 Intro to Computer Programming I | |
| Humanities 100-level Elective | 3 |
| Total Hours | 16 |

| Semester 2 | Credits |
|---|-----------|
| CHE 101 Introduction to the Profession II | 2 |
| MATH 152 Calculus II | 5 |
| PHYS 123 General Physics I | 4 |
| Social Sciences Elective | 3 |
| Humanities or Social Sciences Elective | 3 |
| Total Hours | 17 |

| Semester 3 | Credits |
|---|-----------|
| CHE 202 Material and Energy Balances | 3 |
| MATH 252 Introduction to Differential Equations | 4 |
| CHEM 237 Organic Chemistry I | 4 |
| PHYS 221 General Physics II | 4 |
| Humanities Elective (300+) | 3 |
| Total Hours | 18 |

| Semester 4 | Credits |
|---|-----------|
| CHE 301 Fluid Mechanics | 3 |
| MATH 251 Multivariate and Vector Calculus | 4 |
| CHEM 239 Organic Chemistry II | 3 |
| CHEM 343 Physical Chemistry II | 3 |
| Social Sciences Elective | 3 |
| Total Hours | 16 |

| Semester 5 | Credits |
|--|-----------|
| CHE 302 Heat and Mass Transfer Operations | 3 |
| CHE 311 Foundations of Bio Science for Engineers | 3 |
| CHE 351 Thermodynamics I | 3 |
| ECE 211 Circuit Analysis I | |
| OR | 3 |
| ECE 218 Digital Systems | |
| Humanities Elective (300+) | 3 |
| Total Hours | 15 |

| Semester 6 | Credits |
|---|-----------|
| CHE 317 Chemical/Biological Engineering Lab I | 2 |
| CHE 451 Thermodynamics II | 2 |
| CHE 433 Process Modeling and System Theory | 3 |
| CHEM 344 Physical Chemistry II | 4 |
| IPRO Elective I | 3 |
| Technical Elective | 3 |
| Total Hours | 17 |

| Semester 7 | Credits |
|--|-----------|
| CHE 418 Chemical/Biological Engineering Lab II | 2 |
| CHE 423 Chemical Reaction Engineering | 3 |
| CHE 435 Process Control | 3 |
| CHE 494 Process Design I | 3 |
| Technical Elective | 3 |
| Social Sciences Elective (300+) | 3 |
| Total Hours | 17 |

| Semester 8 | Credits |
|-------------------------------------|-----------|
| CHE 406 Transport Phenomena | 3 |
| CHE 439 Numerical and Data Analysis | 3 |
| CHE 496 Process Design II | 3 |
| IPRO Elective II | 3 |
| Technical Elective | 3 |
| Total Hours | 15 |

Total Credit Hours **131**

* Initial placement in CHEM 125 requires consent of the Biological and Chemical Sciences (BCS) department.

This program is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology.

Professional Specializations

Students choosing one of the professional specializations should take a total of three courses in the specialization area.

Appropriate substitution may be made with the approval of the program advisor.

Energy/Environment/Economics (E³)

Program advisor: J. Abbasian

Students must take the following course:

CHE 543 Energy, Environment, Economics

In addition, they should choose at least one course from each of these two areas:

Energy Sources, Conversion, Utilization, and Distribution

CHE 465 Electrochemical Energy Conversion
 CHE 467 Fuel Cell System Design
 CHE 489 Fluidization
 CHE 491 Undergraduate Research
 CHE 541 Renewable Energy Technologies
 CHE 565 Electrochemical Engineering
 CHE 567 Fuel Cell Fundamentals
 CHE 582 Interfacial and Colloidal Phenomena
 ECE 319 Fundamentals of Power Engineering
 ECE 411 Power Electronics
 ECE 419 Power System Analysis
 ECE 420 Analysis Methods in Power Systems
 ECE 438 Control Systems
 MMAE 423 Air Conditioning and Refrigeration
 MMAE 424 Internal Combustion Engines
 MMAE 425 Direct Energy Conversion
 MMAE 426 Nuclear, Fossil-Fuel, & Sustainable Energy Systems
 MMAE 524 Fundamentals of Combustion
 MMAE 525 Fundamentals of Heat Transfer

Energy and Environment, System Analysis, and Special Problems

CHE 426 Statistical Tools for Engineers
 ENVE 404 Water and Wastewater Engineering
 ENVE 463 Introduction to Air Pollution Control
 ENVE 485 Pollution Prevention
 ECE 491 Undergraduate Research
 MMAE 491 Undergraduate Research
 MMAE 494 Undergraduate Design Project
 MMAE 497 Undergraduate Special Topic
 ECON 423 Economic Analysis of Capital Investments
 PS 338 Energy and Environmental Policy
 IPRO 497 In Energy/Environment Areas

Environmental Engineering

Program advisor: D. Moschandreas

Students must take at least one course from each of the following two areas:

Environmental Engineering

CHE 426 Statistical Tools for Engineers
 ENVE 404 Water and Wastewater Engineering
 ENVE 463 Introduction to Air Pollution Control
 ENVE 485 Pollution Prevention
 ENVE 491 Undergraduate Research

Civil Engineering

CAE 421 Risk Assessment Engineering
 CAE 482 Hydraulic Design of Open Channel Systems
 CAE 483 Environmental Systems for Building I
 CAE 484 Environmental Systems for Building II
 IPRO 497 In Energy/Environment Areas

Process Design and Operation

Program advisor: D. Chmielewski

For students interested in design, operation, monitoring, optimization, and control of chemical processes.

At least one course must be taken from the following:

CHE 426 Statistical Tools for Engineers
 CHE 508 Process-Design Optimization
 CHE 530 Advanced Process Control
 CHE 560 Statistical Quality and Process Control

A least one must be selected from the following (only one may be an ENVE course):

CHE 430 Petrochemical Process Operations and Design
 CHE 465 Electrochemical Energy Conversion
 CHE 489 Fluidization
 CHE 491 Undergraduate Research
 ENVE 463 Introduction to Air Pollution Control
 ENVE 476 Engineering Control of Industrial Hazards
 ENVE 485 Pollution Prevention
 ENVE 578 Industrial Gas Cleaning
 ENVE 580 Hazardous Waste Engineering
 FPE 521 Food Process Engineering
 FPE 522 Advanced Food Process Engineering

Polymer Science and Engineering

Program advisors: J. Schieber, D. Venerus

The program embraces polymer chemistry, characterization, structure and properties, as well as the manufacture of polymeric raw materials and their processing into finished products.

Students must take one of the following courses:

CHE 470 Introduction to Polymer Science

CHEM 470 Introduction to Polymer Science

MMAE 470 Introduction to Polymer Science

In addition, they should choose at least one course from the following:

CHE 538 Polymerization Reaction Engineering

CHE 555 Polymer Processing

CHE 575 Polymer Rheology

CHEM 535 Advanced Polymer Chemistry

CHEM 537 Polymer Chemistry Laboratory

CHEM 542 Interfacial Characterization of Polymers

MMAE 483 Structure/Property Relation in Polymers

MMAE 487 Fiber Reinforced Polymer Composite
Materials

MMAE 579 Characterization of Polymers

MMAE 580 Structure and Property of Polymers

MMAE 581 Theory of Mechanical Behavior of Polymers

Students may take up to one course from the following:

CHE 426 Statistical Tools for Engineers

CHE 489 Fluidization

CHE 491 Undergraduate Research

CHE 582 Interfacial and Colloidal Phenomena

FPE 541 Principles of Food Packaging

MMAE 451 Finite Element Methods in Engineering

MMAE 485 Manufacturing Processing

Bioengineering

Program advisors: S. Parulekar and V. Pérez-Luna

Bioengineering has two career specializations:

Biomedical Engineering

Students must take the following courses:

BIOL 107 General Biology

BIOL 115 Human Biology

One elective is chosen from the following:

BIOL 214 Genetics

OR

BIOL 414 Genetics for Engineering Scientists

BIOL 401 Introductory Biochemistry

BIOL 430 Animal Physiology

BIOL 445 Cell Biology

CHE 491 Undergraduate Research

CHE 577 Bioprocess Engineering

Biotechnology

Three electives are chosen from the following:

BIOL 107 General Biology

BIOL 214 Genetics

OR

BIOL 414 Genetics for Engineering Scientists

BIOL 401 Introductory Biochemistry

BIOL 423 Microbial Genetics Laboratory

BIOL 445 Cell Biology

CHE 577 Bioprocess Engineering

FPE 505 Food Microbiology

Civil, Architectural, and Environmental Engineering

Department Website: www.iit.edu/engineering/cae

Alumni Memorial Hall
3201 S. Dearborn St.
Suite 228
Chicago, IL 60616
312.567.3540

Chair

Gongkang Fu

The Department of Civil, Architectural, and Environmental Engineering offers three degree programs that prepare the IIT graduate to face a changing world and create solutions that benefit all of humanity.

Civil engineering is the oldest of all engineering professions. Its roots can be traced back to ancient history and followed through to modern times by its ubiquitous presence in the lives of every modern and emerging society across the globe. Civil engineers are needed to answer the basic challenges rooted in all of engineering.

Civil engineers work on large infrastructure projects; everything from highways, railroads, pipelines, water treatment systems, dams, reservoirs, seaports, airports, waterways, tunnels, cities, and even skyscrapers. Civil engineers do more than build; they are responsible for ensuring the safety of infrastructure.

Architectural engineers work on buildings. They design and integrate the structure, systems, enclosure, and environment to create a single design that answers and exceeds the needs of the client. Architectural engineering is multidisciplinary by its nature. Studies include thermodynamics of building components, the science of air and water flow, the management of electrical energy, the design of light steel space frames, how to provide the proper illumination in an auditorium, how to manage the humidity in the air, and how to make a theater's acoustics enhance any performance. Architectural engineers are trained to work with architects to incorporate engineering directly into design and ensure that a building performs as expected and actually protects its occupants from the threat of fire and smoke.

Environmental engineering is a specialization within civil engineering. The department offers a Bachelor's degree with specialization in environmental engineering and a Master's program in environmental engineering. Environmental engineers are the designers of sustainable solutions to protect as well as use air, water, and earth across the globe. They fulfill a crucial aspect in the design of our

infrastructure to ensure that resources are conserved and used for the benefit of humanity now and well into the future.

Engineering management is a degree that focuses on the development of professional skills and catapulting new ideas into new products and services in any field of engineering. The degree allows students to concentrate in any engineering area and augments engineering skills with improved knowledge of creativity, innovation, communication, intellectual property, and entrepreneurship. The degree is designed to give maximum freedom in course selection and can be tailored to provide the building blocks leading to start a Master's program in any engineering field.

The Department of Civil, Architectural and Environmental Engineering also offers the following co-terminal degrees that enable a student to complete both degrees in five years:

- Bachelor of Science in Architectural Engineering and a Master of Architectural Engineering
- Bachelor of Science in Architectural Engineering and a Master of Construction Engineering and Management
- Bachelor of Science in Architectural Engineering and a Master of Structural Engineering
- Bachelor of Science in Civil Engineering and a Master of Construction Engineering and Management
- Bachelor of Science in Civil Engineering and a Master of Environmental Engineering
- Bachelor of Science in Civil Engineering and a Master of Geotechnical Engineering
- Bachelor of Science in Civil Engineering and a Master of Structural Engineering
- Bachelor of Science in Civil Engineering and a Master of Transportation Engineering

These programs allow students to complete a dual degree in a shorter time period, to apply through a simplified admission process, and to receive some financial incentives. See the Graduate Bulletin for course details.

The programs in Civil, Architectural, and Environmental Engineering lay a broad basis to begin the journey to professional licensure and assume the responsibility to "...hold paramount the safety, health and welfare of the public and shall strive to comply with the principles of sustainable development in the performance of their professional duties." – American Society of Civil Engineers Code of Ethics.

Faculty

Professors

D. Arditi, G. Fu, J. Mohammadi, D. Moschandreas, K. Noll, K. Pagilla

Associate Professors

P. Anderson, J. Budiman, Z. Li, J. Shen

Assistant Professors

L. Du, C. Menches, M. Modares, B. Stephens

Senior Lecturers

J. Novak, M. Snyder

Faculty Emeritus

J. Dygdon, S. Guralnick, J. Khisty, J. O'Leary

Adjunct Professors

D. Carreira, A. Domel, S. Gill, J. Jahedi, R. Lemming, A. Longinow, A. Oskouie, L. Rohter

Adjunct Associate Professor

P. Sriraj

Adjunct Assistant Professor

D. Grabowski

Civil Engineering

Department Website: www.iit.edu/engineering/cae

The objective of the Civil Engineering program is to prepare graduates to enter and be successful in the civil engineering profession. Graduates are expected to become licensed professional engineers, and to reach responsible positions in a wide range of professional settings, including consulting firms, industry, or government. As well, this program will prepare students to begin and successfully complete graduate studies in engineering and/or post-baccalaureate education in a professional degree program. The Civil Engineering program provides breadth in core sub-disciplines and depth in at least one area of specialization. This degree program is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).

Civil engineering is the original of the engineering disciplines. With the increase in population, the growing complexity of industries, and changing urban centers, the civil engineer's task - applying science to the control and utilization of the environment for the total benefit of mankind - represents a challenge unsurpassed in all of engineering.

The civil engineer often is confronted with conditions so variable and complex that they cannot be precisely defined by science and mathematics. Therefore, a knowledge of the arts and social sciences, as well as the physical sciences, is essential. In addition, because civil engineering requires overall planning of very large projects whose components involve many other disciplines, it is also necessary to have knowledge of management techniques. The goal of the Civil Engineering program is to provide an education that enables graduates to make far-reaching decisions that draw not only from technical knowledge but also from integrity and judgment.

In the professional courses, classroom lectures are supplemented by laboratory practice, including the study of materials, structural engineering, hydraulics, environmental engineering, geotechnical engineering, and surveying. The principal functional areas that are considered subdivisions of civil engineering are structural engineering, transportation engineering, geotechnical engineering, environmental engineering, water resources engineering, and construction management.

Students may choose a professional specialization as described on the following pages, or one of the following minors: Air Force Aerospace Studies, Military Science, Naval Science, and other approved minors (see pages 162-165).

Architecture students who plan to pursue a Master's degree in Structural Engineering should take the following courses:

CAE 303 Structural Design I
CAE 304 Structural Analysis I
CAE 307 Structural Design II
CAE 310 Structural Analysis II
CAE 431 Steel Design
CAE 432 Concrete and Foundation Design

Students should consult the *IIT Bulletin: Graduate Programs* for additional details.

All civil engineering students are required to take the Fundamentals of Engineering (FE) examination during their senior year. The examination is offered by the State of Illinois in October and April. Students should contact the Department of Civil, Architectural, and Environmental Engineering for information concerning this examination.

Bachelor of Science in Civil Engineering

| Required Courses | Credit Hours |
|---|--------------|
| Civil Engineering Requirements CAE 100, 101, 105, 110, 111, 221, 301, 302, 303, 304, 307, 310, 312, 315, 323, 419, 431, 432, 457, 470 | 54 |
| CAE Elective | 3 |
| Technical Electives* | 9 |
| Mathematics Requirements MATH 151, 152, 251, 252 | 18 |
| Physics Requirements PHYS 123, 221 | 8 |
| Capstone Design Requirement | 3 |
| Chemistry Requirement CHEM 124 | 4 |
| Computer Science Requirement CS 104 or CS 105 | 2 |
| Engineering Course Requirements MMAE 200, 202, 305 | 9 |
| Interprofessional Projects | 6 |
| Humanities and Social Sciences Requirements For general education requirements, see page 25. | 21 |
| Total Hours | 137 |

* At least two technical electives must be CAE-400 level courses.

Civil, Architectural, and Environmental Engineering

Civil Engineering Curriculum

| Semester 1 | Credits |
|---|-----------|
| CAE 100 Intro to Engineering Drawing and Design | 2 |
| CAE 110 Professional Practice I | 1 |
| CAE 105 Geodetic Science | 3 |
| MATH 151 Calculus I | 5 |
| CHEM 124 Principles of Chemistry I | 4 |
| Humanities 100-level Elective | 3 |
| Total Hours | 18 |

| Semester 2 | Credits |
|---|-----------|
| CAE 101 Intro to AutoCAD Drawing and Design | 2 |
| CAE 111 Professional Practice II | 1 |
| MATH 152 Calculus II | 5 |
| CS 104 Intro Computer Programming for Engineers | 2 |
| OR | |
| CS 105 Intro to Computer Programming I | 4 |
| PHYS 123 General Physics I | 3 |
| Social Sciences Elective | 3 |
| Total Hours | 17 |

| Semester 3 | Credits |
|---|-----------|
| MATH 251 Multivariate and Vector Calculus | 4 |
| MMAE 201 Mechanics of Solids I | 3 |
| CAE 221 Engineering Geology | 3 |
| PHYS 221 General Physics II | 4 |
| Humanities or Social Sciences Elective | 3 |
| Total Hours | 17 |

| Semester 4 | Credits |
|---|-----------|
| MATH 252 Introduction to Differential Equations | 4 |
| MMAE 305 Dynamics | 3 |
| MMAE 202 Mechanics of Solids II | 3 |
| CAE 312 Engineering Systems Analysis | 3 |
| Humanities Elective (300+) | 3 |
| Total Hours | 16 |

| Semester 5 | Credits |
|-----------------------------------|-----------|
| CAE 301 Hydraulics and Hydrology | 3 |
| CAE 303 Structural Design I | 3 |
| CAE 304 Structural Analysis I | 3 |
| CAE 315 Materials of Construction | 3 |
| CAE or Technical Elective* | 3 |
| I PRO Elective I | 3 |
| Total Hours | 18 |

| Semester 6 | Credits |
|--|-----------|
| CAE 302 Fluid Mechanics and Hydraulics | 3 |
| CAE 307 Structural Design II | 3 |
| CAE 310 Structural Analysis II | 3 |
| CAE 323 Soil Mechanics | 3 |
| I PRO Elective II | 3 |
| Social Sciences Elective | 3 |
| Total Hours | 18 |

| Semester 7 | Credits |
|--|-----------|
| CAE 419 Transport Engineering and Design | 3 |
| CAE 431 Steel Design | 3 |
| CAE 457 Geotechnical Foundation Design | 3 |
| CAE 470 Construction Methods/Cost Estimating | 3 |
| CAE or Technical Elective* | 3 |
| Humanities Elective (300+) | 3 |
| Total Hours | 18 |

| Semester 8 | Credits |
|--|-----------|
| CAE 432 Concrete and Foundation Design | 3 |
| CAE or Technical Elective* | 3 |
| CAE or Technical Elective* | 3 |
| Capstone Design Course | 3 |
| Social Sciences Elective (300+) | 3 |
| Total Hours | 15 |

Total Credit Hours **137**

* At least two courses must be CAE 400-level courses.

This program is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).

Professional Specializations in Civil Engineering

Students who select an area of specialization must take a minimum of nine credit hours from the following technical electives listed under the respective area of specialization.

Three additional credit hours may be any 400-level CAE course taken with prior approval of the student's advisor and chair.

Structural Engineering

CAE 408 Bridge and Structural Design
CAE 420 Dynamics of Structures
CAE 430 Probability Concepts in Civil Engineering
CAE 435 Experimental Analysis of Structures
CAE 442 Finite Elements Methods in Framed Structures

Construction Engineering and Management

CAE 471 Construction Planning and Scheduling
CAE 472 Construction Site Operation
CAE 473 Construction Project Administration

Geotechnical Engineering

CAE 415 Pavement Design, Construction,
and Maintenance
CAE 442 Finite Element Methods in Framed Structures
CAE 486 Soil and Site Improvement

Transportation Engineering

CAE 412 Traffic Engineering Studies and Design
CAE 415 Pavement Design, Construction,
and Maintenance
CAE 416 Facility Design of Transportation Systems
CAE 417 Railroad Engineering Studies and Design
CAE 430 Probability Concepts in Civil Engineering

Civil-Environmental Engineering

ENVE 310 Introduction to Environmental Engineering
ENVE 404 Water & Waste Engineering
ENVE 426 Statistical Tools for Engineers
ENVE 463 Introduction to Air Pollution Control

Architectural Engineering

Department Website: www.iit.edu/engineering/cae

The objective of the Architectural Engineering program is to prepare graduates to enter and be successful in the architectural engineering profession. Graduates are expected to become licensed professional engineers, and to reach responsible positions in a wide range of professional settings, including consulting firms, industry, or government. As well, this program will prepare students to begin and successfully complete graduate studies in engineering and/or post-baccalaureate education in a professional degree program. The Architectural Engineering program provides breadth in core sub-disciplines and depth in at least one area of specialization. This degree program is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).

Architectural engineering is a building-oriented discipline which offers students an opportunity to obtain an engineering education specializing in building architecture, building-system integration, and structural and computer-aided design.

Professional architectural engineers are concerned with the structural integrity of buildings; the design and analysis of HVAC (Heating, Ventilating and Air Conditioning); plumbing, fire protection and electrical systems; acoustics; lighting; energy conservation; building science and the study of building performance; and the management of construction resources and schedules. Graduates of the Architectural Engineering program will be well prepared for careers as consulting engineers, building contractors,

construction managers, structural engineers, and knowledgeable specialists in related areas of building design and analysis.

Architectural engineering shares much in common with civil and mechanical engineering but is distinct in its exclusive concentration on building projects. Architectural engineering students should have an aptitude in and an appreciation of the following areas of knowledge: basic principles of mathematics; physics and chemistry; manual and computer-aided drafting and design; surveying; construction materials; engineering mechanics; structural analysis and design; building-system integration; and professional practice and ethics.

Architecture students who plan to pursue a Master's degree in Architectural Engineering should take the following courses:

CAE 208 Thermal-Fluids Engineering I

CAE 209 Thermal-Fluids Engineering II

CAE 383 Electrical and Electronic Circuits

Students should consult the *IIT Bulletin: Graduate Programs* for additional details.

All architectural engineering students are required to take the Fundamentals of Engineering (FE) examination during their senior year. The examination is offered by the State of Illinois in October and April. Students should contact the Department of Civil, Architectural, and Environmental Engineering for information concerning this examination.

Bachelor of Science in Architectural Engineering

| Required Courses | Credit Hours |
|---|--------------|
| Architectural Engineering Requirements CAE 100, 101, 105, 110, 111, 208, 209, 303, 304, 307, 312, 315, 323, 331, 334, 383, 461, 464, 468, 469, 470, 471 | 59 |
| Capstone Design Requirement | 3 |
| Technical Electives* | 9 |
| Mathematics Requirements MATH 151, 152, 251, 252 | 18 |
| Physics Requirements PHYS 123, 221 | 8 |
| Chemistry Requirement CHEM 124 | 4 |
| Computer Science Requirement CS 104 or CS 105 | 2 |
| Engineering Course Requirements MMAE 200, 202 | 6 |
| Humanities Requirement AAH 119 | 3 |
| Interprofessional Projects | 6 |
| Humanities and Social Sciences Requirements For general education requirements, see page 25. | 18 |
| Total Hours | 136 |

* At least two technical electives must be CAE-400 level courses.

Architectural Engineering Curriculum

| Semester 1 | Credits |
|---|-----------|
| CAE 100 Intro to Engineering Drawing and Design | 2 |
| CAE 110 Professional Practice I | 1 |
| CAE 105 Geodetic Science | 3 |
| CHEM 124 Principles of Chemistry I | 4 |
| MATH 151 Calculus I | 5 |
| Humanities 100-level Elective | 3 |
| Total Hours | 18 |

| Semester 2 | Credits |
|---|-----------|
| CAE 101 Intro to AutoCAD Drawing and Design | 2 |
| CAE 111 Professional Practice II | 1 |
| CS 104 Intro Computer Programming for Engineers | 2 |
| OR | |
| CS 105 Intro to Computer Programming I | |
| PHYS 123 General Physics I | 4 |
| MATH 152 Calculus II | 5 |
| Social Sciences Elective | 3 |
| Total Hours | 17 |

| Semester 3 | Credits |
|---|-----------|
| MMAE 201 Mechanics of Solids I | 3 |
| PHYS 221 General Physics II | 4 |
| MATH 251 Multivariate and Vector Calculus | 4 |
| CAE 208 Thermo-Fluids Engineering I | 3 |
| AAH 119 History of World Architecture I | 3 |
| Total Hours | 17 |

| Semester 4 | Credits |
|---|-----------|
| MMAE 202 Mechanics of Solids II | 3 |
| CAE 312 Engineering Systems Analysis | 3 |
| MATH 252 Introduction to Differential Equations | 4 |
| CAE 209 Thermo-Fluids Engineering II | 4 |
| Social Sciences Elective | 3 |
| Total Hours | 17 |

| Semester 5 | Credits |
|--|-----------|
| CAE 315 Materials of Construction | 3 |
| CAE 303 Structural Design I | 3 |
| CAE 304 Structural Analysis I | 3 |
| CAE 331 Building Science | 3 |
| CAE 383 Electrical and Electronic Circuits | 3 |
| IPRO Elective I | 3 |
| Total Hours | 18 |

| Semester 6 | Credits |
|------------------------------------|-----------|
| CAE 307 Structural Design II | 3 |
| CAE 323 Soil Mechanics | 3 |
| CAE 334 Illumination and Acoustics | 3 |
| CAE 464 HVAC Systems Design | 3 |
| IPRO Elective II | 3 |
| Humanities Elective (300+) | 3 |
| Total Hours | 18 |

| Semester 7 | Credits |
|--|-----------|
| CAE 461 Plumbing and Fire Protection Design | 3 |
| CAE 470 Construction Methods/Cost Estimating | 3 |
| CAE 468 Architectural Design | 2 |
| CAE Technical Elective* | 3 |
| CAE Technical Elective* | 3 |
| Humanities Elective (300+) | 3 |
| Total Hours | 17 |

| Semester 8 | Credits |
|--|-----------|
| CAE 471 Construction Planning and Scheduling | 3 |
| CAE 469 Architectural Studio | 2 |
| Capstone Design Course | 3 |
| CAE Technical Elective | 3 |
| Social Sciences Elective (300+) | 3 |
| Total Hours | 14 |

Total Credit Hours **136**

* At least two courses must be CAE 400-level courses.

This program is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).

Professional Specializations in Architectural Engineering

Students who select an area of specialization must take a minimum of nine credit hours from the following technical

electives listed under the respective area of specialization.

Building Mechanical and Energy

CAE 403 Sound and Vibration Control in Buildings
CAE 463 Building Enclosure Design
CAE 465 Building Energy Conservation Technologies

Acoustics and Illumination

CAE 403 Sound and Vibration Control in Building
CAE 409 Acoustic Performance Spaces
CAE 467 Lighting Systems Design

Structural Engineering*

CAE 310 Structural Analysis II
CAE 431 Steel Design
CAE 432 Concrete and Foundation Design

Construction and Engineering Management

CAE 471 Construction Planning and Scheduling
CAE 472 Construction Site Operation
CAE 473 Construction Project Administration

Electrical and Illumination

CAE 465 Building Energy Conservation Technologies
CAE 466 Building Electrical Systems Design
CAE 467 Lighting Systems Design

Fire Protection and Life Safety

CAE 422 Sprinklers, Standpipes, and Fire Pumps
CAE 424 Introduction to Fire Dynamics
CAE 425 Fire Protection and Life Safety

* Students should take CAE 310 in Semester 6 and an IPRO in Semester 7.

Engineering Graphics-Optional Programs

Engineering graphics is an indispensable communication and design tool which is concerned with the graphical representation of designs and specifications for physical objects and data relationships used in engineering, science, business, and technical work. The graphic language, along with the symbolic and verbal languages, enables those engaged in technology to communicate effectively, making it possible for new ideas, designs, and developments to

be transformed into useful consumer products. The well-trained engineer, scientist, or technician must be able to make correct graphical representations of engineering structures, designs, and data relationships, as well as possess an ability to express ideas quickly and accurately through the use of the graphic language.

For further information call 312.567.3365.

Certificate in Engineering Graphics and CAD

Recognizing the need for drafters and designers with a strong background in special areas of graphics, the Department of Civil, Architectural, and Environmental Engineering offers a certificate program in Engineering Graphics. This certificate is only available to students enrolled in a degree program at IIT and does not qualify for federal financial aid. It is designed to prepare specialists in graphics for positions in business and industry. Students completing the specified courses with satisfactory grades will be awarded a certificate of completion.

Students must take:

An Introductory Engineering Graphics & Design course*
EG 305 Advanced Engineering Graphics and Design
EG 306 Engineering Descriptive Geometry
EG 405 Mechanical Design Graphics
EG 406 Technical and Pictorial Illustration
EG 419 Computer Graphics in Engineering

* EG 105 (no longer offered), CAE 100 and CAE 101, MMAE 232, or an equivalent introductory course.

Professional Specialization in Engineering Graphics

The department offers a comprehensive series of special courses in engineering graphics that a student may take as electives in areas related to individual professional goals.

Consult the department's engineering graphics coordinator for advice on appropriate courses.

Engineering Management

Department Website: www.iit.edu/engineering/cae

The Engineering Management program at IIT is founded on the tradition of discipline and innovation established by the Armour College of Engineering.

The program offers an opportunity for students to obtain skills and competencies that are highly relevant and driven by the accelerating development of new technologies in the emerging global economy at the intersection of engineering invention and business administration.

The program's objective is to prepare students to become leaders in the corporate world shaped by innovations in engineering. Students learn fundamentals of science, engineering management, and business administration by concentrating on the development of critical thinking skills directed toward practical problem solving and informed decision making.

Students completing this program are uniquely positioned

to make decisions concerning product process development in ways that combine technical, financial, marketing, human resources, and strategic considerations. Students are prepared to perform economic analyses for new products, evaluate technologies, and assess business processes. Students completing this program will be able to prepare business plans that include financial details, marketing strategies, and design decisions based on target costs and forecasted rate of return on investment capital.

Students have several possibilities to specialize in engineering disciplines. Specializations include: civil engineering, architectural engineering, materials science and engineering, and mechanical engineering.

The program also includes a business curriculum that focuses on developing organization and management, critical thinking, and entrepreneurship skills.

Bachelor of Science in Engineering Management

| Required Courses | Credit Hours |
|---|----------------|
| Mathematics/Computer Science Requirements MATH 151, 152, 251, 252, CS 105 | 20 |
| Physics Requirements PHYS 123, 221 | 8 |
| Chemistry Requirement | 3/4 |
| Introduction to the Profession | 2 |
| Core Engineering Specialization (Individual department requirements may vary) | 28/30 |
| Core Entrepreneurship Requirements BUS 211, 212, 301, and 371 and four courses selected from the following: EMGT 363, 406, 470, INTM 477, MMAE 232, BUS 361, COM 428 or ECON 423 or CAE 312 (for non-CAE majors). | 24 |
| Interprofessional Projects | 6 |
| Humanities and Social Sciences Requirements ECON 211 is recommended. For general education requirements, see page 25. | 21 |
| Core Engineering Technical Electives | 9 |
| Free Electives | 6 |
| Total Hours | 127/130 |

Engineering Management Specializations

Specializations include those listed below. See www.iit.edu/engineering/cae for additional engineering specializations.

Civil Engineering (28 Credit Hours)

Students must take:

CAE 100 Introduction to Engineering Drawing and Design
CAE 101 Introduction to AutoCAD Drawing and Design
MMAE 200 Introduction to Mechanics
MMAE 202 Mechanics of Solids II
MMAE 305 Dynamics
CAE 301 Hydraulics and Hydrology
CAE 302 Fluid Mechanics and Hydraulics
CAE 312 Engineering Systems Analysis
CAE 315 Materials of Construction

Students must also take one of the following courses:

CAE 303 Structural Design
CAE 323 Soil Mechanics

Architectural Engineering (29 Credit Hours)

Students must take:

CAE 100 Introduction to Engineering Drawing and Design
CAE 101 Introduction to AutoCAD Drawing and Design
MMAE 200 Introduction to Mechanics
MMAE 202 Mechanics of Solids II
CAE 208 Thermal-Fluid Engineering I
CAE 209 Thermal-Fluid Engineering II
CAE 312 Engineering Systems Analysis
CAE 331 Building Science
CAE 334 Illumination and Acoustics

Students must also take one of the following courses:

CAE 383 Electrical and Electronic Circuits
CAE 461 Plumbing and Fire Protection

Materials Science and Engineering (28 Credit Hours)

Students must take:

MMAE 100 Introduction to the Profession*
MS 201 Materials Science
MMAE 200 Introduction to Mechanics
MMAE 202 Mechanics of Solids II
MMAE 232 Design for Innovation
MMAE 365 Structure & Properties of Materials I
MMAE 370 Materials Laboratory I
MMAE 463 Structure & Properties of Materials II

Students must also take two of the following courses:

MMAE 371 Engineering Materials

OR

MMAE 372 Design or Aerospace Materials Laboratory
MMAE 470 Introduction to Polymer Science
MMAE 468 Introduction to Ceramics

OR

MMAE 472 Advanced Aerospace Materials

OR

MMAE 482 Composites
MMAE 476 Materials Laboratory II
MMAE 485 Manufacturing Processes

Mechanical Engineering (29/30 Credit Hours)

Students must take:

MMAE 100 Introduction to the Profession*
MS 201 Materials Science
MMAE 200 Introduction to Mechanics
MMAE 202 Mechanics of Solids II
MMAE 232 Design for Innovation
MMAE 313 Fluid Mechanics
MMAE 315 Aerospace Laboratory I

OR

MMAE 319 Mechanical Laboratory II
MMAE 320 Thermodynamics

Students must also take one of the following courses:

MMAE 302 Mechanics of Solids II
MMAE 321 Applied Thermodynamics
MMAE 322 Heat & Mass Transfer with Laboratory

OR

MMAE 323 Heat & Mass Transfer
MMAE 332 Design of Machine Elements
MMAE 547 Computer-Integrated Manufacturing Technologies
MMAE 557 Computer-Integrated Manufacturing Systems
MMAE 589 Applications in Reliability Engineering I
MMAE 590 Applications in Reliability Engineering II

* Two hours of MMAE 100 applies to the Introduction to the Profession requirement and one hour applies to the specialization.

Computer Science

Department Website: www.iit.edu/csl/cs

Stuart Building 235
10 W. 31st St.
Chicago, IL 60616
312.567.5150

Chair

Xian-He Sun

Associate Chair

Bogdan Korel

Associate Chair

Cynthia Hood

Director of Undergraduate Programs

Matthew Bauer

Computers have changed what we do and how we do it in our homes, in our offices, and throughout our world. The discipline of computer science focuses upon the many challenging problems encountered in the development and use of computers and computer software. Areas of study in computer science range from theoretical analyses into the nature of computing and computing algorithms, through the development of advanced computing devices and computer networks, to the design and implementation of sophisticated software systems.

The department offers two undergraduate programs in computer science: a Bachelor of Science (B.S.) in Computer Science and Bachelor of Science (B.S.) in Computer Information Systems. Both programs provide an excellent background in computer science and allow for ample study in other areas. Where these programs differ is in the approach they take to computer science. The B.S. in Computer Science provides an in-depth experience focusing on the theory and practice of computer science while the B.S. in Computer Information Systems provides a more interdisciplinary experience, balancing study in computer science with study in another field.

Each graduate of the B.S. in Computer Science program should be able to:

- Apply knowledge of computing and mathematics appropriate to the discipline.
- Analyze a problem, and identify and define the computing requirements appropriate to its solution.
- Design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs.
- Function effectively on teams to accomplish a common goal.
- Have an understanding of professional, ethical, legal, security, and social issues and responsibilities.
- Communicate effectively with a range of audiences.
- Analyze the local and global impact of computing on individuals, organizations, and society.

- Recognize the need for, and an ability to engage in, continuing professional development.
- Use current techniques, skills, and tools necessary for computing practices.
- Apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices.
- Apply design and development principles in the construction of software systems of varying complexity.
- Be prepared to enter a top-ranked graduate program in computer science.

Both programs begin with a set of introductory courses that work together to provide students with a firm foundation in computer science. These introductory courses include weekly labs in which students use state-of-the-art software development techniques (object-oriented programming in C++ or Java, for instance) to create solutions to interesting problems. The department's unique four-phase laboratory model encourages student creativity by providing ample opportunity for constructive feedback on each student's efforts. Having completed the introductory core, a student is prepared to work independently within a well-structured design framework – in the classroom or on the job.

The last two years of study build upon this foundation. The B.S. in Computer Science focuses on the concepts and techniques used in the design and development of advanced software systems. Students in this program explore the conceptual underpinnings of computer science—its fundamental algorithms, programming languages, operating systems, and software engineering techniques. In addition, students choose from a rich set of electives including computer graphics, artificial intelligence, database systems, computer architecture, and computer networks, among others. As with the introductory sequence, these advanced courses stress “hands-on” learning by doing. A generous allotment of free electives allows students to combine study in computer science with study in another field – either by taking a well-defined specialized minor in another discipline or by working with an advisor to formulate a program that combines experiences across disciplines.

The B.S. in Computer Information Systems program emphasizes the use of computers as sophisticated problem-solving tools. Students in this program pursue an interdisciplinary course of study that combines a solid foundation in computer science with a focus in another discipline. This program is designed for students who seek to blend their computer science abilities with skills specific to another domain to solve problems in that domain. Examples include computing with a business focus (e.g., management information systems) or computing with a natural science focus (e.g., computational physics).

The Computer Science department also offers the following co-terminal degrees that enable a student to complete both degrees in five years:

- B.S. in Computer Science and M.S. or M.C.S. in Computer Science
- B.S. in Applied Mathematics and M.S. or M.C.S. in Computer Science
- B.S. in Biology and M.S. or M.C.S. in Computer Science
- B.S. in Computer Engineering and M.S. or M.C.S. in Computer Science
- B.S. in Physics and M.S. or M.C.S. in Computer Science

These programs allow students to complete a dual degree in a shorter time period, to apply through a simplified admission process, and to receive some financial incentives. See page 166 or go to www.iit.edu/csl/cs/programs/undergrad/dual_degree.shtml.

Brief History and Mission of the Department

The Computer Science (CS) department grew out of Illinois Institute of Technology's Information Science Center which first offered CS courses in 1959. When the Information Science Center became the Department of Computer Science in 1971, IIT was already offering undergraduate and graduate courses leading to a Master of Science in Information Science, a Master of Science for Teachers in Information Science, and non-credit courses for high school students and teachers. Since 1971, Computer Science has

become the largest department in the College of Science and Letters and has granted more than five thousand degrees. On Main Campus, degrees are offered at all levels, and through IIT Online Master's degrees are offered both nationally and internationally.

The mission of the CS department is to prepare graduates for a broad range of professional careers and provide a foundation for advanced studies at the graduate or professional level. The mission of the department as part of the college of Science and Letters (CSL) is to:

- Deliver superior educational and research opportunities through B.S., M.S., and Ph.D. degree programs as well as certificate, professional masters, and short-course programs.
- Provide responsive, appropriate core curriculum courses for students from all academic units at IIT.
- Engage in nationally and internationally recognized research and scholarship.
- Promote interdisciplinary and collaborative research among faculty and students within and outside of IIT and the college.
- Prepare our graduates for leadership in the profession and in higher education.

The CS mission statement is posted on our website: www.iit.edu/csl/cs/about/mission.shtml.

Faculty

Professors

S. Kapoor, X. Li, E. Reingold, X. Sun, P. Wan

Associate Professors

G. Agam, S. Argamon, G. Calinescu, C. Hood, B. Korel, Z. Lan, S. Ren

Assistant Professors

M. Bilgic, B. Glavic, I. Raicu

Industry Professor

W. Leung

Industry Associate Professor

E. Chlebus

Research Professors

D. Roberson, H. Zhang-Sun

Senior Lecturers

M. Bauer, A. Beckman, J. Sasaki, M. Soneru

Senior Instructors

J. Hanrath, M. Saelee, V. Winans

Faculty Emeritus

C. Bauer, I. Burnstein, M. Evens, P. Greene

Joint Appointments

Professors

C. Robert Carlson (Information Technology and Management), E. Reingold (Applied Mathematics)

Computer Science

Bachelor of Science in Computer Science

| Required Courses | Credit Hours |
|---|--------------|
| Computer Science Requirements CS 100, 115, 116*, 330**, 331, 350, 351, 425, 430, 440, 450, 485, 487 | 36 |
| Computer Science Electives*** | 12 |
| Mathematics Requirements MATH 151, 152, 251, (332 or 333), (474 or 475) | 20 |
| Mathematics Elective Chosen from MATH 252, 410, 435, 453, 454, 476, 482 | 3 |
| Science Requirements PHYS 123, 221 | 8 |
| Science Electives**** | 6 |
| Humanities and Social Sciences Requirements For general education requirements, see page 25. | 21 |
| Writing and Speaking Elective COM 421 or COM 428 | 3 |
| Interprofessional Projects | 6 |
| Free Electives | 12 |
| Total Hours | 127 |

* CS 201 is a one-semester, accelerated course equivalent to the two-semester CS 115/CS 116 sequence.

** MATH 230 is allowed as a substitute for CS 330.

*** Computer science electives: Any computer science course at the 300-level or higher (including graduate CS courses) may be used as a computer science elective, except CS 401, CS 402, CS 403 and CS 406. ECE 218 - Digital Systems and ECE 441 - Microcomputers may also be used as computer science electives. No courses from any other programs can be used as computer science electives.

**** Science electives (no lab required): Chosen from the natural sciences (biology, chemistry, and physics), or MS 201 - Materials Science, or psychology (limited to courses marked with an N in the IIT Bulletin). At least one course must be in a field other than physics.

The Bachelor of Science in Computer Science degree is accredited by the Computing Accreditation Commission of ABET, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012, telephone: 410.347.7700.

Computer Science Curriculum

| Semester 1 | Credits |
|---------------------------------------|-----------|
| CS 100 Introduction to the Profession | 2 |
| CS 115 Object-Oriented Programming I | 2 |
| MATH 151 Calculus I | 5 |
| Humanities 100-level Elective | 3 |
| Social Sciences Elective | 3 |
| Total Hours | 15 |

| Semester 3 | Credits |
|---|-----------|
| CS 331 Data Structures and Algorithms | 3 |
| CS 330 Discrete Structures | 3 |
| MATH 251 Multivariate and Vector Calculus | 4 |
| PHYS 221 General Physics II | 4 |
| Social Sciences Elective | 3 |
| Total Hours | 17 |

| Semester 5 | Credits |
|--|-----------|
| CS 351 System Programming | 3 |
| CS 440 Programming Languages/Translators | 3 |
| MATH 474 Probability and Statistics | 3 |
| OR | |
| MATH 475 Probability | |
| COM 421 Technical Communication | 3 |
| OR | |
| COM 428 Verbal and Visual Communication | |
| Computer Science Elective | 3 |
| Total Hours | 15 |

| Semester 7 | Credits |
|--|-----------|
| CS 487 Software Engineering | 3 |
| IPro Elective II | 3 |
| Computer Science Elective | 3 |
| Science Elective | 3 |
| Humanities or Social Sciences Elective | 3 |
| Free Elective | 3 |
| Total Hours | 18 |

| Semester 2 | Credits |
|---------------------------------------|-----------|
| CS 116 Object-Oriented Programming II | 2 |
| MATH 152 Calculus II | 5 |
| PHYS 123 General Physics I | 4 |
| Humanities Elective (300+) | 3 |
| Social Sciences Elective (300+) | 3 |
| Total Hours | 17 |

| Semester 4 | Credits |
|---|-----------|
| CS 350 Computer Org/Assembly Language Prog | 3 |
| CS 430 Introduction to Algorithms | 3 |
| MATH 332 Matrices | 3 |
| OR | |
| MATH 333 Matrix Algebra and Complex Variables | |
| Humanities Elective (300+) | 3 |
| Science Elective | 3 |
| Total Hours | 15 |

| Semester 6 | Credits |
|------------------------------|-----------|
| CS 425 Database Organization | 3 |
| CS 450 Operating Systems | 3 |
| IPro Elective I | 3 |
| Mathematics Elective | 3 |
| Free Elective | 3 |
| Total Hours | 15 |

| Semester 8 | Credits |
|-----------------------------|-----------|
| CS 485 Computers in Society | 3 |
| Computer Science Elective | 3 |
| Computer Science Elective | 3 |
| Free Elective | 3 |
| Free Elective | 3 |
| Total Hours | 15 |

Total Credit Hours **127**

Computer Science

Bachelor of Science in Computer Information Systems

| Required Courses | Credit Hours |
|--|--------------|
| Computer Science Requirements CS 100, 115, 116, 330 (or MATH 230), 331, 350, 351 | 18 |
| Computer Science Technical Electives* | 15 |
| Computer Science Electives | 6 |
| Mathematics Requirement MATH 151 | 5 |
| Mathematics Elective | 3 |
| Science Requirements BIOL 107 or 115, CHEM 124, PHYS 123 | 11 |
| Science Elective | 3 |
| Humanities Requirement Humanities 100-level course | 3 |
| Humanities Electives | 9 |
| Psychology Requirements PSYC 221, 301 | 6 |
| Social Sciences Requirement PS 200 | 3 |
| Social Sciences Electives | 6 |
| Interprofessional Projects | 6 |
| Minor Electives | 15 |
| Free Electives | 18 |
| Total Hours | 127 |

* Computer science technical electives are designated with a (T) in the course descriptions.

Computer Information Systems Curriculum

| Semester 1 | Credits |
|---|-----------|
| CS 100 Introduction to the Profession | 2 |
| CS 115 Object-Oriented Programming I | 2 |
| MATH 151 Calculus I | 5 |
| PSYC 221 Human Behavior Growth and Learning | 3 |
| Humanities 100-level | 3 |
| Total Hours | 15 |

| Semester 2 | Credits |
|---------------------------------------|-----------|
| CS 116 Object-Oriented Programming II | 2 |
| BIOL 115 Human Biology | |
| OR | 3 |
| BIOL 107 General Biology | |
| Mathematics Elective | 3 |
| Humanities Elective | 3 |
| Social Sciences Elective | 3 |
| Total Hours | 14 |

| Semester 3 | Credits |
|---------------------------------------|-----------|
| CS 330 Discrete Structures | 3 |
| CS 331 Data Structures and Algorithms | 3 |
| CHEM 124 Principles of Chemistry I | 4 |
| PS 200 American Government | 3 |
| Humanities Elective (300+) | 3 |
| Total Hours | 16 |

| Semester 4 | Credits |
|--|-----------|
| CS 350 Computer Org/Assembly Language Prog | 3 |
| PHYS 123 General Physics I | 4 |
| Minor Elective | 3 |
| Computer Science Elective | 3 |
| Computer Science Technical Elective* | 3 |
| Total Hours | 16 |

| Semester 5 | Credits |
|----------------------------|-----------|
| CS 351 Systems Programming | 3 |
| Minor Elective | 3 |
| Science Elective | 3 |
| Free Elective | 3 |
| Free Elective | 3 |
| Total Hours | 15 |

| Semester 6 | Credits |
|--------------------------------------|-----------|
| PSYC 301 Industrial Psychology | 3 |
| IPRO Elective I | 3 |
| Minor Elective | 3 |
| Computer Science Technical Elective* | 3 |
| Humanities Elective (300+) | 3 |
| Free Elective | 3 |
| Total Hours | 18 |

| Semester 7 | Credits |
|--------------------------------------|-----------|
| Minor Elective | 3 |
| Computer Science Elective | 3 |
| Computer Science Technical Elective* | 3 |
| Computer Science Technical Elective* | 3 |
| Social Sciences Elective (300+) | 3 |
| Free Elective | 3 |
| Total Hours | 18 |

| Semester 8 | Credits |
|--------------------------------------|-----------|
| IPRO Elective II | 3 |
| Minor Elective | 3 |
| Computer Science Technical Elective* | 3 |
| Free Elective | 3 |
| Free Elective | 3 |
| Total Hours | 15 |

Total Credit Hours **127**

* Computer science technical electives are designated with a (T) in the course descriptions.

Specializations in Computer Science

Students in either the CS or CIS program may elect to complete one of these specializations by choosing their computer science electives and free electives appropriately, or by taking extra classes. The student must receive depart-

ment approval and notify the Office of Undergraduate Academic Affairs. A minimum of four courses are required for a specialization.

Data Science

BUS 371 Strategies for Reaching New Markets

CS 451 Introduction to Distributed Computing

CS 442 Data Mining

OR

CS 584 Machine Learning

MATH 481 Introduction to Stochastic Processes

OR

MATH 483 Design and Analysis of Experiments

Note: MATH 481 has prerequisites of MATH 332 or MATH 333 and MATH 475; MATH 483 has a prerequisite of MATH 476.

Distributed and Cloud Computing

CS 451 Introduction to Distributed Computing

CS 455 Data Communication

CS 442 Mobile Applications Development

OR

CS 447 Distributed Options

CS 553 Cloud Computing

Information and Knowledge Management Systems

Students must take the following courses:

CS 425 Database Organization

CS 482 Information & Knowledge Management Systems

In addition, they should choose at least two courses from the following:

CS 422 Introduction to Data Mining

CS 429 Introduction to Information Retrieval Systems

CS 481 Artificial Intelligence: Language Understanding

Information Security

CS 425 Database Organization

CS 458 Information Security

CS 455 Data Communications

CS 549 Cryptography and Network Security

Electrical and Computer Engineering

Department Website: www.iit.edu/engineering/ece

Siegel Hall Ste 103
3301 S. Dearborn St.
Chicago, IL 60616
312.567.3400

Interim Chair

Geoffrey Williamson

Associate Chair

Jafar Saniie

The Department of Electrical and Computer Engineering offers the Bachelor of Science in Electrical Engineering (B.S.E.E.). The department also offers a Bachelor of Science in Computer Engineering (B.S.CP.E.). Both degree programs are accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).

Minors in areas not listed below require approval from an academic advisor and department chair (for more details, see pages 162–165).

- Air Force Aerospace Studies
- Applied Mathematics
- Applied Solid State Physics
- Business
- Energy/Environment/Economics (E³)
- Military Science
- Naval Science
- Premedical Studies for Electrical Engineering
- Telecommunications

The B.S.E.E. curriculum provides a strong foundation in mathematics, physics, chemistry, and computer science during the first two years of study. The fundamentals of circuits, electronics, digital and computer systems, electrodynamics, linear systems, and energy conversion are introduced in the second and third years. In the senior

year, students further explore their specific areas of interest and gain in-depth exposure to engineering design through the choice of elective courses.

The B.S.CP.E. curriculum concentrates on the design and application of computer hardware and software systems. During the first three years, the curriculum provides students with a strong foundation in mathematics, physics, chemistry, and computer science, followed by the fundamentals of electrical engineering and computer science that form the basis of computer engineering. During the senior year, advanced courses provide students with depth in selected areas and exposure to the practice of engineering design. Elective courses provide the flexibility to take specialized courses in a number of different areas.

Students with strong interests in both electrical engineering and computer engineering can elect to earn a dual degree, B.S.E.E./B.S.CP.E.

Students also have the option of completing the following co-terminal degrees that enable a student to complete both degrees in five years:

- Bachelor of Science in Computer Engineering and Master of Computer Science
- Bachelor of Science in Computer Engineering and Master of Science in Computer Science
- Bachelor of Science in Computer Engineering and Master of Electrical and Computer Engineering
- Bachelor of Science in Electrical Engineering and Master of Electrical and Computer Engineering

These programs allow students to complete a dual degree in a shorter time period, to apply through a simplified admission process, and to receive some financial incentives. See page 166 or go to www.iit.edu/engineering/ece for more information.

Faculty

Professors

J. Saniie, M. Shahidehpour, Z. Shen, M. Wernick,
G. Williamson, T. Wong, Y. Yang

Associate Professors

T. Anjali, G. Atkin, Y. Cheng, A. Flueck, Z. Li,
C. Zhou

Assistant Professors

J. Brankov, I. Brown, K. Choi, J. Kim,
M. Krishnamurthy, E. Oruklu, J. Wang, Y. Xu, I. Yetik

Senior Lecturers

S. Borkar, H. Modir Shanechi

Faculty Emeritus

R. Armington, R. Arzbaeher, G. Saletta, H. Stark,
E. Weber

Adjunct Faculty

B. Briley, R. Nordin

Electrical Engineering

Department Website: www.iit.edu/engineering/ece

Electrical engineering is concerned with the generation, transmission, and utilization of electrical energy and with the transmitting and processing of information. Electrical engineers are involved in the analysis, design, and production of electric power, radio, radar, television, computing, telecommunication, control, and information systems. These engineers find solutions to the challenging technical problems that arise in our rapidly changing society. They impact virtually every aspect of daily life, as evidenced by examples such as wireless communications, audio and video equipment, power distribution, computerized traffic control, noise pollution monitoring and abatement, and medical instrumentation.

The Electrical Engineering curriculum puts emphasis on

both theory and practical applications by providing a solid background in engineering science and mathematics, followed by a sequence of core courses in electrical engineering. Design skills are fostered in the professional elective courses in the senior year, along with the project experience instilled by Interprofessional Projects (IPROs).

The objectives of the ECE undergraduate Electrical Engineering program are to produce electrical engineering graduates who are prepared to:

- Enter their profession and make intellectual contributions to it.
- Embark on a lifelong career of personal and professional growth.
- Take advanced courses at the graduate level.

Bachelor of Science in Electrical Engineering

| Required Courses | Credit Hours |
|--|----------------|
| Electrical Engineering Requirements ECE 100, 211, 213, 218, 242, 307, 308, 311, 312, 319 | 36 |
| Professional ECE Electives | 17/20 |
| Mathematics Requirements MATH 151, 152, 251, 252, 333, 474 | 24 |
| Physics Requirements PHYS 123, 221, 224 | 11 |
| Chemistry Requirement CHEM 122 | 3 |
| Engineering Science Course Requirement MMAE 200 or MMAE 320 | 3 |
| Computer Science Requirements CS 115, 116 | 4 |
| Humanities and Social Sciences Requirements For general education requirements, see page 25. | 21 |
| Science Elective BIOL 107, BIOL 115, MS 201, or CHEM 126 | 3 |
| Technical Elective | 3 |
| Interprofessional Projects | 6 |
| Total Hours | 131/134 |

Electrical Engineering Curriculum

| Semester 1 | Credits | Semester 2 | Credits |
|---|--------------|---|--------------|
| ECE 100 Introduction to the Profession | 3 | MATH 152 Calculus II | 5 |
| MATH 151 Calculus I | 5 | PHYS 123 General Physics I | 4 |
| CHEM 122 Principles of Chemistry I | 3 | CS 116 Object-Oriented Programming II | 2 |
| CS 115 Object-Oriented Programming I | 2 | Science Elective* | 3 |
| Humanities 100-level Course | 3 | Social Sciences Elective | 3 |
| Total Hours | 16 | Total Hours | 17 |
| | | | |
| Semester 3 | Credits | Semester 4 | Credits |
| MATH 252 Introduction to Differential Equations | 4 | MATH 251 Multivariate & Vector Calculus | 4 |
| PHYS 221 General Physics II | 4 | PHYS 224 General Physics III | 3 |
| ECE 211 Circuit Analysis I | 4 | ECE 213 Circuit Analysis II | 4 |
| ECE 218 Digital Systems | 3 | ECE 242 Digital Computers and Computing | 3 |
| Total Hours | 15 | Social Sciences Elective | 3 |
| | | Total Hours | 17 |
| | | | |
| Semester 5 | Credits | Semester 6 | Credits |
| MATH 333 Matrix Algebra and Complex Variables | 3 | ECE 308 Signals and Systems | 3 |
| ECE 307 Electrodynamics | 4 | ECE 312 Electronic Circuits | 4 |
| ECE 311 Engineering Electronics | 4 | ECE 319 Fundamentals of Power Engineering | 4 |
| IPro Elective I** | 3 | MATH 474 Probability and Statistics | 3 |
| Humanities Elective (300+) | 3 | Social Sciences Elective (300+) | 3 |
| Total Hours | 17 | Total Hours | 17 |
| | | | |
| Semester 7 | Credits | Semester 8 | Credits |
| IPro Elective II** | 3 | Professional ECE Elective† | 4 |
| Professional ECE Elective† | 4 | Professional ECE Elective† | 3/4 |
| Professional ECE Elective† | 3/4 | Professional ECE Elective† | 3/4 |
| Technical Elective†† | 3 | Engineering Science Elective*** | 3 |
| Humanities Elective (300+) | 3 | Humanities or Social Sciences Elective | 3 |
| Total Hours | 16/17 | Total Hours | 16/18 |

Total Credit Hours **131/134**

* Science elective must be BIOL 107, BIOL 115, CHEM 126, or MS 201.

** Interprofessional Projects may be taken at any time during the sophomore, junior or senior years. (Course scheduling must be adjusted accordingly with advisor approval.)

*** Engineering science elective: Choose either MMAE 200 or MMAE 320.

† Professional ECE electives may be chosen from any of the 400-level ECE courses identified with (P) in the course descriptions. Courses at the 500-level may be taken with the written consent of the instructor, faculty advisor and the ECE department chair. At least two of the electives must contain laboratories. A maximum of three credits of Undergraduate Research (ECE 491) or Special Problems (ECE 497) may be used as professional ECE electives with advisor approval.

†† Advisor-approved course from engineering, science, mathematics, or computer science that is more advanced than the academic level of the student.

This program is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).

Computer Engineering

Department Website: www.iit.edu/engineering/ece

Computer engineering involves the design and application of computer hardware and computer software. Computer hardware consists of the physical components that implement a computer system: processor and memory chips, circuit boards, and peripheral devices. Computer software consists of computer programs that accomplish a specific task using sequences of simple, programmable steps. Computers have become an integral part of many large systems that require sophisticated control, including automobiles, medical instrumentation, telecommunication systems, and factory automation. Computers are a driving force behind many of today's exciting new technologies, including wireless communications, interactive multimedia, and

high-speed computer networks. Computer engineers must have detailed knowledge of both hardware and software to design, build, and use complex information processing systems for a wide range of applications.

The objectives of the ECE undergraduate Computer Engineering program are to produce electrical engineering graduates who are prepared to:

- Enter their profession and make intellectual contributions to it.
- Embark on a lifelong career of personal and professional growth.
- Take advanced courses at the graduate level.

Bachelor of Science in Computer Engineering

| Required Courses | Credit Hours |
|--|----------------|
| ECE Major Requirements ECE 100, 211, 213, 218, 242, 311, 441, 485 | 28 |
| Computer Science Major Requirements CS 115, 116, 330, 331, 351, 450 | 16 |
| Junior Computer Engineering Elective ECE 307, 308, 312, or 319 | 3/4 |
| Professional ECE Electives | 6/8 |
| Computer Systems/Software Elective ECE 407, 408, 443, 449, CS 425, or CS 487 | 3/4 |
| Hardware-Design Elective ECE 429 or 446 | 4 |
| Mathematics Requirements MATH 151, 152, 251, 252, 474, junior mathematics elective (MATH 333 or 350) | 24 |
| Physics Requirements PHYS 123, 221, 224 | 11 |
| Chemistry Requirement CHEM 122 | 3 |
| Engineering Course Requirement MMAE 200 or MMAE 320 | 3 |
| Humanities and Social Sciences Requirements For general education requirements, see page 25. | 21 |
| Science Elective BIOL 107, BIOL 115, MS 201, or CHEM 126 | 3 |
| Interprofessional Projects | 6 |
| Total Hours | 131/135 |

Computer Engineering Curriculum

| Semester 1 | Credits |
|--------------------------------------|-----------|
| ECE 100 Interprofessional Project | 3 |
| MATH 151 Calculus I | 5 |
| CHEM 122 Principles of Chemistry I | 3 |
| CS 115 Object-Oriented Programming I | 2 |
| Humanities 100-level Course | 3 |
| Total Hours | 16 |

| Semester 2 | Credits |
|---------------------------------------|-----------|
| MATH 152 Calculus II | 5 |
| PHYS 123 General Physics I | 4 |
| CS 116 Object-Oriented Programming II | 2 |
| Social Sciences Elective | 3 |
| Science Elective* | 3 |
| Total Hours | 17 |

| Semester 3 | Credits |
|---|-----------|
| MATH 252 Introduction to Differential Equations | 4 |
| PHYS 221 General Physics II | 4 |
| ECE 211 Circuit Analysis I | 4 |
| ECE 218 Digital Systems | 3 |
| CS 331 Data Structures and Algorithms | 3 |
| Total Hours | 18 |

| Semester 4 | Credits |
|---|-----------|
| MATH 251 Multivariate and Vector Calculus | 4 |
| PHYS 224 General Physics III | 3 |
| ECE 213 Circuit Analysis II | 4 |
| ECE 242 Digital Computers and Computing | 3 |
| CS 330 Discrete Structures | 3 |
| Total Hours | 17 |

| Semester 5 | Credits |
|---------------------------------|-----------|
| ECE 311 Engineering Electronics | 4 |
| CS 351 Systems Programming | 3 |
| Engineering Science Elective** | 3 |
| Junior Mathematics Elective*** | 3 |
| Humanities Elective (300+) | 3 |
| Total Hours | 16 |

| Semester 6 | Credits |
|-------------------------------------|--------------|
| CS 450 Operating Systems I | 3 |
| MATH 474 Probability and Statistics | 3 |
| IPRO Elective I† | 3 |
| Junior CPE Elective**** | 3/4 |
| Social Sciences Elective | 3 |
| Total Hours | 15/16 |

| Semester 7 | Credits |
|---|--------------|
| ECE 441 Microcomputers | 4 |
| ECE 485 Computer Organization and Design***** | 3 |
| Computer Systems/Software Elective†††† | 3/4 |
| Professional ECE Elective†† | 3/4 |
| Humanities or Social Sciences Elective | 3 |
| Total Hours | 16/18 |

| Semester 8 | Credits |
|---------------------------------|--------------|
| IPRO Elective II† | 3 |
| Professional ECE Elective†† | 3/4 |
| Hardware-Design Elective††† | 4 |
| Humanities Elective (300+) | 3 |
| Social Sciences Elective (300+) | 3 |
| Total Hours | 16/17 |

Total Credit Hours 131/135

* Science elective must be BIOL 107, BIOL 115, CHEM 126, or MS 201.

** Engineering science elective: Choose either MMAE 200 or MMAE 320.

*** Junior mathematics elective: Choose either MATH 333 or MATH 350.

**** Junior CPE elective: Choose one of ECE 307, 308, 312, or 319.

***** CS 470 may be substituted with advisor approval.

† Interprofessional Projects may be taken at any time during the sophomore, junior, or senior years. (Course scheduling must be adjusted accordingly with advisor approval.)

†† Professional electives may be chosen from the 400-level ECE courses identified with a (P) in the course descriptions, and any 400-level computer science courses except CS 485. A maximum of three credits of Undergraduate Research (ECE 491) or Special Problems (ECE 497) may be used as a professional elective with advisor approval.

††† Hardware-design elective must be ECE 429 or ECE 446.

†††† Computer systems/software elective: Choose one of ECE 407, 408, 443, 449, CS 425, or CS 487.

This program is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).

Bachelor of Science in Electrical Engineering/ Bachelor of Science in Computer Engineering

The dual degree, B.S.E.E./B.S.CP.E., combines all the essential elements of a broad-based, traditional B.S.E.E. degree with the modern and progressive aspects of a B.S.CP.E. degree. This program contributes to the foundation of the new millennium, where computer hardware

and software are used in areas such as telecommunications, power electronics, digital signal processing, computer networks, and control systems. Freshmen entering IIT with a significant number of Advanced Placement credits may be able to complete both degrees in four years.

Bachelor of Science in Electrical Engineering/ Bachelor of Science in Computer Engineering

| Required Courses | Credit Hours |
|--|----------------|
| Electrical Engineering Requirements ECE 100, 211, 212, 213, 214, 218, 242, 307, 308, 311, 312, 319, 441, 485 | 43 |
| Computer Engineering Requirements CS 115, 116, 330, 331, 351, 450 | 16 |
| Professional ECE Electives | 9/12 |
| Computer Systems/Software Elective ECE 407, 408, 443, 449, CS 425, or CS 487 | 3/4 |
| Hardware-Design Elective ECE 429 or ECE 446 | 4 |
| Mathematics Requirements MATH 151, 152, 251, 252, 333, 474 | 24 |
| Physics Requirements PHYS 123, 221, 224 | 11 |
| Chemistry Requirement CHEM 122 | 3 |
| Engineering Science Course Requirement MMAE 200 or MMAE 320 | 3 |
| Humanities and Social Sciences Requirements For general education requirements, see page 25. | 21 |
| Science Elective BIOL 107, BIOL 115, MS 201, or CHEM 126 | 3 |
| Interprofessional Projects | 6 |
| Total Hours | 146/150 |

Bachelor of Science in Electrical Engineering/ Bachelor of Science in Computer Engineering

| Semester 1 | Credits | Semester 2 | Credits |
|--|-----------|---------------------------------------|-----------|
| ECE 100 Introduction to the Profession | 3 | MATH 152 Calculus II | 5 |
| MATH 151 Calculus I | 5 | PHYS 123 General Physics I | 4 |
| CHEM 122 Principles of Chemistry I | 3 | CS 116 Object-Oriented Programming II | 2 |
| CS 115 Object-Oriented Programming I | 2 | Science Elective* | 3 |
| Humanities 100-level Course | 3 | Social Sciences Elective | 3 |
| Total Hours | 16 | Total Hours | 17 |

| Semester 3 | Credits | Semester 4 | Credits |
|---|-----------|---|-----------|
| MATH 252 Introduction to Differential Equations | 4 | MATH 251 Multivariate and Vector Calculus | 4 |
| PHYS 221 General Physics II | 4 | PHYS 224 General Physics III | 3 |
| ECE 211 Circuit Analysis I | 4 | ECE 213 Circuit Analysis II | 4 |
| ECE 218 Digital Systems | 3 | ECE 242 Digital Computers and Computing | 3 |
| CS 331 Data Structures and Algorithms | 3 | CS 330 Discrete Structures | 3 |
| Total Hours | 18 | Total Hours | 17 |

| Semester 5 | Credits | Semester 6 | Credits |
|---|-----------|---|-----------|
| MATH 333 Matrix Algebra and Complex Variables | 3 | ECE 308 Signals and Systems | 3 |
| ECE 307 Electrodynamics | 4 | ECE 312 Electronic Circuits | 4 |
| ECE 311 Engineering Electronics | 4 | ECE 319 Fundamentals of Power Engineering | 4 |
| IPEO Elective I | 3 | Engineering Science Elective** | 3 |
| CS 351 Systems Programming | 3 | Social Sciences Elective | 3 |
| Total Hours | 17 | Total Hours | 17 |

| Semester 7 | Credits | Semester 8 | Credits |
|-------------------------------------|-----------|---|--------------|
| ECE 441 Microcomputers | 4 | ECE 485 Computer Organization and Design*** | 3 |
| CS 450 Operating Systems | 3 | Computer Systems/Software Elective**** | 3/4 |
| MATH 474 Probability and Statistics | 3 | Hardware-Design Elective† | 4 |
| IPEO Elective II | 3 | Professional ECE Elective†† | 3/4 |
| Humanities Elective (300+) | 3 | Social Sciences Elective (300+) | 3 |
| Total Hours | 16 | Total Hours | 16/18 |

| Semester 9 | Credits |
|--|--------------|
| Professional ECE Elective†† | 3/4 |
| Professional ECE Elective†† | 3/4 |
| Humanities Elective (300+) | 3 |
| Humanities or Social Sciences Elective | 3 |
| Total Hours | 12/14 |

Total Credit Hours **146/149**

* Science elective must be BIOL 107, CHEM 126, or MS 201.

** Engineering science elective: Choose either MMAE 200 or MMAE 320.

*** CS 470 may be substituted with advisor approval.

**** Computer systems/software elective: Choose one of ECE 407, 408, 443, 449, CS 425, or CS 487.

† Hardware-design elective must be ECE 429 or 446.

†† ECE 400-level course with (P) designation. A maximum of three credits of either ECE 491 or ECE 497.

Humanities

Department Website: www.iit.edu/csl/hum

218 Siegel Hall
3301 S. Dearborn St.
Chicago, IL 60616
312.567.3465

Chair

Maureen A. Flanagan

Associate Chair and Undergraduate Advisor

Greg Pulliam

The Department of Humanities offers Bachelor of Science (B.S.) degrees in Humanities (HUM), Journalism of Technology, Science & Business (JTSB), and Professional and Technical Communication (PTC). The HUM degree is a flexible liberal arts degree with an emphasis on the humanistic study of technology. The JTSB degree is a science/mathematics/business-intensive program which also features a strong journalism/writing component. The PTC degree provides students with both a liberal arts education in communication and culture and an applied professional education in a technical communication field. The department offers courses in art and architectural history, communication, English as a second language, history, languages and linguistics, literature, and philosophy.

The Humanities department also offers academic minors in communication, English language and literature, history, linguistics, literature, philosophy, professional and technical communication, and Web communication. Minors in legal studies and urban studies are also offered in conjunction with the Department of Social Sciences.

The department has these five undergraduate educational objectives:

- To offer and support the B.S. degree programs and the academic minors.
- To provide students the opportunity to pursue personal interests in the humanities. This objective is achieved through offering a wide range of advanced courses in the many disciplines that comprise the humanities. The department also encourages students to take minors in literature, history, and philosophy.

- To strengthen the ability of all IIT students to formulate and to express ideas. In addition to composition courses for both native and non-native English speakers, the department supports the Writing Center, where students receive one-on-one tutoring at their convenience. Undergraduates who qualify may also take advanced courses in writing. Advanced courses provide further exposure to critical thinking and to the communication of ideas.
- To support the requirements of all of IIT's professional degree programs. Courses marked with (H) satisfy degree requirements in general education. The department also offers specialized courses (such as architectural history) that meet the educational needs of specific degree programs. The department offers many courses of special relevance to students preparing for careers in the law in IIT's pre-professional degree programs.
- To enable all IIT students to enrich their professional and personal lives. This goal is achieved through advanced elective courses in the humanities, which provide an appreciation and understanding of human development and the moral foundations of human experience, particularly as reflected in history, literature, and philosophy.

IIT students are encouraged to broaden their educational backgrounds and to discover new interests through the study of humanities.

The Humanities department considers the advising of students an important obligation. Each semester, all students majoring in HUM, JTSB, or PTC must meet with their faculty advisors during the advising period. Students must closely adhere to course prerequisites to maximize academic performance and satisfy requirements of the degree programs.

Faculty

Professors

M. Davis, M. Flanagan, M. Power, W. Schmaus

Associate Professors

M. Bauer, J. Snapper, K. Stolley

Assistant Professors

L. Hemphill, M. Hicks, C. Kocurek, J. Otterbacher

Senior Lecturers

J. Dabbert, E. Glassman, G. Pulliam

Faculty Emeritus

W. Applebaum, S. Feinberg, K. Harrington, R. Irving, R. Ladenson, K. Riley, D. Zesmer

Bachelor of Science in Humanities

IIT's B.S. in Humanities is a flexible degree program aimed at students who are interested in the study of history, philosophy, and communication from a technological point of view, and in the study of science and technology from a humanistic point of view. This degree prepares students for graduate studies in the humanities and social sciences and for professional programs in law and medicine.

Within this major, students can choose concentrations in digital humanities, literature, linguistics, philosophy,

history, and communication. Students who choose philosophy, for example, would take all major electives and independent study courses in philosophy and add these to the two required philosophy courses, for a total of 30 hours in philosophy.

This degree has three components:

- General Education (47 hours)
- Major Coursework (33 hours)
- Minor*/Second Major/Free Electives (46 hours)

Bachelor of Science in Humanities

1. General Education (47 hours)

Where unspecified, follow the bulletin guidelines.

Basic Writing Proficiency
 Mathematics (five hours)
 Computer Science (two hours)
 Humanities and Social
 or Behavioral Sciences (21 hours)
 Natural Science or Engineering (11 hours)
 Interprofessional Projects (six hours)
 ITP: Introduction to the Profession (two hours)

2. The Major (33 hours)

Eleven courses in art and architectural history, communication, history, literature, philosophy, or courses offered by other departments that are approved by the student's HUM major advisor. At least eight of these courses should be at or above the 300 level.

Students wishing to specialize should take at least eight courses (24 hours) in a particular discipline.

Students planning to go on to graduate study in the humanities are encouraged to take at least one independent study course.

For single majors, all major coursework is over and above general education humanities requirements, and must be chosen in consultation with the student's academic advisor.

For multiple majors, up to two courses may in some cases be double-counted as applying to both humanities general education and the humanities major.

3. Minor*/2nd Major/Free Electives (46 hours)

Total Hours: 126

* Students accepted into the Honors Pre-law Program forego the minor and most free electives and take all other coursework in the first three years.

Sample Curriculum for Honors Law Program Students

| Semester 1 | Credits |
|---------------------------------------|-----------|
| MATH 151 Calculus I | 5 |
| BIOL 107 General Biology | 3 |
| BIOL 109 General Biology Laboratory | 2 |
| PS 101 Introduction to the Profession | 2 |
| Humanities 100-level Elective | 3 |
| Total Hours | 15 |

| Semester 2 | Credits |
|--|-----------|
| BIOL 115 Human Biology | 3 |
| CS 105 Intro to Computer Programming I | 2 |
| Major Elective | 3 |
| Major Elective | 3 |
| Humanities Elective (300+) | 3 |
| Social Sciences Elective | 3 |
| Total Hours | 17 |

| Semester 3 | Credits |
|--|-----------|
| PHYS 211 Basic Physics I | 3 |
| Major Elective | 3 |
| Major Elective | 3 |
| Humanities Elective (300+) | 3 |
| Humanities or Social Sciences Elective | 3 |
| Total Hours | 15 |

| Semester 4 | Credits |
|--------------------------|-----------|
| IPRO Elective I | 3 |
| Major Elective | 3 |
| Major Elective | 3 |
| Free Elective | 3 |
| Free Elective | 3 |
| Social Sciences Elective | 3 |
| Total Hours | 18 |

| Semester 5 | Credits |
|---------------------------------|-----------|
| IPRO Elective II | 3 |
| Major Elective | 3 |
| Major Elective | 3 |
| Major Elective | 3 |
| Social Sciences Elective (300+) | 3 |
| Total Hours | 15 |

| Semester 6 | Credits |
|--------------------|-----------|
| Major Elective | 3 |
| Major Elective | 3 |
| Major Elective | 3 |
| Free Elective | 3 |
| Free Elective | 3 |
| Free Elective | 3 |
| Total Hours | 18 |

| Semester 7 | Credits |
|--|-----------|
| Courses at Chicago-Kent College of Law | |
| Total Hours | 14 |

| Semester 8 | Credits |
|--|-----------|
| Courses at Chicago-Kent College of Law | |
| Total Hours | 14 |

Total Credit Hours 126

Professional and Technical Communication (PTC)

Website: www.iit.edu/csl/hum

The Professional and Technical Communication program helps students develop their writing skills, sensitivity to the social and cultural aspects of communication, fluency with the latest computer technologies, and strategies for information design. Students in this major will therefore take a number of courses in IIT's computer classrooms with state-of-the-art hardware and software. The required ethics component focuses on moral issues in communication, business, engineering, or computer science. Finally, elective coursework in science, technology, and society

(STS) gives students awareness of the power of language and image to shape thoughts, values, and actions in a variety of public, private, and professional contexts.

The Internet Communication (*iCOM*) specialization brings together coursework in technical writing, communication, web design, ethics, science and technology in society, along with a minor in computer networking, to train Internet professionals.

Bachelor of Science in Professional and Technical Communication (PTC)

| Required Courses | Credit Hours |
|---|--------------|
| Communication Requirements COM 421 (or 423), 424, 425, 428 | 12 |
| One of the following three nine-credit sequences: | 9 |
| WebCom Sequence ITM 461, 462, (460 or 465) <i>Sequence required for iCOM specialization</i> | |
| Engineering Graphics Sequence EG 225, 325, 425 | |
| Architectural CAD Sequence ARCH 125 and two CAD elects* | |
| Computer Science Requirement CS 105 (<i>CS 201 or (CS 115 and 116) required for iCOM specialization</i>) | 2 |
| Humanities and Social Sciences Requirements For general education requirements, see page 25. | 21 |
| Introduction to the Profession | 2 |
| Natural Science and Engineering Requirements For general education requirements, see page 25. | 11 |
| Mathematics Requirements For general education requirements, see page 25. <i>MATH 151 required for iCOM specialization</i> | 5 |
| Interprofessional Projects | 6 |
| PTC (Technical) Electives | 9 |
| AAH or ARCH Elective AAH 119, AAH 120, AAH 301, or ARCH 331 | 3 |
| Science, Technology, and Society Electives | 12 |
| Minor Electives <i>CS Networking minor required for iCOM specialization</i> | 15 |
| Linguistics Elective | 3 |
| Ethics Elective | 3 |
| Free Electives | 15 |
| Total Hours | 128 |

* Chosen in consultation with advisor.

Professional and Technical Communication (PTC) Curriculum

| Semester 1 | Credits | Semester 2 | Credits |
|---|----------------|--|----------------|
| Introduction to the Profession | 2 | CS 105 Intro to Computer Programming I | 2 |
| MATH 151 Calculus I | 5 | Natural Science or Engineering Elective | 4 |
| Natural Science or Engineering Elective | 4 | Linguistics Elective | 3 |
| Humanities 100-level Elective | 3 | Humanities Elective (300+) | 3 |
| Social Sciences Elective | 3 | Free Elective | 3 |
| Total Hours | 17 | Total Hours | 15 |
| Semester 3 | Credits | Semester 4 | Credits |
| PTC (technical) Elective | 3 | Minor Elective | 3 |
| Natural Science or Engineering Elective | 3 | PTC (technical) Elective | 3 |
| AAH or ARCH Elective* | 3 | STS Elective** | 3 |
| Ethics Elective** | 3 | Humanities Elective (300+) | 3 |
| Social Sciences Elective | 3 | Free Elective | 3 |
| Free Elective | 3 | Total Hours | 15 |
| Total Hours | 18 | | |
| Semester 5 | Credits | Semester 6 | Credits |
| COM 421 Technical Writing | | COM 424 Document Design | 3 |
| OR | 3 | ITM 462 Web Site Application Development† | |
| COM 423 Writing Workplace | | OR | |
| ITM 461 Internet Technologies & Web Design† | | EG 325 Adv Eng Graphics for Non-Engineers† | 3 |
| OR | | OR | |
| EG 225 Engineering Graphics† | 3 | CAD Elective**† | |
| OR | | Minor Elective | 3 |
| ARCH 125 Introduction to Architectural Computing† | | Humanities or Social Sciences Elective | 3 |
| IPro Elective I | 3 | Free Elective | 3 |
| Minor Elective | 3 | Total Hours | 15 |
| STS Elective** | 3 | | |
| Social Sciences Elective (300+) | 3 | | |
| Total Hours | 18 | | |
| Semester 7 | Credits | Semester 8 | Credits |
| ITM 460 Fundamentals of Multimedia† | | COM 428 Verbal and Visual Communication | 3 |
| OR | | Minor Elective | 3 |
| ITM 465 Rich Internet Application† | | PTC (technical) Elective | 3 |
| OR | 3 | STS Elective** | 3 |
| EG 425 Computer Graphics for Non-Engineers† | | Free Elective | 3 |
| OR | | Total Hours | 15 |
| CAD Elective**† | | | |
| COM 425 Editing | 3 | | |
| IPro Elective II | 3 | | |
| Minor Elective | 3 | | |
| STS Elective** | 3 | | |
| Total Hours | 15 | | |

Total Credit Hours **128**

* Choose from AAH 119, AAH 120, AAH 301, ARCH 331.

** Chosen in consultation with advisor.

† Choose from one of the following three nine-credit sequences:

WebCom Sequence: ITM 461, 462, (460 or 465) (*Sequence required for iCOM specialization*)

Engineering Graphics Sequence: EG 225, 325, 425

Architectural CAD Sequence: ARCH and two CAD electives chosen in consultation with advisor.

Journalism of Technology, Science, and Business (JTSB)

Journalism is possibly the most important occupation in a free and democratic society and the demand for journalists is increasing as news outlets proliferate. Today, in addition to newspapers and magazines, there is news on radio, television, cable, satellite TV and radio, web sites, and even cell phones and iPods. As the number and types of news outlets increase, many are also specializing in science, technology, and business. The JTSB degree program meets this specialized demand by incorporating IIT's considerable resources in the sciences, business, engineering, and other technological areas with the Humanities depart-

ment's strengths in communication and STS (science and technology in society). This is a rigorous curriculum: our students go above and beyond the minimum general education requirements in mathematics, the sciences and engineering, computer science, business, communication, and humanities courses. By educating strong writers who have a clear understanding of science, technology, and business, and the way such disciplines relate to society, the JTSB program gives its graduates a competitive edge in the workplace.

Bachelor of Science in Journalism of Technology, Science, and Business (JTSB)

| Required Courses | Credit Hours |
|---|--------------|
| Journalism Requirements COM 372, 373, 377, 421, 425, 435, 440 | 21 |
| Journalism Electives and Supervised Field Projects | 8 |
| Technology, Science, and Business Electives* | 15-16 |
| Science, Technology, and Society Electives | 6 |
| Business Requirements BUS 205, 210, ECON 211 | 9 |
| Mathematics Requirements MATH 151, 152 | 10 |
| Science Requirements BIOL 107, CHEM 124, PHYS 123 | 11 |
| Science Elective* BIOL 115, CHEM 125, 126, or PHYS 221 | 3-4 |
| Humanities and Social Science Requirements For general education requirements, see page 25. | 21 |
| Introduction to the Profession | 2 |
| Interprofessional Projects | 6 |
| Computer Science Requirements CS 115, 116, 331 | 7 |
| Free Electives | 9 |
| Total Hours | 129 |

* Students who complete a three-credit-hour science elective must complete 16 credit hours of Science, Technology, and Business electives.

Journalism of Technology, Science, and Business Curriculum (JTSB)

| Semester 1 | Credits |
|--------------------------------------|-----------|
| Introduction to the Profession | 2 |
| BIOL 107 General Biology | 3 |
| MATH 151 Calculus I | 5 |
| CS 115 Object-Oriented Programming I | 2 |
| Humanities 100-level Elective | 3 |
| Total Hours | 15 |

| Semester 2 | Credits |
|---------------------------------------|-----------|
| CHEM 124 Principles of Chemistry I | 4 |
| ECON 211 Principles of Economics | 3 |
| COM 372 Mass Media and Society | 3 |
| MATH 152 Calculus II | 5 |
| CS 116 Object-Oriented Programming II | 2 |
| Total Hours | 17 |

| Semester 3 | Credits |
|---------------------------------------|-----------|
| PHYS 123 General Physics I | 4 |
| COM 377 Communication Law and Ethics | 3 |
| BUS 205 Business Basics | 3 |
| CS 331 Data Structures and Algorithms | 3 |
| Social Sciences Elective | 3 |
| Total Hours | 16 |

| Semester 4 | Credits |
|-------------------------------------|--------------|
| BIOL 115 Human Biology* | |
| OR | |
| CHEM 125 Principles of Chemistry II | 3/4/4 |
| OR | |
| PHYS 221 General Physics II | |
| COM 440 Introduction to Journalism | 3 |
| STS Elective | 3 |
| Humanities Elective (300+) | 3 |
| Free Elective | 3 |
| Total Hours | 15/16 |

| Semester 5 | Credits |
|---|-----------|
| COM 373 Writing about Science, Tech, and Bus | 3 |
| BUS 211 Fin Accounting and External Reporting | 3 |
| IPRO Elective I | 3 |
| TSB Elective | 3 |
| Supervised Field Project | 1 |
| Humanities or Social Sciences Elective | 3 |
| Total Hours | 16 |

| Semester 6 | Credits |
|-------------------------------------|-----------|
| COM 435 Intercultural Communication | 3 |
| TSB Elective | 3 |
| TSB Elective | 3 |
| Journalism Elective | 3 |
| Supervised Field Project | 1 |
| Social Sciences Elective | 3 |
| Total Hours | 16 |

| Semester 7 | Credits |
|---------------------------------|-----------|
| COM 421 Technical Communication | 3 |
| IPRO Elective II | 3 |
| TSB Elective | 3 |
| STS Elective | 3 |
| Social Sciences Elective (300+) | 3 |
| Free Elective | 3 |
| Total Hours | 18 |

| Semester 8 | Credits |
|----------------------------|--------------|
| COM 425 Editing | 3 |
| TSB Elective* | 3/4 |
| Journalism Elective | 3 |
| Humanities Elective (300+) | 3 |
| Free Elective | 3 |
| Total Hours | 15/16 |

Total Credit Hours **129**

* Students who complete a three-credit-hour science elective must complete 16 credit hours of Science, Technology, and Business electives.

Industrial Technology and Management

School of Applied Technology

Department Website: www.iit.edu/cpd/intm

3424 S. State St.
Suite 4001 South
Chicago, IL 60616
312.567.3650

Director

Mazin Safar

Program Manager

Pamela Houser

The Bachelor of Industrial Technology and Management (BINTM) program is designed to prepare skilled adults for managerial positions in industry. This is a completion program for working individuals who have technical training in manufacturing or industrial specialties. The program enables students to build upon existing skills, improve their managerial capabilities, and thereby expand their career opportunities.

Educational outcomes of the BINTM program include:

- Understand best practices in industry and methods of implementation.
- Identify and evaluate significant factors and issues affecting managerial decision-making.
- Ability to assume a leadership role and a higher level of professional responsibility.
- Understand how to address a wide range of operational and situational challenges.
- Understand the importance of ethical and sustainable industrial operations.
- Communicate effectively at all levels, in an objective and professional manner.
- Ability to function on multidisciplinary teams.

The program offers five professional specializations: Industrial Facilities (IF), Industrial Sustainability (ST), Man-

ufacturing Technology (MT), Supply Chain Management (SCM), and Telecommunication Technology (TT). Students have the option to complete a specialization or take courses from more than one specialization area as electives. The core curriculum covers material applicable to all industrial sectors. This approach allows students to optimize course selection to suit individual career objectives.

The ideal candidate for this program is a person who is already working within, or has strong interest in, these industries or related fields. This curriculum provides a broad knowledge base which gives students the flexibility to advance within a chosen technical specialty or to move into a related career at a professional or management level.

Admission to the program is based on a review of college transcripts plus consideration of work experience and career goals. Nominally, 63 semester hours from an accredited college are needed for admission (only courses graded C or better are accepted for transfer). Those who have accrued at least 45 hours towards admission requirements may be admitted with the condition that all outstanding requirements be completed within two years of starting the program. Candidates with more than 63 hours of transferable credit may qualify to have excess credit applied towards INTM coursework.

To accommodate full-time work schedules, courses are offered evenings and Saturdays at IIT's Main Campus in Chicago, IIT's Rice Campus in Wheaton, IL, and via the Internet for students who are unable to attend live classes.

A three-course INTM certificate program is available for individuals interested in improving management and decision-making skills. The courses are part of the regular curriculum and can be applied toward the BINTM degree.

Faculty

Industry Professor

M. Safar

Industry Associate Professor

W. Maurer

Adjunct Professors

D. Arditi, R. Ayman, J. Blair, W. Bobco,
J. Caltagirone, J. Coates, J. Cesarone, B. Davis,
J. Donahue, J. Field, R. Footlik, J. Goldberg,
E. Goldman, G. Gopal, R. Hoffman, K. Jabbari,
J. Jain, A. Kumiega, R. Lemming, P. Lewis,
M. Nicholson, J. Prendergast, I. Rozansky, R. Shankar,
H. Shields, D. Tjunelis, D. Tomal, J. Twombly

Admission Requirements

Candidates must complete an application for undergraduate admission and submit official transcripts from all colleges attended, one letter of recommendation, and a personal statement. The BINTM program nominally requires the transfer of 63 semester hours as outlined in the following admission requirements:

Mathematics

Six credit hours at the level of college algebra or above.

Computer Science

Three credit hours of computer programming.

Natural Science

Eleven credit hours of science or engineering courses. Relevant courses include physics, chemistry, or biology (physics highly recommended). Up to six credit hours may be in graphics/drafting. Two sequential courses must be com-

pleted in a single field and the third course must be in a different field. In some cases, certain technology courses might be applied to this requirement.

Humanities and Social Sciences

Twelve credit hours. Humanities courses include literature, philosophy (except logic), and history. Social sciences typically include anthropology, geography, political science, psychology, sociology, and economics. A minimum of three credit hours in humanities and six credit hours in social sciences is required.

Technical coursework

Thirty-one credit hours. (Candidates with adequate college credit but lacking the technical coursework may qualify for admission based on a strong interest and/or relevant industrial experience.)

Industrial Technology and Management Curriculum

A total of 126 semester hours are required for the Bachelor's degree, consisting of 63 credit hours (21 courses) of junior- and senior-level courses completed at IIT and the 63 transfer credit hours required for admission. Students may attend on a part-time or full-time basis, understanding that INTM courses are generally offered evenings to accommodate full-time work schedules of students.

The core curriculum (14 courses) emphasizes proficiency in the essential functions of industrial enterprises with a focus on management-related topics. This coursework includes upper-level humanities and social sciences electives and two Interprofessional Projects (IPRO). Students also complete three technical electives and four specialization electives, which provide in-depth coverage of specific aspects of industrial organizations and their related sectors. Students have the option to complete a formal specialization or alternatively to choose electives from more than one specialization area.

Five specializations are available:

Industrial Facilities (IF)

Covers construction, project management, and renovation and maintenance of buildings, facilities, and equipment.

Industrial Sustainability (ST)

Covers a range of issues in sustainability, critical material resources, and alternative energies.

Manufacturing Technology (MT)

Covers manufacturing processes for metals, chemical, and electronic industries, information systems, and quality control.

Supply Chain Management (SCM)

Covers supply chain management, warehousing and distribution, purchasing, transportation, and export/import activities.

Telecommunication Technology (TT)

Covers management and maintenance of data networks, network configurations, network security, and evolving technologies, including voice over IP.

Bachelor of Industrial Technology and Management

| Required Courses | Credit Hours |
|--|--------------|
| Admission Requirements | 63 |
| Industrial Technology Requirements INTM 301, 315, 404, 408, 409, 410, 414, 432, 477 | 27 |
| Technical Electives | 9 |
| Specialization Electives | 12 |
| Humanities Electives 300/400-level courses | 6 |
| Social Sciences Elective 300/400-level course | 3 |
| Interprofessional Projects | 6 |
| Total Hours | 126 |

Industrial Technology and Management

A suggested program based on half-time attendance. Students may complete coursework at their own pace.

| Semester 1 | Credits | Semester 2 | Credits |
|---|-----------|---------------------------------------|----------|
| INTM 301 Communications for the Workplace | 3 | INTM 410 Operations Management | 3 |
| INTM 315 Industrial Enterprises | 3 | Technical Elective* | 3 |
| INTM 414 Topics in Industry | 3 | Humanities Elective (300+) | 3 |
| Total Hours | 9 | Total Hours | 9 |
| Semester 3 | Credits | Semester 4 | Credits |
| INTM 404 Sales, Marketing and Product Intro | 3 | INTM 409 Inventory Control | 3 |
| Specialization Elective | 3 | Technical Elective* | 3 |
| Technical Elective* | 3 | Total Hours | 6 |
| Total Hours | 9 | | |
| Semester 5 | Credits | Semester 6 | Credits |
| INTM 432 Vendor/Customer Relations | 3 | INTM 477 Entrepreneurship in Industry | 3 |
| Specialization Elective | 3 | Specialization Elective | 3 |
| IPro Elective I | 3 | Social Sciences Elective (300+) | 3 |
| Total Hours | 9 | Total Hours | 9 |
| Semester 7 | Credits | Semester 8 | Credits |
| INTM 408 Cost Management | 3 | IPro Elective II | 3 |
| Humanities Elective (300+) | 3 | Specialization Elective | 3 |
| Total Hours | 6 | Total Hours | 6 |
| Total Credit Hours | 63 | | |

* Technical Electives:

INTM 314 Maintenance Technology and Management
 INTM 319 Electronics in Industry
 INTM 322 Industrial Project Management
 INTM 418 Industrial Risk Management

INTM 420 Applied Strategies for the Competitive Enterprise
 INTM 425 Human Resource Management
 INTM 427 E-Commerce
 INTM 441 Supply Chain Management

Specializations in Industrial Technology and Management

To earn a specialization, students must complete four courses within an identified subject area.

Industrial Facilities (IF)

INTM 407 Construction Technology
INTM 413 Facilities and Construction Administration
INTM 415 Advanced Project Management
INTM 417 Construction Estimating

Industrial Sustainability (ST)

INTM 459 Issues in Industrial Sustainability
INTM 460 Sustainability of Critical Materials
INTM 461 Energy Options in Industry
INTM 462 Special Topics in Sustainability

Manufacturing Technology (MT)

INTM 406 Quality Control
INTM 412 Manufacturing Processes for Metals and Mechanical Systems
INTM 431 Manufacturing Processes for Electronics/Electrical Systems
INTM 433 Manufacturing Processes in Chemical Industries
INTM 446 Manufacturing and Logistics Information Systems

Supply Chain Management (SCM)

INTM 430 Transportation
INTM 442 Warehousing and Distribution
INTM 443 Purchasing
INTM 444 Export/Import
INTM 446 Manufacturing and Logistics Information Systems

Telecommunication Technology (TT)

ITMO 440 Introduction to Data Networks and the Internet
ITMO 441 Network Administration and Operations
ITMS 448 Cyber Security Technologies
INTM 449 Telecommunications Over Data Networks

Certificate in Industrial Technology and Management

The three-course INTM certificate provides an introduction to industrial organizations and how they operate.

Certificate students should have at least two years of work experience and some college credit in industrial subjects. The INTM certificate does not qualify for federal financial aid.

Students must complete the following courses:

INTM 315 Industrial Enterprises
INTM 322 Industrial Project Management
INTM 410 Operations Management

Information Technology and Management– School of Applied Technology

Department Website: www.iit.edu/cpd/itm

10 W. 33rd St.
Room 223
Chicago IL 60616
312.567.5290

Dean and Program Director

C. Robert Carlson

Associate Director and Director of Undergraduate Advising

Ray Trygstad

The objective of the Bachelor of Information Technology and Management degree is to produce graduates prepared for a career in the information technology field, while equipping them with the critical thinking skills necessary to cope with the emergence of new technologies and with management principles needed to advance in their careers. While the program was originally designed for students who have achieved an Associate's degree and would like to complete a Bachelor's degree, students may also enter the program as first-year students.

Government studies such as Free and Aspray: *The Supply of Information Technology Workers in the United States*, show that technology positions will be the fastest growing segment in the United States for the next 30 years. Organizations of all kinds have become dependent on networked computing infrastructure as the key element to enabling modern business processes, and our graduates are prepared to select, manage, and maintain that infrastructure, ensuring that it meets organizational needs. Information technology professionals assume responsibility for selecting hardware and software products appropriate for an organization, integrating those products with organizational needs and infrastructure, and installing, customizing, and maintaining those applications for the organization's computer users. Planning and managing an organization's technology infrastructure is a difficult and complex job that requires a solid foundation in applied computing as well as management and people skills. Professionals in this discipline require special skills, such as understanding how networked systems are composed and structured and what their strengths and weaknesses are, and being prepared to deal with important software systems concerns such as reliability, security, usability, and effectiveness and efficiency for their intended purpose. These topics are difficult and intellectually demanding.

The Bachelor of Information Technology and Management degree program produces graduates who:

- Advocate for users and meet their needs within an organizational and societal context through the selection, creation, application, integration, and administration of computing technologies.
- Provide integrated technology solutions for business, government, healthcare, schools, and other organizations.
- Exhibit current knowledge of the technologies that are in use in today's workplace.
- Make information technology work in a wide range of settings.
- Create digital content for the technology infrastructure.
- Provide support to individuals who use the technology infrastructure.

To meet these goals, graduates must demonstrate knowledge and proficiency in these areas:

- Information technology basics including hardware and operating systems
- Application development and programming
- Human-computer interaction
- Databases and data management
- Networking and communications
- Websystems
- Cybersecurity
- Professionalism

Entering the program as a first-year student requires the completion of additional courses in technical communication, psychology, engineering graphics, and a minor. The minor may be in a field which will complement information technology such as business or professional and technical communication, or may be chosen from a field very different such as history or sociology to provide a more widely rounded educational experience.

Admission for transfer students is based on a review of college transcripts and documentation of work experience. Applicants must submit an application for admission as a degree-seeking student. Transfer applicants must hold an Associate's degree (A.A.) from an accredited college or the equivalent (completion of 60 credit hours). Only courses in which the student has earned a grade of C or better may be accepted for transfer. Supporting documentation to be included with the application includes official transcripts of all college-level work.

Faculty

Professor

C. R. Carlson

Industry Professors

C. Davids, R. Hendry, W. Lidinsky, R. Trygstad

Industry Associate Professor

J. Hajek

Adjunct Industry Professors

A. Friedman, B. Goins, P. Gupta, D. Hood, N. Joiner, W. Slater, K. Vaccaro

Adjunct Industry Associate Professors

M. England, D. Hasenfang, P. Huang, R. Kandemir, M. Kozi, J. Meyers, S. Shamsuddin, R. VanDame

Adjunct Instructors

B. Bailey, S. Haurberg, L. McHugh

Transfer Admission Requirements

Admitted transfer students are expected to have satisfied the following general education requirements prior to admission. If not, the student must complete them while working on the ITM degree. The degree requires

a minimum of 129 semester hours including transfer and coursework completed at IIT. A maximum of 68 applicable semester hours of transfer credit is permitted from a two-year college.

Basic Writing Proficiency Requirement

Students must take the IIT English Proficiency Examination before beginning classes at IIT. Within their first year at IIT, students who do not pass the IIT English Proficiency Examination must demonstrate basic writing proficiency by passing a composition course at IIT.

Natural Science or Engineering

Eleven semester hours of natural science or engineering courses. Relevant science courses include physics, chemistry, astronomy, or biology. Two sequential courses must be from the same field and one must be from another field. In some cases, certain technology courses might be applied to this requirement.

Computer Science

Two credit hours of computer programming; may be satisfied by taking ITM 311.

Humanities and Social Science

Twelve semester hours. Humanities include literature, philosophy (except logic), and history. Social or behavioral sciences typically include anthropology, geography, political science, psychology, sociology, and economics. Studies must include a minimum of three semester hours in humanities and six semester hours in the social sciences.

Mathematics

Five semester hours of mathematics at the level of MATH 119 or above; probability and statistics is highly recommended. Students who enter the program with less than 60 hours of total transfer credit or less than five hours of mathematics credit will be required to take BUS 221 – Statistics for Managerial Decision Making.

Free or Technical Electives

Thirty-three semester hours of approved courses. Students should contact the Office of Undergraduate Academic Affairs for additional information.

Bachelor of Information Technology and Management

Transfer students are required to take 66 semester hours at IIT and transfer 63 semester hours to complete the Bachelor's degree for a total of 129 semester hours. This includes 17 information technology courses for a total of 51 semester hours in the major. An additional 18 semester hours outside the major must be taken at IIT in order to satisfy the remaining IIT general education requirements. These include three 300/400-level humanities and social sciences electives and two IPRO courses. Two social sciences electives must be from the same field and one must be from a different field; lower-level social sciences electives count towards this requirement. The computer science general education requirement may be satisfied by completion of ITM 311. Students who enter the program with less than 60 hours of total transfer credit or less than five hours of mathematics credit will be required to take BUS 221 – Statistics for Managerial Decision Making.

All students must complete a minimum of 42 semester hours of courses with a significant written and oral communication component, identified with a (C) in the bulletin; 15 hours of (C)-coded courses must be taken in the major.

Entering the Bachelor of Information Technology and Management program as a first-year student requires com-

pletion of 126 to 130 hours of coursework (depending on mathematics placement) which must include a minor. ITM students completing a minor are strongly encouraged to consider minors which complement their primary program of study; these include (but are not limited to) Business, Professional and Technical Communications; Circuits and Systems; Computer Architecture; and ROTC. Courses taken to fulfill a minor requirement may not also be used as electives in the major.

Current IIT students, who entered as first-year students, and are changing their major to Information Technology and Management from another major are expected to meet the same requirements as students entering the Bachelor of Information Technology and Management program as first-year students, except that the minor requirement may be waived.

A maximum of nine hours of ITM graduate courses taken as an undergraduate may be applied to the Master of Information Technology and Management degree, and any graduate courses taken to fulfill undergraduate degree requirements may not also be applied to a graduate degree unless the student is enrolled in a co-terminal Master's degree program.

Bachelor of Information Technology and Management (Transfer, Part-Time Program)

| Required Courses | Credit Hours |
|---|--------------|
| Courses Transferred (or taken at IIT) | 63 |
| Humanities Electives 300/400-level courses | 6 |
| Social Sciences Elective 300/400-level course | 3 |
| Interprofessional Projects | 6 |
| ITM Requirements ITM 301, 302, 311, 312, ITMD 411, 421, 461 ITMM 471, ITMO, 440, ITMS 448, ITMT 434 | 33 |
| ITM Electives Select from ITM, ITMD, ITMM, ITMO, ITMS, ITMT, and TECH | 18 |
| Total Hours | 129 |

Information Technology and Management Curriculum

(Students Entering as Transfer, Part-Time)

| | | | | | |
|---------------------------------|---|----------------|----------------------------|--|----------------|
| Semester 1 | | Credits | Semester 2 | | Credits |
| ITM 301 | Contemporary Op Sys/Hardware I | 3 | ITM 302 | Contemporary Op Sys/Hardware II | 3 |
| ITM 311 | Intro to Software Development | 3 | ITM 312 | Intro to Systems Software Programming | 3 |
| ITMD 421 | Data Modeling and Applications | 3 | Humanities Elective (300+) | | 3 |
| Total Hours | | 9 | Total Hours | | 9 |
| Semester 3 | | Credits | Semester 4 | | Credits |
| ITMO 440 | Intro to Data Networks and the Internet | 3 | ITMD 461 | Internet Technologies and Web Design | 3 |
| ITMD 441 | Intermediate Software Development | 3 | ITMS 448 | Systems and Network Security | 3 |
| Total Hours | | 6 | Humanities Elective (300+) | | 3 |
| | | | Total Hours | | 9 |
| Semester 5 | | Credits | Semester 6 | | Credits |
| ITMT 434 | Human/Computer Interaction | 3 | ITMM 471 | Project Management for Info Technology | 3 |
| ITM Elective | | 3 | IPro Elective I | | 3 |
| Social Sciences Elective (300+) | | 3 | ITM Elective | | 3 |
| Total Hours | | 9 | Total Hours | | 9 |
| Semester 7 | | Credits | Semester 8 | | Credits |
| IPro Elective II | | 3 | ITM Elective | | 3 |
| ITM Elective | | 3 | ITM Elective | | 3 |
| ITM Elective | | 3 | Total Hours | | 6 |
| Total Hours | | 9 | | | |
| Total Credit Hours | | 66 | | | |

Bachelor of Information Technology and Management (Program for First-Year Students)

| Required Courses | Credit Hours |
|---|----------------|
| ITM Requirements ITM 100, 301, 302, 311, 312, ITMD 411, 421, 461, ITMM 471, ITMO 440, ITMS 448, ITMT 434 | 35 |
| ITM Electives Select from ITMD, ITMM, ITMO, ITMS, ITMT, and TECH | 18 |
| Mathematics Requirements ((MATH 130 and 425) or (MATH 148 and 149) or MATH 151) and a statistics elective | 8/12 |
| Engineering Requirement EG 225 | 3 |
| Natural Science and Engineering Requirements For general education requirements, see page 25. | 8 |
| Humanities and Social Sciences Requirements | 21 |
| Psychology Requirement PSYC 301 (May count toward upper-level social sciences requirement) | 3 |
| Technical Communication Requirement COM 421 | 3 |
| Interprofessional Projects | 6 |
| Minor Electives | 15 |
| Free Electives | 6 |
| Total Hours | 126/130 |

Information Technology and Management Curriculum

(Program for First-Year Students)

| Semester 1 | Credits |
|---|--------------|
| EG 225 Engineering Graphics for Non-Engineers | 3 |
| First-year MATH sequence Elective* | 3/5 |
| Natural Science or Engineering Elective | 4 |
| Humanities or Social Sciences Elective | 3 |
| Total Hours | 13/15 |

| Semester 2 | Credits |
|---|--------------|
| ITM 100 Introduction to the Profession | 2 |
| ITM 301 Contemporary Op Sys/Hardware I | 3 |
| ITM 311 Intro to Software Development | 3 |
| First-year MATH sequence Elective* | 3/5 |
| Natural Science or Engineering Elective | 4 |
| Total Hours | 15/17 |

| Semester 3 | Credits |
|---|-----------|
| ITM 302 Contemporary Op Sys/Hardware II | 3 |
| ITM 312 Introduction to Systems Software Prog | 3 |
| ITM Elective | 3 |
| ITM Elective | 3 |
| Humanities 100-level Elective | 3 |
| Social Sciences Elective | 3 |
| Total Hours | 18 |

| Semester 4 | Credits |
|---|-----------|
| ITMD 411 Intermediate Software Development | 3 |
| ITMT 434 Human/Computer Interaction | 3 |
| ITM Elective | 3 |
| Statistics Elective (MATH 425, BUS 221, PSYC 203) | 3 |
| Minor Elective | 3 |
| Total Hours | 15 |

| Semester 5 | Credits |
|--|-----------|
| ITMM 440 Intro to Data Networks and the Internet | 3 |
| ITMO 471 Project Management for Info Technology | 3 |
| PSYC 301 Industrial Psychology | 3 |
| Minor Elective | 3 |
| Humanities Elective (300+) | 3 |
| Free Elective | 2 |
| Total Hours | 17 |

| Semester 6 | Credits |
|---|-----------|
| ITMD 421 Data Modeling and Applications | 3 |
| ITMD 461 Internet Technologies & Web Design | 3 |
| COM 421 Technical Writing | 3 |
| IPro Elective I | 3 |
| Social Sciences Elective | 3 |
| Minor Elective | 3 |
| Total Hours | 18 |

| Semester 7 | Credits |
|--------------------------------------|-----------|
| ITMS 448 System and Network Security | 3 |
| ITM Elective | 3 |
| Minor Elective | 3 |
| Humanities Elective (300+) | 3 |
| Free Elective | 3 |
| Total Hours | 15 |

| Semester 8 | Credits |
|---------------------------------|-----------|
| IPro Elective II | 3 |
| ITM Elective | 3 |
| ITM Elective | 3 |
| Minor Elective | 3 |
| Social Sciences Elective (300+) | 3 |
| Total Hours | 15 |

Total Credit Hours **126/130**

* Choose from (MATH 130 and 425) or (MATH 148 and 149) or MATH 151.

Information Technology Curriculum Specializations

The ITM electives may be chosen from one or more of the following course specializations. ITM required courses may not be counted toward completion of elective requirements

for specializations. With the permission of the advisor, other undergraduate or graduate courses in the same area may be substituted for courses in a specialization.

Systems Security

Focuses on application, data, and network security and the management of information technology security.

ITMS 478 Cyber Security Management

AND *select one course from the following:*

ITMO 451 Distributed Workstation System

Administration

ITMO 452 Client-Server System Administration

ITMO 456 Introduction to Open Source Operating

Systems

AND *any two ITMS electives.*

Data Management

Focuses on the design, development, and administration of traditional and Internet-based data management.

ITMD 422 Advanced Database Management

ITMS 428 Database Security

AND *select two courses from the following:*

ITMO 444 Cloud Computing Technologies

OR *any ITMD elective(s).*

Web Design and Application Development

Focuses on the design and development of fully-interactive websites and applications for Internet deployment.

ITMO 441 Network Applications and Operations

ITMD 462 Web Site Application Development

AND *select two courses from the following:*

ITMO 444 Cloud Computing Technologies

ITMD 455 Intelligent Device Applications

ITMD 463 Intermediate Web Site Application

Development

ITMD 464 Advanced Web Site Application

Development

ITMD 465 Rich Internet Applications

ITMD 466 Service Oriented Architecture

ITMD 469 Topics in Application Development

IT Entrepreneurship and Management

Focuses on the managerial and entrepreneurial skills needed to launch a new enterprise.

ITMM 470 Fundamentals of Management for Technical

Professionals

ITMM 481 IT Entrepreneurship

AND *select any two courses from ITMM or the following:*

BUS 100 Introduction to Business

ECON 151 Making Strategic Decisions in the Marketplace

OR *any BUS elective at the 200-level or above.*

Software Development

Focuses on programming and the development of sophisticated applications.

ITMD 415 Advanced Software Development

ITMD 462 Web Site Application Development

AND *select one course from the following:*

ITMD 412 Advanced Structured & Systems

Programming

ITMD 413 Open Source Programming

ITMD 419 Topics in Software Development

ITMD 455 Intelligent Device Applications

AND *any ITMD elective.*

System Administration

Focuses on the administration and the management of servers.

ITMO 441 Network Applications and Operations

AND *select one course from the following:*

ITMO 451 Distributed Workstation System

Administration

ITMO 452 Client-Server System Administration

AND *select two courses from the following:*

ITMO 444 Cloud Computing Technologies

ITMO 454 Operating System Virtualization

ITMO 456 Introduction to Open Source Operating

Systems

ITMS 458 Operating System Security

Networking and Communications

Focuses on network applications and management.

ITMO 441 Network Applications and Operations

AND *select one course from the following:*

ITMO 451 Distributed Workstation System

Administration

ITMO 452 Client-Server System Administration

ITMO 456 Introduction to Open Source Operating

Systems

AND *select any two courses from ITMO, ITMT, or the following:*

ITMS 443 Vulnerability Analysis and Control

ITMD 465 Rich Internet Applications

ITMS 478 Cyber Security Management

IIT/College of DuPage and IIT/Joliet Junior College Dual Admissions Programs

Students who meet the requirements of the Dual Admissions Program (DAP) may enroll simultaneously at the College of DuPage (COD) or Joliet Junior College (JJC) and IIT. Students accepted into the DAP will have access to advising and other services from both institutions. Students

who successfully complete the institutional course requirements of both institutions under the DAP will be awarded an Associate's degree from COD or JJC and a Bachelor of Information Technology and Management from IIT.

Eligibility for the Program

Students applying to the DAP must be enrolled in one of the following programs:

At COD: Associate of Applied Science degree in Computer Information Systems or Associate of Applied Science degree in Computer Internetworking Technologies

At JJC: Associate of Applied Science degree in Computer Information Systems; Network Specialist, Programming or Web Design and Administration Options

Students must have and maintain a cumulative GPA of at least 3.00 at COD or JJC to be eligible for admission to IIT. Students must make satisfactory academic progress at COD, as defined by COD, or at JJC, as defined by JJC.

Application Process

Applicants must complete a Statement of Intent Form, which permits the exchange of academic admission and advising information between IIT and COD or JJC. Applicants must also complete the application process at both COD or JJC and IIT in order to be admitted to both

institutions. The IIT application may be submitted only for a Bachelor's program in Information Technology and Management. Admission to other IIT programs may have additional requirements that are outside the scope of the program.

Academic Program Requirements

Students must follow each institution's policies regarding admission, course enrollment, transfer hours, probation, dismissal and re-instatement. Transcripts must be sent to the IIT Office of Undergraduate Academic Affairs each semester for each student attending COD or JJC and enrolled in the DAP. IIT will provide COD and JJC with major and course updates, course prerequisites, and program requirements for the Information Technology and Management Bachelor's degree completion program.

Graduation Requirements

Students enrolled in the DAP must follow the COD or JJC catalog to satisfy requirements for the Associate's degree and the requirements set out in the IIT Undergraduate Bulletin in effect at the time of admission into the DAP for the Bachelor's degree.

Mathematics and Science Education

Department Website: www.iit.edu/csl/msed

South Tower 4007
3424 S. State St.
Chicago, IL 60616
312.567.3661

The Department of Mathematics and Science Education has an education program that prepares students for a teaching certificate at the secondary level (grades 6-12) while they receive a Bachelor of Science degree in Biology, Chemistry, Physics, Applied Mathematics, Computer Sciences, an engineering discipline, or a related field.

A math or science teacher must know the subject matter as well as how to teach it. The Department of Mathematics and Science Education is a discipline-based teaching program. Students will learn how to effectively teach their chosen disciplines because the curriculum focuses on each student's chosen discipline as opposed to general education.

The program draws primarily from constructivist epistemology as a means by which knowledge is developed and fully recognizes the individual perspectives from which learners approach school and life situations. Additionally, the knowledge base utilizes contemporary research on teaching and learning and is philosophically and substantively aligned with Illinois Content Standards and the professional subject-matter organizations. Graduates of the program will be leaders in instructional innovation in mathematics and science.

The overall organizational framework for the program borrows heavily from Shulman's (1986) *Knowledge Growth in Teaching* with the ultimate focus on the Teacher as Transformer of Subject Matter. At an operational level, the program focuses on the development, revision, and elaboration of six primary domains of knowledge that both theory and research have indicated are essential for effective instruction. It is this combination of domains of knowledge that distinguishes the expert teacher from others possessing one or more of the following domains of knowledge: subject matter knowledge, pedagogical knowledge, knowledge of schools, knowledge of learners, curricular knowledge, and pedagogical content knowledge.

Within the Knowledge Growth in Teaching model, the IIT program is committed to providing students with experiences that help them develop a full range of knowledge and skills in the areas of subject matter, pedagogy, pedagogical content knowledge, schools, learners, and curriculum within a framework of moral and ethical societal norms, including a commitment to equity and diversity. From a constructivist perspective, individuals are continually structuring knowledge and revising their knowledge in response to differing contexts and new knowledge/perceptions. Consequently, it is important to note that the program does not view any of the domains of knowledge as completed outcomes upon graduation. Rather, the domains provide a basis for continued life-long professional development.

Specific Program Outcomes

Program graduates will demonstrate their knowledge of the stated domains of knowledge by:

- The development of integrated and in-depth subject matter knowledge in topical areas directly relevant to teaching content specialty (Subject Matter Knowledge).
- The successful development of instructional materials/plans consistent with research on teaching/learning and supports emotional development (Pedagogical Knowledge).
- Successfully working within the school and community in a manner that fosters community and state instructional goals (Knowledge of Schools).
- The development and implementation of instructional materials and plans that are consistent with current cognitive and social theories on student learning and personal development for all students regardless of their race, ethnicity, gender, sexual orientation, language, religion, socioeconomic status, and regional/geographic origins (Knowledge of Learners).
- Appropriate selection of instructional/curriculum materials relative to local, state, and national curriculum goals and reforms, and exhibited ability to analyze and revise materials so that they are consistent with appropriate curriculum goals (Curricular Knowledge).
- Successful development and implementation of instruction that represents current subject matter to students in a form that promotes in-depth understanding and ability to apply knowledge to new and unique situations (Pedagogical Content Knowledge).

Mathematics and Science Education

Faculty

Professor

N. Lederman

Associate Professor

J. Lederman

Visiting Assistant Professor

D. Meyer

Instructor

G. Popovic

Mathematics and Science Education Secondary Science or Mathematics Teaching Certification*

| Required Courses | Credit Hours |
|---|--------------|
| MSED 200 Analysis of Classrooms (Practicum and Seminar) | 3 |
| MSED 250 Middle and Secondary School Curriculum/Foundations | 3 |
| MSED 300 Instructional Methods/Strategies I | 3 |
| MSED 320 Inquiry and Problem Solving in Mathematics and Science | 3 |
| MSED 350 Informal Education (Practicum and Seminar) | 3 |
| MSED 400 Instructional Methods/Strategies II | 3 |
| MSED 450 Professional Internship | 6 |
| Total Hours | 24 |

* This program has been approved by Illinois State Board of Education.

Mechanical, Materials, and Aerospace Engineering

Department Website: www.iit.edu/engineering/mmae

10 W. 32nd St.
Engineering 1 Building Suite 243
Chicago, IL 60616
312.567.3175

Chair

Keith Bowman

The Department of Mechanical, Materials, and Aerospace Engineering offers the Bachelor of Science degree in Mechanical Engineering (ME), Materials Science and Engineering (MSE), and Aerospace Engineering (AE). These degree programs are accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).

The objectives of the (AE/ME/MSE) undergraduate program are to prepare graduates for a broad range of professional careers and provide a foundation for advanced studies at the graduate or professional level.

The educational outcomes of the (AE/ME/MSE) program are to develop in graduates:

- An ability to apply knowledge of mathematics, science, and engineering.

- An ability to design and conduct experiments, as well as to analyze and interpret data.
- An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, sustainability.
- An ability to function on multidisciplinary teams.
- An ability to identify, formulate, and solve engineering problems.
- An understanding of professional and ethical responsibility.
- An ability to communicate effectively.
- The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
- A recognition of the need for, and an ability to engage in, life-long learning.
- A knowledge of contemporary issues.
- An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Faculty

Professors

K. Bowman, A. Cramb, J. Kallend, K. Meade,
H. Nagib, S. Nair, P. Nash, A. Ostrogorsky, B. Pervan,
D. Rempfer, L. Shaw, C. Wark, D. Williams

Associate Professors

K. Cassel, H. Clack, M. Gosz, X. Qian, G. Raman,
F. Ruiz, S. Tin, M. Vural, B. Wu

Assistant Professors

S. Datta-Barua, S. Shadden, M. Spenko

Research Assistant Professor

S. Khanafseh

Senior Lecturer

J. Cesarone

Lecturer

R. Cammino

Faculty Emeritus

R. Bonthron, N. Breyer, R. Dix, L. Graham,
G. Higgins, S. Kalpakjian, S. Kumar, M. Morkovin,
S. Mostovoy, R. Porter, B. Rasof, C. Sciammarella,
J. Way

Joint Appointments

Professors

H. Arastoopour (Chemical and Biological Sciences),
J. Kallend (Physics), S. Nair (Applied Mathematics),
D. Rempfer (Applied Mathematics)

Adjunct Faculty

D. Duvall, S. Gonczy, R. Lisowski

Mechanical, Materials, and Aerospace Engineering

Students are introduced to the scope of the engineering profession in the first-semester course “Introduction to the Profession”, and to the ethical, economical, safety, environmental, and other responsibilities of being a professional engineer. Strong emphasis is placed on development of oral and written communication skills. Accompanying courses in mathematics and the basic sciences provide the foundation for later studies of engineering sciences relevant to the students’ major fields of study. These areas include: energy, structures, and motion for the ME major; materials, structure-property relations, materials processing, service behavior, and design for the MSE major; and structures and materials, propulsion, and aerodynamics for the AE major. Regardless of the students’ intended major, all MMAE students have a common curriculum for the first two semesters.

The second year emphasizes building a foundation for the eventual study of engineering design. The engineering sciences offer a rational approach to solving detailed problems encountered in major-specific courses, including the

IPROs and capstone design courses of the third and fourth years.

In the third year, students begin the transition to professional practice and learn to develop sound engineering judgment by studying open-ended problems and realistic constraints. Students build further on the engineering sciences, and approximately one-third of major-specific coursework is devoted to the introduction of tangible engineering design. The student’s professional experience is developed by participation in a minimum of two Interprofessional Projects in the third and fourth years.

The process continues into the fourth year where the three programs culminate in senior-year projects. Mechanical engineering projects involve design of thermal and mechanical systems; materials science and engineering students develop new or optimized materials, processing routes, or selection schemes; and aerospace engineering students produce conceptual designs of aircraft and spacecraft missions.

Advising

The MMAE department considers the advising of students an important obligation. Each student must meet with a faculty advisor during the advising period each semester. Students must closely adhere to course prerequisites to maximize academic performance and satisfy requirements for ABET accreditation. Students’ academic advisors can

be found on their myIIT account.

Program requirements may not be waived, nor will substitutions be permitted, without the approval of the departmental Undergraduate Studies Committee.

Minors

Minors available to students who wish to broaden their knowledge can be found on pages 162–165. In all programs, two of the required minor courses substitute for two technical electives. Minors other than those listed below may be undertaken with the approval of the student’s faculty advisor and the MMAE Undergraduate Studies Committee. In the event that a required course for a minor is also required for the major, an approved substitution must be made. Application to take a minor is typically made in the student’s third or fourth semester. Minors require completion of additional courses.

Among the minors that are available to ME, MSE, and AE students are:

- Aerospace Engineering (for ME students only)
- Air Force Aerospace Studies
- Artificial Intelligence
- Business
- Construction Management
- Electromechanical Design and Manufacturing (for ME and AE students only)
- Energy/Environment/Economics (E3)
- Environmental Engineering
- Materials Engineering (for ME or AE students only)
- Mechanical Engineering (for AE students only)
- Military Science
- Naval Science
- Polymer Science and Engineering
- Premedical Studies
- Software Engineering

Mechanical Engineering

Mechanical engineering is an essential part of most industries and modern technologies, and includes the analysis, design, and development of machines and structures that involve motion. Mechanical engineers are employed in areas such as the design and control of machinery; the development of means of transportation including automobiles, aircraft, space and marine vehicles, and railroads;

computer-aided design and manufacture of products, consumer goods, devices, and industrial equipment; medical technology utilizing mechanical and electromechanical devices; the generation of energy from fossil and nuclear fuels; and the utilization, storage, and distribution of alternative energy sources.

Bachelor of Science in Mechanical Engineering

| Required Courses | Credit Hours |
|--|--------------|
| Mechanical Engineering Requirements MMAE 100, 200, 202, 232, 302, 305, 313, 319, 320, 321, 323, 332, 350, 419, 432, 433, 443, 445, 485 | 59 |
| Material Science Requirement MS 201 | 3 |
| Mathematics Requirements MATH 151, 152, 251, 252 | 18 |
| Physics Requirements PHYS 123, 221 | 8 |
| Chemistry Requirement CHEM 124 | 4 |
| Computer Science Requirement CS 105 | 2 |
| Humanities and Social Sciences Electives For general education requirements, see page 25. | 21 |
| Interprofessional Projects | 6 |
| Free Electives | 6 |
| Total Hours | 127 |

Mechanical Engineering Curriculum

| Semester 1 | Credits |
|---|-----------|
| MMAE 100 Introduction to the Profession | 3 |
| MATH 151 Calculus I | 5 |
| CHEM 124 Principles of Chemistry I | 4 |
| Humanities 100-level Elective | 3 |
| Total Hours | 15 |

| Semester 2 | Credits |
|--|-----------|
| MS 201 Materials Science | 3 |
| MATH 152 Calculus II | 5 |
| PHYS 123 General Physics I | 4 |
| CS 105 Intro to Computer Programming I | 2 |
| Social Sciences Elective | 3 |
| Total Hours | 17 |

| Semester 3 | Credits |
|---|-----------|
| MMAE 200 Introduction to Mechanics | 3 |
| MMAE 232 Design for Innovation | 3 |
| MATH 251 Multivariate and Vector Calculus | 4 |
| PHYS 221 General Physics II | 4 |
| Humanities or Social Sciences Elective | 3 |
| Total Hours | 17 |

| Semester 4 | Credits |
|---|-----------|
| MMAE 202 Mechanics of Solids II | 3 |
| MMAE 350 Computational Mechanics | 3 |
| MATH 252 Introduction to Differential Equations | 4 |
| Humanities Elective (300+) | 3 |
| Social Sciences Elective | 3 |
| Total Hours | 16 |

| Semester 5 | Credits |
|----------------------------------|-----------|
| MMAE 302 Mechanics of Solids III | 3 |
| MMAE 305 Dynamics | 3 |
| MMAE 310 Fluid Mechanics | 3 |
| MMAE 320 Thermodynamics | 3 |
| Humanities Elective (300+) | 3 |
| Total Hours | 15 |

| Semester 6 | Credits |
|-------------------------------------|-----------|
| MMAE 319 Mechanical Laboratory I | 4 |
| MMAE 321 Applied Thermodynamics | 3 |
| MMAE 323 Heat & Mass Transfer | 3 |
| MMAE 332 Design of Machine Elements | 3 |
| Social Sciences Elective (300+) | 3 |
| Total Hours | 16 |

| Semester 7 | Credits |
|-------------------------------------|-----------|
| MMAE 419 Mechanical Laboratory II | 4 |
| MMAE 443 Systems Analysis & Control | 3 |
| MMAE 445 Computer Aided Design | 3 |
| MMAE 485 Manufacturing Processes | 3 |
| IPro Elective I | 3 |
| Total Hours | 16 |

| Semester 8 | Credits |
|---------------------------------------|-----------|
| MMAE 432 Design of Mechanical Systems | 3 |
| MMAE 433 Design of Thermal Systems | 3 |
| IPro Elective II | 3 |
| Free Elective | 3 |
| Free Elective | 3 |
| Total Hours | 15 |

Total Credit Hours **127**

Materials Science and Engineering

The Materials Science and Engineering program aims to develop an understanding of the structure, properties, processing, and service behavior of engineering materials, including metallic, ceramic, polymeric, and composite materials. This understanding fosters both development of new materials and improvement of existing materials in order to optimize manufactured products. Laboratory experience is an important part of the program and emphasizes

microstructural characterization using modern analytical techniques, such as optical and electron microscopy and x-ray diffraction, materials processing, determination of the physical and mechanical behavior of materials, and materials and process selection. Graduating students find employment opportunities in a wide range of industries requiring knowledge of materials development and/or optimization, processing, and selection.

Bachelor of Science in Materials Science and Engineering

| Required Courses | Credit Hours |
|---|--------------|
| Materials Engineering Requirements MMAE 100, 200, 202, 232, 320, 365, 370, 372, 373, 463, 465, 470, 472, 476, 485 | 46 |
| Material Science Requirement MS 201 | 3 |
| Mathematics Requirements MATH 151, 152, 251, 252 | 18 |
| Physics Requirements PHYS 123, 221, 224 | 11 |
| Chemistry Requirement CHEM 124 | 4 |
| Computer Science Requirement CS 105 | 2 |
| Technical Electives | 9 |
| Engineering Elective | 3 |
| Humanities and Social Sciences Electives For general education requirements, see page 25. | 21 |
| Interprofessional Projects | 6 |
| Free Elective | 3 |
| Total Hours | 126 |

Materials Science and Engineering Curriculum

| Semester 1 | Credits | Semester 2 | Credits |
|--|-----------|---|-----------|
| MMAE 100 Introduction to the Profession | 3 | MS 201 Materials Science | 3 |
| MATH 151 Calculus I | 5 | MATH 152 Calculus II | 5 |
| CHEM 124 Principles of Chemistry I | 4 | PHYS 123 General Physics I | 4 |
| Humanities 100-level Elective | 3 | CS 105 Intro to Computer Programming I | 2 |
| Total Hours | 15 | Social Sciences Elective | 3 |
| | | Total Hours | 17 |
| | | | |
| Semester 3 | Credits | Semester 4 | Credits |
| MMAE 200 Introduction to Mechanics | 3 | MMAE 202 Mechanics of Solids II | 3 |
| MMAE 232 Design for Innovation | 3 | MATH 252 Introduction to Differential Equations | 4 |
| MATH 251 Multivariate and Vector Calculus | 4 | PHYS 224 General Physics III for Engineers | 3 |
| PHYS 221 General Physics II | 4 | Humanities Elective (300+) | 3 |
| Humanities or Social Sciences Elective | 3 | Free Elective | 3 |
| Total Hours | 17 | Total Hours | 16 |
| | | | |
| Semester 5 | Credits | Semester 6 | Credits |
| MMAE 320 Thermodynamics | 3 | MMAE 372 Aerospace Materials Laboratory | 3 |
| MMAE 365 Structure & Properties of Materials I | 3 | MMAE 463 Structure and Properties of Materials II | 3 |
| MMAE 370 Materials Laboratory I | 3 | MMAE 465 E&M/Optical Properties of Materials | 3 |
| MMAE 373 Instrumentation & Measurements Lab | 3 | Technical Elective* | 3 |
| Social Sciences Elective | 3 | Humanities Elective (300+) | 3 |
| Total Hours | 15 | Total Hours | 15 |
| | | | |
| Semester 7 | Credits | Semester 8 | Credits |
| MMAE 470 Introduction to Polymer Science | 3 | MMAE 472 Advanced Aerospace Materials | 4 |
| MMAE 476 Materials Laboratory II | 3 | IPro Elective II | 3 |
| MMAE 485 Manufacturing Processes | 3 | Technical Elective* | 3 |
| IPro Elective I | 3 | Engineering Elective** | 3 |
| Technical Elective* | 3 | Social Sciences Elective (300+) | 3 |
| Total Hours | 15 | Total Hours | 16 |

Total Credit Hours **126**

* A technical elective is a 300- or higher-level course in any engineering discipline (other than required MMAE courses or their equivalent) or in mathematics, chemistry, physics, or computer science. However, not all such courses are acceptable as technical electives. See your faculty advisor for a determination of which courses are acceptable. In addition, ECE 218 and ECON 423 are permitted. Any substitutions require written approval by the department.

** An engineering elective is a 300- or higher-level course in any engineering discipline (other than required MMAE courses or their equivalents).

Aerospace Engineering

Aerospace engineering explores both the design and manufacture of aircraft, as well as the design and flight of vehicles beyond the earth's atmosphere. Knowledge of aerodynamics, structures and materials, propulsion systems, and flight mechanics and controls are important to this field. Aerospace engineers are primarily employed in civil aero-

navitics, the defense industry, and the space program. However, applications of aerospace technology are also found in related areas such as ground and undersea transportation systems, pollution control, wind power and the effects of wind on structures, and the development and use of advanced materials.

Bachelor of Science in Aerospace Engineering

| Required Courses | Credit Hours |
|---|--------------|
| Aerospace Engineering Requirements MMAE 100, 200, 202, 304, 311, 312, 313, 315, 320, 350, 372, 410, 411, (412 or 414), 415, (413 or 416), 443, 450, 452 | 59 |
| Aerospace Engineering Elective MMAE 417 or 418 or 472 | 3 |
| Material Science Requirement MS 201 | 3 |
| Mathematics Requirements MATH 151, 152, 251, 252 | 18 |
| Physics Requirements PHYS 123, 221, 224 | 11 |
| Chemistry Requirement CHEM 124 | 4 |
| Computer Science Requirement CS 105 | 2 |
| Humanities and Social Sciences Electives For general education requirements, see page 25. | 21 |
| Interprofessional Project | 6 |
| Total Hours | 127 |

Aerospace Engineering Curriculum

| Semester 1 | Credits |
|---|-----------|
| MMAE 100 Introduction to the Profession | 3 |
| MATH 151 Calculus I | 5 |
| CHEM 124 Principles of Chemistry I | 4 |
| Humanities 100-level Elective | 3 |
| Total Hours | 15 |

| Semester 2 | Credits |
|--|-----------|
| MS 201 Materials Science | 3 |
| MATH 152 Calculus II | 5 |
| PHYS 123 General Physics I | 4 |
| CS 105 Intro to Computer Programming I | 2 |
| Social Sciences Elective | 3 |
| Total Hours | 17 |

| Semester 3 | Credits |
|---|-----------|
| MMAE 200 Introduction to Mechanics | 3 |
| MATH 251 Multivariate and Vector Calculus | 4 |
| PHYS 221 General Physics II | 4 |
| Humanities or Social Sciences Elective | 3 |
| Humanities Elective (300+) | 3 |
| Total Hours | 17 |

| Semester 4 | Credits |
|---|-----------|
| MMAE 202 Mechanics of Solids II | 3 |
| MMAE 313 Fluid Mechanics without Laboratory | 3 |
| MMAE 320 Thermodynamics | 3 |
| MATH 252 Introduction to Differential Equations | 4 |
| PHYS 224 General Physics III for Engineers | 3 |
| Total Hours | 16 |

| Semester 5 | Credits |
|---|-----------|
| MMAE 311 Compressible Flow | 3 |
| MMAE 312 Aerodynamics of Aerospace Vehicles | 3 |
| MMAE 315 Aerospace Laboratory I | 4 |
| MMAE 350 Computational Mechanics | 3 |
| Social Sciences Elective | 3 |
| Total Hours | 16 |

| Semester 6 | Credits |
|--------------------------------------|-----------|
| MMAE 304 Mechanics of Aerostructures | 3 |
| MMAE 372 Aerospace Materials | 3 |
| MMAE 443 Systems Analysis & Control | 3 |
| MMAE 450 Computational Mechanics II | 3 |
| MMAE 452 Aerospace Propulsion | 3 |
| Total Hours | 15 |

| Semester 7 | Credits |
|------------------------------------|-----------|
| MMAE 410 Aircraft Flight Mechanics | 3 |
| MMAE 411 Spacecraft Dynamics | 3 |
| MMAE 412 Spacecraft Design I* | 3 |
| OR | |
| MMAE 414 Aircraft Design I* | 3 |
| IPRO Elective I | 3 |
| Humanities Elective (300+) | 3 |
| Total Hours | 15 |

| Semester 8 | Credits |
|----------------------------------|-----------|
| MMAE 413 Spacecraft Design II* | 3 |
| OR | |
| MMAE 416 Aircraft Design II* | 4 |
| MMAE 415 Aerospace Laboratory II | 3 |
| IPRO Elective I | 3 |
| Aerospace Elective** | 3 |
| Social Sciences Elective (300+) | 3 |
| Total Hours | 16 |

Total Credit Hours **127**

* Students must choose either the MMAE 412 and MMAE 413 sequence or the MMAE 414 and MMAE 416 sequence.

** Students must choose either MMAE 417, MMAE 418, or MMAE 472.

Physics

Department Website: www.iit.edu/csl/phy

182 Life Sciences
3101 S. Dearborn St.
Chicago, IL 60616
312.567.3579

Chair

Christopher White

Associate Chair

Alan Glodowski

The undergraduate Physics programs at IIT provide an excellent preparation for a number of professions including law (patent and intellectual property), health physics, business, and research. Graduates are prepared for immediate entry into positions in industrial and government research laboratories, and for graduate study in areas such as biophysics, solid-state physics, or high energy physics. Many undergraduates go on to obtain graduate degrees not only in physics, but in engineering disciplines, the health sciences, or computer science.

A student completing a Bachelor of Science (B.S.) degree in one of the Physics programs at IIT will:

- Develop exceptional problem-solving ability.
- Gain experience with instrumentation and measurement processes.

- Develop mathematics and computational skills.
- Gain a wide knowledge of physics as it applies both to the everyday world and to understanding nature's secrets.

Students also have the option of completing the following co-terminal degrees that enable a student to complete both degrees in five years:

- Bachelor of Science in Applied Physics and Master of Science in Applied Physics
- Bachelor of Science in Physics and Master of Science in Physics
- Bachelor of Science in Physics and Master of Health Physics
- Bachelor of Science in Physics and Master of Computer Science
- Bachelor of Science in Physics and Master of Science in Computer Science

These programs allow students to complete a dual degree in a shorter time period, to apply through a simplified admission process, and to receive some financial incentives. See page 166 or go to www.iit.edu/csl/phy for more information.

Faculty

Professors

R. Betts, G. Bunker, D. Kaplan, T. Morrison, H. Scott, C. Segre, C. White, J. Zasadzinski

Associate Professors

L. Coffey, D. Gidalevitz, L. Spentzouris, J. Terry
Y. Torun

Assistant Professors

P. Snopok, Z. Sullivan,

Research Assistant Professors

S. Chattopadhyay, P. Hanlet, B. Mishra, T. Shibata

Senior Lecturer

A. Glodowski

Faculty Emeritus

R. Burnstein, T. Erber, I. Hauser, P. Johnson,
R. Malhot, H. Rubin, H. Spector, E. Zwicker

Joint Appointments

Professors

T. Irving (Biological and Chemical Sciences and Biomedical Engineering), J. Kallend (Mechanical, Materials, and Aerospace Engineering), J. Schieber (Chemical and Biological Sciences)

Joint Appointment

Associate Professor

A. Howard (Biological and Chemical Sciences)

Physics

Department Website: www.iit.edu/csl/phy

The undergraduate Physics program at IIT provides an excellent preparation for a number of professions including law (patent and intellectual property), health physics, business, medicine, or research. The rigorous interdisciplinary nature of the program prepares graduates with a greater

understanding of how physics is interrelated with biology and chemistry. Graduates are also prepared for immediate entry into positions in industrial, medical, and other research laboratories and for graduate study in areas such as biophysics, solid state physics, or high energy physics.

Bachelor of Science in Physics

| Required Courses | Credit Hours |
|---|--------------|
| Physics Requirements PHYS 100, 123, 221, 223, 240, 300, 304, 308, 309, 348, 405, 406, 413, 414, 427, 440, 485 (2) | 53 |
| Interprofessional Projects | 6 |
| Mathematics Requirements MATH 151, 152, 251, 252 | 18 |
| Mathematics Electives | 6 |
| Chemistry Requirements CHEM 124, 125 | 8 |
| Computer Science Requirement CS 105 | 2 |
| Humanities and Social Sciences Requirements For general education requirements, see page 25. | 21 |
| Free Electives | 12 |
| Total Hours | 126 |

Physics Curriculum

| Semester 1 | Credits | Semester 2 | Credits |
|---|------------|---|-----------|
| PHYS 100 Introduction to the Profession | 2 | PHYS 221 General Physics II | 4 |
| PHYS 123 General Physics I | 4 | CHEM 125 Principles of Chemistry II | 4 |
| CHEM 124 Principles of Chemistry I | 4 | MATH 152 Calculus II | 5 |
| MATH 151 Calculus I | 5 | Social Science Elective | 3 |
| Total Hours | 15 | Total Hours | 16 |
| Semester 3 | Credits | Semester 4 | Credits |
| PHYS 223 General Physics III | 4 | PHYS 240 Computational Science | 3 |
| CS 105 Intro to Computer Programming I | 2 | PHYS 348 Modern Physics | 3 |
| MATH 251 Multivariate and Vector Calculus | 4 | MATH 252 Introduction to Differential Equations | 4 |
| Humanities or Social Science Elective | 3 | Social Science Elective | 3 |
| Humanities 100-level Elective | 3 | Social Science Elective (300+) | 3 |
| Total Hours | 16 | Total Hours | 16 |
| Semester 5 | Credits | Semester 6 | Credits |
| PHYS 308 Classic Mechanics I | 3 | PHYS 309 Classic Mechanics II | 3 |
| PHYS 300 Instrumentation Lab | 4 | PHYS 304 Statistical Physics and Thermodynamics | 3 |
| PHYS 405 Quantum Theory I | 3 | PHYS 406 Quantum Theory II | 3 |
| IPRO Elective I | 3 | IPRO Elective II | 3 |
| Humanities Elective (300+) | 3 | Free Elective | 3 |
| Total Hours | 16 | Total Hours | 15 |
| Semester 7 | Credits | Semester 8 | Credits |
| PHYS 413 Electricity and Magnetism I | 3 | PHYS 414 Electricity and Magnetism II | 3 |
| PHYS 427 Advanced Physics Laboratory I | 3 | PHYS 440 Computational Physics | 3 |
| PHYS 485 Physics Colloquium | 1 | PHYS 485 Physics Colloquium | 1 |
| Math Elective, 400-level or above | 3 | Math Elective, 400-level or above | 3 |
| Humanities Elective (300+) | 3 | Free Elective | 3 |
| Free Elective | 3 | Free Elective | 3 |
| Total Hours | 16 | Total Hours | 16 |
| Total Credit Hours | 126 | | |

Physics Education

Department Website: www.iit.edu/csl/phy

According to the President's Council of Advisors on Science and Technology, "The most important factor in ensuring excellence is great STEM (science, technology, engineering, and math) teachers, with both deep content knowledge in STEM subjects and mastery of the pedagogical skills required to teach these subjects well." However, based on recent statistics from the National Taskforce on Teacher Education in Physics, two thirds of our nation's high school physics teachers do not have a degree in physics. IIT's Bachelor of Science in Physics Education answers these needs by providing deep grounding in both physics and in the pedagogical knowledge to teach physics, thus setting the IIT student apart from other prospective teachers.

Students in this program will have all the benefits of studying with IIT's Physics department including small class size, close relationships with faculty, and the opportunity to conduct research at nearby facilities such

as Argonne National Lab and Fermi National Accelerator Lab. In addition, students take classes, including a classroom internship, with IIT's Mathematics and Science Education department, a global leader in teaching and learning of the sciences. Upon completion of this degree program, students receive certification to teach high school science in Illinois and will have the necessary skills to fulfill certification requirements in other states.

Ideally students will choose the physics education track at the end of their second year and begin taking science education courses in their third year after having completed the general physics and modern physics sequence. An alternate route available to students is to first complete the requirements for the Bachelor of Science degree in Physics and then teaching certification requirements. This alternate path would take longer to complete than eight semesters.

Bachelor of Science in Physics Education

| Required Courses | Credit Hours |
|--|--------------|
| Physics Requirements PHYS 100, 123, 221, 223, 240, 300, 304, 308, 309, 348, 405, 413, 427, 485 | 43 |
| Mathematics and Science Education Requirements MSED 200, 250, 300, 320, 350, 400, 450 | 24 |
| Mathematics Requirements MATH 151, 152, 251, 252, 425 | 21 |
| Interprofessional Projects | 6 |
| Chemistry Requirements CHEM 124, 125 | 8 |
| Biology Requirement BIOL 107 or 114 or 115 | 3 |
| Computer Science Requirement CS 105 | 2 |
| Humanities and Social Sciences Requirements For general education requirements, see page 25. | 21 |
| Total Hours | 128 |

Physics Education Curriculum

| Semester 1 | Credits |
|---|-----------|
| PHYS 100 Introduction to the Profession | 2 |
| PHYS 123 General Physics I | 4 |
| CHEM 124 Principles of Chemistry I | 4 |
| MATH 151 Calculus I | 5 |
| Total Hours | 15 |

| Semester 2 | Credits |
|--|-----------|
| CS 105 Intro to Computer Programming I | 2 |
| CHEM 125 Principles of Chemistry II | 4 |
| MATH 152 Calculus II | 5 |
| PHYS 221 General Physics II | 4 |
| Humanities 100-level Elective | 3 |
| Total Hours | 18 |

| Semester 3 | Credits |
|---|-----------|
| BIOL 107* General Biology | 3 |
| PHYS 223 General Physics III | 4 |
| MATH 251 Multivariate and Vector Calculus | 4 |
| Social Sciences Elective | 3 |
| Humanities or Social Sciences Elective | 3 |
| Total Hours | 17 |

| Semester 4 | Credits |
|---|-----------|
| MATH 252 Introduction to Differential Equations | 4 |
| PHYS 240 Computational Science | 3 |
| PHYS 348 Modern Physics | 3 |
| Social Sciences Elective | 3 |
| Humanities Elective (300+) | 3 |
| Total Hours | 16 |

| Semester Summer 1 | Credits |
|---------------------------------|----------|
| Social Sciences Elective (300+) | 3 |
| Total Hours | 3 |

| Semester 5 | Credits |
|---------------------------------------|-----------|
| PHYS 300 Instrumentation Lab | 4 |
| PHYS 308 Classic Mechanics I | 3 |
| MSED 200 Analysis of Classrooms | 3 |
| MSED 250 Middle, Secondary Curriculum | 3 |
| IPro Elective I | 3 |
| Total Hours | 16 |

| Semester 6 | Credits |
|---|-----------|
| PHYS 304 Kinetic Theory and Thermodynamics | 3 |
| PHYS 309 Classic Mechanics II | 3 |
| MATH 425 Statistical Methods | 3 |
| MSED 300 Instructional Methods/Strategies I | 3 |
| MSED 320 Inquiry & Problem Solving | 3 |
| IPro Elective II | 3 |
| Total Hours | 18 |

| Semester Summer 2 | Credits |
|--|----------|
| MSED 400 Instructional Methods/Strategies II | 3 |
| Total Hours | 3 |

| Semester 7 | Credits |
|--|-----------|
| PHYS 405 Quantum Theory I | 3 |
| PHYS 413 Electricity and Magnetism I | 3 |
| PHYS 427 Advanced Physics Laboratory I | 3 |
| PHYS 485 Physics Colloquium | 1 |
| MSED 350 Informal Ed., Practicum & Seminar | 3 |
| Humanities Elective (300+) | 3 |
| Total Hours | 16 |

| Semester 8 | Credits |
|----------------------------------|----------|
| MSED 450 Professional Internship | 6 |
| Total Hours | 6 |

Total Credit Hours 128

* BIOL 114 or BIOL 115 may be substituted for this course.

Applied Physics

Department Website: www.iit.edu/csl/phy

According to the Princeton Review: “With technology’s constantly expanding influence in our society, a major in applied physics could place you at the forefront of the next technology revolution.” Applied physics combines fundamental research in physics with knowledge of how to solve real-world problems, thus putting graduates of this major in high demand by employers. Through research in applied physics, lasers in DVD players, flash memories in iPods, diagnostic tools for medicine, and many other cutting edge technologies have been developed. With this degree, graduates will be prepared to immediately begin a career in a multitude of different areas or to enter into a graduate program in physics, engineering, or a non-physics related field. College Board sums up this degree in one word: flexibility.

The Bachelor of Science in Applied Physics degree at IIT provides an option for students who have a strong affinity for physics but who wish to pursue a career in application of basic scientific principles to the design of equipment, which includes electronic and electro-mechanical systems for use in measurements, communications, and data acquisition. The program is recommended for students interested in newly developing areas of physics, high technology, instrumentation, and communications. It provides students with a solid physics background while allowing for a significant engineering or other technical concentration.

Bachelor of Science in Applied Physics

| Required Courses | Credit Hours |
|--|--------------|
| Physics Requirements PHYS 100, 123, 221, 223, 240, 300, 304, 308, 309, 348, 405, 406, 413, 414, 427, 485 | 49 |
| Engineering Requirements (Specialization) MS 201 plus 24 credit hours in a specific engineering discipline. See page 138 for recommended specializations. | 27 |
| Mathematics Requirements MATH 151, 152, 251, 252 | 18 |
| Technical Electives To be selected from physics, mathematics, computer science, or engineering courses. | 6 |
| Interprofessional Projects | 6 |
| Chemistry Requirement CHEM 124 | 4 |
| Computer Science Requirement CS 105 | 2 |
| Humanities and Social Sciences Requirements For general education requirements, see page 25. | 21 |
| Total Hours | 133 |

Applied Physics Curriculum

| Semester 1 | Credits |
|---|-----------|
| PHYS 100 Introduction to the Profession | 2 |
| PHYS 123 General Physics I | 4 |
| CHEM 124 Principles of Chemistry I | 4 |
| MATH 151 Calculus I | 5 |
| Total Hours | 15 |

| Semester 2 | Credits |
|--|-----------|
| MS 201 Materials Science | 3 |
| PHYS 221 General Physics II | 4 |
| MATH 152 Calculus II | 5 |
| Humanities 100-level Elective | 3 |
| Humanities or Social Sciences Elective | 3 |
| Total Hours | 18 |

| Semester 3 | Credits |
|---|-----------|
| CS 105 Intro to Computer Programming I | 2 |
| PHYS 223 General Physics III | 4 |
| MATH 251 Multivariate and Vector Calculus | 4 |
| Engineering Course* | 4 |
| Social Sciences Elective | 3 |
| Total Hours | 17 |

| Semester 4 | Credits |
|---|-----------|
| PHYS 240 Computational Science | 3 |
| PHYS 348 Modern Physics | 3 |
| MATH 252 Introduction to Differential Equations | 4 |
| Engineering Course* | 4 |
| Humanities Elective (300+) | 3 |
| Total Hours | 17 |

| Semester 5 | Credits |
|---------------------------------|-----------|
| PHYS 300 Instrumentation Lab*** | 4 |
| PHYS 308 Classic Mechanics I | 3 |
| IPRO Elective I | 3 |
| Engineering Course* | 3 |
| Social Science Elective | 3 |
| Total Hours | 16 |

| Semester 6 | Credits |
|--|-----------|
| PHYS 304 Kinetic Theory and Thermodynamics | 3 |
| PHYS 309 Classic Mechanics II | 3 |
| IPRO Elective II | 3 |
| Engineering Course* | 4 |
| Humanities Elective (300+) | 3 |
| Total Hours | 16 |

| Semester 7 | Credits |
|--|-----------|
| PHYS 405 Quantum Theory I | 3 |
| PHYS 413 Electricity and Magnetism I | 3 |
| PHYS 427 Advanced Physics Laboratory I | 3 |
| Technical Elective** | 3 |
| Engineering Course* | 3 |
| Social Sciences Elective (300+) | 3 |
| Total Hours | 18 |

| Semester 8 | Credits |
|---------------------------------------|-----------|
| PHYS 406 Quantum Theory II | 3 |
| PHYS 414 Electricity and Magnetism II | 3 |
| PHYS 485 Colloquium | 1 |
| Technical Elective** | 3 |
| Engineering Course* | 3 |
| Engineering Course* | 3 |
| Total Hours | 16 |

Total Credit Hours **133**

* A minimum of 24 semester hours are required in a specific engineering discipline. See page 138 for recommended specializations. Courses should be chosen in consultation with an academic advisor.

** See page 138 for technical electives required in approved specialization.

*** For students who choose the electrical engineering specialization, PHYS 300 is satisfied by ECE 211, 213, and 218.

Engineering Specializations for Applied Physics

Courses should be chosen in consultation with an academic advisor. Approved specializations for the Bachelor of Science degree in Applied Physics include, but are not limited to, the following:

Aerospace Engineering

Students should take the following courses:

MMAE 232 Design for Innovation
MMAE 202 Mechanics of Solids II
MMAE 313 Fluid Mechanics
MMAE 304 Mechanics of Aerostructures
MMAE 311 Compressible Flow
MMAE 312 Aerodynamics of Aerospace Vehicles
MMAE 315 Aerospace Laboratory I
MMAE 372 Aerospace Materials Lab

In addition, the six semester hours of technical electives may be chosen from any 400-level physics course or the following:

MMAE 410 Aircraft Flight Mechanics
MMAE 411 Spacecraft Dynamics
MMAE 414 Aircraft Design I
MMAE 433 Design of Thermal Systems
MMAE 452 Aerospace Propulsion

Electrical Engineering

Students should take the following courses:

ECE 211 Circuit Analysis I
ECE 213 Circuit Analysis II
ECE 218 Digital Systems
ECE 308 Signals and Systems
ECE 311 Engineering Electronics

The remaining 6 semester hours may be chosen from the following:

ECE 401 Communication Electronics
ECE 421 & 423 Microwave Circuits & Systems & Laboratory
ECE 425 Analysis & Design of Integrated Circuits
ECE 429 Introduction to VLSI Design
ECE 436 & 437 Digital Signal Processing I & Laboratory
ECE 438 Control Systems
ECE 441 Microcomputers
ECE 446 Advanced Logic Design

In addition, the six semester hours of technical electives must include MATH 333 and three semester hours chosen from the ECE courses listed above. The required course, PHYS 300 is satisfied by ECE 211, 213, and 218.

Mechanical Engineering

Students should take the following courses:

MMAE 232 Design for Innovation
MMAE 202 Mechanics of Solids II
MMAE 313 Fluid Mechanics
MMAE 302 Mechanics of Solids III
MMAE 323 Heat & Mass Transfer
MMAE 319 Mechanical Laboratory I
MMAE 321 Applied Thermodynamics
MMAE 332 Design of Machine Elements

In addition, the six semester hours of technical electives may be chosen from any 400-level physics course or the following:

MMAE 418 Fluid Power for Aerospace Applications
MMAE 443 Systems Analysis & Control
MMAE 485 Manufacturing Process

Co-terminal Bachelor of Science in Physics/Master of Health Physics Degree Program

IIT offers a five-year, co-terminal Bachelor of Science in Physics/Master of Health Physics degree program for students who wish to combine a Bachelor of Science degree in Physics with a professional-track Master of Health Physics degree leading to a career as a radiation health physicist. This program is designed for students seeking careers in government, industry, the military, and environmental and health-related fields where radiation protection and planning are critical.

The Nuclear Regulatory Commission, the Department of Energy, and the Health Physics Society (HPS) have all foreseen a significant need for new radiation health physicists. According to the HPS, "A projected shortfall in sufficiently educated radiation safety professionals has placed a bur-

den on industries using radiation to support our nation's energy, security, and health needs." The current workforce in government and industry is aging and those positions need to be filled.

The unique opportunity to take classes online, as well as on campus, sets IIT apart from other health physics programs. According to a recent survey by the Oak Ridge Institute for Science and Education, IIT ranked third in the number of Master's degrees in Health Physics awarded in 2010. IIT is one of only a handful of universities that offer this five-year, co-terminal opportunity and at IIT, faculty help students find an appropriate health physics internship.

College of Psychology

College Website: www.iit.edu/psych

3105 South Dearborn
Suite 252
Chicago, IL 60616
312.567.3500

Dean

M. Ellen Mitchell

Associate Dean

Scott Morris

Psychology's objective is to understand the manner in which organizations, human beings, and animals behave, learn, and interact, as well as the ways in which their behavior can be modified. The College's curriculum encompasses the past 25 years' worth of major changes in psychology and prepares students for modern careers in psychology or other allied professions.

The College offers a distinct undergraduate program that draws upon the strengths of highly successful graduate programs in clinical psychology, industrial/organizational psychology, and rehabilitation counseling. Designed for highly motivated, career-oriented students, this program emphasizes the integration of applied research with faculty, practical experience in professional settings, and traditional classroom activities. It is characterized by faculty mentorship, individual advising, and group activities with faculty, graduate students, and other undergraduate students.

The curriculum is customizable and supports students with diverse career goals. Students who have interest in

such areas as wellness counseling, child care, disability, or human resources can include preliminary preparation for those professions in their studies. To assist students in developing a more coherent path, the College offers three specialty tracks from which to choose. These are: Culture, Conflict and International Relations; Psychology of Emerging Technologies; The Human Environment.

The objectives of the Bachelor of Science degree program in Psychology are:

- To prepare students for baccalaureate-level careers that draw on an understanding of human behavior.
- To provide a basic understanding of research methods in the behavioral sciences.
- To incorporate the recommendations of the American Psychological Association for undergraduate education in the four basic areas of social differences, individual differences, physiology, and learning and cognition.
- To prepare students for graduate training in psychology.

Most psychologists hold advanced degrees and the program offers excellent preparation for graduate school. A Bachelor's degree in Psychology offers diverse options, including those in the burgeoning areas of geriatrics, health and wellness counseling, behavioral medicine, and managed health care, as well as traditional settings such as schools, courts, hospitals, industries, and research laboratories. Many students will find psychology highly beneficial as a pre-professional major for advanced studies in medicine, dentistry, law, business, or public administration.

Faculty

Professors

R. Ayman, P. Corrigan, R. Landis, M. Mitchell,
S. Morris, R. Schleser, M. Young

Associate Professors

J. Hopkins, F. Lane, A. Moller

Assistant Professors

N. Ditchman, J. Ellington, A. Haedt-Matt, E. Houston,
J. Larson, E. Lee, A. Mead, J. Miller

Clinical Assistant Professor

K. Kazukauskas

Visiting Associate Professor

S. Stanard

Visiting Assistant Professor

M. Saxena

Faculty Emeritus

G. Geist, M. Huyck, C. Lam, A. Wolach

Bachelor of Science in Psychology

| Required Courses | Credit Hours |
|--|----------------|
| Psychology Requirements PSYC 100, 101, 204, 221, 222, 301, 303, 310, 406, 409, 423, 435, or 436 | 34 |
| Mathematics Requirements PSYC 203, (any two of MATH 119, 122, 130) OR (MATH 148 and 149) OR MATH 151 | 8/12 |
| Computer Science Requirement CS 105 | 2 |
| Natural Sciences Requirements For general education requirements, see page 25. At least one biology course is required. Suggested courses are BIOL 105, 109, 114, PHYS 211, and a natural science elective. | 11/13 |
| Humanities and Social Sciences Requirements For general education requirements, see page 25. | 21 |
| Interprofessional Projects | 6 |
| Psychology Capstone Project PSYC 485* | 3 |
| Free Electives | 37/45 |
| Total Hours | 126/130 |

* Option is available to take a two-semester psychology capstone project (PSYC 485 and PSYC 486) for six credit hours.

Psychology Curriculum

| Semester 1 | Credits |
|--|-----------|
| PSYC 100 Introduction to the Profession I | 2 |
| PSYC 221 Human Behavior, Growth and Learning | 3 |
| BIOL 105 Introduction to Biology Lectures | 3 |
| BIOL 109 General Biology Laboratory* | 1 |
| Math Sequence Elective** | 3 |
| Humanities 100-level Elective | 3 |
| Total Hours | 15 |

| Semester 2 | Credits |
|--|-----------|
| PSYC 101 Introduction to the Profession II | 2 |
| PSYC 222 Brain, Mind and Behavior | 3 |
| BIOL 114 Introduction to Human Biology | 3 |
| Math Sequence Elective** | 3 |
| Social Sciences Elective | 3 |
| Free Elective | 3 |
| Total Hours | 17 |

| Semester 3 | Credits |
|---|-----------|
| PSYC 203 Undergrad Stats for Behavioral Sciences† | 3 |
| PSYC 301 Industrial Psychology | 3 |
| OR | 3 |
| PSYC 310 Social Psychology | 3 |
| Humanities or Social Sciences Elective | 3 |
| Free Elective | 3 |
| Free Elective | 3 |
| Free Elective | 3 |
| Total Hours | 18 |

| Semester 4 | Credits |
|--|-----------|
| PSYC 204 Research Methods | 3 |
| PSYC 303 Abnormal Psychology | 3 |
| PHYS 211 Basic Physics I* | 3 |
| CS 105 Intro to Computer Programming I | 3 |
| Free Elective | 3 |
| Free Elective | 3 |
| Total Hours | 18 |

| Semester 5 | Credits |
|--------------------------------|-----------|
| PSYC 310 Social Psychology | 3 |
| OR | 3 |
| PSYC 301 Industrial Psychology | 3 |
| PSYC 409 Psychological Testing | 3 |
| OR | 3 |
| PSYC 423 Learning Theory | 3 |
| IPro Elective I | 3 |
| Free Elective | 3 |
| Humanities Elective (300+) | 3 |
| Total Hours | 15 |

| Semester 6 | Credits |
|----------------------------|-----------|
| PSYC 435 Early Development | 3 |
| OR | 3 |
| PSYC 436 Adult Development | 3 |
| Social Sciences Elective | 3 |
| Humanities Elective (300+) | 3 |
| Free Elective | 3 |
| Free Elective | 3 |
| Total Hours | 15 |

| Semester 7 | Credits |
|---------------------------------------|-----------|
| PSYC 423 Learning Theory | 3 |
| OR | 3 |
| PSYC 409 Psychological Testing | 3 |
| IPro Elective II | 3 |
| Natural Science Elective* | 3 |
| Free Elective | 3 |
| Free Elective | 3 |
| OR | 3 |
| PSYC 485 Senior Capstone Project I††† | 3 |
| Total Hours | 15 |

| Semester 8 | Credits |
|--|-----------|
| PSYC 406 History and Systems of Psychology†† | 3 |
| PSYC 485 Senior Capstone Project I | 3 |
| OR | 3 |
| PSYC 486 Senior Capstone Project II††† | 3 |
| Social Sciences Elective (300+) | 3 |
| Free Elective | 3 |
| Free Elective | 3 |
| Total Hours | 15 |

Total Credit Hours 128

* To meet the natural science requirement, students must take 11 hours, with two courses from one discipline and one from a different discipline. A biology course is required.

** Based on math placement exam, choose from sequences listed below:

- Any two of MATH 119, 122, 130
- MATH 148 and 149
- MATH 151

† Must take psychology statistics, not business statistics.

†† Must be fourth year/senior to enroll.

††† Option is available to take a two-semester psychology capstone project.

Specialty Tracks

In order to assist students in developing a sound career path, the College of Psychology offers the undergraduate Psychology degree with optional specialty tracks. The selection of a track is not a degree requirement, but it is encouraged. These tracks are distinct from a minor by virtue of their cross-disciplinary and in-depth nature. Some students may elect to pursue a double major or a minor which would not be precluded by these specialty tracks. A spe-

cialty consists of 15 credit hours from courses in the track in which at least two of the classes are higher than the 200-level. Students take these classes as electives and they are expected to incorporate the specialty content area into their final capstone project. The courses for these tracks are listed online at www.iit.edu/psych and may be obtained from advisors.

Culture, Conflict, and International Relations

Today's world is characterized by diversity that contributes to richness of culture and also to tensions associated with those differences. The global economy and the reach of information systems transcend political and national bound-

aries. Students who select this track will be prepared for careers that draw on strengths in human relations, cross cultural knowledge, and negotiation.

Psychology of Emerging Technologies

This specialty track focuses on the human dimension of technological development. Just as advances in computer science have lead to changes in relationships, business communication, and accessibility, emerging technologies such as artificial intelligence, nanotechnology, and genetic engi-

neering will produce equally broad social changes in the future. The students who complete this track may wish to pursue careers in law, sociology, genetic counseling, humanities, public policy, or journalism.

The Human Environment

Architecture influences many aspects of human life including work, leisure activities, family life, and ultimately social interaction. Public spaces and multi-use buildings represent current areas of particular interest to architects whose attention is increasingly on sustainability. The built environment must now, more than ever before, include consideration of human needs, behavioral patterns, social concerns,

resources both natural and economic, environmental consciousness, and planning for the future. Students who complete this track may wish to pursue careers in architecture, city planning, urban development, resource management, business, conservation, human factors, or consulting psychology.

Optional Programs

Accelerated Combined-Degree Programs

Today, an undergraduate degree doesn't necessarily guarantee a job in the workforce or provide long-term career security. However, the College of Psychology offers combined, accelerated undergraduate and graduate programs that help minimize both concerns. These flexible programs give students solid professional credentials in more than one field – improving their marketability and expanding their career options.

A specialization in psychology may be used as the basis for the combined undergraduate-graduate professional degree programs in law (B.S./J.D.), business (B.S./M.B.A.), public administration (B.S./M.P.A.), rehabilitation counseling (B.S./M.S.) or personnel and human resources development (B.S./M.S.) offered by IIT. Students wishing to participate in these options must indicate this as early as possible. With the consent of the College of Psychology

dean, undergraduate psychology students may enroll in some graduate-level psychology courses. Close communication with advisors is required for students to reach their target completion dates for accelerated programs. Students must also meet the minimum graduate program admission criteria, apply, and be accepted into the graduate program they wish to enter.

For undergraduate psychology majors, it is possible to earn a Masters of Science in Rehabilitation Counseling or a Masters of Science in Personnel and Human Resources Development (PHRD) in one-and-a-half years instead of the normal two years. By taking psychology courses that apply to the Rehabilitation Counseling or PHRD program, graduate program coursework can be reduced by up to 15 credit hours, or one full-time semester.

B.S./M.S. Rehabilitation

The mission of the Counseling and Rehabilitation Sciences Division at IIT is to prepare students to assume vital roles as counselors fully qualified to help in the vocational, educational, and personal adjustment of people with physical, mental, and emotional disabilities.

Since its inception, the Rehabilitation Services Administration (RSA) of the U.S. Department of Education has continuously funded IIT's Rehabilitation Counselor Education programs. The RSA scholarships are designed to increase the number of practicing rehabilitation counselors by providing scholarships and stipend money to cover the cost of student tuition and books. The Council of Rehabilitation Education (CORE) has accredited the graduate program since 1975 and the CORE Commission on Undergraduate Education has registered the undergraduate program in Rehabilitation Services since 2006. IIT Rehabilitation graduates are eligible to become nationally certified rehabilitation counselors and licensed professional counselors in Illinois.

U.S. News & World Report ranked the Rehabilitation Counseling program in the top 10 in the nation.

Current Research Projects

- Assessment of readiness for change and treatment matching
- Psychosocial adjustment to disability and chronic illness
- Traumatic brain injury rehabilitation and neuropsychological assessment
- Disability and health
- Technology applied to human behavior and rehabilitation

Rehabilitation Counseling Courses

Students in the accelerated program may take the following courses as part of required or elective courses for the B.S. in Psychology. If taken as an undergraduate student, the courses listed below do not have to be repeated for the graduate Rehabilitation Counseling program. A grade of B or better is required for courses to be used toward a graduate degree.

- PSYC 410 Vocational Rehabilitation
- PSYC 411 Medical Aspects of Disabling Conditions
- PSYC 412 Multicultural and Psychosocial Aspects of Disability
- PSYC 513 Assessment in Rehabilitation Counseling
- PSYC 523 Introduction to Theories of Psychotherapy
- PSYC 557 Pre-Practicum in Rehabilitation Counseling
- PSYC 562 Job Placement
- PSYC 563 Human Growth and Career Development
- PSYC 583 Rehabilitation Engineering Technology I

B.S./M.S. Personnel and Human Resources Development

The Personnel and Human Resources Development Master's program is for individuals interested in careers in highly dynamic environments such as management consulting, human resources management, industrial relations, and consumer behavior.

Housed within the Industrial, Organizational, and Business Psychology Division, the Personnel and Human Resources Development program is based on a scientist/practitioner model and the guidelines of the Society for Industrial and Organizational Psychology, Division 14, of the American Psychology Association.

Current Research Projects

- Women in the Workplace
- Leadership
- Training
- Organizational Effectiveness

- Employee Selection
- Individual and Team Performance
- Organizational Justice

Personnel and Human Resources Development Courses

Students in the accelerated program may take the following courses as part of required or elective courses for the B.S. in Psychology. If taken as an undergraduate student, the courses listed below do not have to be repeated for the graduate Personnel and Human Resources Development program. A grade of B or better is required for courses to be used toward a graduate degree.

PSYC 556 Organizational Psychology

PSYC 502 Social Bases of Behavior

PSYC 545 Graduate Statistics I

PSYC 546 Graduate Statistics II

PSYC 503 Learning, Cognition, and Motivation

IIT/College of DuPage Dual Admission 2+2 Program

Students who meet the requirements of the Dual Admission Program (DAP) may enroll simultaneously at the College of DuPage (COD) and IIT. Students accepted into the DAP will have access to advising and other services from both institutions. Students who successfully complete the institutional course requirements of both institutions under the DAP will be awarded an Associate's degree from COD and a Bachelor of Science degree in Psychology from IIT.

Eligibility for the program

Students applying to the program must have a cumulative GPA of at least 3.00 either in high school or at COD to be eligible for admission to the DAP. Students must make satisfactory academic progress at COD, as defined by COD and IIT, to remain in the program.

Application Process

Applicants must complete a Statement of Intent Form which permits the exchange of academic, admission, and advising information between IIT and COD. Applicants must also complete the application process at both COD and IIT in order to be admitted to both institutions. The

IIT application may be submitted only for a Bachelor's program in Psychology. Admission to other IIT programs may have additional requirements that are outside the scope of this program.

Academic Program Requirements

Students must follow each institution's policies regarding admission, course enrollment, transfer hours, probation, dismissal, and reinstatement. Transcripts must be sent to the IIT Office of Undergraduate Academic Affairs each semester for each student attending COD and enrolled in the DAP. IIT will provide COD with major and course updates, course prerequisites, and program requirements for the Psychology program.

Graduation Requirements

Students enrolled in the DAP must follow the COD catalog to satisfy requirements for the Associate's degree and the requirements set out in the IIT Undergraduate Bulletin in effect at the time of admission into the DAP for the Bachelor's degree.

Scholarship Opportunities

Psychology students have access to a wide range of scholarships. One program – the David J. Vitale Scholarship – is earmarked only for undergraduate psychology students.

Recipients typically receive \$2,000-\$5,000 per year. This award is only applicable to a student's first four years of study at IIT.

Certificate in Industrial Training

This certificate is designed to help either the experienced skilled worker or a technically educated person to learn methods of knowledge delivery in industrial training settings.

Admission Requirements

Qualified participants must be high school graduates and meet the minimum admission requirements for enrollment at IIT. Students should either have multiple years of work experience or have junior or higher status in a four-year program at IIT. Some basic psychology background would be helpful to the student, but this is not a requirement. This certificate is only available to students enrolled in a degree program at IIT and does not qualify for federal financial aid.

Program of Study

The American Society of Training and Development has a certificate with topics and courses similar to this certificate program. We ensure that our students will receive training on par with ASTD specifications. An introductory psychology course or basic knowledge of the field is recommended for this program.

PSYC 301 Industrial Psychology

PSYC 455 Development of Evaluation of Training in Organizations

PSYC 489 Undergraduate Psychology Seminar

Minors

Minors consist of at least five courses (minimum 15 semester hours) and are optional and frequently cross-disciplinary. Since they provide a coherent set of ideas, concepts, and educational experiences in a variety of areas, students may find that they enhance potential for professional development. Students who wish to pursue a minor must consult with advisors in their respective major departments.

Minors offered through the College of Psychology are:

Human Resources

PSYC 221 Human Behavior, Growth, and Learning

PSYC 301 Industrial Psychology

PSYC 310 Social Psychology

PSYC 409 Psychological Testing

PSYC 455 Development and Evaluation of Training Organizations

PSYC 481 Group & Leadership at Work

Organizational Psychology

PSYC 221 Human Behavior, Growth, and Learning

PSYC 301 Industrial Psychology

PSYC 303 Abnormal Psychology

PSYC 310 Social Psychology

PSYC 409 Psychological Testing

Psychology

At least 15 credit hours must be completed, including the following two required courses:

PSYC 203 Undergraduate Statistics for the Behavioral Sciences

PSYC 221 Human Behavior, Growth, and Learning

Rehabilitation Services

PSYC 410 Vocational Rehabilitation

PSYC 411 Medical Aspects of Disabling Conditions

PSYC 412 Multicultural and Psychosocial Aspects of Disability

PSYC 583 Rehabilitation Engineering Technology

PSYC 590 Introduction to Psychiatric Rehabilitation

ROTC: Air Force Aerospace Studies

Department Website: www.afrotc.iit.edu

AFROTC Detachment 195

10 W. 31st St.

Chicago IL 60616

312.567.3525

Chair

Lt. Col. Brendan D. O'Brien

The mission of Air Force Reserve Officer Training Corps (AFROTC) is to develop quality leaders for the Air Force. Students who become cadets have the opportunity to earn a commission in the United States Air Force while earning their baccalaureate degree. Most graduates who enter the

Air Force through this program are assigned to positions consistent with their academic majors, but the needs of the Air Force do come first. Highly qualified, interested graduates may compete for selection as pilots, remotely piloted aircraft pilots, and navigators, usually in their AS 300 year.

Air Force ROTC students gain an understanding of air and space fundamental concepts and principles, and a basic understanding of associated professional knowledge. Students develop a strong sense of personal integrity, honor, and individual responsibility, and an appreciation of the requirements for national security.

Faculty

Professor

B. O'Brien

Assistant Professors

J. Bennett, W. Boland, S. Briones

Financial Aid

The Air Force ROTC High School Scholarship Program (HSSP) offers four-, three-, and two-year scholarships for highly qualified high school graduates interested in an Air Force career. Additionally, the In-College Scholarship Program (ICSP) offers a variety of scholarships to qualified

students already enrolled in college. Interested students can learn more about scholarship opportunities at the Air Force ROTC website, www.afrotc.com or may contact Detachment 195 at 312.567.3525.

Courses

The General Military Course (AS 101, 102, 201, 202) examines the role of U.S. military forces in the contemporary world, with particular attention to the United States Air Force and its organization and mission.

The Professional Officer Course (AS 301, 302, 401, 402) provides an examination of the broad range of U.S. civil-military relations, the environmental context in which U.S. defense policy is formulated and implemented, and the

principles and practices of leadership as they relate to the U.S. Air Force.

Leadership Laboratory is mandatory for each course and complements the program by providing fellowship and leadership experiences.

A student may take any course without entering the AFROTC program.

Minors

Students may select a minor in Air Force aerospace studies. For course requirements, see pages 162–165.

Four-Year Program

The four-year program consists of a two-year General Military Course (GMC) and a two-year Professional Officer Course (POC). Students normally start this program in their freshman year. Qualified students with previous service or at least three years Air Force JROTC may start as sophomores and enroll directly in the AS 200 course. Any student who is not on an AFROTC scholarship may withdraw from the GMC at any time. Students selected

for POC must complete an AFROTC sponsored four-week field training encampment at an Air Force Base before being awarded POC status and stipends (pay). This requirement is normally fulfilled the summer after completing the sophomore year and before beginning the junior year. The major areas of study during field training include junior officer training, career orientation, base functions, and the Air Force environment.

ROTC Air Force Aerospace Studies Curriculum

| Semester 1 | | Credits |
|-------------|-------------------------------|---------|
| AS 101 | The Foundations of the USAF I | 1 |
| Total Hours | | 1 |

| Semester 2 | | Credits |
|-------------|--------------------------------|---------|
| AS 102 | The Foundations of the USAF II | 1 |
| Total Hours | | 1 |

| Semester 3 | | Credits |
|-------------|--|---------|
| AS 201 | The Evolution of USAF Air and Space Power I | 1 |
| Total Hours | | 1 |

| Semester 4 | | Credits |
|-------------|---|---------|
| AS 202 | The Evolution of USAF Air and Space Power II | 1 |
| Total Hours | | 1 |

| Semester 5 | | Credits |
|-------------|--------------------------------|---------|
| AS 301 | Air Force Leadership Studies I | 3 |
| Total Hours | | 3 |

| Semester 6 | | Credits |
|-------------|---------------------------------|---------|
| AS 302 | Air Force Leadership Studies II | 3 |
| Total Hours | | 3 |

| Semester 7 | | Credits |
|-------------|---------------------------|---------|
| AS 401 | National Security Affairs | 3 |
| Total Hours | | 3 |

| Semester 8 | | Credits |
|-------------|-----------------------------|---------|
| AS 402 | Preparation for Active Duty | 3 |
| Total Hours | | 3 |

Total Credit Hours 16

ROTC: Military Science

Department Website: www.iit.edu/departments/army

Department of Military Science
116 Farr Hall
Chicago, IL 60616
312.808.7140

Chair

LTC Peter Farrell

IIT Program Director

LTC Doug Barnett

Assistant Program Director

CSM Mark Bowman

The principal objective of the college-level Reserve Officer's Training Corps (ROTC) program is to develop commissioned officers for the Active Army, the Army National Guard, and U.S. Army Reserve. Each course is designed to develop essential qualities and traits of leadership required for success in either a civilian or a military career.

Instruction is offered through either a four-year or two-year program. The four-year program consists of the Basic Course (freshman and sophomore years) and the Advanced Course (junior and senior years). The two-year Advanced Course is open to students eligible for advanced placement through a variety of options. Both programs include attendance at Camp Adventure (a six-week advanced summer camp) just prior to commissioning.

Faculty

Professor

P. Farrell

Assistant Professors

D. Barnett, M. Bowman

Basic Course

The Basic Course is an introduction to military science and carries no military obligation. Completion is a prerequisite to enrollment in the Advanced Course. Prior service,

completion of basic combat training through the National Guard or Reserve, or completion of Camp Challenge may be substituted for the Basic Course.

Leadership Development Assessment Course (LDAC)

All cadets who successfully complete the Basic Course, meet the physical and academic requirements, and pass an officer-qualification test and a physical examination are eligible for selection by the professor of military science for the Leadership Development Assessment Course (LDAC). A tax-free subsistence allowance of \$450-\$500 per month is paid to each cadet in this advanced course except during

attendance at summer camp, when pay is approximately \$200 per week. Upon graduation and successful completion of the LDAC and the Professional Military Education Requirements (PMEs), cadets are commissioned as second lieutenants in the Active Army, the Army Reserve, or the National Guard.

Leadership Training Course (LTC)

Cadets are paid approximately \$800 during this course. Travel to and from this course is at government expense.

Meals, housing, medical care, uniforms, and equipment are furnished.

Professional Military Education Requirements (PMEs)

In order to receive a well-rounded education, cadets are required to complete courses in the following areas: advanced

written communications, human behavior, military history, computer literacy, and math reasoning.

Simultaneous Membership Program (SMP)

Membership in the Army National Guard or United States Army Reserve offers cadets additional experience as officer trainees, and these individuals will receive both the ROTC

stipend and drill pay as an E-5. They may also receive additional money while attending school through the Montgomery GI Bill and/or USAR Kickers.

Financial Assistance

In addition to a monthly stipend of \$450-\$500 as an advance-course cadet, the program offers two-, three-, and four-year federal Army ROTC scholarships for full tuition to qualified students. IIT offers an excellent incentive pack-

age to scholarship winners. For further information, students should call 312-808-7140 or visit the Department of Military Science in 116 Farr Hall.

ROTC: Military Science Curriculum

| Semester 1 | Credits |
|-------------------------------------|----------|
| MILS 101 Foundations of Officership | 1 |
| MILS 147 Aerobic Conditioning* | 2 |
| Total Hours | 3 |

| Semester 2 | Credits |
|--------------------------------|----------|
| MILS 102 Basic Leadership | 1 |
| MILS 148 Aerobic Conditioning* | 2 |
| Total Hours | 3 |

| Semester 3 | Credits |
|--|----------|
| MILS 201 Individual Leadership Studies | 2 |
| MILS 247 Aerobic Conditioning* | 2 |
| Total Hours | 4 |

| Semester 4 | Credits |
|----------------------------------|----------|
| MILS 202 Leadership and Teamwork | 2 |
| MILS 248 Aerobic Conditioning* | 2 |
| Total Hours | 4 |

| Semester 5 | Credits |
|---|----------|
| MILS 301 Leadership and Problem Solving | 3 |
| MILS 347 Aerobic Conditioning** | 2 |
| Total Hours | 5 |

| Semester 6 | Credits |
|---------------------------------|----------|
| MILS 302 Leadership and Ethics | 3 |
| MILS 348 Aerobic Conditioning** | 2 |
| Total Hours | 5 |

| Semester 7 | Credits |
|------------------------------------|----------|
| MILS 401 Leadership and Management | 3 |
| MILS 447 Aerobic Conditioning** | 2 |
| Total Hours | 5 |

| Semester 8 | Credits |
|---------------------------------|----------|
| MILS 402 Officership | 3 |
| MILS 448 Aerobic Conditioning** | 2 |
| Total Hours | 5 |

Total Credit Hours **34**

* MILS 147, 148, 247, and 248 (Aerobic Conditioning) are required for all scholarship cadets in the Basic Program.

** MILS 347, 348, 447, and 448 (Aerobic Conditioning) are required for all Advanced Course cadets.

ROTC: Naval Science

Department Website: www.iit.edu/nrotc

NROTC IIT
10 W. 31st St.
Rm 215
Chicago, IL 60616
312.567.3527

Chair

CAPT Brian Koehr, USN

The Naval Reserve Officers Training Corps (NROTC) offers an opportunity for young men and women to qualify for a commission in the U.S. Navy or U.S. Marine Corps while attending college. While pursuing their academic studies, midshipmen of the NROTC receive a professional education and the necessary specialized training to qualify them to become commissioned Navy or Marine Corps officers.

As commissioned officers in the United States Navy, graduates may serve in one of the various components of the U.S. Fleet, such as surface ships, the aviation community, or nuclear-powered submarines. Of particular interest is the opportunity to serve as an operating engineer aboard a nuclear or conventionally powered ship. The theoretical knowledge obtained at IIT is combined with practical knowledge and early responsibility in the operation and management of the latest in missile, aircraft, and high-performance ship propulsion systems.

Students may request the option to become officers in the U.S. Marine Corps. A commission in the Marine Corps may lead to a specialization in aviation, infantry, engineering, armor, communications, or supply.

Faculty

Professor

B. Koehr

Associate Professor

C. Liberman

Assistant Professors

C. Boynton, J. Edminister, J. King, A. Kowalke

ROTC: Naval Science Undergraduate Study

The Illinois Institute of Technology Naval Reserve Officers Training Corps (NROTC) Unit was established in 1946 by congressional authorization to create a Naval Science department. The Professor of Naval Science (PNS) chairs Illinois Institute of Technology's Department of Naval Sci-

ence. Department faculty members are commissioned officers serving on active duty in the United States Navy or Marine Corps. They are selected and nominated by their respective services and screened and approved by the University.

Naval ROTC Programs

The Naval Reserve Officers Training Corps offers young men and women the opportunity to obtain leadership and management experience as commissioned officers in the United States Navy (Navy option) or Marine Corps after graduation from Illinois Institute of Technology, through either the Scholarship Program or the non-scholarship College Program.

At Illinois Institute of Technology, NROTC midshipmen lead essentially the same campus life as other students. They participate in campus activities of their choice and can participate in work-study programs including University-sponsored overseas study.

There are no prescribed academic majors for NROTC students, although scientific and technical studies are encouraged. NROTC students are required to complete the Naval Science curriculum, attend a weekly two-hour laboratory, and participate in four to six weeks of active duty for summer training at sea or ashore. Additionally, NROTC students will participate in physical training at least once a week, and will have the opportunity to travel with the unit drill team to regional competitions. College Program students attend training during the summer preceding their last academic year. Between their third and fourth years, Marine Corps NROTC students will attend a summer training program at the Marine Corps development and Education Command in Quantico, VA.

Scholarship Program

NROTC scholarship students are selected by nationwide competition. The NROTC Scholarship pays for tuition, books, and fees, as well as providing a tax-free stipend each

month for four years. Graduates are commissioned as naval or marine corps officers and incur a minimum obligation of four years of active duty service.

College Program

Admission to the College Program is controlled by the Professor of Naval Science. Students incur no obligation to the naval services for participation in this program until their junior year. Qualified students enrolled in this program may be recommended for scholarships by the Professor of Naval Science. In addition to uniforms and some naval sci-

ence books issued to students enrolled in this program, the Navy provides a tax-free stipend each month during the junior and senior years. Graduates are commissioned as Reserve naval officers and incur a minimum obligation of three years of active duty.

Two-Year Programs

The Navy/Marine Corps offer two two-year programs; one of these is a Scholarship Program and the other is a two-year College Program. Students are selected before April 1 of their sophomore year and attend a six-week Naval Science Institute Course at Newport, RI, in the summer be-

fore entering their junior year. Scholarship benefits for the junior and senior year are identical to those received by students in the four-year scholarship program during their junior and senior years.

Academic Requirements

Scholarship Program students are encouraged to pursue majors in engineering and applied sciences to meet the technological demands of the modern Navy. Most other fields of study leading to a baccalaureate degree are permitted with the approval of the Professor of Naval Science. All Navy option scholarship program students are required to complete one year each of calculus and physics.

College Program students and students enrolled in the Marine Corps option are encouraged to take courses in

calculus and physics or to pursue a science or engineering major. In addition to the prescribed naval professional academic courses, the naval faculty conducts laboratories all four academic years to give students experience in practical leadership.

All scholarship students are required to complete a course in American Military Affairs or National Security Policy and complete a cultural studies course. Naval science courses are not offered on a pass-fail basis.

Optional Program

Students may select a minor in naval science. Course requirements are shown on the next page.

ROTC: Naval Science Curriculum

| Semester 1 | Credits |
|--------------------------------------|----------|
| NS 101 Introduction to Naval Science | 2 |
| Total Hours | 2 |

| Semester 2 | Credits |
|--------------------------------------|----------|
| NS 202 Seapower and Maritime Affairs | 3 |
| Total Hours | 3 |

| Semester 3 | Credits |
|----------------------------------|----------|
| NS 401 Leadership and Management | 3 |
| Total Hours | 3 |

| Semester 4 | Credits |
|--------------------|----------|
| NS 301 Navigation | 3 |
| Total Hours | 3 |

| Semester 5 | Credits |
|---------------------------|----------|
| NS 102 Naval Ship Systems | 3 |
| Total Hours | 3 |

| Semester 6 | Credits |
|------------------------------|----------|
| NS 201 Naval Weapons Systems | 3 |
| Total Hours | 3 |

| Semester 7 | Credits |
|--|----------|
| NS 302 Naval Operations and Seamanship | 3 |
| Total Hours | 3 |

| Semester 8 | Credits |
|------------------------------------|----------|
| NS 402 Naval Leadership and Ethics | 3 |
| Total Hours | 3 |

Total Credit Hours **23**

Marine Option

| Semester 1 | Credits |
|--------------------------------------|----------|
| NS 101 Introduction to Naval Science | 2 |
| Total Hours | 2 |

| Semester 2 | Credits |
|--------------------------------------|----------|
| NS 202 Seapower and Maritime Affairs | 3 |
| Total Hours | 3 |

| Semester 3 | Credits |
|----------------------------------|----------|
| NS 401 Leadership and Management | 3 |
| Total Hours | 3 |

| Semester 4 | Credits |
|--------------------|----------|
| Total Hours | 0 |

| Semester 5 | Credits |
|-----------------------------|----------|
| NS 310 Evolution of Warfare | 3 |
| Total Hours | 3 |

| Semester 6 | Credits |
|--------------------------------------|----------|
| NS 410 History of Amphibious Warfare | 3 |
| Total Hours | 3 |

| Semester 7 | Credits |
|--------------------|----------|
| Total Hours | 0 |

| Semester 8 | Credits |
|------------------------------------|----------|
| NS 402 Naval Leadership and Ethics | 3 |
| Total Hours | 3 |

Total Credit Hours **17**

Social Sciences

Department Website: www.iit.edu/csl/socs

Siegel Hall
3301 S. Dearborn St.
Chicago, IL 60616
312.567.3000

Chair

Christena Nippert-Eng

Associate Chair

Rebecca Steffenson

IIT's Department of Social Sciences offers three undergraduate degrees: 1) a Bachelor of Science (B.S.) in Sociology, 2) a Bachelor of Science (B.S.) in Political Science, and 3) an interdisciplinary Bachelor of Science (B.S.) in Social Sciences. The department offers minors in political science and sociology, and participates with other IIT departments in offering interdisciplinary minors in legal studies and urban affairs.

Also offered are two accelerated degree programs: a B.S./J.D. program with IIT's Chicago-Kent College of Law that can be completed in six years and a B.S./M.P.A. program with IIT Stuart School of Business that can be completed in five years.

The department offers a variety of courses to broaden the IIT student's education and to fulfill the university's general education requirements. Note that only the courses from sociology, anthropology, and political science disciplines are administered through the Department of Social Sciences. Other social sciences courses are offered through the College of Psychology (psychology) and the Stuart School of Business (economics).

Faculty

Professors

P. Ireland, C. Nippert-Eng, U. Segerstrale

Assistant Professors

D. Bliss, L. Hosman, N. McClain, M. Shapiro,
R. Steffenson

Visiting Assistant Professor

B. Lynerd

Faculty Emeritus

D. Beam, P. DeForest, W. Grimshaw

Political Science

A Political Science undergraduate degree is common for the following professions: law, journalism, public administration, medicine, science, politics, and planning. Such professionals are in constant need of information on and understanding of the political, legal, governmental, and public implications of their fields.

At IIT, most political science students devote most of their attention to American government, urban affairs, or international and comparative studies. Several faculty conduct research in and teach the politics and policies of science and technology. Substantial attention is also devoted to studying various aspects of the new workplace.

Political science majors are required to complete 36 credits in political science. There are eight required courses and four electives, including a senior seminar or “capstone course” in which students produce a research paper or other project that demonstrates their interests and skills to potential employers and/or graduate schools. Majors are also required to complete an approved course in statistics and a course in research methods. Additional courses may be required to prepare students for professional training and for entrance to fields such as law and medicine.

Bachelor of Science in Political Science

| Required Courses | Credit Hours |
|--|--------------|
| Mathematics Requirements Two courses at the level of MATH 119 or above including PSYC 203 or BUS 221 | 6 |
| Humanities and Social Sciences Requirements For general education requirements, see page 25. | 21 |
| Natural Sciences Requirements For general education requirements, see page 25. | 11 |
| Computer Science Requirement CS 105 | 2 |
| Political Science Requirements PS 100*, PS 200, PS/SOC 209, PS 273 or PS/SOC 210, PS 230 or 232, PS 306 or 353, PS 315, PS 490 | 24 |
| Political Science Electives | 12 |
| Free Electives | 44 |
| Interprofessional Projects | 6 |
| Total Hours | 126 |

* Students may substitute SOC 200 or 203.

Political Science Curriculum

| Semester 1 | Credits |
|---|-----------|
| PS 100 Introduction to the Profession* | 3 |
| PS 200 American Government | 3 |
| Humanities 100-level Elective | 3 |
| Math Elective* | 3 |
| Natural Science or Engineering Elective | 4 |
| Total Hours | 16 |

| Semester 2 | Credits |
|---|-----------|
| CS 105 Intro to Computer Programming I | 2 |
| PS 230 International Relations | 3 |
| OR | |
| PS 232 Introduction to Comparative Politics | 3 |
| Natural Science or Engineering Elective | 4 |
| Humanities or Social Science Elective | 3 |
| Social Science Elective | 3 |
| Free Elective | 3 |
| Total Hours | 18 |

| Semester 3 | Credits |
|--|-----------|
| PSYC 203 Undergrad Stats for Behavioral Sciences** | 3 |
| PS 306 Politics & Public Policy | 3 |
| OR | |
| PS 353 The Promise & Problems of Policy | 3 |
| Political Science Elective | 3 |
| Humanities Elective (300+) | 3 |
| Social Science Elective | 3 |
| Total Hours | 15 |

| Semester 4 | Credits |
|---|-----------|
| PS 209 Research Methods | 3 |
| PS 315 Urban Politics | 3 |
| IPRO Elective I | 3 |
| Natural Science or Engineering Elective | 3 |
| Free Elective | 3 |
| Total Hours | 15 |

| Semester 5 | Credits |
|-----------------------------------|-----------|
| PS 273 Great Political Thinkers | 3 |
| OR | |
| PS 210 Social & Political Thought | 3 |
| Political Science Elective | 3 |
| Social Science Elective (300+) | 3 |
| Free Elective | 2 |
| Free Elective | 3 |
| Free Elective | 3 |
| Total Hours | 17 |

| Semester 6 | Credits |
|----------------------------|-----------|
| Political Science Elective | 3 |
| Humanities Elective (300+) | 3 |
| Free Elective | 3 |
| Free Elective | 3 |
| Free Elective | 3 |
| Total Hours | 15 |

| Semester 7 | Credits |
|-----------------------|-----------|
| PS 490 Senior Seminar | 3 |
| IPRO Elective II | 3 |
| Free Elective | 3 |
| Free Elective | 3 |
| Free Elective | 3 |
| Total Hours | 15 |

| Semester 8 | Credits |
|----------------------------|-----------|
| Political Science Elective | 3 |
| Free Elective | 3 |
| Free Elective | 3 |
| Free Elective | 3 |
| Free Elective | 3 |
| Total Hours | 15 |

Total Credit Hours **126**

* Mathematics requirement: Two courses at the level of MATH 119 or above, including PSYC 203 or BUS 221.

** Students may substitute SOC 200 or 203.

Social Sciences

At IIT, the social sciences disciplines include economics, anthropology, sociology, political science, and some aspects of psychology. These disciplines each focus on a complementary set of methods, theories, and knowledge that allow us to enlarge our understanding of social systems and behaviors. The Social Sciences undergraduate degree allows students to explore and use “S” designated courses from all these fields to meet their major requirements for graduation. The degree provides students with a unique opportunity for interdisciplinary training in the sciences.

Nuanced understandings of social systems and behaviors are highly desired in many types of professions such as law, journalism, public administration, science, business,

medicine, planning, politics, and consulting.

There are six core courses and six electives required within the social sciences major, including a senior seminar or “capstone course” in which students will produce a research paper or other project that demonstrates their interests and skills to potential employers and/or graduate schools.

Social sciences majors are required to complete 39 credits in the social sciences plus an approved course in statistics. Additional courses may be required to prepare students for professional training and for entrance to fields such as law and medicine.

Bachelor of Science in Social Sciences

| Required Courses | Credit Hours |
|---|--------------|
| Mathematics Requirements Two courses at the level of MATH 119 or above including PSYC 203 or BUS 221 | 6 |
| Humanities and Social Sciences Requirements For general education requirements, see page 25. | 21 |
| Natural Sciences Requirements For general education requirements, see page 25. | 11 |
| Computer Science Requirement CS 105 | 2 |
| Introduction to the Profession PS/SOC 100 | 3 |
| Sociology Requirements PS/SOC 209, PS/SOC 210, SOC 490 plus three of the five following options: (1) ANTH 200 (2) ECON 151 or ECON 152 (3) PS 202 (4) PSYC 221 or 222 (5) SOC 200 or SOC 203 | 18 |
| Social Sciences Electives | 18 |
| Free Electives | 42 |
| Interprofessional Projects | 6 |
| Total Hours | 127 |

Social Sciences Curriculum

| Semester 1 | Credits |
|---|-----------|
| PS/SOC 100 Introduction to the Profession | 3 |
| Introduction to the Discipline* | 3 |
| Humanities 100-level Elective | 3 |
| Math Elective*** | 3 |
| Natural Science or Engineering Elective | 4 |
| Total Hours | 16 |

| Semester 2 | Credits |
|---|-----------|
| CS 105 Intro to Computer Programming I | 2 |
| Introduction to the Discipline* | 3 |
| Introduction to the Discipline* | 3 |
| Natural Science or Engineering Elective | 4 |
| Humanities Elective (300+) | 3 |
| Total Hours | 15 |

| Semester 3 | Credits |
|---|-----------|
| PS 209 Research Methods | 3 |
| PS/SOC 210 Social and Political Thought | 3 |
| Natural Science or Engineering Elective | 3 |
| Social Sciences Elective | 3 |
| Free Elective | 3 |
| Total Hours | 15 |

| Semester 4 | Credits |
|---|-----------|
| PSYC 203 Undergrad Stats for Behavioral Sciences*** | 3 |
| Social Sciences Elective** | 3 |
| I PRO Elective I | 3 |
| Social Sciences Elective | 3 |
| Humanities Elective (300+) | 3 |
| Total Hours | 15 |

| Semester 5 | Credits |
|--|-----------|
| Social Sciences Elective** | 3 |
| Social Sciences Elective** | 3 |
| I PRO Elective II | 3 |
| Social Sciences Elective (300+) | 3 |
| Humanities or Social Sciences Elective | 3 |
| Total Hours | 15 |

| Semester 6 | Credits |
|----------------------------|-----------|
| Social Sciences Elective** | 3 |
| Social Sciences Elective** | 3 |
| Free Elective | 3 |
| Free Elective | 3 |
| Free Elective | 3 |
| Free Elective | 3 |
| Total Hours | 18 |

| Semester 7 | Credits |
|----------------------------|-----------|
| SOC 490 Senior Seminar | 3 |
| Social Sciences Elective** | 3 |
| Free Elective | 3 |
| Free Elective | 3 |
| Free Elective | 3 |
| Free Elective | 3 |
| Total Hours | 18 |

| Semester 8 | Credits |
|--------------------|-----------|
| Free Elective | 3 |
| Free Elective | 3 |
| Free Elective | 3 |
| Free Elective | 3 |
| Free Elective | 3 |
| Total Hours | 15 |

Total Credit Hours 127

* Three Introduction to the Discipline electives must be chosen from the following five options: ANTH 200, (ECON 151 or ECON 152), PS 202, (PSYC 221 or 222), (SOC 200 or SOC 203)

** These courses are part of the requirements of the social sciences major. The other social sciences electives satisfy the general education requirements.

*** Mathematics requirement: two courses at the level of MATH 119 or above, including PYSC 203 or BUS 221.

Sociology

A Sociology undergraduate degree is common for many types of professionals: social workers, counselors, administrative professionals, teachers, librarians, business managers, marketing, and sales. Sociologists learn powerful ways of thinking about and analyzing human systems and behaviors that can be applied to just about anything. Once mastered, the perspective constantly yields new and important insights.

At IIT, the major emphasizes the sociology of technology, science, the built environment, and work and organizations. Given IIT's strong history and reputation in these fields, there is no better place for an undergraduate to study more sociological aspects. Sociology undergraduates will find a rich possibility for training that is generally not available elsewhere.

There are five core courses and six electives required within the sociology major, including a senior seminar or "capstone course" in which students will produce a research paper or other project that demonstrates their interests and skills to potential employers and/or graduate schools.

Sociology majors are required to complete 36 credits in sociology. Majors are also required to complete an approved course in statistics and a course in research methods. Additional courses may be required to prepare students for professional training and for entrance to fields such as law and medicine.

Bachelor of Science in Sociology

| Required Courses | Credit Hours |
|--|--------------|
| Mathematics Requirements Two courses at the level of MATH 119 or above including PSYC 203 or BUS 221 | 6 |
| Humanities and Social Sciences Requirements For general education requirements, see page 25. | 21 |
| Natural Sciences Requirements For general education requirements, see page 25. | 11 |
| Computer Science Requirement CS 105 | 2 |
| Introduction to the Profession PS/SOC 100 | 3 |
| Sociology Requirements SOC 200 or 203, PS/SOC 209, PS/SOC 210, PS/SOC 221 or SOC 263, SOC 490 | 15 |
| Sociology Electives | 18 |
| Free Electives | 45 |
| Interprofessional Projects | 6 |
| Total Hours | 127 |

Sociology Curriculum

| Semester 1 | Credits |
|---|-----------|
| PS/SOC 100 Introduction to the Profession | 3 |
| SOC 200 Introduction to Sociology | |
| OR | 3 |
| SOC 203 Engaging Sociology: Ethnography | |
| Humanities 100-level Elective | 3 |
| Math Elective* | 3 |
| Natural Science or Engineering Elective | 4 |
| Total Hours | 16 |

| Semester 2 | Credits |
|---|-----------|
| CS 105 Intro to Computer Programming I | 2 |
| PS/SOC 221 Social Inequality | |
| OR | 3 |
| SOC 263 Historical Inequality | |
| Natural Science or Engineering Elective | 4 |
| Humanities Elective (300+) | 3 |
| Social Sciences Elective | 3 |
| Total Hours | 15 |

| Semester 3 | Credits |
|---|-----------|
| PS/SOC 210 Social and Political Thought | 3 |
| PSYC 203 Undergrad Stats for Behavioral Sciences* | 3 |
| Natural Science or Engineering Elective | 3 |
| Humanities Elective (300+) | 3 |
| Social Sciences Elective | 3 |
| Total Hours | 15 |

| Semester 4 | Credits |
|---------------------------------|-----------|
| PS/SOC 209 Research Methods | 3 |
| Sociology Elective | 3 |
| IPRO Elective I | 3 |
| Social Sciences Elective (300+) | 3 |
| Free Elective | 3 |
| Total Hours | 15 |

| Semester 5 | Credits |
|--|-----------|
| IPRO Elective II | 3 |
| Sociology Elective | 3 |
| Sociology Elective | 3 |
| Humanities or Social Sciences Elective | 3 |
| Free Elective | 3 |
| Free Elective | 3 |
| Total Hours | 18 |

| Semester 6 | Credits |
|--------------------|-----------|
| Sociology Elective | 3 |
| Sociology Elective | 3 |
| Free Elective | 3 |
| Free Elective | 3 |
| Free Elective | 3 |
| Free Elective | 3 |
| Total Hours | 18 |

| Semester 7 | Credits |
|------------------------|-----------|
| SOC 490 Senior Seminar | 3 |
| Sociology Elective | 3 |
| Free Elective | 3 |
| Free Elective | 3 |
| Free Elective | 3 |
| Total Hours | 15 |

| Semester 8 | Credits |
|--------------------|-----------|
| Free Elective | 3 |
| Free Elective | 3 |
| Free Elective | 3 |
| Free Elective | 3 |
| Free Elective | 3 |
| Total Hours | 15 |

Total Credit Hours **127**

* Mathematics requirement: Two courses at the level of MATH 119 or above, including PSYC 203.



Minors and Special Programs

Minors

Minors consist of at least five courses (minimum 15 semester hours), are optional, and are frequently cross-disciplinary. Since they provide a coherent set of ideas, concepts, and educational experiences in a variety of areas, students may find that they enhance potential for professional development. Students who wish to pursue a minor must consult with advisors in their respective major departments. Courses used to satisfy general education or major requirements do not apply to a minor. Exceptions may be made in individual cases.

NOTE: Not all minors are applicable to all majors.

Following are approved minors:

Aerospace Science - Materials Science

Engineering Majors only

MMAE 304, MMAE 311, MMAE 312, MMAE 313, and one (1) of the following courses: MMAE 350, MMAE 410 or MMAE 411, MMAE 443, or MMAE 452.

Aerospace Science - Mechanical Engineering Majors only

MMAE 311, MMAE 312, MMAE 452, and one (1) course from each of the following group of courses: (MMAE 410, MMAE 411, MMAE 441) and (MMAE 412, MMAE 414).

Air Force Aerospace Studies

AS 101, AS 102, AS 201, AS 202, AS 301, AS 302, AS 401, AS 402.

Applied Mathematics

MATH 230, MATH 252, MATH 332, and at least two (2) mathematics courses at the 400-level.

Applied Mechanics - Aerospace Engineering Majors only

MMAE 432 or MMAE 433, and four (4) of the following courses: MMAE 321, MMAE 323, MMAE 302 or MMAE 332, MMAE 445, or MMAE 485.

Applied Mechanics - Materials Science Engineering Majors only

MMAE 302 or MMAE 332, MMAE 313, MMAE 323, MMAE 350, MMAE 432 or MMAE 445.

Architecture - Non-Architecture Majors only

This minor consists of 15 semester hours. ARCH 100, ARCH 109, ARCH 113, AAH 119 or AAH 120, and one (1) of the following courses: ARCH 114, ARCH 125, ARCH 321, ARCH 403, or ARCH 413. Students preparing for competitive application to graduate programs in architecture are encouraged to select ARCH 114.

Artificial Intelligence

CS 201, CS 330, CS 331, CS 430, CS 480.

Biochemistry

BIOL 214, BIOL 401, BIOL 402, BIOL 404, BIOL 445.

Biology

BIOL 107, BIOL 115, BIOL 214, BIOL 445, and one (1) of the following: BIOL 210, BIOL 305, BIOL 327, BIOL 401, BIOL 402, BIOL 404, BIOL 410, BIOL 426, BIOL 430, BIOL 446, or an approved Biology elective at the 500-level.

Building Systems Engineering

CAE 331, CAE 334, CAE 461, CAE 464, and one (1) of the following courses: CAE 403, CAE 409, CAE 425, CAE 463, CAE 465, CAE 466, or CAE 467.

Business

BUS 210 or (BUS 211 and 212), ECON 211 or (ECON 151 and 152), BUS 301, and two (2) of the following courses: ECON 423, BUS 371, or BUS 305. Chemical engineering majors should also take CHE 426 or another engineering science course.

Chemistry

This minor consists of at least 15 semester hours. CHEM 247, (CHEM 237 and 239) or (CHEM 343 and 344), and electives chosen from 300-level and 400-level chemistry courses.

Circuits and Systems - Non-Electrical Engineering, Non-Computer Engineering Majors only

ECE 211, ECE 213, ECE 218, and one (1) of the following sequences: (ECE 308 and 403), (ECE 308 and 438), or (ECE 319 and 420).

Communication

This minor consists of 15 semester hours of communication coursework chosen in consultation with the minor advisor. At least nine (9) semester hours must be at or above the 300-level.

Computational Structures

CS 201, CS 330, CS 331, CS 430, MATH 350.

Computer Architecture

CS 201, ECE 218, CS 331, CS 350, CS 470.

Computer Networking

CS 201, CS 331, CS 350, CS 450, CS 455.

Construction Management

CAE 470, CAE 471, CAE 472, CAE 473, ECON 423.

Database Management

CS 201, CS 331, CS 422 or CS 429, CS 425, CS 445.

Digital Humanities

At least 15 semester hours in humanities department courses which deal with technology-related topics, chosen in consultation with the minor advisor.

Electromechanical Design and Manufacturing - Aerospace Engineering Majors only

MMAE 445, MMAE 485, BUS 305, ECE 218, ECE 242, ECE 441 (replaces MMAE 315).

Electromechanical Design and Manufacturing - Mechanical Engineering Majors only

MMAE 485, BUS 305, ECE 218, ECE 242, ECE 441 (replaces MMAE 319).

Energy/Environment/Economics (E3)

This minor consists of 15 semester hours. CHE 543 and six (6) semester hours from each of the following group of courses: (CHE 465, CHE 467, CHE 489, CHE 491, CHE 541, CHE 542, CHE 565, CHE 582, ECE 319, ECE 411, ECE 419, ECE 420, ECE 438, MMAE 424, MMAE 425, MMAE 426 or MMAE 522, MMAE 524, MMAE 525) and (ECE 491, ECE 497, ECON 423, ENVE 404, ENVE 426, ENVE 463, ENVE 485, MMAE 491, MMAE 494, MMAE 497, PS 338). Appropriate substitutions may be made with the approval of the minor advisor.

Engineering Graphics and CAD

CAE 100, CAE 101, EG 305, EG 306, EG 405, EG 406, EG 419.

English Language/Literature

Six (6) semester hours of English linguistics courses, six (6) semester hours of literature courses, and a three (3) semester hour course in either English linguistics or literature. At least nine (9) semester hours must be at or above the 300-level.

Entrepreneurship

BUS 210, BUS 371, ECON 211, ECON 423, BUS 469

Environmental Engineering

This minor consists of 15 semester hours. At least six (6) semester hours from each of the following group of courses: (ENVE 404, ENVE 426, ENVE 463, ENVE 485) and (CAE 421, CAE 439, CAE 465, CAE 482). Appropriate substitutions may be made with the approval of the minor advisor.

Graphics and CAD for Non-Engineers

EG 225, EG 325, EG 329, EG 425, EG 429.

History

This minor consists of 15 semester hours of history coursework chosen in consultation with the minor advisor. Courses must be at or above the 300-level.

Human Resources

PSYC 221, PSYC 301, PSYC 310, PSYC 409, PSYC 455, PSYC 481.

Industrial Technology and Management

Completion of 15 hours from the following: INTM 315, INTM 322, INTM 410, INTM 418, INTM 420, INTM 441, INTM 477.

Information Security

ITMD 421, ITMS 428, ITMO 440, ITMS 448, ITMS 478.

Information System Administration

ITM 301, ITM 302, ITMO 440, and six (6) semester hours from the following courses: ITMO 451, ITMO 452, ITMO 454, or ITMO 456.

Information System Network Management

ITMO 440, ITMO 441, ITMS 448, ITMO 456 or ITMD 461, ITMM 471.

Information Technology and Management

ITM 301, ITM 302, ITMD 421, ITMO 440, ITMM 471.

Internet Application Development

ITM 311, ITMD 411, ITMD 461, ITMD 462, and one (1) of the following courses: ITMD 465, ITMD 466, ITMD 469, or an applicable communication (COM) course chosen in consultation with the minor advisor.

Legal Studies

PHIL 362, PS 318, PS 356, PS 365, and one (1) of the following courses: BUS 341, PHIL/COM 377, or a law oriented course such as CAE 473 or MMAE 435.

Linguistics

This minor consists of 15 semester hours of linguistics coursework chosen in consultation with the minor advisor. At least nine semester hours must be at or above the 300-level.

Literature

This minor consists of 15 semester hours of literature courses, at or above the 300-level.

Materials Science - Aerospace Engineering Majors only

MMAE 365, MMAE 370, MMAE 463, and two (2) of the following courses: MMAE 465, MMAE 468, MMAE 470, MMAE 472 or MMAE 482, MMAE 486, or MMAE 485.

Materials Science - Mechanical Engineering Majors only

MMAE 365, MMAE 370, MMAE 463, and two (2) of the following courses: MMAE 465, MMAE 468, MMAE 470, MMAE 472 or MMAE 482, or MMAE 476.

Materials Science - Non-MMAE Majors

MS 201, MMAE 365, MMAE 463, MMAE 465, and one (1) of the following courses: MMAE 370, MMAE 468, or MMAE 470.

Mathematics and Science Education

MSED 200, MSED 250, MSED 300, and two (2) additional MSED courses chosen in consultation with the minor advisor.

Military Science

MILS 101, MILS 102, MILS 201, MILS 202 or MILS 107, MILS 301, MILS 302, MILS 401, MILS 402. MILS 147, MILS 148, MILS 247, and MILS 248 (Aerobic Conditioning) are required for all cadets in the Basic Program. The proceeding four (4) courses and MILS 347, MILS 348, MILS 447, and MILS 448 (Aerobic Conditioning) are required for all Advanced Course cadets.

Minors

Music

This minor consists of 15 semester hours in music theory or practice taken at VanderCook College of Music. A maximum of three (3) semester hours of performance courses may be used toward a minor. Students should contact the Office of Undergraduate Academic Affairs regarding applicability of courses toward a degree program.

Naval Science

NS 101, NS 102 (Navy option), NS 201 (Navy option), NS 202, NS 301 (Navy option), NS 302 (Navy option), NS 310 (Marine option), NS 401, NS 402, NS 410 (Marine option). Attendance at the Naval Science Institute may be substituted for NS 101, NS 102, NS 201, and NS 202. NS 497 (0 credits) is required every semester.

Operating Systems

CS 201, CS 331, CS 350, CS 351, CS 450.

Organizational Psychology

PSYC 221, PSYC 301, PSYC 303, PSYC 310, PSYC 409.

Philosophy

This minor consists of 15 semester hours of philosophy courses, at or above the 300-level.

Physics

PHYS 300 or PHYS 427, PHYS 308, PHYS 348, PHYS 405, PHYS 413.

Political Science

This minor consists of 15 semester hours. PS 100 or PS 202 and four (4) additional political science courses.

Polymer Science and Engineering

This minor consists of 15 semester hours. One (1) of the following courses: CHE 470, CHEM 470, or MMAE 470; three (3) of the following courses: CHE 538, CHE 555, CHE 575, CHEM 535, CHEM 537, CHEM 542, MMAE 483, MMAE 487, MMAE 579, MMAE 580 or MMAE 581; and ONLY one (1) of the following courses: CHE 426, CHE 489, CHE 491, CHE 582, FPE 541, MMAE 451, or MMAE 485. Appropriate substitutions may be made with the approval of the minor advisor.

Premedical Studies

This minor is intended for those students who plan to apply to medical school and has been approved by the Premedical Advisory Committee. Students who major in biology, biochemistry, or molecular biochemistry and biophysics satisfy the premedical studies course requirements.

Biomedical Engineering - Cell and Tissue Track
CHEM 240 and at least 13 semester hours chosen from the following courses: BIOL 210, BIOL 214, BIOL 225, BIOL 401, BIOL 402, BIOL 403(equivalent of BIOL 401 and 402), BIOL 404, BIOL 445, BIOL 446, BIOL 491 (1-3 semester hours), or BME 495 (1-3 semester hours).

Premedical Studies - continued

Biomedical Engineering Majors - Neural Engineering or Medical Imaging Track CHEM 237, CHEM 239, CHEM 240 and at least six (6) semester hours chosen from the following courses: BIOL 210, BIOL 214, BIOL 225, BIOL 401, BIOL 402, BIOL 403(equivalent of BIOL 401 and 402), BIOL 404, BIOL 445, BIOL 446, or BME 491 (1-3 semester hours). If CHEM 237 or CHEM 239 is taken as an option in the Neural Engineering or Medical Imaging Track, then add the equivalent number of semester hours chosen from courses listed above.

Chemical Engineering BIOL 107, BIOL 109, BIOL 115, BIOL 117, CHEM 240, CHE 426 or a three (3) semester hour engineering science course.

Chemistry Students interested in pursuing chemistry as a premedical degree may elect the Bachelor of Science in Chemistry with emphasis in Biological Chemistry optional degree program. This program includes all the necessary courses required for entrance into medical school. Students may also pursue any of the other optional degree programs in chemistry but must additionally take BIOL 107, BIOL 109, BIOL 115, BIOL 117, BIOL 214, and one (1) of the following courses: BIOL 430 or BIOL 445.

Computer Science BIOL 107, BIOL 109, BIOL 115, BIOL 117, CHEM 124, CHEM 125, CHEM 237, CHEM 239, CHEM 240.

Electrical Engineering BIOL 107, BIOL 109, BIOL 115, BIOL 117, CHEM 125, CHEM 237, CHEM 239, CHEM 240.

Materials Science and Engineering BIOL 107, BIOL 109, BIOL 115, BIOL 117, CHEM 237, CHEM 239, CHEM 240.

Mechanical Engineering BIOL 107, BIOL 109, BIOL 115, BIOL 117, CHEM 125, CHEM 237, CHEM 239, CHEM 240.

Physics BIOL 107, BIOL 109, BIOL 115, BIOL 117, CHEM 237, CHEM 239, CHEM 240.

Professional and Technical Communication

COM 421 and 12 semester hours of communication coursework chosen in consultation with the minor advisor.

Programming Languages

CS 201, CS 331, CS 350, CS 351, CS 440.

Psychology

PSYC 203, PSYC 221, and at least nine (9) additional semester hours of psychology courses.

Public Administration

PS 200, PS 306, PS 314, PS 315, PS 351.

Rehabilitation Services

PSYC 410, PSYC 411, PSYC 412, PSYC 583, PSYC 590.

Sociology

This minor consists of 15 semester hours. SOC 200 or SOC 203 and four (4) additional sociology courses.

Software Engineering

CS 201, CS 331, CS 441, CS 445, CS 487.

Structural Engineering - Architecture Majors only

CAE 303, CAE 304, CAE 307, CAE 310, CAE 431.

This minor is usually taken in conjunction with the Bachelor of Architecture/Master of Civil Engineering Dual Degree Program (see page 167).

Structural Engineering - Non-CAEE, Non-ARCH Majors

CAE 303, CAE 304, CAE 307, CAE 310, CAE 315.

Telecommunications

CS 116 or CS 201, ECE 403, ECE 407, ECE 436, and two (2) of the following courses: CS 331, CS 450, or ECE 449.

Urban Studies

HIST 350, HIST 352, PS 315, PS 317, and (SOC 311 or SOC 350).

Special Programs

Dual Undergraduate Degree Options

Depending upon interest, capabilities, and goals, and with the permission of their advisors and department chairs, stu-

dents may choose dual undergraduate degree programs or select one of the options listed below.

Bachelor of Science in Computer Engineering/Bachelor of Science in Computer Science

Students interested in this program should consult a Department of Computer Science advisor. Freshmen entering

IIT with a significant number of Advanced Placement credits might be able to complete both degrees in four years.

Bachelor of Science in Computer Engineering/Bachelor of Science in Electrical Engineering

Students interested in this program should consult a Department of Electrical and Computer Engineering advisor. Freshman entering IIT with a significant number of Ad-

vanced Placement credits may be able to complete both degrees in four years.

Bachelor of Science in Mechanical Engineering (ME)/ Bachelor of Science in Aerospace Engineering (AE)/ Bachelor of Science in Materials Science and Engineering (MSE)

A dual major in ME and AE, ME and MSE, or AE and MSE may generally be completed in one additional

semester. Interested students should consult their advisor.

B.S./M.S. and B.S./M.A.S. Co-Terminal Degrees

The B.S./M.S. and B.S./M.A.S. co-terminal degrees are introduced to encourage outstanding undergraduate students to pursue a Master's degree. A B.S./M.A.S. degree could be completed in five years by proper planning.

IIT Undergraduate students with a GPA of 3.00 or above may apply to the existing co-terminal programs in their fourth semester or later. The Graduate Admissions will have a special application form for this. The admission decisions are made by the program advisors. The co-terminal degree students will be assigned an undergraduate and a graduate advisor as many of these programs involve two academic units.

The co-terminal degree programs will have a reduced credit-hour requirement with up to nine credit hours of senior or

graduate courses included in both programs. Certain academic units may have a more restricted list of common courses. The co-terminal students will be classified as undergraduates throughout their study and, as such, are eligible to continue their financial benefits until graduation.

When the requirements of both degrees are completed, the two diplomas will be awarded simultaneously at the commencement. Students in this program will not be allowed to receive diplomas sequentially.

The co-terminal degree students are required to maintain a 3.00 or higher GPA throughout their study at IIT. If the GPA drops below 3.00, their co-terminal program will be terminated.

Bachelor's/Master's Degree Options

IIT's double-degree options allow students to earn two degrees in as few as five years. The University has created Bachelor's degree/Master's degree options in fields in demand in professions where graduate training is essential.

Students may enter some undergraduate/graduate double-degree programs either through the honors track or the standard track. Through the honors track, exceptional students may be admitted simultaneously into both the undergraduate and graduate schools when they apply to

IIT. Admission will be based on their high school records, including grades, test scores, faculty/employer recommendation, and other documentation. Through the standard track, students are admitted into the undergraduate department offering the Bachelor's portion of the program.

Depending upon their interests, capabilities, and goals, and with the permission of their advisors and department chairs, students may choose combined degree programs or select one of the following options.

Bachelor of Architecture (B.Arch.)/Master of Business Administration (M.B.A.)

Architects recognize the importance of business skills in their profession. Recognizing the 21st century's concerns with environmental management and sustainable design issues, IIT offers young architects a unique opportunity for advanced graduate study in the Stuart School of Business.

IIT students completing the requirements for the B.Arch. degree may also earn the M.B.A. degree by completing an approved set of courses established by their academic advisors and appropriate deans in the College of Architecture and the Stuart School of Business. Thus, qualified architecture students may earn their B.Arch. and the M.B.A. in approximately six-and-a-half years, rather than the usual seven years. When including a summer term, the M.B.A. will typically require one-and-a-half more years of study.

Students considering the B.Arch./M.B.A. dual degree pro-

gram should consult with undergraduate advisors in both programs early in their academic career.

Students will be required to apply for admission to the graduate M.B.A. program, providing Graduate Management Admission Test (GMAT) scores and all other necessary application materials. Application should be completed prior to the end of the seventh semester of the B.Arch. program. Upon admission, B.Arch. students could successfully complete up to four M.B.A. courses, or 12 credits, before joining the program on a full-time basis. These courses are typically basic core courses for which there are no prerequisites. The Stuart School M.B.A. advisors would be able to identify these courses and offer appropriate advice to the B.Arch students upon their admission to the program.

Bachelor of Architecture/Master of Civil Engineering

Qualified students enrolled at IIT may earn both the Bachelor of Architecture and one of two professional Master's degrees in Civil Engineering. Students who seek the Master of Structural Engineering degree (MAS STE) must successfully complete the following courses as part of their undergraduate program in architecture:

MATH 151 Calculus I
 MATH 152 Calculus II
 MATH 251 Multivariate and Vector Calculus
 MATH 252 Differential Equations
 PHYS 123 General Physics I: Mechanics
 MMAE 200 Introduction to Mechanics
 MMAE 202 Mechanics of Solids II
 CAE 303 Structural Design I
 CAE 304 Structural Analysis I
 CAE 307 Structural Design II
 CAE 310 Structural Analysis II

CAE 431 Steel Design
 CAE 432 Concrete and Foundation Design

Students who seek the Professional Master's degree in Architectural Engineering should take:

CAE 208 Thermal-Fluids Engineering I
 CAE 209 Thermal-Fluids Engineering II
 CAE 383 Electrical and Electronic Circuits

Students who seek the Master of Construction Engineering and Management (MAS CM) should consult the department.

Students who anticipate entering into the program should seek advising in the Department of Civil, Architectural, and Environmental Engineering and the College of Architecture early in their studies at IIT.

Special Programs

Bachelor of Science/Master of Business Administration

One of the most appealing career preparations is the combination of a Bachelor's degree with the Master of Business Administration (M.B.A.) degree. IIT students who complete the necessary undergraduate business courses may earn both the Bachelor's degree and the M.B.A. degree in about five years, rather than the usual six years. (See previous page for B.Arch./M.B.A. program.) Undergraduate courses, when included as part of the Bachelor's degree program, replace graduate courses that are part of the M.B.A. program. This allows students to complete the M.B.A. with as few as 16 courses.

Students who are considering the Bachelor/M.B.A. program should consult with the Stuart School of Business undergraduate programs advisor as early as possible in their academic career in order to plan a program enabling them to receive the maximum number of advanced standing credits toward their M.B.A. Formal application to the M.B.A. program, which includes a Graduate Management Admission Test (GMAT) score, should be submitted prior to the completion of the seventh semester of the Bachelor's program.

Bachelor of Science/Master of Public Administration

Qualified students who are interested in careers in the public sector may complete their Bachelor's degree and Master's degree in Public Administration (M.P.A.) in five or fewer years.

The requirements for the Bachelor of Science in Political Science and Master of Public Administration are often completed in four-and-a-half years. Requirements for a Bachelor's degree in engineering or science can be combined with an M.P.A. degree and usually take somewhat longer, depending on the student's load each semester and his or her total program. Students interested in this option submit their request to the M.P.A. program after their fourth semester. Qualified students are granted provisional

admission to the program and begin taking the graduate level M.P.A. courses, usually at the rate of one per semester. When the student has completed substantially all the requirements for the Bachelor's degree portion of the program, the student applies for regular admission to the graduate program. The decision about regular admission will be based on the work the student has completed at the time of his or her request for regular admission. By then, the student will have completed the M.P.A. foundation courses. Students in this program receive credit toward their Bachelor's degree electives for two M.P.A. courses and with the approval of the academic director, may receive credit toward their M.P.A. degree for up to six hours of relevant undergraduate coursework.

Combined Undergraduate/Graduate Law Programs (Leading to B.S./J.D. Degrees)

Students in these programs study their undergraduate program at the Main Campus of IIT and the law school portion of the program at IIT's Chicago-Kent College of Law. Two combined undergraduate and graduate law degree programs are available.

Prelaw undergraduate students also have access to seminars, prelaw advising, and assistance preparing for the LSAT.

Honors Law Program

The Honors Law Program allows students to pursue an accelerated sequence of coursework leading to the Bachelor of Science (B.S.) and Juris Doctor (J.D.) degrees. Students apply to the Honors Law Program prior to the beginning of their freshman year. Students who major in biology, chemistry, computer information systems, humanities, physics, political science, professional and technical communications, or psychology pursue an accelerated, focused course of study and normally complete both the B.S. degree and the J.D. degree in six years instead of the usual seven years. Students in other majors may also be able to accelerate completion of both degrees.

Acceptance by Chicago-Kent is automatic for those students who meet the minimum program requirements. Students are guaranteed a seat in the Chicago-Kent entering class provided that they meet the following criteria:

- Maintain a 3.25 cumulative undergraduate GPA.
- Take the Law School Admissions Test (LSAT) by February of their third undergraduate year at IIT if they are

in the six-year program or by February of their fourth year at IIT if they are not and achieve an LSAT score at or exceeding the median score for the Chicago-Kent entering class.

- Submit a completed application to Chicago-Kent by April 15 of the third undergraduate year if they are in the six-year program or in the fourth undergraduate year if they are not.
- Maintain a record consistent with the requirements of the bar examining program.

Students who participate in the program but who do not meet the criteria for guaranteed admission are invited to apply through the regular competitive application process for admission to Chicago-Kent after three or four years of undergraduate study. In reviewing such applications, consideration will be given to the student's participation in the Honors Law Program.

Business Honors Law Program

The Business Honors Law Program allows students to obtain both a Bachelor of Science degree in Business Administration (B.S.B.A.) and a Juris Doctor (J.D.) degree. Students apply to the Business Honors Law Program prior to the beginning of their freshman year. Business Honors Law students are guaranteed admission to Chicago-Kent College of Law provided they meet the following criteria:

- Maintain a 3.25 cumulative undergraduate GPA.
- Take the Law School Admissions Test (LSAT) by February of their third undergraduate year at IIT and achieve an LSAT score at or exceeding the median score for the Chicago-Kent entering class.
- Submit a completed application to Chicago-Kent by April 15 of the third undergraduate year.
- Fulfill the undergraduate requirements specified by the B.S.B.A. program and complete the required undergraduate courses.

- Maintain a record consistent with the requirements of the bar examining program.

Students who participate in the program but do not meet the academic standards for guaranteed admission are invited to apply through the regular competitive application process for admission to Chicago-Kent College of Law after three years of undergraduate study.

While the B.S.B.A. program is a full four-year program students in the Business Honors Law Program have the possibility of accelerating the curriculum to complete both the B.S. degree and the J.D. degree in six years. This will require incoming Advanced Placement credit and/or summer school and should be discussed with an academic advisor.

Special Programs

B.S./M.D./D.O./O.D. Programs

In addition to Premedical Studies, IIT offers three dual-degree programs. Students earn a Bachelor's degree from IIT and a medical degree from the medical or optometry school. These innovative programs are designed to meet

the urgent and intensifying need for technologically proficient physicians and researchers. More information can be obtained from the Office of Undergraduate Admission at 312.567.3025.

IIT/Midwestern University Chicago College of Osteopathic Medicine Dual Admission Program (4+4)

The IIT/Midwestern B.S./D.O. Program is an eight-year program open to freshmen applicants in which students complete their Bachelor of Science degree at IIT in a major of their choosing. Students must complete a standard curriculum of Premedical Studies either as part of their major or as a Premedical Studies minor, maintain high academic

standards, and obtain a satisfactory score on the MCAT. The final four years are spent at Midwestern University-Chicago College of Osteopathic Medicine, during which the student earns the Doctor of Osteopathic Medicine (D.O.) degree.

IIT/Rush Medical College B.S./M.D. Early Admission Program (4+4)

The IIT/Rush Medical College Program is an early admission program open to sophomores and to students attending other colleges or universities who transfer to IIT. Students must demonstrate high academic standards and research experience prior to admittance. This program is not open to international students. The MCAT is required. Students admitted to this program will complete their Bachelor of Science degree at IIT in a major of their choosing.

As part of this experience, they will participate in a year-long research project that bridges engineering, science, and medicine. The final four years are spent at Rush Medical College, during which time the student earns the Doctor of Medicine (M.D.) degree. This program is designed for students who intend to become research-oriented physicians.

IIT/Illinois College of Optometry B.S./O.D. Early Admission Program (3+4)

The IIT/ICO Program is an early admission program open to sophomores. Students admitted to the program complete three years at IIT taking courses leading to a Bachelor of Science degree in Biology and four years at Illinois College of Optometry (ICO). IIT students are only guaranteed an interview with ICO after they have successfully completed the required biology curriculum outlined by ICO. Courses taken during the first year at ICO also

count as senior-year-level biology courses. Students receive the Bachelor of Science degree in Biology from IIT after completing the first year at ICO and receive the Doctor of Optometry (O.D.) degree after completing all requirements at ICO. Students must maintain high academic standards and perform satisfactorily on the OPT (Optometry Admissions Test).

Premedical Programs

Department Website: www.iit.edu/premed

IIT provides excellent preparation for students planning to attend medical or other health-related professional schools. Students majoring in various fields, listed below, earn a Bachelor of Science degree and, at the same time, fulfill the prerequisites for medical school:

- Science (biology, chemistry, molecular biochemistry and biophysics, physics) with a minor in Premedical Studies (see pages 162–165). Many science majors will complete most of the courses required for the premedical curriculum as part of their major requirements. These students will not qualify for a Premedical Studies minor.
- Engineering (biomedical, chemical, electrical, materials science, mechanical) and computer science with a minor in Premedical Studies (see pages 162–165).

Rapidly advancing technology is changing the practice of medicine. Physicians who have a strong technical background will be among the best prepared to utilize the new technology. IIT's curricula emphasize technical proficiency as well as communication and teamwork, which help students develop the interpersonal skills that are critical in the health professions.

Students interested in pursuing careers in medicine, pharmacy, dentistry, osteopathy, optometry, and veterinary science should contact the Premedical Office for further information.

Each student works with a departmental premedical advisor to structure a course of study to meet medical school requirements and to prepare for the Medical College Admission Test (MCAT) in the junior year.

The following is a list of IIT science courses that fulfill the premedical requirements of most medical schools:

CHEM 124 Principles of Chemistry I with Laboratory
 CHEM 125 Principles of Chemistry II
 CHEM 237 Organic Chemistry I
 CHEM 239 Organic Chemistry II
 CHEM 240 Organic Chemistry Laboratory
 PHYS 123 General Physics I: Mechanics
 PHYS 221 General Physics II: Electricity & Magnetism
 BIOL 107 General Biology Lectures
 BIOL 109 General Biology Laboratory
 BIOL 115 Human Biology Lectures
 BIOL 117 Human Biology Laboratory

For a competitive application, and to improve performance during the first year in medical school, or to prepare for the MCAT, the following courses are recommended:

BIOL 214 Genetics
 BIOL 403 Biochemistry Lectures
 BIOL 430 Animal Physiology
 BIOL 445 Cell Biology
 PHYS 224 General Physics III for Engineers

The Premedical Advisory Committee members monitor academic progress, gather information about volunteer and research opportunities, guide the student through the medical school application process, advise in choosing a medical school and in preparation of the AMCAS application, collect and prepare recommendation letters, and assist in preparation for interviews with medical school admission committees.

Premedical Advisory Committee:

Kathryn Spink (Chair) (BCS)
 Konstantinos Arfanakis (BME)
 Nick Menhart (BCS)
 Satish Parulekar (CHBE)
 Molly Pachan (PSYC)

Coordinator

Cathie D'Amico
 116 Engineering 1
 312.567.8852

Coordinator

Todd Kersh
 182 Life Sciences
 312.567.7986

Post-Baccalaureate Premedical Program

The purpose of the Post-baccalaureate Premedical Program is to meet the needs of college graduates who have decided to pursue a medical education but who have taken none or only some of the basic science courses required for admission to medical school. The objective of the program is to provide rigorous education in all areas of the pre-medical sciences which are required for admission to any medical, osteopathic, or veterinary school in the country. Students who satisfactorily complete the program will be awarded a Certificate in Premedical Sciences.

Coursework

Students sufficiently prepared in mathematics and English who enter the program in the fall semester can expect to complete the program in two years. The third year is known as the “glide year.” This is the year between completing the program and entering medical school. For most students, the glide year provides the opportunity to take additional courses or to deepen their exposure to medicine through full-time employment in a clinical setting or in a medical research laboratory. In order to be eligible for admission to medical school and, subsequently, to be licensed to practice medicine, students must complete the following seven courses in the arts and sciences:

- One year of college English, including a significant amount of expository writing.
- One year of college mathematics, beyond precalculus, including at least one term of calculus. Statistics is recommended as the second mathematics course.
- One year of general physics, including laboratory.
- One year of general chemistry, including laboratory.
- One year of organic chemistry, including laboratory.
- One year of biology, including laboratory, with significant emphasis in molecular and cellular biology.

Advising and Support

On the main campus of Illinois Institute of Technology there are a number of advisors, who together constitute the Premedical Advisory Committee, see: www.iit.edu/premed. Post-baccalaureate Premedical students will be assigned an advisor who will be available to counsel them as they plan their program of study and as they prepare their applications to medical school. A number of academic support services will be made available to students in the Post-baccalaureate Premedical Program. In the University's Academic Resource Center, students can meet with tutors at no expense for additional help in their premedical courses. In the Premedical Office, support staff will collect and send letters of recommendation to medical schools. Each year the Premedical Office and the

IIT Honors Medical Society host a number of events specifically for premedical students including special seminars of medical interest and forums in which current students can learn from experiences of those who have already taken the MCAT or been admitted to medical school. The Princeton Review offers MCAT Preparatory courses at reduced cost to IIT students in the spring semester each year. Post-baccalaureate Premedical students are invited and encouraged to attend weekly colloquia in the biological and chemical sciences and in other departments offering seminars of medical interest. Finally, IIT's location in the city of Chicago is a special advantage to students in the Post-baccalaureate Premedical Program. The city is home to six medical schools and numerous hospitals and medical research centers. It is also home to the American Medical Association. This concentration of medical practice will provide IIT Post-baccalaureate Premedical students with a wide variety of opportunities to gain experience in both clinical settings and in medical research through volunteer service and paid employment.

Academic Standards

Medical schools expect successful applicants to possess excellent grounding in the premedical sciences. The quality of a student's preparation is measured by the grades earned in premedical courses. For this reason, IIT Post-baccalaureate Premedical students will be held to high academic standards. At a minimum, students must maintain a cumulative GPA of 3.00 to remain in the program. Likewise, medical schools have high expectations about an applicant's character. Students in the IIT Post-baccalaureate Premedical Program are expected to conduct themselves with honesty and integrity inspiring confidence in their abilities to assume the responsibilities of medical practice. Students in the Post-baccalaureate Premedical Program are subject to the academic and disciplinary standards detailed in the Illinois Institute of Technology Student Handbook.

Admissions Eligibility

The student must hold the degree of Bachelor of Arts or Science from an accredited college or university in the United States or an equivalent degree from an institution outside the United States. At a minimum, successful applicants must possess a cumulative undergraduate GPA of 3.00. In most cases, students will not be eligible for admission if they have applied to medical school previously or have completed their premedical preparation elsewhere within the last five years. This is not a remedial program. Students must submit a complete application package to the Undergraduate Admission Office for full consideration.

Certificate Programs

Undergraduate Certificate Programs

The Department of Civil, Architectural and Environmental Engineering offers a certificate program in Engineering Graphics and CAD. This program is designed to prepare specialists in graphics for positions in business and industry. Students completing the specified courses with satisfactory grades will be awarded a certificate of completion. This certificate is only available to students enrolled in a degree program at IIT and does not qualify for federal financial aid. Consult the Civil and Architectural Engineering section in this bulletin for further information.

The Industrial Technology and Management program offers the Industrial Technology and Management (INTM) certificate for individuals who want to improve manage-

ment, supervisory, and decision-making skills required for world-class industrial operations. This certificate does not qualify for federal financial aid. Consult the Industrial Technology and Management section in this bulletin for further information.

The College of Psychology offers a certificate in Industrial Training. This certificate is designed to help either the experienced skilled worker or a technically educated person to learn methods of knowledge delivery in industrial training settings. This certificate is only available to students enrolled in a degree program at IIT and does not qualify for federal financial aid. Consult the College of Psychology section in this bulletin for further information.

Post-Baccalaureate Certificate Programs

IIT departments that offer graduate certificate programs are: Biological and Chemical Sciences; Chemical and Biological Engineering; Civil, Architectural and Environmental Engineering; Computer Science; Electrical and Computer Engineering; Humanities; Information Technology and Management; Mechanical, Materials and Aerospace

Engineering; Physics. Certificate programs are also offered by: the Institute for Food Safety and Health; the College of Psychology; and the Stuart School of Business.

For a complete list of graduate certificate programs; consult the current *IIT Bulletin: Graduate Programs*.

Gainful Employment Requirements

As of July 1, 2011, institutions must disclose the following information about each of the institution's certificate programs that lead to gainful employment: the name of the certificate program, the CIP code, and the Standard Occupation Code (SOC); tuition and fee charges, the typical cost of books and supplies, and the average cost of room and board.

IIT's accreditor does not require the calculation of job placement rates and therefore we are unable to disclose such rates. Once the National Center of Education Statistics (NCES) publishes its methodology for calculating placement rates, IIT will use it to calculate such rates.

Per Gainful Employment guidelines, if the number of students who completed a Gainful Employment program during the award year was less than 10, for privacy reasons the school cannot disclose median loan debt and on-time completion rate.

Presently, undergraduate certificate programs do not fall under financial aid eligibility guidelines. Most undergraduate certificate programs are taken concurrently with a Bachelor's degree program.

Pre-Pharmacy Program

IIT and Midwestern University have a Dual Acceptance Program for Midwestern's Chicago College of Pharmacy (CCP). To be eligible for this program, students must meet IIT's admission requirements and also be selected for admission by the CCP Admissions Committee. Successful applicants will be ensured a seat at CCP upon successful completion of the pre-pharmacy requirements within two years at IIT; maintain a minimum cumulative pre-

pharmacy GPA of 3.20; and earn a grade of C or higher in all required courses. The Pharmacy College Admissions Test (PCAT) is waived for students who successfully complete the pre-pharmacy program at IIT and who are admitted to CCP in the Dual Acceptance Program.

For further information see www.midwestern.edu.

Special Programs

Study Abroad

IIT encourages students of all majors to consider studying abroad for part of their undergraduate career. Studying abroad enriches the college experience by providing a different intellectual and cultural environment and often enriches the academic program by giving breadth to the major discipline.

Students wishing to participate in an exchange program or to study abroad should first contact the International

Center for information, application forms, and procedural guidelines. The application process should begin approximately one year before study abroad is anticipated. Only students whose applications are approved by the Study Abroad Committee are permitted to participate in an exchange program or a study-abroad program. For more information, please visit the Study Abroad website at www.iit.edu/study_abroad.

General Exchange Programs

IIT has undergraduate exchange programs with the following universities:

- Institut National des Sciences Appliquées de Lyon (INSA-Lyon), Lyon, France
 - The Royal Institute of Technology (KTH), Stockholm, Sweden
 - University of Oviedo, Asturias, Spain
 - University College Cork (UCC), Cork, Ireland
 - Singapore Management University (Singapore)
 - Pforzheim University (Germany)
 - Zurich University of Applied Sciences (Switzerland)
 - Università IUAV di Venezia (Italy)
 - Tecnológico de Monterrey (Mexico)
 - UPC-ETS Arquitectura ETSAB (Spain)
 - Queensland University of Technology (Australia)
-

Business Exchanges

Students majoring in business may participate in the following exchange programs: Instituto Tecnológico de Monterrey, Monterrey, Mexico; Pforzheim University,

Pforzheim, Germany and Singapore Management University, Singapore; Zurich University of Applied Sciences (ZHAW), Winterthur, Switzerland.

Engineering/Computer Science Exchanges

IIT is a member of the Global Engineering Education Exchange (GE³), allowing students to take engineering and

computer science courses abroad as an exchange student in over 20 countries, many courses taught in English.

General Study Abroad Opportunities

IIT has many ties with universities around the world where students can earn IIT credit with courses provided in English or in a foreign language. Prior to participating in a study-abroad program, a student must meet the international university's admission criteria and must submit an

academic plan of study. Recently, students have attended universities in Australia, England, France, Germany, Mexico, Italy, Singapore, Sweden, Japan, Korea, Ireland, and more.

IIT Program in Paris, France

IIT offers a summer program in Paris led by IIT faculty for students in any major. IIT's College of Architecture

manages a semester-based program in Paris, France where architecture majors can take classes with IIT faculty.

Joint Programs

IIT has established Joint Program agreements with the following Chicago-area institutions: Benedictine University, DePaul University, Dominican University, Elmhurst College, Lewis University, University of St. Francis, and Wheaton College. These programs differ from a 3+2 transfer program in that students earn two degrees: a Bachelor's degree in an engineering discipline from IIT and a Bachelor's degree in an approved discipline from their host school.

Students will live on the campus of their host school while completing the requirements for both degrees.

Admission into the Joint Program at another institution does not guarantee admission to IIT. For additional information, students should contact the Office of Undergraduate Admission (see page 10).

Dual Admission Programs

IIT has established dual admission programs with College of DuPage and Joliet Junior College. These 2+2 programs allow students to complete an Associate's degree and a Bachelor's degree in four years of study with transfer credit. The Bachelor's degree program areas include Infor-

mation Technology and Management (ITM) and Psychology. For more information, see the Information Technology and Management or Psychology sections of this bulletin, or contact the Office of Undergraduate Admission (see page 10).

Reserve Officers Training Corps (ROTC)

ROTC programs are available as minors in the regular IIT degree programs. These programs enable men and women to become commissioned officers in the U.S. Air Force, Army, Marine Corps, or Navy upon graduation with

a Bachelor's degree. ROTC/IIT combined scholarships in many cases allow winners to attend IIT free of charge. Contact the Office of Undergraduate Admission or any of IIT's ROTC departments for scholarship/program information.

Shimer College

Shimer College, a small liberal arts college devoted principally to studying the Great Books, is located on the IIT-Chicago campus. The study of classic texts, in discussion classes of 12 students or fewer, offers a uniquely rigorous and stimulating four-year liberal arts education.

IIT students in good standing may take courses at Shimer College. Many Shimer College courses may be used as electives in IIT degree programs. Admission to Shimer College classes is on a space-available basis and students

may be asked to satisfy other requirements prior to acceptance into a Shimer College class. All students must be approved by both Shimer College and IIT to enroll in these classes. Please contact the Office of Undergraduate Academic Affairs (ugaa@iit.edu) for further information.

Shimer students who wish to take classes at IIT should contact the Office of Undergraduate Admission (see page 10).

VanderCook College of Music

Full-time IIT students in good standing may take courses offered at VanderCook College of Music. The following VanderCook courses: HIST 203, HIST 204, HUM 301, and FT 301, may be used as humanities electives in all IIT degree programs. A maximum of three semester hours of performance courses may be used as free electives. Please contact the Office of Undergraduate Academic Affairs for further information.

Admission to VanderCook courses is on a space-available basis and students may be asked to audition or to satisfy other requirements prior to acceptance into a VanderCook course. Approval of the IIT Bursar's office also is required since there is a fee for taking a course at VanderCook.



Course Descriptions

Course Descriptions

| | |
|---|-----|
| Art and Architectural History (AAH) | 179 |
| Anthropology (ANTH) | 179 |
| Architecture (ARCH) | 180 |
| Air Force Aerospace Studies (AS) | 188 |
| Architecture and Urbanism (AURB) | 188 |
| Biology (BIOL) | 188 |
| Biomedical Engineering (BME) | 191 |
| Business (BUS) | 194 |
| Civil, Architectural, and Environmental Engineering (CAE) | 198 |
| Chemical Engineering (CHE) | 203 |
| Chemistry (CHEM) | 205 |
| Communication (COM) | 208 |
| Computer Science (CS) | 209 |
| Electrical and Computer Engineering (ECE) | 213 |
| Economics (ECON) | 218 |
| Engineering Graphics (EG) | 218 |
| Engineering Management (EMGT) | 220 |
| Engineering (ENGR) | 220 |
| Environmental Engineering (ENVE) | 220 |
| Food Processing Engineering (FPE) | 221 |
| Food Safety and Technology (FST) | 222 |
| History (HIST) | 222 |
| Humanities (HUM) | 224 |
| Industrial Technology and Management (INTM) | 224 |
| Interprofessional Projects (IPRO) | 227 |
| Information Technology and Management (ITM) | 228 |
| Information Technology and Management: Development (ITMD) | 228 |
| Information Technology and Management: Management (ITMM) | 230 |
| Information Technology and Management: Operations (ITMO) | 230 |
| Information Technology and Management: Security (ITMS) | 231 |
| Information Technology and Management: Theory and Technology (ITMT) | 231 |
| Landscape Architecture (LA) | 232 |
| Literature (LIT) | 232 |
| Mathematics (MATH) | 234 |
| Military Science (MILS) | 237 |
| Mechanical, Materials, and Aerospace Engineering (MMAE) | 238 |
| Materials Science (MS) | 243 |
| Mathematics and Science Education (MSED) | 243 |
| Naval Science (NS) | 244 |
| Philosophy (PHIL) | 245 |
| Physics (PHYS) | 247 |
| Political Science (PS) | 251 |
| Psychology (PSYC) | 256 |
| Sociology (SOC) | 258 |

Alpha-Numeric Indicators

Numbers in Parentheses

The required number of lecture hours, laboratory hours, and credit hours are indicated at the end of each course description. For example, (3-0-3).

Course Identifiers

- (C) Identifies courses that fulfill the communications general educational requirements
- (D) CAE design courses
- (E) Ethics Content
- (H) Identifies courses that fulfill the humanities general educational requirements
- (N) Identifies courses that fulfill the natural science or engineering general educational requirements
- (P) ECE, CPE professional elective
- (S) Identifies courses that fulfill the social sciences general educational requirements
- (T) CS technical elective

Art and Architectural History

AAH 119

History of World Architecture I

Comprehensive background as well as concentration on individual cultures and their architects from ancient to medieval times. Discussion of architectures from around the world. Specific details and expressions of more generalized theories and strategies will be explored.

Prerequisite(s): Satisfaction of IIT's Basic Writing Proficiency Requirement
(3-0-3) (C)(H)

AAH 120

History of World Architecture II

Comprehensive background as well as concentration on individual cultures and their architects from the Renaissance to modern times. Discussion of architectures from around the world. Specific details and expressions of more generalized theories and strategies will be explored.

Prerequisite(s): Satisfaction of IIT's Basic Writing Proficiency Requirement
(3-0-3) (C)(H)

AAH 322

19th Century American Art & Culture

This course explores the artistic history of the United States, from an agrarian society that developed into an industrialized nation with a distinguished national art. This broad chronological survey begins with the colonial art of Copley, Peale, West and Stuart, followed by the nation building iconography of the Hudson River School. The art of Mount and Bingham reflect antebellum culture, followed by Johnson in post-Civil War America on the eve of the Gilded Age. Finally, the course examines the realism of Homer and Eakins, defining a truly American iconography.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(3-0-3) (C)(H)

AAH 323

20th Century American Art & Culture

This broadly chronological survey begins with Sargent and Cassatt in the context of European traditions. Impressionism comes to America through the art of Chase and Hassam, and other members of "The Ten". Early Modernism follows with Henri, Glackens and Sloan, leading artists of "The Eight" and the Ashcan painters, including Bellows. The major regionalists include Benton, Wood, and O'Keefe with Hopper emerging as the most significant artist of the century. With New York as the new center of Western art in post-war America, Pollock defines abstract Expressionism, followed by Warhol and Pop-Art.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(3-0-3) (C)(H)

AAH 380

Topics in Art & Architecture History

An investigation into a topic of current or enduring interest in Art and/or Architectural History which will be announced by the instructor when the course is scheduled.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(3-0-3) (C)(H)

AAH 491

Independent Reading & Research

For advanced students. Instructor permission required.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(Credit: Variable) (C)(H)

Anthropology

ANTH 200

Introduction to Anthropology

This course introduces students to the vast and exciting world of anthropology using a holistic, four-field approach to understanding human biological and cultural diversity. This includes a survey of cultural anthropology, linguistics, biological anthropology, and archaeology. We explore: (a) human evolution from the earliest primates to modern humans; (b) methods, theories, and approaches used by anthropologists; (c) archaeology, technology, and the rise of cities; (d) subsistence strategies; (e) marriage, kinship, and descent; and (f) the role of ethnicity in modern life.

(3-0-3) (C)(S)

ANTH 300

Anthropology of Technology

Studies technology from a cross-cultural perspective, using modern ethnographic and historical case studies. The course examines an assortment of technologies and end-products by looking at the social, economic, and ideological contexts in which they are embedded.

Prerequisite(s): [(ANTH 200) OR (PS 190-299) OR (SOC 190-299)]
(3-0-3) (C)(S)

ANTH 359

Humans, Ecology, & Environment

Examines the relationship between humans and nature, including reasons for some well-known ecological catastrophes in human history. The course traces changing attitudes to the environment and explores various measures that have been offered to solve problems, for instance, the Green Revolution, sustainable development, renewable energy, "clean" technologies, and the potential social and ecological consequences of these solutions. Same as SOC 359.

Prerequisite(s): [(ANTH 200) OR (PS 209) OR (PS 210) OR (PS 221) OR (SOC 190-299)]
(3-0-3) (S)

Course Descriptions

ANTH 380

Technology for Development

This course explores meaningful ways to use advanced technologies to support development from a social sciences perspective. Students will review the history and politics of development over the last century and learn about the economic and social contexts in which development work takes place and current applications of advanced technology for sustainable development. Students will also explore a variety of advanced technologies and their potential for new applications in the context of global development. This course requires an interest in understanding and evaluating information and communication technologies and how they are and could be employed around the world. Same as PS 380 and SOC 380.

Prerequisite(s): [(ANTH 200) OR (PS 190-299) OR (SOC 190-299)]
(3-0-3) (C)(S)

Architecture

ARCH 100

Introduction to Architecture

Orientation to contemporary local architecture practice in the context of the history of architectural theory; examination of the changing role of the architect through history; introduction to the formal language and vocabulary of the discipline. Emphasis given to developing written and presentations skills. Open only to Architecture majors.

(2-1-3) (C)

ARCH 109

Freehand Drawing I

Drawing from still life, human figure, and architecture, both out-of-doors and in the studio; drawing from life in various media. Open only to Architecture majors.

(0-4-2)

ARCH 110

Freehand Drawing II

Drawing from still life, human figure, and architecture, both out-of-doors and in the studio; drawing from life in various media. Open only to Architecture majors.

Prerequisite(s): [(ARCH 109)]

(0-4-2)

ARCH 113

Architecture Studio I

Studio exercises to develop excellence in craftsmanship and visual sensitivity as a foundation for a basic architectural language. Problems of various lengths will deal with the technical skills of drawing and model-making materials and in both two and three dimensions. Using problems of both an abstract and an architectural character, this course will build verbal communication skills and model shop ability. Open only to Architecture majors.

(0-12-6) (C)

ARCH 114

Architecture Studio II

Studio exercises to develop excellence in craftsmanship and visual sensitivity as a foundation for a basic architectural language. Problems of various lengths will deal with the technical skills of drawing and model-making materials and in both two and three dimensions. Using problems of both an abstract and an architectural character, this course will build verbal communication skills and model shop ability. Open only to Architecture majors.

Prerequisite(s): [(ARCH 113)]

(0-12-6) (C)

ARCH 125

Introduction to Architectural Computing

The class introduces concept development, design thinking and problem solving related to architectural representation and production technique (digital and analog). The class will look critically at recent digital design developments, as well as introduce students to the history of each “type” of computer program; and the class will introduce students to the basic skills required to productively work with a variety of practice-based software programs. The class will also introduce 3D “craft-based” thinking/working.

(1-2-3)

ARCH 201

Architecture III: Structures, Building Systems, & Assemblies

The development of architectural principles through the study and analysis of building materials. Development of the graphic language in architecture. Consideration of the appropriate use of materials, energy, and clear construction as the basis of architecture. Open only to Architecture majors.

Prerequisite(s): [(ARCH 113 and ARCH 114)]

(0-10-5)

ARCH 202

Architecture IV: Structures, Building Systems, & Assemblies

The development of architectural principles through the study and analysis of building materials. Development of the graphic language in architecture. Consideration of the appropriate use of materials, energy, and clear construction as the basis of architecture. Open only to Architecture majors.

Prerequisite(s): [(ARCH 113, ARCH 114, and ARCH 201)]

(0-12-6)

ARCH 226

Architectural Computing

Review of drafting, modeling and rendering computer hardware and software used in the practice of architecture design. Design and management issues are explored with the extensive use of PC CAD systems, including AutoCAD. Contemporary practice applications are discussed.

Prerequisite(s): [(ARCH 125)]

(2-2-3)

ARCH 230

Structure & Architecture

The theory and concepts of structures are presented with a visual format and models to emphasize an intuitive comprehension of the fundamental principles of structural behavior including loading, shear and bending moments. Architectural examples of integrated structures then become format to introduce an understanding of materials and the design process to quantify the engineering. Masonry load-bearing walls and the arch are used as the initial examples to correlate intuition and engineering calculations.

Prerequisite(s): [(PHYS 123) OR (PHYS 200) OR (PHYS 211 and PHYS 212)]

(3-0-3) (N)

ARCH 305

Architecture V

Continued development of architectural principles of ARCH 201 and 202 through the correlation of design process and building systems. Consideration of the interrelation of building, programming, site planning, structure, enclosure systems, energy consumption, and environmental control systems, and the cultural concepts supporting their organization. Open only to Architecture majors.

Prerequisite(s): [(ARCH 201, ARCH 202, and ARCH 230)]

(0-12-6)

ARCH 306

Architecture VI

Continued development of architectural principles of ARCH 201 and 202 through the correlation of design process and building systems. Consideration of the interrelation of building, programming, site planning, structure, enclosure systems, energy consumption, and environmental control systems, and the cultural concepts supporting their organization. Open only to Architecture majors.

Prerequisite(s): [(ARCH 201, ARCH 202, ARCH 230, and ARCH 305)]
(0-12-6)

ARCH 321

Contemporary Architecture

This course investigates the state of contemporary architecture as represented by significant practices, buildings, theories, and criticisms. Themes to be considered include globalization, the role of digital design media, the ethics and aesthetics of sustainability, contemporary urbanism, new approaches to materials and structure, and recent interests in ornament and pattern-making. Current conditions will be related historically to postwar reactions to modernism and contextually to the social and technological shifts of recent decades.

Prerequisite(s): [(AAH 119 and AAH 120)]
(3-0-3) (C)

ARCH 331

Visual Training I

Aesthetic expression as experience. Exercises in the study of form: proportion and rhythm, texture and color, mass and space. Exercises in visual perception and aesthetic judgment. Isolation and analysis; interdependence and integration of sensuous qualities. Aesthetic unity under restrictive conditions.

(3-0-3)

ARCH 332

Visual Training II

Aesthetic expression as experience. Exercises in the study of form: proportion and rhythm, texture and color, mass and space. Exercises in visual perception and aesthetic judgment. Isolation and analysis; interdependence and integration of sensuous qualities. Aesthetic unity under restrictive conditions.

Prerequisite(s): [(ARCH 331)]
(3-0-3)

ARCH 333

Visual Training III

Spatial studies with planes and volumes of various materials. Aesthetic expression as experience. Exercises in the study of form: proportion and rhythm, texture and color, mass and space. Exercises in visual perception and aesthetic judgment. Isolation and analysis; interdependence and integration of sensuous qualities. Aesthetic unity under restrictive conditions.

Prerequisite(s): [(ARCH 331 and ARCH 332)]
(3-0-3)

ARCH 334

Frame Structural Systems & Steel

Based on a statics and strength of materials, analysis of tension, compression and bending, timber and steel members are designed into truss or column and beam structural systems. Connections and shear walls are studied as the transfer of moments to resolve dynamic loads in multiple frames. This engineering knowledge is then directly integrated into the parallel studio experience of developing an architectural project that focuses on steel as the structural material.

Prerequisite(s): [(ARCH 230 and PHYS 200)]
(3-0-3) (N)

ARCH 335

Reinforced Concrete & Continuous Structure

The plastic qualities of reinforced concrete are studied as an internal distribution of forces based on the continuity of the material. These same principles also apply to all dome, cable and membrane structures. Complete structural systems of concrete are developed with footings, columns, shear walls, and horizontal plate options. More advanced applications include tension systems and thin shell construction. These engineering experiences are then integrated into the practice of designing an architectural studio project based on reinforced concrete as the structural material.

Prerequisite(s): [(ARCH 230, ARCH 334, and PHYS 200)]
(3-0-3) (N)

ARCH 403

Mechanical & Electrical Building Systems for Architects I

Selection and design of building support systems: heating, ventilating, air conditioning, water supply, sanitary and storm drainage, power distribution, lighting, communications and vertical transportation. Systems are analyzed for their effect on building form, construction cost and operating efficiency. Open only to Architecture majors.

Prerequisite(s): [(ARCH 201 and ARCH 202)]
(3-0-3)

ARCH 404

Mechanical & Electrical Building Systems for Architects II

Selection and design of building support systems: heating, ventilating, air conditioning, water supply, sanitary and storm drainage, power distribution, lighting, communications, and vertical transportation. Systems are analyzed for their effect on building form, construction cost and operating efficiency. Open only to Architecture majors.

Prerequisite(s): [(ARCH 403)]
(3-0-3)

ARCH 408

Freehand Drawing

A multi-purpose drawing course offering students a chance to develop on-site sketching skills and creative expression in drawing through a combination of sketching field trips and in-class drawing assignments. Open only to Architecture majors.

(0-3-3)

ARCH 409

Advanced Freehand Drawing

Advanced development of freehand drawing skills in various mediums; still life, human figure, the natural and built environment, studio and field settings. Open only to Architecture majors.

Prerequisite(s): [(ARCH 408)]
(0-3-3)

ARCH 410

Architectural Freehand Rendering

The course explores freehand sketching, perspective drawing, and the art of analytical drawing as a means of conveying architectural spatial ideas. Architects must have competence in expressing thought through hand sketching using both fundamental and complex techniques to get an idea across to the viewer. The most successful architectural drawings express the pure concept of space and have a clear complexity of thought. This course teaches several freehand drawing techniques and media including pencil, pen, pastel, and watercolor media utilizing group and individual instruction. Requirements include a journal sketchbook, field sketches, and finished renderings. Drawing excursions in Chicago and surrounding areas. Open only to Architecture majors.

Prerequisite(s): [(ARCH 109 and ARCH 110)]
(2-2-3)

Course Descriptions

ARCH 413

Architectural Practice

Lectures and practical problems dealing with specifications, specification writing, administration of construction, contracts, building law and professional practice.

(3-0-3) (C)

ARCH 414

Professional Practice: Building Case Studies

Case study analysis of buildings, including the design process, building detailing, construction methods, government regulation, owner satisfaction, and post-construction forensics.

(3-0-3) (C)

ARCH 417

Architecture VII

Structure as an architectural factor; space as an architectural problem; proportion as a means of architectural expression; the expressive value of materials; painting and sculpture in their relationship to architecture. Application of principles in comprehensive projects involving program, site, and code analysis. Open only to Architecture majors.

Prerequisite(s): [(ARCH 230, ARCH 334, ARCH 335, ARCH 403, and ARCH 404)]

(0-12-6)

ARCH 418

Architecture VIII

Structure as an architectural factor; space as an architectural problem; proportion as a means of architectural expression; the expressive value of materials; painting and sculpture in their relationship to architecture. Application of principles in comprehensive projects involving program, site, and code analysis. Open only to Architecture majors.

Prerequisite(s): [(ARCH 230, ARCH 334, ARCH 335, ARCH 403, and ARCH 404)]

(0-12-6)

ARCH 419

Architecture IX

These studios represent the most extended and developed exercises in macro planning issues. First priority is given to the urgent needs of our environment such as housing, schools, or community buildings for urban centers; projects reinforce the entire curriculum, emphasizing complex relationships of buildings in an urban landscape taking all factors into consideration. Students increase their ability to make value judgments, and learn to critically review, test, and improve conventional concepts of architecture relative to current demands placed upon the profession. These studios also offer students a variety of possible specialization topics. Open only to Architecture majors.

Prerequisite(s): [(ARCH 230, ARCH 334, ARCH 335, ARCH 403, and ARCH 404)]

(0-12-6)

ARCH 420

Architecture X

These studios represent the most extended and developed exercises in macro planning issues. First priority is given to the urgent needs of our environment such as housing, schools, or community buildings for urban centers; projects reinforce the entire curriculum, emphasizing complex relationships of buildings in an urban landscape taking all factors into consideration. Students increase their ability to make value judgments, and learn to critically review, test and improve conventional concepts of architecture relative to current demands placed upon the profession. These studios also offer students a variety of possible specialization topics. Open only to Architecture majors.

Prerequisite(s): [(ARCH 230, ARCH 334, ARCH 335, ARCH 403, and ARCH 404)]

(0-12-6)

ARCH 421

Energy Conscious Design I

The application of energy conservation methods and renewable energy sources, such as wind power and passive solar systems, will be examined in the development of building energy budgets for a variety of building types.

(3-0-3)

ARCH 422

Energy Conscious Design II

The application of energy conservation methods and renewable energy sources, such as wind power and passive solar systems, will be examined in the development of building energy budgets for a variety of building types.

Prerequisite(s): [(ARCH 421)]

(3-0-3)

ARCH 423

Architectural Programming

Study of the principles of problem definition, problem solving, and decision making in the process of design. Specific research methods are reviewed, including those with computer-aided data collection potential. Coursework includes: identification of client/project requirements and constraints; development of a building/project program; cost analysis; development of relevant design options; and presentation skills and development.

(3-0-3) (C)

ARCH 424

Architectural Construction Management

A survey of the techniques and procedures of construction management as it relates to architectural practice. The organization of the building team, the collaborative design process, cost control, project scheduling, purchasing, accounting, and field supervision are described and documented.

(3-0-3)

ARCH 427

Advanced Architectural Computing

A review of 3-D modeling concepts, computer-aided rendering concepts, and methods in the development of architectural design. Extensive use of PC CAD software is expected.

Prerequisite(s): [(ARCH 125 and ARCH 226)]

(3-0-3)

ARCH 428

3D Animation in CAD Presentations

Review 3-D modeling concepts for animation, preparing camera movements, lighting conditions, special effects, and the digital editing of animation sequences. Extensive use of PC animation and editing software.

Prerequisite(s): [(ARCH 427)]

(1-3-3)

ARCH 429

Digital Form Generation

Introduction to the development of algorithmic design methods, a basis for computational thinking. Review programming in CAD systems, programming basics in AutoCAD, extensive creation of 2D and 3D architectural forms, wall patterns, CAD data interrogation, manipulation, and extraction. Introduction to 2D and 3D parametric and rule-based design. Investigation of form creation based on a variety of mathematical relationships including random generation and form generation based on collected data values including images. Also included is a review of CAD database procedures for space planning and bill of quantities. Includes methods for creating models for the purpose of fabrication including CNC and rapid prototyping.

Prerequisite(s): [(ARCH 125, ARCH 226, and ARCH 427) OR (ARCH 428)]

(2-2-3)

ARCH 430

Web Technology

Study of the relationship between the built environment and networked technologies. Students will learn principles of designing for networked digital space, ways of augmenting physical space through digital technologies, and how networks and web based communication have transformed the practice of architecture and our daily lives.

Prerequisite(s): [(ARCH 427)]

(3-0-3)

ARCH 431

Visual Training I

This elective comprises several topics. They include traditional media, e.g. sculpture, collage or free-hand drawing, digital prototyping, exhibition design, digital media production, architectural lighting, interior design, etc. The course provides students the opportunity to pursue individual paths in order to synthesize skills acquired in the previous visual training segments of the curriculum.

Prerequisite(s): [(ARCH 506 with min. grade of C and ARCH 507 with min. grade of C)]

(1-2-3)

ARCH 432

Visual Training II

This elective comprises several topics. They include traditional media, e.g. sculpture, collage or free-hand drawing, digital prototyping, exhibition design, digital media production, architectural lighting, interior design, etc. The course provides students the opportunity to pursue individual paths in order to synthesize skills acquired in the previous visual training segments of the curriculum.

Prerequisite(s): [(ARCH 506 with min. grade of C and ARCH 507 with min. grade of C)]

(1-2-3)

ARCH 433

Introduction to Digital Fabrication

This course offers a comprehensive exploration of computer-aided fabrication from concept development and modeling through digital file creation and cutting processes. Using CAD/CAM software, laser cutters, CNC mills, and 3D printers, students with a variety of interests can build the elements of detailed models, fabricate a range of finished objects, or even create landscapes incorporating highly articulated surfaces. The course stresses the integration of the complete thought process from concept development to pre-visualization to detailed modeling to fabrication setup and finishing. Students gain a solid understanding of the rapidly developing world of CAD/CAM techniques while acquiring specific long-term skills in software-based modeling and machine-assisted fabrication.

Prerequisite(s): [(ARCH 427) OR (ARCH 508)]

(1-1-3)

ARCH 434

Advanced Building Information Modeling Strategies

This course is an in-depth exploration of how building information modeling tools are being utilized in the architectural profession with an emphasis on Autodesk Revit. Advanced BIM modeling tools and strategies will be investigated alongside explorations into interoperability between tools.

Prerequisite(s): [(ARCH 427) OR (ARCH 508)]

(0-3-3)

ARCH 435

Digital Fabrication

This course explores the design and fabrication of components in contemporary practice. The class will investigate through the design and prototyping of a custom component. Survey of CAD/CAM/GIS use in practice and component manufacturing including modeling, simulation, and scripting. Behavioral models of components using simulation and analysis tools (flow, system dynamics, etc.). Use of CAD tools to model components for production (modeling for CNC considering toolpaths and jigs). Use of CAD tools to analyze properties of components. Material properties and related fabrication constraints. Current fabrication processes. Use of IIT-owned CNC tools to fabricate components. Rapid prototyping.

Prerequisite(s): [(ARCH 427) OR (ARCH 467)]

(1-2-3)

ARCH 436

Advanced Modeling

This course will focus on 3D modeling of complex geometric components in architecture and design. Concepts explored will concentrate on the advancement of digital design as an iterative process. Various modeling types covered are (1) Explicit Modeling, (2) Nurbs Surface Modeling, (3) Parametric Modeling, and (4) Generative Components and Response Modeling. Output will utilize digital fabrication methods as support of the iterative design process.

Prerequisite(s): [(ARCH 427) OR (ARCH 508)]

(0-3-3)

ARCH 438

Design Visualization

This course is an in-depth exploration of new visualization techniques to support and express architectural design through 3D rendering. Topics covered will include 3D modeling, cameras, lighting, material mapping, and rendering output. Presentation concepts covered include storytelling, rendering style, visual mood, and image composition.

Prerequisite(s): [(ARCH 226) OR (ARCH 508)]

(1-3-3)

ARCH 445

Prairie School & Naturalistic Landscape Design

This significant Midwestern style of landscape and architectural design provided the beginnings of ecology and continues to influence landscape design today. The course specifically addresses the work of designers such as Jens Jensen, O.C. Simonds, and Frank Lloyd Wright, and features IIT's Alfred Caldwell. Students receive an introduction to the types of plants used by these designers and the connections between landscape and architecture will be explored.

(3-0-3)

ARCH 446

History of Landscape Architecture

Survey of the history of landscape design throughout the world, including contemporary projects. The course emphasizes both analytical and holistic approaches to the study of historic designs, highlights the relationship between architecture and landscape, and stresses major concepts that directly influence present day designs. One field trip.

(3-0-3)

Course Descriptions

ARCH 447

Architecture & Furniture

Individually or in small groups, students will design and fabricate furniture as part of a collectively developed master plan. Students explore historic and contemporary furniture design, theory, materials, and fabrication techniques. Lectures and discussions will focus on the relationship between architecture and furniture in its 500-year history, the design process, fabrication technologies and techniques, drawing and modeling as a means of exploration, representation, presentation, and fabrication. Labs will allow students the opportunity to experience in a semester the traditional sequence of master plan, schematic design, design development, construction drawings, fabrication, and use.

(1-2-3)

ARCH 454

Contemporary Chicago Architecture: Case Studies

Contemporary architecture and urban design projects in Chicago present an invaluable opportunity to learn about some of the most advanced applications in practice today. By examining significant projects currently underway, this course will investigate project execution, design concepts and the various forces affecting projects' definition and results. Close scrutiny of all the components and personnel will give a better understanding of the complex synergies, advanced technologies, and adept project teams necessary for successful innovative architecture and urban planning.

(3-0-3)

ARCH 456

Topics in Modernism

Historical and critical study of a significant topic in architecture and urban design tied to important building types, architects, architectural movements, historical periods, or theoretical trends of lasting significance in the twentieth century. Conducted as a seminar, this course analyzes texts, writings, and buildings as students prepare research papers, presentations, and other projects. Recent courses have examined modernism in post-World War II Europe and the United States and the history of the skyscraper from the Chicago school to the present.

(3-0-3) (C)

ARCH 457

Architecture & Culture: Challenging the Global Vernacular

This course investigates the link between architecture and the cultural, climatic, political, and socio-economic environment in which it is created. Taking a different cultural case study each week, it looks at the framework in which architecture is created and examines threads between traditional vernacular and modern forms of architecture. The course will embrace external influencing factors (global) as well as internal (local). As the building typology that has had perhaps the most influence on homogenizing global culture, the course studies tall buildings in their urban fabric. Ultimately, the course is concerned with the debate on Regionalist versus Globalist approaches to architecture. Students will develop critical writing and reading skills, research techniques, and effective argumentation. Open only to Architecture majors.

(3-0-3)

ARCH 460

Integrated Building Delivery Practice/BIM

Architecture has always been a complex interdisciplinary business, where the management of allied professions and industry affiliates is critical to the success of any endeavor of significant scale. The introduction of BIM (Building Information Modeling) is an advance in project delivery tools which should be viewed as a multi-dimensional expansion of the mechanisms of management and accommodation of an ever-broadening range of participants in the organization of a project, allowing the development of a new delivery protocol, IBPD (Integrated Building Project Delivery). BIM is currently recognized as consolidating the basis for a range of functions including drawing, modeling, document management, clash detection, interdisciplinary coordination, estimating, scheduling, constructability review, production modularization, fabrication protocols, and for the analysis of myriad physical and prescriptive demands such as energy consumption, daylighting, code compliance, egress, circulation, and operation scenarios. The breadth of information embedded in a BIM model will require the emergence of facilitating professionals to an extent previously unknown in the practice and the industry. This course explores the state of the profession and the anticipated ramifications. Undergraduate students must be in their fifth year of study. Only for 5th year Architecture majors.

(3-0-3)

ARCH 461

Entrepreneurship & Innovation in Architecture

The course teaches future architects the practical aspects of entrepreneurial small business management, to develop a comprehensive opportunity assessment, and to develop the skills necessary to improve the odds of success. The course will consider strategies to leverage limited resources for maximum effect. The course will also cover small organization and group behavior, performance, leadership, and motivation in small business settings and will focus on the owner/manager as the principal success factor in the context of a small organization. Emphasis is placed on the circumstances and opportunities of the professional practice of architecture: practice as profession, process, organization, business, and evolving models of practice are covered. The course also provides a series of concepts, frameworks, and heuristics that enable the entrepreneur to anticipate and deal with the challenges that accompany growth of an existing business. Cases, exercises, lectures, and speakers are used to focus on choosing opportunities, allocating resources, motivating employees, and maintaining control while not stifling innovation. A key component of the course is how to sustain entrepreneurial thinking in mid-sized ventures as they continue to grow. Undergraduate students must be in their fifth year of study. Only for 5th year Architecture majors.

(3-0-3)

ARCH 462

Planning Law & Land Policy

Since the introduction of basic zoning laws to the numbers and complexity of ordinances attached to any land parcel have proliferated to include those addressing land use, development, density, environmental concerns both on and off site, aesthetic mandates, energy use, quality of life concerns, and infrastructure development, the growing understanding that comprehensive and integrated systems must be managed across property lines to effect sustainable planning and communities will accelerate the number of prescriptive and policy ordinances enforced at the development of a parcel. Many agencies have further created extra-legal linkages between approvals for land development and the provision of social and ideological benefits to the community. The impact on the profession of architecture of the panoply of planning options and governmental goals is the result that the navigation of the system of mandated design determinates is one of the initial and potentially most creative acts in the process of project delivery. Project designers must understand the ramifications and trade-offs inherent in the system, especially in any attempt to achieve the best use of any parcel of land and position the most appropriate built environment. Undergraduate students must be in their fifth year of study. Only for 5th year Architecture majors.

(3-0-3)

ARCH 463

Introduction to Real Estate Finance Fundamentals

The Art of the Deal, with the emphasis on Art, is a term best positioning the financial structuring behind any project. The ability of the project team leader in integrated practice to understand and appreciate the motivations and opportunities inherent in the initiation of the project will be essential in guiding team decisions and maintaining a leadership position. The understanding of the financial underpinnings of a project is of paramount importance to those intending to actually engage the process of initiating and effecting a construction activity. The sources, costs, and sequence of funding, budgeting, cash flow, incentives options, and tax ramifications regarding a project are to be addressed as component knowledge to an understanding of integrated project management. Undergraduate students must be in their fifth year of study. Only for 5th year Architecture majors.

(3-0-3)

ARCH 464

Comprehensive Opportunity Assessment & Entrepreneurship Development Project/Practicum

Two options are available to the student for the acquisition and assimilation of the breadth of knowledge required to bring project ideas to fruition. The Comprehensive Development Project is a capstone effort which will demonstrate project concept, planning resolution, land acquisition strategies, estimating, scheduling, financial pro-forma, and value capture intents. The Practicum would entail employment at a vetted office engaged in the actual process of project assembly. A position requiring a minimum of 20 hours per week, prior review and approval of the work plan, and submittal of documentation of the work undertaken would be required for this scenario. The ultimate objective is to provide a roadmap of the interaction between the architect-entrepreneur, market opportunities, and integrated building delivery practices which facilitate the development of student skills necessary to compete in a rapidly changing socio-economic environment. This course is designed to help students learn and use tools and frameworks to create, implement, and update a strategic plan to shape the future and guide an entrepreneurial organization on its path to success. This course will entail collaboration with real world organizations including city agencies, community development corporations, IIT Department of Community Affairs, or private developers. Undergraduate students must be in their fifth year of study. Only for 5th year Architecture majors.

(6-0-6)

ARCH 465

Construction & Project Management

The organization of deliverables from the multiple participants in a project plan, including estimating, quality control, value engineering, scheduling of work, conflict resolution, pay schedules, and project close-out and commissioning are essential to managing a building project. Many of these areas of endeavor are those most directly impacted by the developments addressed in Integrated Building Delivery Practice. This course will solidify the underpinnings and will amplify, where needed, the requisite understanding in these areas of the practice. The development of managerial skills requisite to the practice of this coordination and the basis of developing inter-professional relationships will be stressed throughout the incorporation of the technical methodologies.

(3-0-3)

ARCH 466

Entrepreneurial Design: Sector Studies/Case Studies

This course will be advanced as an independent study format. Each student will work independently to research a project option, or building type, and document the particular attributes of that case study which require specialized address. Case studies might be a particular business niche such as land sub-divisions, condo conversions, change of use conversions, or build-to-suit options. The studies might pursue particular building types, social initiatives, historic restoration strategies, or even unique construction typologies. Undergraduate students must be in their fifth year of study. Only for 5th year Architecture majors.

(3-0-3)

ARCH 467

Advanced Materials Workshop

This course is designed to involve students with the architectural craft of materials that can be applied to model and prototype construction. Included will be a product project of the student's own choosing.

(1-4-3)

Course Descriptions

ARCH 468

Drawing From Travel

A drawing course that develops the perceptual and technical skills critical to drawing in the field. Particular emphasis will be placed on the freehand travel sketch and its capacity to evoke both the physicality and character of a place. Production of a comprehensive drawn record of travels in the form of a journal/sketchbook is required. Various media will be explored. Requisite: European Study Program or Paris Program
(0-6-3)

ARCH 469

Urban Design in Europe

This seminar course will explore current notions of urbanity as observed in the built environment of some cities in Europe. Projects and discussions will complement the design work undertaken in the architecture design studio. Assignments will focus on documentation and analysis of the various daily patterns and rituals of habitation. Requisite: European Study Program or Paris Program
(3-0-3)

ARCH 470

Image City: Mediation of Space

This seminar surveys the interaction between media and the city from the 19th century to the present. A history of the technological innovations of the last two hundred years turns out to be, in large part, a history of the development of the contemporary city, and no account of contemporary urban issues can be considered complete without taking into account the role played in our lives by the media. Accordingly, every space we encounter or create has to be considered mediated.
(3-0-3)

ARCH 471

Architectural Freehand Rendering

Utilizing site visits, lectures, presentations, and critiques, students will learn freehand sketching, perspective, and conceptual sketching to convey building spatial ideas. Conceptual and schematic analysis of site visits will teach students to represent existing spaces, environments, and buildings as well as various building materials. Students will rely on four media to quicken their drawing skills and visual analysis – pencil, ink, pastel, and water color. Open only to Architecture majors.

Prerequisite(s): [(ARCH 109)] AND [(ARCH 110)]
(3-0-3)

ARCH 473

Conflict & Time

This seminar employs comparative studies of other arts, in particular cinema, to illuminate architectural esthetics and the creative process.
(3-0-3)

ARCH 474

Production/Design

This seminar examines aspects of design in motion pictures. The premise underlying the course is that the act of perception constitutes an act of design; we produce and design the world we perceive. This becomes particularly evident through analysis of the artificially constructed, illusory reality of films.
(3-0-3)

ARCH 475

Spatial Stories

This course will examine the spatial story as it appears in diverse media: short fiction, films, everyday discourse, the media architecture, etc. The course work will consist of reading and writing assignments, as well as the viewing of films and other visual artifacts. The course has two goals: to offer students the opportunity to improve their study and communication skills and to examine the social, cultural and historical aspects of spatial practices such as architecture.
(3-0-3) (C)

ARCH 476

Developed Surface

This course looks at models as operational and instrumental tools that assist an architect to control both the material and the meaningful. Acting as an advanced seminar and workshop, course sessions will juxtapose speculative model making with seminar discussion. Student work will be reviewed in direct relation to readings and short lectures on historical and theoretical precedents in art, architecture, and urban design. Field research will support speculative mapping and modeling systems. A project to support the studio will reconcile a conceptual interest with a technical one. (Paris Program)
(3-0-3)

ARCH 477

Building as Model

This course examines moments of paradigmatic change from the late 19th to the early 20th century in European architecture, urban planning, and urban design. Beginning with Violet-le-Duc and ending with the first iterations of OMA, the course prioritizes “building” as an act rather than as an object. The class examines moments when technical and social change reshaped dependent, but sometimes academically opposed, realms of design practice. The first realm considers architecture’s relationship with power within the socio-political context. The second aspect considers architecture as a discipline of control as students examine how ideas of architectural practice were strongly connected to the story of industrial production. (Paris Program)
(3-0-3)

ARCH 480

Materials & Construction

This course provides an overview of basic building materials and assemblies, how they are constructed, and the relationships between them. The objective is to introduce students to the range of material choices available to the designer, new materials and assemblies, and fundamental principles to guide design decisions. The course is organized according to the MasterFormat outline developed by the Construction Specifications Institute. Students will learn standards for writing specifications using a system of numbered categories to organize construction activities, products, and requirements into a standard order. Topics include pre-design issues, sites and foundations, concrete, masonry, metals, wood, plastics, thermal and moisture protection, glass, roofing systems, and conveying equipment. Open only to Architecture majors.
(3-0-3)

ARCH 481

Materiality in Architecture

This history/theory course examines the topic of materiality in contemporary architecture and explores the different approaches, ideas, and philosophies associated with aspects of materiality in architecture through investigation and discussion of case study projects by contemporary architects. Students are introduced to a variety of approaches to the topic since the dawn of the Modern Movement, and they explore how different contemporary architects approach the ideas of materiality in their work through their words, thoughts, and built work. Thematic topics related to materiality are also discussed, including landscape, technology, and memory. Open only to Architecture majors.

(3-0-3)

ARCH 485

Structures I: Concepts

Examination of the basic and vast range of structural concepts and solutions, in an illustrated and summary format. Examples include historic as well as contemporary structures. Statics and strength of materials, beam theory, shear and bending moment diagrams, deflection analysis. Overview of systems choices in architectural applications. History of strength of materials.

(3-0-3)

ARCH 486

Structures II: Design of Wood & Steel

Analysis, design and detailing of tectonic systems (steel and wood). Design of compression, tension and flexural members. Design of timber beams and columns. Design of steel beams and columns. The behavior of structures under static and dynamic loads. Analysis, design and detailing of concrete and masonry systems. Theory of reinforced concrete applied to beams and slabs.

Prerequisite(s): [(ARCH 485)]

(3-0-3)

ARCH 487

Eco Structures

Research seminar giving focus to new technologies, especially complex structures: biotechnic, pneumatic, ultra-tall, composite structures, etc. Students conduct research using literature, data sources, and ideas to prepare imaginative small project interdisciplinary approach to solving problems in the built environment.

(3-0-3)

ARCH 488

Long-Span & Special Structures

Introduction of structural systems for long spans and special structures. The structural behavior will be discussed and the required strength and stiffness will be evaluated. Individual projects will be assigned to students to be presented at the end of the course.

(3-0-3)

ARCH 489

Structural Systems for Tall Buildings & Long-Span Structures

This course reviews the historical development of the interaction of the structure with architecture and explores future trends and directions. The suitability of different materials and systems will be studied, with emphasis placed on efficiency.

(3-0-3)

ARCH 491

Special Problems

Independent study of projects and problems. Students must be advised and have consent of the instructor and approval of the dean.

(Credit: Variable)

ARCH 495

Technology as Design

Since the development of cast iron as a viable construction material in the mid-1800s, one path of architecture has explored the open-ended possibilities of technology. Integrated within the culture, this determination to use the technology of one's time as the creative generator of a new evolving architecture becomes the historical precedent of the thesis of this course.

(3-0-3)

ARCH 497

Special Projects

Independent study of projects and problems. Students must be advised and have consent of the instructor and approval of the dean.

(Credit: Variable)

Additional Undergraduate and Graduate Courses

Graduate courses are available under limited conditions to degree-seeking undergraduate students with the approval of the course instructor. In general, and only when maximum enrollment has not been met, undergraduates must have completed relevant advanced-level undergraduate courses in the subject. Students should notify their academic advisor when they have completed a graduate course to ensure the course is recognized as an architecture elective. See the current *IIT Bulletin: Graduate Programs* for full descriptions.

ARCH 500

History of Architectural Ideas I

ARCH 501

History of Architectural Ideas II

ARCH 502

Advanced Topics in History and Theory I

ARCH 503

Advanced Topics in History and Theory II

ARCH 509

Topics in Advanced Technology

ARCH 553

High-Rise Building Technology I

ARCH 554

High-Rise Building Technology II

LA 443

Forests, Preserves, Parks, and Urbanscapes

LA 501

Nature of Ecology

LA 502

Landscape Architectural History: From Antiquity to Olmsted

LA 503

Advanced Contemporary Theory: Case Studies

LA 515

Firms, Parks, Developers

LA 516

Historic Landscape Preservation

LA 545

Studio V: Advanced Landscape Design Investigations

LA 546

Studio VI: Advanced Landscape Design Investigations

Course Descriptions

LA 565

Ecology and Materials Workshop I: Plants and Planting

LA 566

Ecology and Materials Workshop II: Earthworks and Infrastructures

LA 567

Ecology and Materials Workshop III: Horticulture and Design

LA 568

Ecology and Materials Workshop IV: Manufacturing the Urban Environment

Air Force Aerospace Studies

Leadership laboratory is required when enrolling in any Air Force Aerospace Studies course.

AS 101

The Foundations of the USAF I

Introduction to the U.S. Air Force and Air Force ROTC. This course will focus on officership and professionalism, military customs and courtesies, health and physical fitness, and drill and ceremonies. Leadership Laboratory will continue to emphasize the application of customs and courtesies, health and physical fitness, and drill and ceremonies.

(1-2-1) (C)

AS 102

The Foundations of the USAF II

Introduction to history and organization of the U.S. Air Force. The origin of the Air Force will be described, and the current command structure will be reviewed. Leadership Laboratory continued.

(1-2-1) (C)

AS 201

The Evolution of USAF Air & Space Power I

Examines general aspects of air and space power through a historical perspective. Historical examples are provided to show the development of Air Force capabilities and missions from early flight through the Korean War. Leadership Laboratory continued.

(1-2-1) (C)

AS 202

The Evolution of USAF Air & Space Power II

Continuing study of topics covered in AS 201. Covers the period from the Vietnam War through today. Leadership Laboratory continued.

(1-2-1) (C)

AS 301

Air Force Leadership Studies I

Study of leadership authority, principles and accountability, management fundamentals, oral and written presentation and counseling skills required of an Air Force junior officer. Leadership Laboratory complements this course by providing leadership experience in officer-type activities.

(3-2-3) (C)

AS 302

Air Force Leadership Studies II

Study of professional knowledge, motivation, empowerment, mentoring, delegation, Air Force personnel and evaluation systems, leadership ethics, and oral and written presentation skills required of an Air Force junior officer. Continuation of Leadership Laboratory.

(3-2-3) (C)

AS 401

National Security Affairs

This course is designed for college seniors, it gives them the foundation to understand their role as military officers in American society. The course closely examines the national security process, regional studies, Air Force doctrine, and current issues affecting the military profession. Emphasis is also given on refining oral and written communication skills. Continuation of Leadership Laboratory.

(3-2-3) (C)

AS 402

Preparation for Active Duty

Designed for college seniors, it gives them the foundation to understand their role as military officers in American society. This course builds upon the subject matter previously covered in AS 401 and also further examines regional studies, advanced leadership, ethics, military justice, the military as a profession, and officership. Preparation for active duty life is one of the core elements of this course, and students will learn the role of an Air Force commander in addition to different services and programs available on a military installation. Emphasis is also given on refining oral and written communication skills. Continuation of Leadership Laboratory.

(3-2-3) (C)

Architecture and Urbanism

AURB 201

The Elements of Urbanism

The fundamental components, structures, systems, and networks of cities. Historical and contemporary examples of urban realms along with context of Chicago are examined to develop a working knowledge of the physical and systemic components of cities.

(3-0-3)

AURB 465

Principles of Urbanism

Advanced study of infrastructure, networks, and systemic character that define the urban realm including an examination of ecologic, economic, social, and compositional frameworks. Historical and current discourse of urban conditions and planning.

Prerequisite(s): [(AURB 201)]

(3-0-3)

Biology

BIOL 100

Introduction to the Profession

Introduction to the biological sciences, scientific method, computing tools, and critical thinking.

(2-0-2) (C)

BIOL 105**Introduction to Biology**

This course, designed for non-majors, considers basic concepts and selected topics in biology beginning at the molecular level and ending with the biosphere. Topics include the following: the chemistry and structure of cells in plants and animals; how cells obtain and use energy; basic genetics and the role of biotechnology in agriculture and medicine; evolution, natural selection, and species formation; the origin and diversity of microbial, plant, and animal life; ecology, organisms, and their environments; and the impact of human population growth and human activity on the systems and resources of our planet.

This course is not available to those students for whom BIOL 107 is a required course, including students majoring in Biology, Biochemistry, Chemical and Biological Engineering, Molecular Biochemistry and Biophysics, or any pre-health professional major or minor. BIOL 105 and BIOL 114 constitute a one-year sequence in biology. Acceptable as part of the science component of the General Education Program. Course does not satisfy graduation requirements for Biology, Biochemistry, Chemical and Biological Engineering, Molecular Biochemistry and Biophysics majors.

(3-0-3) (N)

BIOL 107**General Biology Lectures**

This course emphasizes biology at the organismal level. It provides an introduction to the study of the structure and function of plants and animals, their origin and evolution, their reproduction and genetics, and their diversity and ecological relations. BIOL 107 plus BIOL 115 constitutes a one-year sequence in biology. Acceptable as part of the science component of the General Education Program.

(3-0-3)

BIOL 109**General Biology Laboratory**

A laboratory course to accompany BIOL 107. An introduction to laboratory techniques and their application to the understanding of general biological concepts.

Prerequisite(s): [(BIOL 105*) OR (BIOL 107*)] An asterisk (*) designates a course which may be taken concurrently.

(0-3-1) (C)

BIOL 114**Introduction to Human Biology**

This course, designed for non-majors in biology, covers selected topics in biology of particular relevance to humans and to human health and disease. Topics include: Introductory biochemistry and cell structure, organization, and regulation of body systems; human genetics; human development; biotechnology; introduction to human pathogens and infectious diseases including sexually-transmitted diseases and immunologic diseases such as AIDS; human ecology; and human evolution. This course is not available to those students for whom BIOL 115 is a required course, including students majoring in Biology, Biochemistry, Molecular Biochemistry and Biophysics, Chemical Engineering, or Biomedical Engineering, and students in any pre-health profession major or minor. BIOL 107 and BIOL 114 constitutes a one-year sequence in biology. Acceptable as part of science component of the General Education Program. Course does not satisfy graduation requirements for Biochemistry, Biology, Biomedical Engineering, Chemical Engineering or Molecular Biochemistry and Biophysics majors.

(3-0-3)

BIOL 115**Human Biology**

This course covers selected topics in biology of particular relevance to humans and to human health and disease. Topics include biology of human cells and selected organ systems; neurobiology including psychoactive drugs and drug addiction; development and birth defects; genetics and genetic diseases; toxicology; the immune system and immunologic diseases such as AIDS; human nutrition and nutritional effects; microbial human diseases. BIOL 107 plus BIOL 115 constitutes a one-year sequence in biology. Acceptable as part of science component of the General Education Program.

(3-0-3)

BIOL 117**Human Biology Laboratory**

A biology laboratory course to accompany BIOL 114 or BIOL 115. A cellular approach to the functional organization of organs and organ systems. Laboratories will include the application of experimental methods and techniques for understanding the relationship between cell structure and function.

Prerequisite(s): [(BIOL 114*) OR (BIOL 115*)] An asterisk (*) designates a course which may be taken concurrently.

(0-3-1) (C)

BIOL 210**Microbiology Lectures**

This course covers basics of microbiology including structure, genetics, growth, and metabolic diversity of microorganisms. Topics relating to the importance of microorganisms in health, ecosystems, industry, and water and food safety are also covered.

Prerequisite(s): [(BIOL 107) OR (BIOL 114) OR (BIOL 115)]

(3-0-3)

BIOL 214**Genetics**

An introduction to transmission and molecular genetics designed for both biology and other science and engineering majors. Applications of genetics to solution of various practical problems will also be discussed.

Prerequisite(s): [(BIOL 107) OR (BIOL 114) OR (BIOL 115)]

(3-0-3)

BIOL 225**Microbiology Laboratory**

Exercises focus on sterile technique, growth requirements of microorganisms, identification of microorganisms using biochemical activities, food, and water microbiology.

Prerequisite(s): [(BIOL 210*)] An asterisk (*) designates a course which may be taken concurrently.

(0-4-2) (C)

BIOL 305**Human Anatomy**

This course will provide a comprehensive overview of the structural, functional, and developmental anatomy of the human body. Particular consideration will be given to the bony structures, vasculature, innervation, musculature, and relationships of the various structures to one another.

Prerequisite(s): [(BIOL 107) OR (BIOL 114) OR (BIOL 115)]

(3-0-3)

Course Descriptions

BIOL 327

Introduction to Immunology

Covers general principles of innate and adaptive immunity including structure and function of immune system components, T and B cell development, responses of the immune system to infection, and consequences of immune system failure.

Prerequisite(s): [(BIOL 214)]
(3-0-3)

BIOL 401

Introductory Biochemistry

The first part of a one-year Biochemistry series. This semester covers the basic principles of biological chemistry with particular focus on: proteins, nucleic acids, carbohydrates, and lipids; their molecular structure, chemical reactions, and practical methods in characterization; and enzymes and enzyme-catalyzed reactions.

Prerequisite(s): [(BIOL 107) OR (BIOL 115)] AND [(CHEM 237)]
(3-0-3)

BIOL 402

Metabolic Biochemistry

The second part of a one-year Biochemistry series. This semester deals with biochemistry of metabolism, focusing on: glycolysis, the citric acid cycle, gluconeogenesis, electron transport, and the synthesis and breakdown of biomolecules (amino acids, nucleic acids, lipids, and carbohydrates), blood chemistry, lipid transportation, and metabolic control.

Prerequisite(s): [(BIOL 401)] AND [(CHEM 239)]
(3-0-3)

BIOL 403

Biochemistry Lecture

Molecular organization of cell structures and cell membranes. Proteins, nucleic acids, carbohydrates and lipids, their molecular structure, characterization and chemical reactions. Enzymes and enzyme-catalyzed reactions and metabolism. Does not satisfy biochemistry requirement for Biology, Biochemistry, or Molecular Biochemistry and Biophysics majors.

Prerequisite(s): [(BIOL 107) OR (BIOL 115) OR (CHE 311)] AND [(CHEM 237)]

(4-0-4)

BIOL 404

Biochemistry Laboratory

Analytical methods in the chemistry and metabolism of proteins, amino acids, and nucleic acids, including chromatography, spectrophotometry, and electrophoresis. Enzyme reactions.

Prerequisite(s): [(BIOL 401*) OR (BIOL 402*) OR (BIOL 403*)] An asterisk (*) designates a course which may be taken concurrently.
(0-6-3) (C)

BIOL 410

Medical Microbiology

Properties of pathogenic bacteria, fungi, viruses, and parasites and their mechanisms of pathogenesis with a focus on organisms that cause human disease.

Prerequisite(s): [(BIOL 210)]
(3-0-3)

BIOL 414

Genetics for Engineering Scientists

A course in genetics designed for advanced students in engineering and related disciplines. The course will cover transmission and molecular genetics and their application to the solution of various practical problems. A term paper will be required in addition to in-class examinations.

(3-0-3) (C)

BIOL 426

Concepts of Cancer Biology

The course is designed to provide a complete overview of cancer as a disease. It will cover normal and abnormal cell signaling pathways, cancer genes and their regulation, experimental chemical carcinogenesis, metastasis, cancer prevention and therapy, drug development for cancer treatment, cancers of individual organ sites and application of biotechnology for cancer detection and treatment.

Prerequisite(s): [(BIOL 107, BIOL 115, BIOL 401*, BIOL 445*, and CHEM 237)] An asterisk (*) designates a course which may be taken concurrently.
(3-0-3)

BIOL 430

Animal Physiology

Respiration; circulation; energy metabolism; temperature regulation; water and osmotic regulation; digestion and excretion; muscle and movement; nerve excitation; information control and integration; and chemical messengers. Emphasis on general principles with examples drawn from various animal phyla.

Prerequisite(s): [(BIOL 107) OR (BIOL 114) OR (BIOL 115)]
(3-0-3)

BIOL 431

Animal Physiology Laboratory

This course provides an introduction to some of the basic concepts of physiology through experimental procedures involving laboratory animals and humans. Experiments include EKG, producing and measuring nerve action potential, muscle contraction generation and its mechanism, human blood pressure measurement, human lung capacity measurement, and some other human noninvasive experiments.

Prerequisite(s): [(BIOL 430)]
(0-6-3)

BIOL 445

Cell Biology

Modern studies of cell structure and function at the cellular, subcellular, and molecular levels. Topics include molecular components of cells, membranes, membrane-bound organelles, microtubular and cytoskeletal components and principles of bioenergetics.

Prerequisite(s): [(BIOL 107 and CHEM 237) OR (BIOL 115 and CHEM 237)]
(3-0-3)

BIOL 446

Cell Biology Laboratory

A laboratory course in cell biology to accompany BIOL 445.

Prerequisite(s): [(BIOL 445*)] An asterisk (*) designates a course which may be taken concurrently.
(0-6-3) (C)

BIOL 451

Biological Literature

Library research on advanced topics in biology followed by oral presentations of this research. Requires senior standing.

Prerequisite(s): [(BIOL 400-499)]
(2-0-2) (C)

BIOL 490

Individual Study

Individual study. Consent of instructor required.
(Credit: Variable) (C)

BIOL 491

Biology Research Project

An opportunity for advanced undergraduates to participate in research. A written report covering the procedures, data, and conclusion of the problem is required.

(Credit: Variable) (C)

BIOL 495**Biology Colloquium**

Lectures by prominent scientists. This course exposes students to current and active research in biology both within and outside the IIT community. It helps prepare students for a career in research. It is complementary to our academic courses and provides examples of professional/scientific presentations. This course may not be used to satisfy the natural science general education requirement.

(1-0-1) (C)

GRADUATE COURSES

Degree-seeking undergraduates may take graduate courses with approval of the course instructor and faculty advisor. For course descriptions, see the *IIT Bulletin: Graduate Programs*.

BIOL 503**Virology****BIOL 512****Advanced Biochemistry****BIOL 514****Toxicology****BIOL 515****Molecular Biology****BIOL 526****Developmental Biology****BIOL 527****Immunology and Immunochemistry****BIOL 542****Advance Microbiology Lectures****BIOL 550****Bioinformatics and Biotechnology****BIOL 555****Macromolecular Structure****BIOL 562****Current Topics in Functional Genomics**

Biomedical Engineering**BME 100****Introduction to the Profession**

Introduces the student to the scope of the biomedical engineering profession and its role in society, and develops a sense of professionalism in the student. Provides an overview of biomedical engineering through lectures, presentations by outside speakers, hands-on exercises, and scientific literature analyses. Develops professional communication and teamwork skills. Open only to Biomedical Engineering majors.

(3-0-3) (C)

BME 200**Biomedical Engineering Application of MATLAB**

This course will provide students an opportunity to learn how to use the MATLAB programming environment to solve biomedical engineering problems. Students will learn basic MATLAB functions for importing, analyzing, visualizing, and exporting data, as well as computational techniques for modeling and solving quantitative engineering problems. Examples will be taken from the three areas of specialization offered in the biomedical engineering department – cell and tissue engineering, neural engineering, and medical imaging. Open only to Biomedical Engineering majors.

Prerequisite(s): [(BME 100*)] AND [(CS 115)] AND [(ECE 211*) OR (ECE 215*)] An asterisk (*) designates a course which may be taken concurrently.

(0-3-1)

BME 301**Bio-Fluid Mechanics**

Basic properties of fluids in motion. Lagrangian and Eulerian viewpoints, material derivative, streamlines. Continuity, energy, angular and linear momentum equations in integral and differential forms. Applications in biofluids and biomedical devices; rheology of biological fluids. Open only to Biomedical Engineering majors.

Prerequisite(s): [(BIOL 115, MATH 251, and MMAE 200)] (3-0-3)

BME 309**Biomedical Imaging & Sensing**

An introduction to concepts of imaging and sensing that underlie a wide range of biomedical imaging modalities. Topics covered include cell imaging, multiphoton microscopy for biomedical studies, molecular imaging, infrared imaging, biomedical magnetic imaging, X-ray imaging, nuclear medicine, magnetic resonance imaging, and ultrasound imaging. Open only to Biomedical Engineering majors.

Prerequisite(s): [(BME 330* and PHYS 221)] An asterisk (*) designates a course which may be taken concurrently.

(3-0-3)

BME 310**Biomaterials**

Applications of biomaterials in different tissue and organ systems. Relationship between physical and chemical structure of materials and biological system response. Choosing, fabricating, and modifying materials for specific biomedical applications.

Prerequisite(s): [(BME 100 and CHEM 125)] (3-0-3) (C)

BME 315**Instrumentation & Measurement Laboratory**

Laboratory exercises stress instrumentation usage and data analysis used to determine physiological functions and variables and the relations to the physiological variability. Open only to Biomedical Engineering majors.

Prerequisite(s): [(BME 200 and BME 330*)] An asterisk (*) designates a course which may be taken concurrently.

(1-3-2) (C)

BME 320**Fluids Laboratory**

Laboratory experiments in thermodynamics, biological fluid flow, and heat transfer. Emphasis is placed on current methods, instrumentation, and equipment used in biomedical engineering; oral presentation of results; and on the writing of comprehensive reports. Open only to Biomedical Engineering majors. Open only to Biomedical Engineering majors.

Prerequisite(s): [(BIOL 115 and BME 315)] (0-3-1) (C)

BME 330

Analysis of Biosignals & Systems

This course is a junior level introduction to the theoretical and practical aspects of signal processing and dynamic systems behavior as they relate to physiological, biological, and biomedical systems. The topics covered will include sampling theory, continuous and discrete Fourier transforms and series, Laplace transforms, Linear systems theory, signal filtering, models of biological and physiological systems, and analysis of dynamic and feedback systems. Open only to Biomedical Engineering majors.

Prerequisite(s): [(BME 200, ENVE 426*, and MATH 252)]

An asterisk (*) designates a course which may be taken concurrently.

(3-0-3)

BME 331

Modeling & Control of Biological Systems

The course expands upon the systems and signal processing concepts introduced in BME 330 to develop the tools to model physiological processes and the feedback control of these processes.

Prerequisite(s): [(BME 330) OR (ECE 308)]

(3-0-3)

BME 335

Thermodynamics of Living Systems

Principles of thermodynamics and conservation of mass applied to living systems and biomedical devices. The first and second laws of thermodynamics, pHs and chemical equilibrium, metabolic stoichiometry and energetics.

Prerequisite(s): [(BME 320*, CHE 202, and MATH 251)]

An asterisk (*) designates a course which may be taken concurrently.

(3-0-3)

BME 405

Physiology Laboratory

A laboratory course which demonstrates basic concepts of bioengineering design through experimental procedures involving humans and experimental animals. Statistical principles of experimental design. Study of possible errors. Experiments include nerve action, electrocardiography, mechanics of muscle, membranes, and noninvasive diagnostics in humans. Open only to Biomedical Engineering majors. Open only to Biomedical Engineering majors.

Prerequisite(s): [(BME 315)]

(1-3-2) (C)

BME 410

Transport Phenomena in Living Systems

Convective and diffusive movement and reaction of molecules in biological systems. Kinetics of homogeneous and heterogeneous reactions in biological environments. Mechanisms and models of transport across membranes. Convective diffusion with and without chemical reaction.

Prerequisite(s): [(BME 301 and MATH 252)]

(3-0-3)

BME 415

Concepts of Neural Engineering

Introduction to the fundamentals and principles of neural engineering. Emphasis is placed on pathological conditions that motivate the engineering design and clinical use of neural prosthetic devices. Pacemakers, FES stimulators, as well as CNS devices are examined, including extracorporeal and implantable systems.

Prerequisite(s): [(BME 315)] AND [(ECE 211) OR (ECE 215)]

(3-0-3) (C)

BME 418

Reaction Kinetics for BME

This course focuses on analysis of rate data and single and multiple reaction schemes. Biomedical topics include biological systems, enzymatic pathways, enzyme and receptor-ligand kinetics, pharmacokinetics, heterogeneous reactions, microbial cell growth and product formation, and the design and analysis of biological reactors.

Corequisite(s): (BME 482)

Prerequisite(s): [(BME 301, BME 335, and MATH 252)]

(3-0-3)

BME 419

Introduction to Design Concepts in Biomedical Engineering

Introduction to Design Concepts in Biomedical Engineering. This course aims to educate students on project definition, and on the design, development and technology transfer of potential biomedical products in the context of the student's major capstone project. Students will learn best practices for designing a marketable medical device, including the design process from the clinical problem definition through prototype and clinical testing to market readiness. Open only to Biomedical Engineering majors. Requires senior standing.

Prerequisite(s): [(BME 315, BME 320, and BME 330)]

(2-0-2) (C)

BME 420

Design Concepts in Biomedical Engineering

An introduction to the strategies and fundamental bioengineering design criteria behind the development of biomedical engineering systems and implantable devices that use either synthetic materials or hybrid (biological-synthetic) systems. Analysis and design of replacements for the heart, kidneys, and lungs. Specification and realization of structures for artificial organ systems. Students will be required to complete a team-oriented design project in their chosen track.

Prerequisite(s): [(BME 419)]

(3-0-3) (C)

BME 422

Mathematical Methods for Biomedical Engineers

This course integrates mathematical and computational tools that address directly the needs of biomedical engineers. The topics covered include the mathematics of diffusion, pharmacokinetic models, biological fluid mechanics, and biosignal representations and analysis. The use of MATLAB will be emphasized for numerically solving problems of practical relevance.

Prerequisite(s): [(BME 330 and MATH 252)]

(3-0-3)

BME 423

Cell Biomechanics: Principles & Biological Processes

This course will provide students an opportunity to learn about mechanical forces that develop in the human body and how they can influence cell functions in a range of biological processes from embryogenesis, wound healing, and regenerative medicine to pathological conditions such as cancer invasion. Examples of research methods for investigating cell biomechanics in various biological systems will be discussed.

Prerequisite(s): [(BME 301)]

(3-0-3)

BME 424

Quantitative Aspects of Cell and Tissue Engineering

This course is designed to cover fundamentals of cell and tissue engineering from a quantitative perspective. Topics addressed include elements of tissue development, cell growth and differentiation, cell adhesion, migration, molecular and cellular transport in tissues and polymeric hydrogels for tissue engineering and drug delivery applications.

Prerequisite(s): [(BME 418 and BME 482)]

(3-0-3)

BME 425

Concepts of Tissue Engineering

An introduction to the strategies and fundamental bioengineering design criteria behind the development of cell-based tissue substitutes. Topics include biocompatibility, biological grafts, gene therapy-transfer, and bioreactors.

Prerequisite(s): [(BME 310)]
(3-0-3) (C)

BME 430

Concepts of Medical Imaging

This course is an introduction to the basic concepts in medical imaging, such as: receiver operating characteristics, the rose model, point spread and transfer functions, covariance and autocovariance, noise filters, sampling, aliasing, interpolation, and image registration.

Prerequisite(s): [(BME 315)] AND [(PHYS 221) OR (PHYS 224)]
(3-0-3) (C)

BME 433

Biomedical Engineering Applications of Statistics

Application of modern computing methods to the statistical analysis of biomedical data. Sampling, estimation, analysis of variance, and the principles of experimental design and clinical trials are emphasized.

Prerequisite(s): [(MATH 251 and MATH 252)]
(3-0-3)

BME 438

Neuroimaging

This course describes the use of different imaging modalities to study brain function and connectivity. The first part of the course deals with brain function. It includes an introduction to energy metabolism in the brain, cerebral blood flow, and brain activation. It continues with an introduction to magnetic resonance imaging (MRI), perfusion-based fMRI, BOLD fMRI, fMRI paradigm design and statistical analysis, introduction to positron emission tomography (PET) and studying brain function with PET, introduction to magnetoencephalography and studying brain function with (MEG). The second part of the course deals with brain connectivity. It includes an introduction to diffusion tensor MRI, explanation to the relationship between the diffusion properties of tissue and its structural characteristics, white matter fiber tractography. Open only to Biomedical Engineering majors.

Prerequisite(s): [(BME 315 and PHYS 221)]
(3-0-3)

BME 439

Advanced Medical Imaging

This course introduces advanced clinical imaging modalities, research imaging techniques, and concepts from image science and image perception. The first part of the course introduces the perception of image data by human observers and the visualization of brain structure and function. It includes an introduction to magnetic resonance imaging (MRI) and a survey of neurological imaging via functional MRI (fMRI). The second part of the course covers image science, clinical imaging applications, and novel research imaging techniques. It includes an introduction to radiation detection and image quality evaluation, a survey of clinical cases, and an overview of new imaging methods.

Prerequisite(s): [(BME 309)]
(3-0-3)

BME 440

Bioelectric Interfaces

Examination of the fundamental principles and theory behind the interface between recording and stimulating electrodes and biological tissue. Equivalent circuit models for recording and stimulating electrodes are presented. Safety issues, and electrochemical stability of stimulating electrodes are detailed.

Prerequisite(s): [(BME 315 and ECE 215)]
(3-0-3)

BME 443

Biomedical Instrumentation & Electronics

Principles of circuit analysis are applied to typical transducer and signal recording situations found in biomedical engineering. Open only to Biomedical Engineering majors. Requires junior standing.

Prerequisite(s): [(BME 315)]
(3-0-3)

BME 445

Quantitative Neural Function

Computational approach to basic neural modeling and function, including cable theory, ion channels, presynaptic potentials, stimulation thresholds, and nerve blocking techniques. Synaptic function is examined at the fundamental level.

Prerequisite(s): [(BME 315)]
(3-0-3)

BME 450

Animal Physiology

Respiration; circulation; energy metabolism; temperature regulation; water and osmotic regulation; digestion and excretion; muscle and movement; nerve excitation; information control and integration; chemical messengers. Emphasis on general principles with examples drawn from various animal phyla. Same as BIOL 430.

Prerequisite(s): [(BIOL 107) OR (BIOL 115)]
(3-0-3)

BME 452

Control Systems for Biomedical Engineers

Control systems design and analysis in biomedical engineering. Time and frequency domain analysis, impulse vs. step response, open vs. closed loop response, stability, adaptive control, system modeling. Emphasis is on understanding physiological control systems and the engineering of external control of biological systems.

Prerequisite(s): [(BME 330)]
(3-0-3)

BME 453

Quantitative Physiology

The primary objective of this course is to introduce students to basic physiological concepts using a quantitative approach. The main systems that control the human body functions will be reviewed to enable the students to understand the individual role of each major functional system as well as the need for the integration or coordination of the activities of the various systems. Attempts will be made to highlight the patho-physiological consequences of defects or failures in the organ systems, and the relevant corrective approaches. This course will include lectures from individuals who have relevant expertise in the different organ systems because of the complexity of the human body.

Corequisite(s): (BME 405)
Prerequisite(s): [(BME 100)]
(3-0-3)

Course Descriptions

BME 455

Cardiovascular Fluid Mechanics

Anatomy of the cardiovascular system. Scaling principles. Lumped parameter, one-dimensional linear and nonlinear wave propagation, and three-dimensional modeling techniques applied to simulate blood flow in the cardiovascular system. Steady and pulsatile flow in rigid and elastic tubes. Form and function of blood, blood vessels, and the heart from an engineering perspective. Sensing, feedback, and control of the circulation. Possible project using custom software to run blood flow simulations. Same as MMAE 455.

Prerequisite(s): [(BME 301) OR (MMAE 310) OR (MMAE 313)]
(3-0-3)

BME 460

Advanced Biomaterials

Continuation of biomaterials applications to tissue and organs. Novel applications of materials to replace living tissues and organs, such as skin, blood vessels, and heart valves will be considered.

Prerequisite(s): [(BME 310)]
(3-0-3)

BME 470

Engineering Biocompatible Materials

Engineering Biocompatible Materials aims to describe synthetic materials that are routinely used as components of various medical devices implanted in the human body. Students will critically examine prosthetic materials used in specific devices. The biological environment relevant to the discussed implant will be reviewed. Problems with current materials will be analyzed. Strategies and techniques required to engineer sophisticated biomaterials for future applications will be developed.

Prerequisite(s): [(BIOL 115 and BIOL 117)]
(3-0-3) (C)

BME 475

Neuromechanics of Human Movement

Concepts from mechanics and neurophysiology will be introduced and employed to analyze and model human movement, especially of the extremities. Topics will include forward and inverse kinematics and dynamics, muscle modeling, and feedback control.

Prerequisite(s): [(BME 330) OR (ECE 308) OR (MMAE 305)]
(3-0-3)

BME 482

Mass Transport for Biomedical Engineers

This course seeks to provide students with an introduction to advanced concepts of mass transport with an emphasis on biological systems. Students will be exposed to derivation of the conservation equations for heat, mass, and momentum. Following derivation of these laws, focus will be placed on mass transport applications, including diffusion, convection-diffusion, diffusion with reactions, and facilitated diffusion. Students will be able to apply mass transport equations to solve problems in biological systems.

Prerequisite(s): [(BME 301 and CHE 202)]
(3-0-3)

BME 490

Senior Seminar

Professional issues in bioengineering. Role of bioengineers in industry. Professional identity. Structure of bioengineering industries and product development process. Job market analysis. Current employment opportunities. Recruiting process and interview. Analysis of employer. Marketing versus engineering. Management by objective. Role of higher degrees.

(1-0-1) (C)

BME 491

Independent Study

Focused reading and study under the supervision of a BME faculty member. A final written report is required to receive credit.

(Credit: Variable) (C)

BME 492

Undergraduate Research

Independent research (experimental or theoretical/computational) under the supervision of a BME faculty member. A final written report is required to receive credit.

(Credit: Variable) (C)

BME 493

BME Undergraduate Project

Research or design project involving 2 or more students under supervision of a BME faculty member. A final written report from each student is required to receive credit.

(3-0-3)

BME 497

Special Problems

Design, development, analysis or research on special topics defined by a faculty member or the department.

(0-0-3)

Business

BUS 100

Introduction to Business

This course introduces students not only to the business environment but also to the different purposes and functions of businesses. Students will obtain a broad understanding of the fundamentals of business organizations and their operations and, in the process, learn the basic terminology and concepts employed in the business world. Students will also gain experience using computer applications popular in the business community such as Excel, Word, and Access Database.

(3-0-3) (C)(E)

BUS 103

Ideation: What Are My Interests?

This course introduces students to methods of exploration and analysis of ideas. Students will participate in creativity exercises, practice brainstorming, and use tools (such as SWOT) that will provide a framework for analyzing interests and understanding comparative values. Students will practice storyboarding techniques and learn to present their ideas in a clear and concise manner.

(1-0-1)

BUS 104

Needs Analysis & Opportunity Analysis Aligned with My Interests

This course introduces students to user observation and research tools. Students will apply these tools to their project idea. Students will learn research planning and employ several methods, such as ethnographic interviewing techniques or journals/diaries, and translate their findings into a report.

(1-0-1)

BUS 203

Identification & Evaluation of Prospective Consumers

This course introduces students to primary and secondary market research tools and analysis. Students will be expected to go into the field to research prospective consumers relevant to their project. Students will learn of research sources beyond Google. Students will also learn and apply analytical techniques to understand the data.

Prerequisite(s): [(BUS 104)]

(1-0-1)

BUS 204

Identification & Evaluation of Competitive Advantage

Students will be expected to determine the strengths and weaknesses of the competitors within the target market, strategies that will provide the startup with a distinct advantage, the barriers that can be developed to make the competitive advantage sustainable, and any weaknesses that can be exploited within the product development cycle.

Prerequisite(s): [(BUS 203)]

(1-0-1)

BUS 210

Financial & Managerial Accounting

This course introduces the student to basic financial and managerial accounting topics: GAAP, the major financial statements, accrual accounting, financial reporting alternatives, financial statement analysis, cost behavior, cost systems, short-term and long-term decision-making, and product costing. BUS 210 should not be taken by business majors.

(3-0-3)

BUS 211

Measuring & Assessing Entity Financial Performance

This course introduces students to the financial reporting practices of firms ranging in size from sole proprietorships to Fortune 500 companies. Although the predominant focus will be on reporting principles used in the United States, the course will consider international reporting standards as well. Students will learn some of the metrics (ratios) by which one measures the financial health of a firm, whether small or large, domestic or international. Finally, using a popular financial management software package, students not only will learn how businesses track their day-to-day transactions and report on operations but also will be able to apply this knowledge to their personal and/or business finances.

Prerequisite(s): [(BUS 100)]

(3-0-3) (E)

BUS 212

Managerial Decision-Making & Control

This course introduces students to how managers use accounting information to make decisions and to monitor and control the operations of their businesses. Students will learn how an entity's profits respond to changes in sales volume, selling prices, and costs. They will also learn how to distinguish between relevant and irrelevant information and use the former to make sound business decisions. The principles introduced in this course are applicable to domestic and international businesses of all sizes.

Prerequisite(s): [(BUS 211)]

(3-0-3)

BUS 221

Analytics for Informed Decision-Making

Business decisions are often difficult and risky because decisions have to be made with incomplete and imperfect information. The primary purpose of this course is to introduce the basics of modeling and analyzing complex problems that involve business decision-making under uncertainty. Students will learn probability theory and some basic statistical concepts and procedures. The course emphasizes techniques for formulating decision problems and analyzing data. Students will also learn how to use computer software in decision and statistical analyses.

Prerequisite(s): [(BUS 100 and MATH 151)]

(3-0-3)

BUS 301

Designing & Structuring the Organization for Strategic Decision-Making

Successful managers are able to align business strategies with the organization's culture and core competencies. In this course, students will develop the managerial skills needed to succeed in today's increasingly competitive global economy. The course explores how individuals are motivated to learn, decide, and coordinate in individual versus group settings. Students will apply these concepts to resolve a wide array of problems in real world organizational settings, such as creating an innovative culture, developing an effective performance management system, and managing a diverse workforce. Particular emphasis will be given to development of leadership skills and entrepreneurship.

Prerequisite(s): [(BUS 100 and ECON 151) OR (ECON 211)]

(3-0-3) (C)(E)

BUS 303

Financial Analysis: Pro-Forma Financial Statements

Financial Analysis: Pro-Forma Financial Statements requires students to develop pro-forma financial statements for a business of their own choosing. They will begin by subjecting at least two similar firms (the "comparable" firms) to a rigorous financial analysis with the objective of identifying their strengths and weaknesses. In the process, students will investigate measures of liquidity (short-term and long-term), efficiency, and profitability. Utilizing the strengths and weaknesses of the comparable firms, students will develop pro-forma financial statements for their own business.

Prerequisite(s): [(BUS 204 and BUS 351)]

(1-0-1)

BUS 304

Financial Valuation: How Much is it Worth?

This course uses the pro-forma financial statements of the student's business and the analysis of the comparable firms from BUS 303 to estimate the value of their business. BUS 304 makes use of discounted cash flow techniques as well as various multipliers to estimate a range of values for the student's business.

Prerequisite(s): [(BUS 303)]

(1-0-1)

BUS 305

Contemporary Design of Business Processes & Business Models

This course introduces students to concepts and techniques related to the design, planning, control, and improvement of both service and manufacturing operations. The course helps students become conversant in the language of operations management and provides them with the quantitative and qualitative tools needed to analyze basic operations issues. It also describes the role of operations management in the overall strategy of a firm. The topics covered include process analysis, waiting line management, project management, inventory and supply chain management.

Prerequisite(s): [(BUS 100 and MATH 151)]

(3-0-3)

Course Descriptions

BUS 321

Quantitative Models for Effective Decision-Making

The role of business decision-making is often how to best design and operate a system. Many managerial decisions, regardless of their functional orientation, are, therefore, increasingly based on analysis using quantitative models from the discipline of management science. Management science tools, techniques and concepts have dramatically changed the way business operates in manufacturing, service operations, marketing and finance. BUS 321 introduces students to various ways of modeling, or thinking structurally about, decision problems in order to enhance decision-making skills. Students will gain experience using spreadsheets to deal with complex managerial decision problems.

Prerequisite(s): [(BUS 221)]
(3-0-3)

BUS 341

Business Law for Entrepreneurs in the Modern Global Economy

BUS 341 surveys the many challenges and opportunities faced by the entrepreneur in the modern global economy. Starting with basic contract law, corporate law, and intellectual property law, the course then explores issues of business organization for entrepreneurs, the legal implications of debt and equity financing, the protection of the expression of ideas that is afforded by copyrights, and the protection of corporate goodwill that is afforded by trademark law as well as the statutory restraints imposed by statutes such as the Financial Services Modernization Act, the Health Insurance Portability and Accountability Act ("HIPPA"), and Children's Online Privacy Protection Act ("COPPA"). The course will broaden the student's perspective into the international environment by studying cross-border data privacy as well as statutes such as the Foreign Corrupt Practices Act ("FCPA").

Prerequisite(s): [(BUS 100)]
(3-0-3) (C)(E)

BUS 351

Effective Financial Decision-Making

BUS 351 introduces students to time value of money concepts and how these concepts are used in making long-term financial decisions. In addition, the course will expose students to after-tax cash flow analysis using a variety of decision models that are appropriate for sole proprietorships, partnerships, and corporations, whether they are newly-founded or established firms. Many of the principles introduced here can be applied to personal financial decisions such as retirement planning, car loan analyses and home mortgage analyses, for example.

Corequisite(s): (BUS 212)

Prerequisite(s): [(BUS 212* and BUS 221)] An asterisk (*) designates a course which may be taken concurrently.
(3-0-3)

BUS 361

Entrepreneurial Thinking & Practice in a Complex Organization

BUS 361 focuses on the role of entrepreneurship within larger, established companies. It provides students wishing to become either corporate managers or intrapreneurs with the information, frameworks and techniques needed to plan, start, evaluate, control, and successfully operate corporate ventures.

Prerequisite(s): [(BUS 351)]
(3-0-3) (C)(E)

BUS 371

Strategies for Reaching New Markets

BUS 371 focuses on the information, frameworks and techniques required to devise a marketing strategy for the organization. The course begins with an understanding of how to design products and services for consumers based on their needs and their budget constraints. It then moves to an evaluation of the capabilities of the firm, its collaborators, and its competitors in service of developing appropriate price and promotion strategies when going to market. This course has no formal pre-requisites, but students will benefit from a basic background in microeconomics and basic statistics.

(3-0-3) (C)(E)

BUS 403

Developing a Strategically Competitive Business Plan

This course introduces students to the research process for developing business plans. They will evaluate a business concept, collect, analyze and organize market research data into a marketing plan; formulate a business model; and prepare financial projections, among other key components of a formal business plan.

Prerequisite(s): [(BUS 304)]
(1-0-1)

BUS 404

Selling Your Business Plan

In BUS 404 students will be expected to explore various options in raising money to fund a business, their advantages and disadvantages, the right ways to negotiate and close the deals.

Prerequisite(s): [(BUS 403)]
(1-0-1)

BUS 452

International Finance

International finance is a combination of macroeconomics and finance. The course covers macroeconomic models of exchange rate and interest rate determination and it also covers the participants and instruments that trade in the foreign exchange market. By the end of the course, participants should be able to construct portfolios and analyze the risk of their positions.

Prerequisite(s): [(BUS 351)]
(3-0-3)

BUS 454

Valuation & Portfolio Management

The course is a survey of asset pricing theory. The fundamentals of bond and option pricing are covered as well as the CAPM, APT and the Fama French models. Excel spreadsheet modeling is used to illustrate and understand the concepts of Markowitz's Mean Variance Optimization, equity valuation, option pricing, and utility theory.

Prerequisite(s): [(BUS 351)]
(3-0-3)

BUS 455

Corporate Finance

This course is an advanced introduction to modern corporate finance. Topics include cash flow forecasting, optimal dividend policies, mergers and acquisitions, structured finance, capital at risk, and the risk of adjusted return on capital. The philosophical foundation of the course is the concept of shareholder value added. Students will learn how financial decisions can contribute to the value of modern corporation.

Prerequisite(s): [(BUS 351)]
(3-0-3)

BUS 456**Financial Economics I**

This course provides a systematic exposition of the primary mathematical methods used in financial economics. Mathematical concepts and methods include logarithmic and exponential functions, algebra, mean-variance analysis, summations, matrix algebra, differential and integral calculus, and optimization. The course will include a variety of financial applications including compound interest, present and future value, term structure of interest rates, asset pricing, expected return, risk and measures of risk aversion, capital asset pricing model (CAPM), portfolio optimization, expected utility, and consumption capital asset pricing (CCAPM).

Prerequisite(s): [(BUS 351)]
(3-0-3)

BUS 457**Financial Modeling I**

This course is the first of three subjects that form the Financial Modeling Sequence. It is designed to provide students with the necessary programming skills necessary to create realistic financial models. It is an essential core subject and must be completed in order to obtain the MSF degree. Modeling I focuses on the implementation of financial models in MS Excel using Visual Basic for Application (VBA).

Prerequisite(s): [(BUS 351)]
(3-0-3)

BUS 458**Futures Options & OTC Derivatives**

This course provides the foundation for understanding the price and risk management of derivative securities. The course starts with simple derivatives (e.g., forwards and futures) and develops the concept of arbitrage-free pricing and hedging. Based upon the work of Black, Scholes, and Merton, the course extends their pricing model through the use of lattices, Monte Carlo simulation methods, and more advanced strategies. Mathematical tools in stochastic processes are gradually introduced. Particular emphasis is given to the pricing of interest rate derivatives.

Prerequisite(s): [(BUS 221, BUS 321, and BUS 351)]
(3-0-3)

BUS 467**Managing Entrepreneurial Enterprise & the Global Marketplace**

BUS 467 focuses on the behaviors of entrepreneurs (both successful and unsuccessful), entrepreneurial networks, the venture creation process, new venture strategies, identification and evaluation of new venture opportunities, new venture financing, legal and tax considerations, market entry strategies, and the development of a formal business plan in a global context.

Prerequisite(s): [(BUS 351)]
(3-0-3)

BUS 468**Creating & Managing the Sustainable Entrepreneurial Enterprise**

This course examines innovative organizations that are created to improve people's lives and that contribute to improved social and economic conditions. It focuses how these organizations sustain themselves, how their impact and performance is measured, how their leaders create and spread their innovation and change, and characteristics possessed by their leaders.

Prerequisite(s): [(BUS 466)]
(3-0-3)

BUS 469**Entrepreneurship Minor Summit Course**

BUS 469 provides students a hands-on, real world opportunity to: 1) identify, investigate and/or evaluate the suitability of a product or service to the marketplace; 2) work with an existing company to evaluate and/or investigate a product or service opportunity for the company; or 3) investigate and/or evaluate a research-based technology for suitability as a product or service. Students will either build or join a small team to develop a prototype, engage customers/partners, and identify support and/or funding. Business students who have taken the prerequisite (or equivalent) courses may register with instructor approval. Prerequisite: Entrepreneurship Minor Classes (4) and IPRO

(3-0-3)

BUS 471**Marketing Management**

The Marketing Management course is designed to provide students with an overview of the decision making process in marketing. Marketing decision-making is a process that is essentially wrapped around the fundamental goal of creating value in the marketplace. This requires a professional knowledge of market drivers, competitors' capabilities, technological trends, and the market dynamics of value. The orientation is toward the kinds of marketing decisions that managers must make within the modern business environment. A primary goal of this course is to provide a thorough understanding of the rapidly changing business environment and the various stakeholders that influence the marketing management function.

Prerequisite(s): [(BUS 371)]
(3-0-3) (C)

BUS 472**New Product Development**

This course offers students a solid grounding in the theory and practice of new product development. Using a combination of theory-based lecture, hands-on exercises and assignments, and discussion, students will develop skills across the entire product development process—from opportunity identification through product launch.

Prerequisite(s): [(BUS 371)]
(3-0-3) (C)

BUS 473**Marketing Research**

This course provides students with a detailed exposure to state-of-the-art marketing research techniques and their applications. Topics include: problem definition, research design, exploratory research, the use of secondary and syndicated data sources and questionnaire development and analysis. Course exercises and projects will emphasize the use of research information for effective marketing decision making.

Prerequisite(s): [(BUS 371)]
(3-0-3) (C)(E)

BUS 475**Sales Management**

Addressing modern technology and methods of selling and presenting highly technical subjects is the basis of this course. Engineers, Information Technologists, Architects, and those dealing with state of the art products will benefit from this new created course that will address the rapidly changing profession of highly skilled representatives, sales persons, and entrepreneurs. The class content will include guest speakers from technical corporations, leading promotion and e-commerce firms to discuss basic requirements for sustaining current customer base and increase gross sales. Application, simulation and case studies from small and mid-sized firms will be reviewed.

Prerequisite(s): [(BUS 371)]
(3-0-3)

Course Descriptions

BUS 476

Consumer Behavior

Good marketing practice requires an understanding of consumers: their needs, why they buy, and how they buy. This course draws on the fields of psychology, sociology, economics, demography, and anthropology to study the various internal and external influences on consumer behavior and decision making. Topics include: perception, memory and learning, motivation, attitudes and attitude change, involvement, cultural and cross-cultural influences, communications and influence tactics, and customer satisfaction.

Prerequisite(s): [(BUS 371)]
(3-0-3)

BUS 480

Strategic Management & Design Thinking for the Next Economy

BUS 480 presents a conceptual and analytical framework for understanding the operation of the firm within a changing business environment from the perspective of the upper management team. The course develops the student's ability to think constructively about the pursuit of sustainable competitive advantage through the systematic identification, evaluation and creation of attractive business and corporate opportunities. Requires senior standing.

Prerequisite(s): [(BUS 467)]
(3-0-3) (C)(E)

BUS 497

Independent Study in Business

Independent study in Business as designed to provide the student with an option to study a specific area of Business in more depth than is offered in the curriculum. For example, a student could expand upon subject matter contained in the existing curriculum, or the student could explore an area of business not currently in the curriculum. In either event, the student, the instructor, and the student's advisor must agree upon a plan of study prior to enrolling in the course.

(Credit: Variable)

Civil, Architectural, and Environmental Engineering

CAE 100

Introduction to Engineering Drawing & Design

Introduction to engineering graphics as a problem-solving tool. Basic traditional techniques of orthographic projection, multi-view, pictorial, auxiliary views, dimensioning and tolerance, sectioning, detail drawing. Use of ANSI standards; applications in civil and architectural engineering.

(1-2-2) (C)

CAE 101

Introduction to AutoCAD Drawing & Design

A continuation of CAE 100. Use of PC-based CAD (Computer-Aided Drawing and Design) software for presentation and problem solving in civil and architectural engineering applications. Introduction to basic principles of design.

Prerequisite(s): [(CAE 100)]
(0-4-2) (C)

CAE 105

Geodetic Science

Measurement of distances and angles. Theory of errors. Study of leveling, traversing, topographic mapping, route surveying, earthwork computation, photometry, and boundary surveys. Practice in the use of tapes, levels, total stations, and PC-based methodology.

Prerequisite(s): [(CAE 100*)] An asterisk (*) designates a course which may be taken concurrently.
(2-2-3)

CAE 110

Professional Practice I

This course is an introduction to the engineering profession. The content and delivery have been designed to challenge the student's perspective of oneself and thus make the student a better engineer. The class focus is on developing the skills to become a professional learner and a successful student, increasing team learning skills, self-reflection, enhancing ethical perception and decision making abilities, and understanding the responsibilities as an engineer. In simple terms, the student will begin to "act as an engineer acts." Requires first-year standing.

(0-1-1)

CAE 111

Professional Practice II

This course continues the introduction to the engineering profession with further studies of team learning, specializations in engineering, enhancing ethical perception and decision making abilities, and understanding the responsibilities as an engineer. The course also looks deeply at the need for continuous innovation by studying and practicing the entrepreneurial mindset needed to create value for oneself as the student, for one's company, and for society. In simple terms, the student will begin to "act as an engineer acts" and "think like an entrepreneur thinks." Requires first-year standing.

(0-1-1)

CAE 208

Thermal-Fluids Engineering I

Basic principles of thermodynamics applied to engineering systems using pure substances and mixtures as working fluids. Direct application of the laws of thermodynamics to analysis of closed and open systems, mass and energy flow. Extensive analysis of isentropic processes in cycles, analysis of gas mixtures and psychometrics in heating and cooling systems. Introduction to fluid mechanics and analysis of fluid statics problems.

Prerequisite(s): [(CHEM 124, CS 104-105, MATH 251*, and PHYS 123)] An asterisk (*) designates a course which may be taken concurrently.

(3-0-3)

CAE 209

Thermal-Fluids Engineering II

Complete the development of fluid mechanics and introduce and develop heat and mass transfer analysis techniques. Description and analysis of fluid kinematics, energy and momentum equations applied to internal/external flow in building engineering systems. Development and application of convection, conduction and radiation to one-, two- and three-dimensional systems in steady state and transient regimes of operation as applied to building materials and geometries.

Prerequisite(s): [(CAE 208 and MATH 252*)] An asterisk (*) designates a course which may be taken concurrently.

(4-0-4)

CAE 221

Engineering Geology

Geology and its relationship to civil engineering; minerals; rocks; soil formation; geologic structure; groundwater hydraulics; frost action in soils, landslides, shoreline erosion, bluff instability; earthquakes; air photo interpretation, soil and rock mechanics in relation to engineering geology; subsurface exploration; dams, reservoirs, tunnels; case-history illustrations.

(2-2-3)

CAE 301

Hydraulics & Hydrology

Collection and distribution of water. Flow of fluids through orifices, weirs, venturi meters. Laminar and turbulent flow in closed conduits. Open channel flow. Model analysis using the principles of dimensional analysis. Rainfall and runoff.

Prerequisite(s): [(MATH 252*)] An asterisk (*) designates a course which may be taken concurrently.

(2-3-3)

CAE 302

Fluid Mechanics & Hydraulics

Fundamental concepts; fluid statics; properties of fluid in motion; fluid flows through orifices, weirs and venturi meters; laminar and turbulent flow in closed conduits; flow in open channels; turbo machinery; measurement in fluid mechanics and hydraulics.

Prerequisite(s): [(MATH 252)]

(3-0-3)

CAE 303

Structural Design I

Design loads, factors of safety; load and resistance factors for steel structures. Experimental and analytical study of steel materials subjected to various states of stress. Failure theories, yield and post-yield criteria are treated. Fatigue and fracture mechanics phenomena are related to design practice. The design of tension member, beams, and columns in steel.

Prerequisite(s): [(MMAE 202)]

(3-0-3) (D)

CAE 304

Structural Analysis I

The analysis of statically determinate trusses and frames. Determination of internal forces and calculation of deflections. Application of the principle of virtual work and energy methods. Column stability.

Prerequisite(s): [(MATH 252 and MMAE 202)]

(2-2-3)

CAE 307

Structural Design II

Design loads, factor of safety, load and resistance factors for concrete structures. Properties of concrete-making materials and the proportioning of concrete mixtures. Experimental and analytical study of plain and reinforced concrete subjected to various states of stress. Failure theories and the ultimate strength of plain and reinforced concrete structural components. The design of beams, columns, and slabs in reinforced concrete.

Prerequisite(s): [(CAE 304 and CAE 315*)] An asterisk (*) designates a course which may be taken concurrently.

(2-3-3) (C)(D)

CAE 310

Structural Analysis II

The analysis of statically indeterminate frames. Application of classical methods including superposition, slope deflection, and moment distribution. Introduction to the direct stiffness method and computer analysis of structures. Instructor's consent may be granted to students who do not meet the prerequisite.

Prerequisite(s): [(CAE 304)]

(2-3-3)

CAE 312

Engineering Systems Analysis

Applications of engineering and economic concepts and analysis to civil engineering systems; practical applications of elementary probability and statistics, operations research and economics in civil engineering. Instructor's consent may be granted to students who do not meet the prerequisite.

Prerequisite(s): [(MATH 251)]

(3-0-3) (C)

CAE 315

Materials of Construction

Physical principles of elastic and plastic deformation of construction. Mechanical testing methods including tensile, compressive, toughness, creep and fatigue. Properties of concrete, wood, iron and steel and other construction materials. The emphasis is on concepts from solid mechanics which explain the behavior of materials to the extent needed in the design of load-bearing constructs.

Prerequisite(s): [(MMAE 202)]

(2-3-3) (C)

CAE 323

Introduction to Geotechnical Engineering

Physical and mechanical properties of soil; elementary principles of soil identification and testing. Principles of soil permeability and seepage, consolidation, failure theories, earth pressures, and bearing capacity. Laboratory included.

Prerequisite(s): [(CAE 209) OR (CAE 301) OR (CAE 302)] AND [(MMAE 202)]

(2-3-3) (C)

CAE 331

Building Science

Study of the physical interaction of climate (humidity, temperature, wind, sun, rain, snow, etc.) and buildings. Topics include psychrometrics, indoor air quality, indoor thermal comfort, heat transfer, air infiltration, solar insolation, and heating and cooling load calculation.

Prerequisite(s): [(CAE 209) OR (CHE 302) OR (MMAE 322)]

(3-0-3)

CAE 334

Illumination & Acoustics

General introduction to the aural and visual environment. Subjective and objective scales of measurement. Laws of psychophysics. Introduction to vibration. The hearing mechanism. Transfer of sound. Passive control of noise in buildings, transmission loss. Absorption and reverberation time. Active control of the aural environment. Visual perception. Photometry, brightness, luminance and illumination. Natural lighting of buildings. Artificial lighting.

Prerequisite(s): [(PHYS 200) OR (PHYS 221)]

(3-0-3)

CAE 383

Electrical & Electronic Circuits

Introduction to electrical and electronic circuits. AC and DC steady state and transient network analysis. Phasors, AC and Three Phase Power. Diodes, transistors, and operational amplifiers. Course does not satisfy graduation requirements for Computer Engineering or Electrical Engineering majors.

Prerequisite(s): [(MATH 252 and PHYS 221)]

(3-0-3)

CAE 403

Sound & Vibration Control in Buildings

Basic sound physics and sound propagation in enclosed spaces. Sound and vibration sources in and out of buildings. Theories of sound transmission through building elements. Effects of noise and vibration on man and buildings, criteria and standards. Design of noise control systems. Calculation of airborne and impact sound insulation. Noise and vibration control implementations in various indoor spaces, such as residential units, offices, schools and mechanical rooms.

Prerequisite(s): [(CAE 334)]

(2-1-3)

Course Descriptions

CAE 408

Bridge & Structural Design

Design of modern bridges, bridge design requirements, LRFD approach, seismic and wind effects, fatigue in bridges, support design.

Prerequisite(s): [(CAE 431*)] An asterisk (*) designates a course which may be taken concurrently.

(3-0-3) (D)

CAE 409

Analysis & Design of Acoustic Performance Spaces

This course will discuss the design of acoustic spaces such as conference rooms, classrooms, lecture halls, music halls, theater, churches, recording studio, and home theater. Course covers the selection and determination of appropriate steady state, spatial, and temporal acoustic measures such as background noise levels, reverberation time, speech transmission index, and interaural cross correlation, as well as the selection of building materials and layout of rooms to meet those requirements.

Prerequisite(s): [(CAE 334) OR (CAE 403)]

(3-0-3)

CAE 410

Introduction to Wind & Earthquake Engineering

Kinematics of Particles, Newton's laws of motion, energy and momentum. Kinematics of rigid bodies. Fundamentals of free, forced, and transient vibration of single and multi-degree of freedom structures. Analysis and design of structures for wind and earthquake loadings. Building code requirements. Instructor's consent may be granted to students who do not meet the prerequisite.

Prerequisite(s): [(CAE 310)]

(3-0-3)

CAE 412

Traffic Engineering Studies & Design

Basic traffic engineering studies including traffic volume, speed, accident, and parking studies. Capacity and analysis for various traffic facilities. Design of traffic control devices. Requires senior standing.

(3-0-3) (D)

CAE 415

Pavement Design, Construction & Maintenance

Pavement types, stresses in flexible and rigid pavements, vehicle pavement interaction. Mathematical models for pavement systems, sub grade support, design of flexible and rigid pavements. Construction procedure, drainage considerations, environmental effects. Rehabilitation and maintenance of pavements.

Prerequisite(s): [(CAE 323)]

(3-3-4)

CAE 416

Facility Design of Transportation Systems

Design and analysis of facilities of transportation systems. Integration of select transportation components and their interrelationships. Design of specific facilities: guide ways, terminals, and other elements for railroads, airports, and harbors. Requires senior standing.

(3-0-3) (D)

CAE 417

Railroad Engineering Design

History of railroad industry. Train operation, train make-up, and handling. Design and analysis of railroad track structure, track irregularities, and their representation. Vehicle/track interaction and dynamic problems associated with it. Performance of railway vehicles. Requires junior standing.

(3-0-3) (C)(D)

CAE 419

Transportation Engineering & Design

Highway functions, design controls and criteria, element of design, cross-section elements, local roads and streets, at-grade intersections, grade separation and interchanges, highway capacity analysis, and introduction to pavement management. Requires junior standing.

(3-0-3) (D)

CAE 420

Dynamics of Structures

Fundamentals of free, forced, and transient vibration of single and multi-degree of freedom structures, including damping of lumped and distributed parameters systems. Time, frequency and approximate methods of analysis. Application of numerical methods in time and frequency domain. Response spectra, normal modes, coupling and normal coordinates, and an introduction to earthquake engineering. Instructor's consent may be granted to students who do not meet the prerequisite.

Prerequisite(s): [(CAE 310 and MMAE 305)]

(3-0-3)

CAE 421

Risk Assessment Engineering

Description and concept of risk, relationship between the likelihood of loss and the impact of loss, engineering hazards assessment and risk identification and evaluation using fault tree analysis, failure mode and effect analysis, etc., risk analyses applications with practical statistics.

(3-0-3)

CAE 422

Sprinklers, Standpipes, Fire Pumps, Special Suppression, & Detection Systems

Review and introduction to fluid dynamics applied to sprinklers, standpipes, fire pumps, and special suppression systems; hydraulic design criteria and procedures for sprinklers requirements, standpipes, fire pumps, special suppression systems, and detection and alarm systems using nationally recognized design (National Fire Protection Association) standards, water supply requirement systems and distributions.

Prerequisite(s): [(CAE 209) OR (CAE 301) OR (CAE 302)]

(3-0-3)

CAE 424

Introduction to Fire Dynamics

Introduction to fire, physics and chemistry, and mass and heat transfer principles, fire fluid mechanic fundamentals, fundamentals and requirements of the burning of materials (gases, liquids, and solids), fire phenomena in enclosures such as pre-flashover and post-flashover.

Prerequisite(s): [(CAE 209)]

(3-0-3)

CAE 425

Fire Protection & Life Safety in Building Design

Fundamentals of building design for fire and life safety. Emphasis on a systematic design approach. Basic considerations of building codes, fire loading, fire resistance, exit design, protective systems, and other fire protection systems.

(3-0-3)

CAE 430

Probability Concepts in Civil Engineering Design

Introduction to probability, modeling, and identification of nondeterministic problems in civil engineering. Development of stochastic concepts and simulation models and their relevance to design and decision problems in various areas of civil engineering.

Prerequisite(s): [(MATH 252)]

(3-0-3) (D)

CAE 431

Steel Design

Design of steel beams, plate girders, and beam columns. Bolted and welded connections. Design of typical frame systems.

Prerequisite(s): [(CAE 303, CAE 310, and CAE 315*)]
An asterisk (*) designates a course which may be taken concurrently.

(3-0-3) (D)

CAE 432

Concrete & Foundation Design

Design of reinforced concrete building frames and continuous structures. Design of girders, slabs, columns, foundations, and retaining walls.

Prerequisite(s): [(CAE 307)]

(3-0-3) (D)

CAE 433

Repair of Existing Building Structures

Building repair and retrofit issues are discussed. Specific requirements of a building for repair and/or reconstruction are emphasized. Methods of assessing building conditions, including forensic structural engineering are covered. Repair and strengthening methods based on types of materials (steel, concrete, masonry, timber), occupancy and function (residential, commercial), and building values are covered along with demonstration case studies and illustrative examples.

Prerequisite(s): [(CAE 431 and CAE 432)]

(3-0-3)

CAE 435

Experimental Analysis of Structures

The analysis of structures (prototypes) with the aid of models constructed from metal, wood, plastics, and other materials. Geometrical, mathematical, demonstration, graphical and direct and indirect models will be treated. Comparisons of experimental results with results from computer models will be made. Similitude and the theory of models will be treated. Individual and group project work will be emphasized.

Prerequisite(s): [(CAE 304 and CAE 310) OR (CAE 351 and CAE 352)]

(2-2-3)

CAE 436

Design of Masonry & Timber Structures

Design of unreinforced and reinforced masonry structural elements and structures. Serviceability and ultimate capacity design. Seismic response, resistance, and design. Design of wood columns and bending members. Mechanical fasteners and connectors. Instructor's consent may be granted to students who do not meet the prerequisite.

Prerequisite(s): [(CAE 307)]

(3-0-3) (D)

CAE 437

Homeland Security Concerns in Engineering Systems

Review of blast effects produced by solid phase weapons and their effects on structures and people. Estimation of the risk of threats to security of public and private systems and facilities. Review of simplified structural methods for the analysis and design of structures to meet homeland security concerns and procedures to minimize casualties. Analysis of post-attack fires and how to prevent them. Examination of potential risk to security of infrastructure systems. Development of contingency plans to include evacuation preparedness at time of emergency. Requires senior standing.

(3-0-3)

CAE 439

Introduction to Geographic Information Systems

Geographic information system (GIS) technology allows databases which display and query information in new ways. This course will teach general GIS and GPS skills and concepts, useful to students and practitioners in a variety of disciplines. Students will complete a final GIS project relevant to their field of study. This hands-on class will use ESRI's Arc View and Spatial Analyst products, as well as Trimble GeoExplorer GPS units.

(3-0-3)

CAE 442

Finite Element Methods in Framed Structures

Basic principles and review of elasticity, energy methods, stiffness method, element stiffness matrix, finite elements applications in frames, trusses, curved and non-prismatic and plate structures, convergence of finite element models, practical problems. Instructor's consent may be granted to students who do not meet the prerequisite.

Prerequisite(s): [(CAE 310)]

(3-0-3)

CAE 457

Geotechnical Foundation Design

Methods of subsoil exploration. Study of types and methods of design and construction of foundations for structures, including single and combined footings, mats, piles, caissons, retaining walls, and underpinning. Drainage and stabilization.

Prerequisite(s): [(CAE 301 and CAE 323)]

(3-0-3) (D)

CAE 461

Plumbing & Fire Protection Design

Study of plumbing systems, water supply, and venting systems. Study of fire protection systems for buildings including pipe sizing, pumps, sprinklers, gravity and pressure vessels, and controls.

Prerequisite(s): [(CAE 209) OR (CAE 302) OR (MMAE 310)]

(3-0-3) (D)

CAE 463

Building Enclosure Design

Design of building exteriors, including the control of heat flow, air and moisture penetration, building movements, and deterioration. Study of the principle of rain screen walls and of energy conserving designs. Analytical techniques and building codes are discussed through case studies and design projects.

Prerequisite(s): [(CAE 331)]

(3-0-3) (D)

CAE 464

HVAC Systems Design

Study of the fundamental principles and engineering procedures for the design of heating, ventilating, and air conditioning systems; HVAC system characteristics; system and equipment selection; duct design and layout. Attention is given to energy conservation techniques and computer applications.

Prerequisite(s): [(CAE 331) OR (CAE 513 with min. grade of C) OR (MMAE 322)]

(3-0-3) (D)

Course Descriptions

CAE 465

Building Energy Conservation Technologies

Identification of the optimal energy performance achievable with various types of buildings and service systems. Reduction of infiltration. Control systems and strategies to achieve optimal energy performance. Effective utilization of daylight, heat pumps, passive and active solar heaters, heat storage and heat pipes in new and old buildings.

Prerequisite(s): [(CAE 331) OR (CAE 531)]
(3-0-3) (D)

CAE 466

Building Electrical Systems Design

Study of the analysis and design of electrical systems in buildings utilizing the National Electric Code. Topics include AC, DC, single-phase and three-phase circuits, transients, branch circuits, panel boards, system sizing, fault calculations and overcurrent protection design. Also studies the design and specification of emergency power backup and alternative power systems.

Prerequisite(s): [(CAE 383) OR (ECE 213)]
(3-0-3)

CAE 467

Lighting Systems Design

An intensive study of the calculation techniques and qualitative aspects of good luminous design. Topics covered include: photometric quantities and color theory, visual perception, standards, daylight and artificial illumination systems, radiative transfer, fixture and lamp characteristics, control devices, and energy conservation techniques. Design problems, field measurements, computer, and other models will be used to explore major topics.

Prerequisite(s): [(CAE 334)]
(3-0-3)

CAE 468

Architectural Design

Architectural Design is the first of a two-part sequence of architectural design and planning for architectural engineers. Students learn the basic theory and practice of the architectural design process from the architect's perspective. Topics include the logical process of architectural design development, integration of code requirement, design approach, and architectural presentation techniques taught through lecture and lab instruction.

Prerequisite(s): [(CAE 331 and CAE 334)]
(2-1-2)

CAE 469

Architectural Studio

Architectural Studio is the second of a two part sequence of architectural design and planning for architectural engineers. Students learn the basic theory and practice of the Architectural Design Process from the architect's perspective. Topics include the Logical Process of Architectural Design Development, Design Approach, and Architectural Presentation Techniques taught through Studio instruction.

Prerequisite(s): [(CAE 468)]
(0-4-2)

CAE 470

Construction Methods & Cost Estimating

The role of estimating in construction contract administration. Types of estimates. Unit costs and production rates; job costs. Preparing bid for complete building project using manual methods and the CSI format; checking quantity take-off and cost estimating in selected divisions using a computer package. Requires senior standing.

(3-0-3) (D)

CAE 471

Construction Planning & Scheduling

Planning, scheduling, and progress control of construction operations. Critical Path Method and PERT. Resource leveling of personnel, equipment, and materials. Financial control/hauling of construction projects. Impact of delay on precedence networks. Construction contract administration. Computer applications. Requires senior standing.

(3-0-3) (C)(D)

CAE 472

Construction Site Operation

Construction site layout and mobilization. Liabilities of the parties. Methods of construction. Concrete form design and fabrication. Scaffolding, temporary facilities, and equipment. Safety on sites. Introduction to construction productivity. Requires senior standing.

(3-0-3)

CAE 473

Construction Contract Administration

Characteristics of the construction industry. Project delivery systems. Duties and liabilities of the parties at the pre-contract stage. Bidding. Contract administration including duties and liabilities of the parties regarding payments, retainage, substantial and final completion, scheduling and time extensions, change orders, changed conditions, suspension of work, contract termination, and resolution of disputes. Contract bonds. Managing the construction company. Labor law and labor relations. Requires senior standing.

(3-0-3)

CAE 482

Hydraulic Design of Open Channel Systems

Uniform flow design; backwater profiles in natural streams; gradually varied flow practical problems; spatially varied flow; flow through nonprismatic and nonlinear channels; gradually varied unsteady flow; rapidly varied unsteady flow; flood routing; numerical solutions of open channels.

Prerequisite(s): [(CAE 301)]
(3-0-3) (D)

CAE 486

Soil & Site Improvement

Theory of water flow through porous media. Site improvement techniques including grading and drainage, dewatering, reinforcement, and slurry trenches. Soil improvement techniques including replacement, in situ compaction, preloading and subsurface drainage, grouting, freezing, prewetting, and heating.

Prerequisite(s): [(CAE 323)]
(3-0-3)

CAE 491

Undergraduate Research

Special research problems in civil and architectural engineering under individual supervision of instructor. Seminar presentation is required. (Credit: Variable; maximum 4 credit hours). Prerequisite: Senior standing, minimum GPA of 3.0, and consent of the instructor.

(Credit: Variable)

CAE 497

Special Project

Special design project under individual supervision of instructor. Prerequisite: Senior standing, minimum GPA of 3.0, and consent of instructor.

(Credit: Variable)

Chemical Engineering

CHE 100

Introduction to the Profession I

Introduction to chemical engineering and engineering productivity software. Communication skills development, technical reporting and presentation, engineering ethics, and a variety of topics are discussed.

(1-2-2) (C)

CHE 101

Introduction to the Profession II

A continuation of CHE 100. Advanced engineering applications of productivity software. Engineering graphics and technical flow sheeting. Team project research and project management skills. Internet publishing.

Prerequisite(s): [(CHE 100) OR (MMAE 100)]

(1-2-2) (C)

CHE 202

Material Energy Balances

Material and energy balances for engineering systems subjected to chemical and physical transformations. Calculations on industrial processes. Open only to Biomedical Engineering or Chemical Engineering majors.

Prerequisite(s): [(CHEM 100-499 and MATH 152)] AND [(CS 104) OR (CS 105) OR (CS 115)]

(3-0-3) (C)

CHE 301

Fluid Mechanics

Flow of fluids. Fundamentals of fluid flow design equations as applied to selected unit operations.

Prerequisite(s): [(CHE 202 and MATH 252)]

(3-0-3)

CHE 302

Heat & Mass Transfer Operations

Fundamentals of heat and mass transfer. Heat and mass transfer design equations as applied to selected unit operations. Mass transfer in stage-wise and continuous contacting equipment. Unsteady state operations in mass transfer equipment.

Prerequisite(s): [(CHE 301)]

(3-0-3)

CHE 311

Foundations of Biological Science for Engineering

This introductory course will introduce engineering students to basic principles of Biological Sciences, which will enable them to understand more advanced courses on the topic and provide a solid base for further study in all life sciences-related topics required in their individual programs.

Prerequisite(s): [(CHEM 125)]

(3-0-3)

CHE 317

Chemical & Biological Engineering Laboratory I

Laboratory work in the unit operations of chemical engineering, fluid flow, heat transfer, and other selected topics.

Prerequisite(s): [(CHE 301)]

(1-3-2) (C)

CHE 351

Thermodynamics I

Laws of thermodynamics and their application to chemical engineering operations.

Prerequisite(s): [(CHE 202 and CHEM 343)]

(3-0-3)

CHE 406

Transport Phenomena

The equations of change in different coordinate systems (mass, momentum, and energy transport). Velocity distribution in laminar and turbulent flow. Formulation and analytical solutions to the problems of viscous flow, molecular diffusion, heat conduction and convection.

Prerequisite(s): [(CHE 301, CHE 302, and MATH 252)]

(3-0-3)

CHE 412

Foundations of Biological Science for Engineering

This introductory course will introduce graduate engineering students to basic principles of Biological Sciences, which will enable them to understand more advanced courses on the topic and provide a solid base for further study in all life sciences-related topics required in their individual programs.

Prerequisite(s): [(CHEM 125)]

(3-0-3)

CHE 418

Chemical & Biological Engineering Laboratory II

Laboratory work in distillation, humidification, drying, gas absorption, filtration, and other areas.

Prerequisite(s): [(CHE 302 and CHE 317)]

(1-3-2) (C)

CHE 423

Chemical Reaction Engineering

Introduction to the fundamentals of chemical kinetics. The design, comparison, and economic evaluation of chemical reactors. Emphasis on homogeneous systems.

Prerequisite(s): [(CHE 302, CHE 351, and CHE 433)]

(3-0-3)

CHE 426

Statistical Tools for Engineers

Descriptive statistics and graphs, probability distributions, random sampling, independence, significance tests, design of experiments, regression, time series analysis, statistical process control, and introduction to multivariate analysis. Requires junior standing.

Prerequisite(s): [(MATH 151)]

(3-0-3)

CHE 433

Process Modeling & System Theory

Principles of process modeling. Modeling of non-reactive and reactive dynamic processes. Transfer functions. Modeling of multistage and non-linear processes. Discrete-event processes, Markov processes, and automata theory.

Prerequisite(s): [(CHE 302 and CHE 351)]

(3-0-3)

CHE 435

Process Control

Dynamic process models, stability assessment, feedback, and feed forward control strategies, design and tuning of closed-loop controllers, time domain and frequency domain design and performance assessment methods. Multivariable systems, interaction, multi-loop control. Software for process simulation and controller design.

Prerequisite(s): [(CHE 302 and CHE 433)]

(3-0-3)

Course Descriptions

CHE 439

Numerical & Data Analysis

Utilization of numerical methods to find solutions to a variety of chemical engineering problems. Emphasis placed on problem formulation, development of computer code, and interpretation of results. Techniques covered include: systems of algebraic equations, linear regression, and statistics. Numerical differentiation and integration, solution of ordinary and partial differential equations.

Prerequisite(s): [(CHE 406*, CHE 423, and CHE 435)] AND [(MATH 252)] An asterisk (*) designates a course which may be taken concurrently.

(3-0-3)

CHE 451

Thermodynamics II

Second law analysis of cooling, separation, combustion, and other chemical processes. Chemical reaction equilibrium and processing applications.

Prerequisite(s): [(CHE 351)]

(3-0-3)

CHE 455

Polymer Processing

Considerations of transport processes in the polymer industry. Analysis of heat, mass, and momentum transfer in molten polymers and polymer solutions. The polymer flow processes to be discussed will include: extrusion, calendaring, fiber spinning, injection molding, mixing, and polymerization reaction.

Prerequisite(s): [(CHE 301 and CHE 302)]

(3-0-3)

CHE 465

Electrochemical Energy Conversion

Thermodynamics, kinetic and mass-transfer fundamentals of electrochemical devices. Potential and potential measurement. Batteries and fuel cells. Fundamentals of corrosion and corrosion prevention.

Prerequisite(s): [(CHE 302)]

(3-0-3)

CHE 467

Fuel Cell System Design

System or chemical reactor perspective of fuel cell design. Macro-scale modeling of fuel cell applications. Description of electrode/electrolyte assemblies and the three phase region, polarization curve characterization, analysis of continuous flow systems, typical fuel cell stack configurations, analysis of spatial non-uniformities in stacks, and balance of plant design.

Prerequisite(s): [(CHE 423)]

(3-0-3)

CHE 470

Introduction to Polymer Science

An introduction to the basic principles that govern the synthesis, processing and properties of polymeric materials. Topics include classifications, synthesis methods, physical and chemical behavior, characterization methods, processing technologies and applications. Same as CHEM 470 and MMAE 470.

Prerequisite(s): [(CHEM 124, MATH 251, and PHYS 221)]

(3-0-3)

CHE 489

Fluidization

Regimes of fluidized beds, rheology behavior of fluidized beds, particle classification, properties of the bubble, emulsion, elutriation, and jet. Fluid mechanic theory and heat and mass transfer in fluidized beds. Design aspects of fluidized beds and pneumatic conveying. Industrial applications of fluidized beds (catalytic reactors, drying, coal conversion, waste treatment).

Prerequisite(s): [(CHE 302)]

(3-0-3)

CHE 491

Undergraduate Research

Students undertake an independent research project under the guidance of a chemical and biological engineering faculty member.

(Credit: Variable)

CHE 494

Process Design I

Introduction to design techniques and economic aspects of chemical processes. The technical and economic aspects of equipment selection and design, and alternative methods of operation.

Prerequisite(s): [(CHE 302, CHE 423*, CHE 433, CHE 435*, and CHE 451)] An asterisk (*) designates a course which may be taken concurrently.

(2-2-3) (C)

CHE 496

Process Design II

Group project in process design. Integration of technical, safety, environmental, economic, and societal issues in process development and design. Only CHE students should register for this course. Open only to Chemical Engineering majors.

Prerequisite(s): [(CHE 423*, CHE 435*, and CHE 494)] An asterisk (*) designates a course which may be taken concurrently.

(1-2-2) (C)

CHE 497

Special Projects

Special projects.

(Credit: Variable)

CHE 498

Chemical Process Safety Design

The purpose of the course is to apply process design disciplines to integrate safety as a principal of the design process. Typical subjects are: thermodynamics of explosions, identification of process hazards, chemical reactivity hazards, dispersion models of release of toxic materials, fires and fire protection, and HAZOP and Fault Tree analysis.

Prerequisite(s): [(CHE 494)]

(3-0-3)

GRADUATE COURSES

Degree-seeking undergraduates may take graduate courses with approval of the course instructor and faculty advisor. For course descriptions, see the *IIT Bulletin: Graduate Programs*.

CHE 503

Thermodynamics

CHE 506

Entrepreneurship and Intellectual Property Management

CHE 508

Process Design Optimization

CHE 525

Chemical Reaction Engineering

| | |
|---|--|
| CHE 530 Advanced Process Control | |
| CHE 535 Applications of Mathematics to Chemical Engineering | |
| CHE 536 Computational Techniques in Engineering | |
| CHE 538 Polymerization Reaction Engineering | |
| CHE 541 Renewable Energy Technologies | |
| CHE 542 Fluidization and Gas-Solids Flow Systems | |
| CHE 543 Energy, Environment and Economics | |
| CHE 545 Metabolic Engineering | |
| CHE 551 Advanced Transport Phenomena | |
| CHE 553 Advanced Thermodynamics | |
| CHE 555 Polymer Processing | |
| CHE 560 Statistical Quality and Process Control | |
| CHE 565 Fundamentals of Electrochemistry | |
| CHE 566 Electrochemical Engineering | |
| CHE 567 Fuel Cell Fundamentals | |
| CHE 575 Polymer Rheology | |
| CHE 577 Bioprocess Engineering | |
| CHE 580 Biomaterials | |
| CHE 582 Interfacial and Colloidal Phenomena with Applications | |
| CHE 583 Pharmaceutical Engineering | |
| CHE 584 Tissue Engineering | |
| CHE 585 Drug Delivery | |

Chemistry

| | |
|---|--|
| CHEM 100 Introduction to the Profession Introduction to the chemical sciences, scientific method, computing tools, and interrelations of chemical sciences with biology, physics and other professions. (2-0-2) (C) | |
| CHEM 122 Principles of Chemistry I Without Laboratory Foundations of chemistry, atoms and molecules, stoichiometry of chemical reactions, thermo chemistry, properties of gases, states of matter, chemical solutions, kinetics. Molecular basis for chemical reactivity; atomic structure, periodicity, chemical bonding. Same as CHEM 124 except without the laboratory. (3-0-3) | |
| CHEM 123 General Chemistry Laboratory General chemistry laboratory. The laboratory portion of CHEM 124. (0-3-1) | |
| CHEM 124 Principles of Chemistry I with Laboratory Foundations of chemistry, atoms and molecules, stoichiometry of chemical reactions, thermo chemistry, properties of gases, states of matter, chemical solutions, kinetics. Molecular basis for chemical reactivity; atomic structure, periodicity, chemical bonding. (3-1-4) (C) | |
| CHEM 125 Principles of Chemistry II Chemical equilibria, the chemistry of acids and bases, solubility and precipitation reactions. Introduction to thermodynamics and electrochemistry. Chemistry of selected elements and their compounds. Prerequisite(s): [(CHEM 124) OR (IIT Chemistry Placement: 125)] (3-3-4) (C) | |
| CHEM 126 Principles of Chemistry II Same as CHEM 125 except without the laboratory. Prerequisite(s): [(CHEM 122) OR (CHEM 124)] (3-0-3) | |
| CHEM 140 Principles of Chemistry II Lab Laboratory portion of CHEM 125 (Principles of Chemistry II) covering Chemical Equilibria, the chemistry of acids and bases, solubility, and precipitation reactions. Introduction to thermodynamics and electrochemistry. Chemistry of selected elements and their compounds. Prerequisite(s): [(CHEM 126)] (0-3-1) | |
| CHEM 235 Organic Chemistry I-Lecture The constitution and properties of the different classes of organic compounds, with considerable attention to stereochemistry, reaction mechanisms, synthetic organic and bio-organic chemistry, and spectroscopy. The laboratory work involves an introduction to major synthetic and analytical techniques of organic chemistry including the preparation of representative organic compounds and the isolation of compounds from natural sources. Lecture only. Prerequisite(s): [(CHEM 125) OR (CHEM 126)] (3-0-3) | |

Course Descriptions

CHEM 236

Organic Chemistry I-Lab

Introduction to the major synthetic and analytical techniques of organic chemistry including the preparation of representative organic compounds from natural sources.

Prerequisite(s): [(CHEM 125) OR (CHEM 126)]
(0-4-1)

CHEM 237

Organic Chemistry I

The constitution and properties of the different classes of organic compounds, with considerable attention to stereochemistry, reaction mechanisms, synthetic organic and bio-organic chemistry, and spectroscopy. The laboratory work involves an introduction to the major synthetic and analytical techniques of organic chemistry including the preparation of representative organic compounds and the isolation of compounds from natural sources.

Prerequisite(s): [(CHEM 125) OR (CHEM 126)]
(3-4-4) (C)

CHEM 239

Organic Chemistry II

Sequel to Organic Chemistry I. Constitution and properties of organic compounds at a fundamental level. Introduction to biological materials and synthetic polymers.

Prerequisite(s): [(CHEM 235 and CHEM 236) OR (CHEM 237)]
(3-0-3)

CHEM 240

Organic Chemistry Laboratory

Laboratory part of CHEM 239. Techniques for advanced organic preparations. Identification and characterization of organic compounds, including modern instrumental methods.

Prerequisite(s): [(CHEM 239*)] An asterisk (*) designates a course which may be taken concurrently.
(1-4-2) (C)

CHEM 247

Analytical Chemistry

Introduction to the theory and applications of analytical chemistry. Laboratory emphasis on obtaining and interpreting quantitative data. Statistical data analysis, equilibrium expressions, pH, volumetric and gravimetric analysis, fundamentals of spectroscopy, fundamentals of electrochemistry, and analytical separations. Laboratory experiments include acid-base behavior, potentiometry with ion-specific electrodes, spectroscopy (UV-visible and atomic absorption), and chromatography (ion-exchange, high pressure liquid, and gas-liquid).

Prerequisite(s): [(CHEM 125)]
(2-4-3) (C)

CHEM 321

Instrumental Analysis

Theory and application of modern instruments in chemical procedures. Standard spectroscopic methods including Fourier transform infrared spectroscopy, nuclear magnetic resonance spectroscopy and ultraviolet spectroscopy. Separation techniques using high pressure liquid chromatography and gas chromatography. Other topics relevant to advanced chemical instrumentation will also be covered.

Prerequisite(s): [(CHEM 247)]
(2-6-4) (C)

CHEM 343

Physical Chemistry I

Equations of state; kinetic molecular theory; temperature dependent enthalpies and heat capacities of chemical compounds and of chemical reactions; entropy and the Gibbs free energy; chemical equilibrium; phases with variable composition; solutions of charged particles; surface phenomena.

Prerequisite(s): [(MATH 251) OR (MATH 252)]
(3-0-3)

CHEM 344

Physical Chemistry II

Quantum theory, molecular structure and spectroscopy, chemical equilibrium constants from statistical mechanics, phenomenological and mechanistic chemical reaction kinetics, transport phenomena from molecular perspective. The laboratory will include experiments dealing with gases, thermochemistry, liquid solutions, phase equilibria, electrochemistry, chemical kinetics, spectra, molecular structure, and treatment of data.

Prerequisite(s): [(CHE 202) OR (CHEM 247)] AND [(CHEM 343 and PHYS 221)]
(3-4-4) (C)

CHEM 410

Science of Climate Change

This course will focus on the science underlying global warming/climate change. How can we continue to lead the good life while living in harmony with nature? Although obviously important, commercial/political aspects are not considered here. However, any serious debate about climate change issues eventually has to rest on the underlying scientific facts so we need to be informed. Ultimately the sun is our primary source of power. How do we responsibly access that power in the short, intermediate and long terms? Bio-fuels, carbon dioxide, polar ice caps, and solar power are some of the topics to be discussed. Class time will be divided between lectures and recitation. Permission of instructor required.

Prerequisite(s): [(CHEM 124) OR (PHYS 221)]
(3-0-3)

CHEM 415

Inorganic Chemistry

In-depth introduction to the vast subfield of the discipline dealing with all of the elements in the periodic table. Presents balanced blend of facts and theories in modern inorganic chemistry. Emphasis is on bonding, electronic, magnetic, and structural features exhibited by inorganic and organometallic compounds and their reactivities. Modern concepts including symmetry and group theory and their relevance in solving chemical problems. Bioinorganic chemistry and high tech inorganic materials and solids are introduced.

Prerequisite(s): [(CHEM 239)]
(3-0-3)

CHEM 416

Advanced Chemistry Laboratory

An advanced laboratory with emphasis on synthesis and characterization of inorganic and organometallic compounds.

Prerequisite(s): [(CHEM 240 and CHEM 415)]
(1-7-3) (C)

CHEM 434

Spectroscopic Methods in Identification & Analysis

Characterization and analysis by mass, vibrational, nuclear magnetic resonance, and electronic spectroscopy. Structure-spectra correlations applied to organic and inorganic compounds with examples drawn from diverse areas, e.g., pollutants, toxic materials, polymers, etc. The laboratory work includes characterization of prepared or separated organic compounds by chromatographic, chemical, and spectroscopic methods.

Prerequisite(s): [(CHEM 240 and CHEM 247)]
(3-4-4)

CHEM 450

Introduction to Research

Required for chemistry majors. Designed to give research experience in a faculty research laboratory.

(0-8-3) (C)

CHEM 451**Modern Techniques in Chemical Literature**

A guide to the use of traditional and automated methods for the storage and retrieval of chemical information.
(3-0-3)

CHEM 454**Chemical Modeling & Simulation**

A computer applications course for chemists, chemical engineers, and scientists emphasizing software application rather than hardware. This class is intended to provide an introduction to computational chemistry for non-specialists and to demonstrate how these techniques can pragmatically impact the chemical industry. The subject matter is presented using practical industrial problems that emphasize scientific solutions. Class work involves "hands on" learning that extensively involves the interactive use of computers. Lectures emphasize the theoretical foundations for a particular topic and follow up practical assignments reinforce that material. Both the lectures and the home works demonstrate the power and limitations of modern molecular modeling by addressing the use of computers in the design of materials. By the end of the course, students will understand the basic concepts and language of chemistry modeling so that they may successfully incorporate it into their work.

Prerequisite(s): [(CHEM 344, CS 105, and MATH 152)]
(3-0-3)

CHEM 455**Advanced Organic Chemistry**

A survey of organic name reactions and modern reagents for organic synthesis with an emphasis on their utility in multistep synthesis.

Prerequisite(s): [(CHEM 239 and CHEM 344)]
(3-0-3)

CHEM 470**Introduction to Polymers**

Basic introduction to Polymer Science. The course will cover basics of polymer nomenclature, synthesis, characterization, and the relationship between polymer structures and properties. Examples of major applications of polymeric materials including biopolymers will be presented.

Prerequisite(s): [(CHEM 239)]
(3-0-3)

CHEM 485**Chemistry Colloquium**

Lectures by prominent scientists. This course exposes students to current and active research in chemistry both within and outside the IIT community. It helps prepare students for a career in research. It is complementary to the academic courses and provides examples of professional/scientific presentations. This course may not be used to satisfy the natural science general education requirement.

(1-0-1)

CHEM 487**Senior Thesis in Chemistry**

Original work carried on by the student under the guidance of a staff member. A careful search of the literature is required before the study is begun, and continued reference to the chemical literature is expected as the work progresses. A written report is required.

Prerequisite(s): [(CHEM 450 and CHEM 451)]
(0-12-4) (C)

CHEM 497**Special Projects**

For juniors and seniors. Requires junior standing.
(Credit: Variable) (C)

GRADUATE COURSES

Degree-seeking undergraduates may take graduate courses with approval of the course instructor and faculty advisor. For course descriptions, see the *IIT Bulletin: Graduate Programs*.

CHEM 500**Advanced Analytical Chemistry****CHEM 502****Gas Chromatography, Gas Chromatography Mass Spectrometry****CHEM 504****Electroanalytical Chemistry****CHEM 505****Spectroscopic Methods****CHEM 506****Sampling and Sample Preparation****CHEM 508****Analytical Methods Development****CHEM 509****Physical Methods of Characterization****CHEM 510****Electronics and Interfacing****CHEM 518****Electrochemical Methods****CHEM 520****Advanced Inorganic Chemistry****CHEM 521****Structural Inorganic and Materials Chemistry****CHEM 522****Efficient Chemical and Materials Synthesis****CHEM 524****Intellectual Property Management****CHEM 530****Organic Reaction Mechanisms****CHEM 531****Tactics in Organic Synthesis****CHEM 535****Polymer Synthesis****CHEM 537****Polymer Chemistry Laboratory****CHEM 538****Physical Biochemistry****CHEM 539****Introduction to Pharmaceutical Chemistry****CHEM 542****Polymer Characterization and Analysis****CHEM 550****Chemical Bonding****CHEM 552****Chemical Kinetics****CHEM 553****Introduction to Chemical Thermodynamics**

Communication

COM 101

Writing in the University

A study of the use of writing, reading, and discussion as a means of discovering, questioning, and analyzing ideas, with an emphasis on audience, context and the use of revision. This course satisfies the Basic Writing Proficiency Requirement. It does not satisfy a general education requirement in the Humanities and Social or Behavioral Sciences.

(3-0-3) (C)

COM 111

Writing in the University for Non-Native Students

Designed to deal with the special writing problems of those students whose native language is not English. Equivalent to COM 101. This course satisfies IIT's Basic Writing Proficiency Requirement. It does not satisfy a general education requirement in the humanities and social or behavioral sciences.

(3-0-3) (C)

COM 301

Introduction to Linguistics

An introduction to the systematic study of language. Focus on the core areas of linguistics, such as sound patterns of language (phonology), form (syntax, morphology), and meaning (semantics, pragmatics), as well as applied areas, such as language, variation, language acquisition, psychology of language, and the origin of language.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(3-0-3) (C)(H)

COM 306

World Englishes

This course surveys dialects of English around the world, including the U.S., U.K., Canada, India, Africa, and the Caribbean, focusing on vocabulary, word and sentence formation, and sound patterning.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(3-0-3) (C)(H)

COM 308

Structure of Modern English

This course examines the structure of the English language from four different approaches: traditional-prescriptive, descriptive, generative, and contextual.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(3-0-3) (C)(H)

COM 309

History of the English Language

Beginning with basic concepts in language development, this course traces the evolution of modern English, from its Indo-European roots, through Germanic, Anglo-Saxon, Middle English and Early Modern English.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(3-0-3) (C)(H)

COM 310

The Human Voice: Description, Analysis & Application

Analysis of human and synthetic speech intended for technology mediated environments and devices. Focus on talker characteristics that affect speech intelligibility and social factors that affect talker characteristics. Attention to design characteristics of technology-mediated speech and how humans react to it.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(3-0-3) (C)(H)

COM 311

Linguistics for Technical Communication

This course examines linguistic theory as it relates to everyday problems. The course is divided into four sections, each of which exposes students to an application of these topics to broader issues. Topics include sound patterns of speech, sentence structure, meaning and language and society.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(3-0-3) (C)(H)

COM 315

Discourse Analysis

The analysis of language "flow" beyond sentence boundaries. Working with both spoken and written discourse, students will consider culture and gender-related patterns, and will apply findings from discourse analysis to communication problems in politics, education, healthcare, and the law.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(3-0-3) (C)(H)

COM 327

Standards-based Web Design

This course introduces the theory and practice of standards-based web design and development. The course focuses on an agile, incremental approach to building accessible, usable, and sustainable web pages that work across all modern browsers and web-enabled mobile devices. The course also provides a rhetorical and technological foundations for quickly establishing competencies in other areas of digital communication, such as web application development.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(3-0-3) (C)(H)

COM 371

Persuasion

The study of covert and overt persuasion and their influences on society and individuals.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(3-0-3) (C)(H)

COM 372

Mass Media & Society

The history and structure of mass media, from print through film and broadcasting to the Internet, and their influences on American society.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(3-0-3) (C)(H)

COM 374

Communications in Politics

This course introduces students to the general theories and practices of political campaign communication today. It investigates how those rules and types apply in the current presidential campaign. More generally, the course teaches students to produce written and oral discourse appropriate to the humanities.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(3-0-3) (C)(H)

COM 377

Communication Law & Ethics

Explores ethical and legal issues concerning communication in diverse contexts, such as: the mass media - e.g. print, broadcast, and electronic; government and politics; organizational hierarchies - e.g. public and private sector workplaces; academic life - e.g. the classroom, student, and faculty affairs; and interpersonal relations - e.g. love, friendship, marriage.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(3-0-3) (C)(H)

COM 380**Topics in Communication**

An investigation into a topic of current interest in communication, which will be announced by the instructor when the course is scheduled.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)] (3-0-3) (C)(H)

COM 381**Topics in Communication**

An investigation into a topic of current interest in communication, which will be announced by the instructor when the course is scheduled.

Prerequisite(s): Satisfaction of IIT's Basic Writing Proficiency Requirement (3-0-3) (C)

COM 383**Social Networks**

This course will discuss a variety of measures and properties of networks, identify various types of social networks, describe how position within and the structure of networks matter, use software tools to analyze social network data, and apply social network analysis to areas such as information retrieval, social media and organizational behavior.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)] (3-0-3) (C)(S)

COM 384**Humanizing Technology**

This course will investigate and experiment with both conceptual and applied efforts to humanize technology. We will question the goals of humanization and its relationships to concepts such as design ethics and user-centered and emotional design. While the focus of the class will be on computer technology and programming languages, we will also look at humanization with regard to industrial design, engineering, architecture and nanotechnologies.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)] (3-0-3) (C)(H)

COM 421**Technical Communication**

Principles and practice in the communication of technical materials. Students work on the design, writing, and revising of reports, articles, manuals, procedures, proposals, including the use of graphics. Works by modern writers are analyzed.

Prerequisite(s): Satisfaction of IIT's Basic Writing Proficiency Requirement (3-0-3) (C)

COM 424**Document Design**

Principles and strategies for effective document and information design, focusing on print media. Students design, produce, and evaluate documents for a variety of applications, such as instructional materials, brochures, newsletters, graphics, and tables.

Prerequisite(s): Satisfaction of IIT's Basic Writing Proficiency Requirement (3-0-3) (C)

COM 425**Editing**

Principles and practical applications of editing at all levels, working with both hard and soft copy and including copy-marking, copyediting, proofreading, grammar and style, and comprehensive editing. Attention primarily to documents from science, technology, and business.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)] (3-0-3) (C)

COM 428**Verbal & Visual Communication**

Introduces students to the issues, strategies, and ethics of technical and professional presentations, and provides students with opportunities to engage in public address, video presentations and conferencing, and group presentations. Analysis of audience types and presentation situations, group dynamics, persuasive theories, language, and mass media.

Prerequisite(s): Satisfaction of IIT's Basic Writing Proficiency Requirement (3-0-3) (C)

COM 435**Intercultural Communication**

An introduction to the problems of communication across cultures, with emphasis on the interplay of American civilization with those of other cultural areas.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)] (3-0-3) (C)(H)

COM 440**Introduction to Journalism**

Introduction to the principles and practices of modern American journalism. Students will analyze news stories and media, and will cover and report on campus area events. Student-generated news stories will be discussed, analyzed and evaluated.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)] (3-0-3) (C)(H)

COM 485**Undergraduate Internship in Technical Communication**

A cooperative arrangement between IIT and industry, the internship provides students with hands-on experience in the field of technical communication.

(Credit: Variable)

COM 491**Independent Reading & Research**

Consent of department. For advanced students. Based on the selected topic, this course may or may not be applied to the humanities general education requirement. Consult the course instructor.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)] (Credit: Variable) (C)(H)

Computer Science

CS 100**Introduction to the Profession**

An introduction to science and engineering as a profession. Examines the problem-solving process used in engineering and science. Emphasizes the interdisciplinary and international nature of problem-solving and the need to evaluate solutions in terms of a variety of constraints: computational, financial, and social.

(1-2-2) (C)

CS 104**Introduction to Computer Programming for Engineers**

Introduces the use of high-level programming language as a problem-solving tool in engineering including basic data structures and algorithms, structured programming techniques, and software documentation. Designed for students who have had little or no prior experience with computer programming.

(2-1-2)

Course Descriptions

CS 105

Introduction to Computer Programming

Introduces the use of high-level programming language as a problem-solving tool, including basic data structures and algorithms, structured programming techniques, and software documentation. Designed for students who have had little or no prior experience with computer programming.

(2-1-2)

CS 110

Computing Principles

An introduction to the following “big ideas” of computer science: (1) computing is a creative activity; (2) abstraction reduces information and detail to facilitate focus on relevant concepts; (3) data and information facilitate the creation of knowledge; (4) algorithms are used to develop and express solutions to computational problems; (5) programming enables problem solving, human expression, and creation of knowledge; (6) the internet pervades modern computing; and (7) computing has global impacts.

(2-0-2)

CS 115

Object-Oriented Programming I

Introduces the use of a high-level object-oriented programming language as a problem-solving tool, including basic data structures and algorithms, object-oriented programming techniques, and software documentation. Designed for students who have had little or no prior experience with computer programming. For students in CS and CS-related degree programs.

(2-1-2)

CS 116

Object-Oriented Programming II

Introduces more advanced elements of object-oriented programming, including dynamic data structures, recursion, searching and sorting, and advanced object-oriented programming techniques. For students in CS and CS-related degree programs.

Prerequisite(s): [(CS 115 with min. grade of C)]

(2-1-2)

CS 201

Accelerated Introduction to Computer Science

Problem-solving and design using an object-oriented programming language. Introduces a variety of problem-solving techniques, algorithms, and data structures in object-oriented programming.

Prerequisite(s): [(CS 105) OR (CS 115)]

(3-2-4)

CS 330

Discrete Structures

Introduction to the use of formal mathematical structures to represent problems and computational processes. Topics covered include Boolean algebra, first-order logic, recursive structures, graphs, and abstract language models. Credit will not be granted for both CS 330 and MATH 230.

Prerequisite(s): [(CS 116) OR (CS 201)]

(3-1-3)

CS 331

Data Structures & Algorithms

Implementation and application of the essential data structures used in computer science. Analysis of basic sorting and searching algorithms and their relationship to these data structures. Particular emphasis is given to the use of object-oriented design and data abstraction in the creation and application of data structures.

Prerequisite(s): [(CS 116) OR (CS 201)]

(3-1-3)

CS 350

Computer Organization & Assembly Language Programming

Introduction to the internal architecture of computer systems, including micro-, mini-, and mainframe computer architectures. Focuses on the relationship among a computer's hardware, its native instruction set, and the implementation of high-level languages on that machine. Uses a set of assembly language programming exercises to explore and analyze a microcomputer architecture. Credit will not be granted for both CS 350 and ECE 242.

Prerequisite(s): [(CS 116*) OR (CS 201*)] An asterisk (*) designates a course which may be taken concurrently.

(3-1-3) (C)

CS 351

Systems Programming

Examines the components of sophisticated multilayer software systems, including device drivers, systems software, applications interfaces, and user interfaces. Explores the design and development of interrupt-driven and event-driven software.

Prerequisite(s): [(CS 331 and CS 350) OR (CS 331 and ECE 242)]

(3-1-3)

CS 397

Special Projects

(Credit: Variable)

CS 411

Computer Graphics

Overview of display devices and applications. Vector graphics in two and three dimensions. Image generation, representation, and manipulation. Homogeneous coordinates. Modeling and hidden line elimination. Introduction to raster graphics. Perspective and parallel projections.

Prerequisite(s): [(CS 331) OR (CS 401) OR (CS 403)]

(3-0-3) (T)

CS 422

Data Mining

This course will provide an introductory look at concepts and techniques in the field of data mining. After covering the introduction and terminologies to Data Mining, the techniques used to explore the large quantities of data for the discovery of meaningful rules and knowledge such as market basket analysis, nearest neighbor, decision trees, and clustering are covered. The students learn the material by implementing different techniques throughout the semester.

Prerequisite(s): [(CS 331) OR (CS 401) OR (CS 403)]

(3-0-3) (C)(T)

CS 425

Database Organization

Overview of database architectures, including the Relational, Hierarchical, Network, and Object Models. Database interfaces, including the SQL query language. Database design using the Entity-Relationship Model. Issues such as security, integrity, and query optimization.

Prerequisite(s): [(CS 331) OR (CS 401) OR (CS 403)]

(3-0-3) (C)(T)

CS 429**Information Retrieval**

Overview of fundamental issues of information retrieval with theoretical foundations. The information-retrieval techniques and theory, covering both effectiveness and run-time performance of information-retrieval systems are covered. The focus is on algorithms and heuristics used to find documents relevant to the user request and to find them fast. The course covers the architecture and components of the search engine such as parser, stemmer, index builder, and query processor. The students learn the material by building a prototype of such a search engine. Requires strong programming knowledge.

Prerequisite(s): [(CS 331) OR (CS 401)]
(3-0-3) (C)(T)

CS 430**Introduction to Algorithms**

Introduction to the design, behavior, and analysis of computer algorithms. Searching, sorting, and combinatorial algorithms are emphasized. Worst case, amortized, and expected bounds on time and space usage.

Prerequisite(s): [(CS 330 and CS 331) OR (CS 331 and MATH 230) OR (CS 401) OR (CS 403)]
(3-1-3) (C)(T)

CS 440**Programming Languages & Translators**

Study of commonly used computer programming languages with an emphasis on precision of definition and facility in use. Scanning, parsing, and introduction to compiler design. Use of compiler generating tools.

Prerequisite(s): [(CS 330 and CS 331) OR (CS 331 and MATH 230) OR (CS 401) OR (CS 403)]
(3-0-3) (T)

CS 442**Mobile Applications Development**

Students will learn a variety of software engineering techniques and design patterns to assist in the rapid development and prototyping of applications, leveraging frameworks and APIs provided by current mobile development platforms (such as Android and iOS). Application lifecycles, data management and persistence mechanisms, and user interface design, among other topics, will be covered. Industry speakers will be invited to speak about best practices. Students (individually or in teams) will take ideas from concept to final implementation and will present their work at the end of the semester. When appropriate, students may take the additional step of deploying their work on the appropriate application marketplace(s).

Prerequisite(s): [(CS 331) OR (CS 401)] AND [(CS 351*) OR (CS 402*)] An asterisk (*) designates a course which may be taken concurrently.
(3-0-3) (T)

CS 443**Compiler Construction**

This course covers the design and implementation of a compiler for modern languages by implementing the following: abstract syntax trees; intermediate representations; static analysis; fix-point operations; symbol tables and type checking; and first-order and high-order function implementation. Students will incrementally create a series of compilers.

Prerequisite(s): [(CS 440)]
(3-0-3)

CS 445**Object Oriented Design & Programming**

Introduction to methodologies for object-oriented design and programming. Examines the object model and how it is realized in various object-oriented languages. Focuses on methods for developing and implementing object-oriented systems.

Prerequisite(s): [(CS 331) OR (CS 401) OR (CS 403)]
(3-0-3) (T)

CS 447**Distributed Objects**

This course provides an introduction to architecture, analysis, design, and implementation of distributed, multi-tier applications using distributed object technology. The course focuses on the services and facilities provided by an Object Request Broker (ORB). Students will use a commercially available ORB and Database Management System to develop distributed object applications.

Prerequisite(s): [(CS 445)]
(3-0-3) (C)(T)

CS 450**Operating Systems**

Introduction to operating system concepts-including system organization for uniprocessors and multiprocessors, scheduling algorithms, process management, deadlocks, paging and segmentation, files and protection, and process coordination and communication.

Prerequisite(s): [(CS 351) OR (CS 401 and CS 402) OR (CS 403)]
(3-0-3) (T)

CS 455**Data Communications**

Introduction to data communication concepts and facilities with an emphasis on protocols and interface specifications. Focuses on the lower four layers of the ISO-OSI reference model.

Prerequisite(s): [(CS 450)]
(3-0-3) (T)

CS 456**Introduction to Wireless Networks & Performance**

This class provides an opportunity for students to obtain a fundamental understanding of the nature and operation of the full range of wireless networks (personal, local area, wide area, and satellite) and their performance characteristics, future potential, and challenges through class lectures, assigned readings, homework, projects, and various hands-on experiences.

Prerequisite(s): [(CS 350) OR (CS 401 and CS 402) OR (CS 403) OR (ECE 242)]
(3-0-3) (T)

CS 458**Information Security**

An introduction to the fundamentals of computer and information security. This course focuses on algorithms and techniques used to defend against malicious software. Topics include an introduction to encryption systems, operating system security, database security, network security, system threats, and risk avoidance procedures.

Prerequisite(s): [(CS 425 and CS 450)]
(3-0-3) (C)(T)

CS 470**Computer Architecture**

Introduction to the functional elements and structures of digital computers. Detailed study of specific machines at the register transfer level illustrates arithmetic, memory, I/O and instruction processing.

Prerequisite(s): [(CS 350 and ECE 218) OR (ECE 218 and ECE 242)]
(2-2-3) (C)(T)

Course Descriptions

CS 480

Artificial Intelligence Planning & Control

Introduction to computational methods for intelligent control of autonomous agents, and the use of programming paradigms that support development of flexible and reactive systems. These include heuristic search, knowledge representation, constraint satisfaction, probabilistic reasoning, decision-theoretic control, and sensor interpretation. Particular focus will be places on real-world application of the material.

Prerequisite(s): [(CS 331) OR (CS 401) OR (CS 403)] AND [(MATH 474*)] An asterisk (*) designates a course which may be taken concurrently.

(3-0-3) (T)

CS 481

Artificial Intelligence Language Understanding

Theory and programming paradigms that enable systems to understand human language texts and extract useful information and knowledge. For example, extraction of structured event representations from news stories or discovering new research hypotheses by analyzing thousands of medical research articles. The course covers a variety of text analysis and text mining methods, with an emphasis on building working systems. Connections to information retrieval, data mining, and speech recognition will be discussed.

Prerequisite(s): [(CS 331) OR (CS 401) OR (CS 403)] AND [(MATH 474)]

(3-0-3) (T)

CS 482

Information & Knowledge Management Systems

This capstone course is designed as a project course whose purpose is to enable students to see how the various algorithms and systems they have learned about in their prerequisite courses can be used in context to create useful knowledge management tools. Class periods will be divided among discussion of design of information and knowledge management systems, lectures on effective project management techniques, and hands-on advising of student project group meetings.

Prerequisite(s): [(CS 422, CS 425, and CS 429) OR (CS 422, CS 425, and CS 481) OR (CS 425, CS 429, and CS 481)]

(3-0-3) (C)(T)

CS 485

Computers & Society

Discussion of the impact of computer technology on present and future society. Historical development of the computer. Social issues raised by cybernetics.

Prerequisite(s): [(COM 421) OR (COM 428)]

(3-0-3) (C)

CS 487

Software Engineering I

Study of the principles and practices of software engineering. Topics include software quality concepts, process models, software requirements analysis, design methodologies, software testing and software maintenance. Hands-on experience building a software system using the waterfall life cycle model. Students work in teams to develop all life cycle deliverables: requirements document, specification and design documents, system code, test plan, and user manuals.

Prerequisite(s): [(CS 331) OR (CS 401) OR (CS 403)] AND [(CS 425)]

(3-0-3) (C)(T)

CS 491

Undergraduate Research

Undergraduate Research

(Credit: Variable)

CS 495

Topics in Computer Science

This course will treat a specific topic, varying from semester to semester, in which there is particular student or staff interest.

(Credit: Variable)

CS 497

Special Projects

Special projects.

(Credit: Variable)

GRADUATE COURSES

Degree-seeking undergraduates may take graduate courses with approval of the course instructor and faculty advisor. For course descriptions, see the *IIT Bulletin: Graduate Programs*.

CS 511

Topics in Computer Graphics

CS 512

Topics in Computer Vision

CS 520

Database Design and Engineering

CS 521

Object-Oriented Analysis and Design

CS 522

Data Mining

CS 525

Advanced Database Organization

CS 529

Information Retrieval

CS 530

Theory of Computation

CS 531

Topics in Automata Theory

CS 533

Computational Geometry

CS 535

Design and Analysis of Algorithms

CS 536

Science of Programming

CS 537

Software Metrics

CS 538

Combinatorial Optimization

CS 540

Syntactic Analysis of Programming Languages

CS 541

Topics in Compiler Construction

CS 542

Computer Networks I Fundamentals

CS 544

Computer Networks II: Network Services

CS 545

Distributed Computing Landscape

CS 546
Parallel and Distributed Processing

CS 547
Wireless Networking

CS 548
Broadband Networks

CS 549
Cryptography and Network Security

CS 550
Advanced Operating Systems

CS 551
Operating System Design and Implementation

CS 552
Distributed Real-Time Systems

CS 553
Cloud Computing

CS 555
Analytic Models and Simulation of Computer Systems

CS 560
Computer Science in the Classroom

CS 561
The Computer and Curriculum Content

CS 570
Advanced Computer Architecture

CS 580
Topics in Machine Learning

CS 581
Topics in Artificial Intelligence

CS 582
Computational Robotics

CS 583
Probabilistic Graphical Models

CS 584
Machine Learning

CS 585
Natural Language Process

CS 586
Software Systems Architectures

CS 587
Software Project Management

CS 588
Advanced Software Engineering Development

CS 589
Software Testing and Analysis

CS 595
Topics in Computer Science

Electrical and Computer Engineering

ECE 100

Introduction to the Profession I

Introduces the student to the scope of the engineering profession and its role in society and develops a sense of professionalism in the student. Provides an overview of electrical engineering through a series of hands-on projects and computer exercises. Develops professional communication and teamwork skills.

(2-3-3) (C)

ECE 211

Circuit Analysis I

Ohm's Law, Kirchhoff's Laws, and network element voltage-current relations. Application of mesh and nodal analysis to circuits. Dependent sources, operational amplifier circuits, superposition, Thevenin's and Norton's Theorems, maximum power transfer theorem. Transient circuit analysis for RC, RL, and RLC circuits. Introduction to Laplace Transforms. Laboratory experiments include analog and digital circuits; familiarization with test and measurement equipment; combinational digital circuits; familiarization with latches, flip-flops, and shift registers; operational amplifiers; transient effects in first-order and second-order analog circuits; PSpice software applications. Concurrent registration in MATH 252 and ECE 218.

Prerequisite(s): [(ECE 218* and MATH 252*)] An asterisk (*) designates a course which may be taken concurrently.

(3-3-4) (C)

ECE 213

Circuit Analysis II

Sinusoidal excitation and phasors. AC steady-state circuit analysis using phasors. Complex frequency, network functions, pole-zero analysis, frequency response, and resonance. Two-port networks, transformers, mutual inductance, AC steady-state power, RMS values, introduction to three-phase systems and Fourier series. Design-oriented experiments include counters, finite state machines, sequential logic design, impedances in AC steady-state, resonant circuits, two-port networks, and filters. A final project incorporating concepts from analog and digital circuit design will be required. Prerequisites: ECE 211 with a grade C or better.

Prerequisite(s): [(ECE 211 with min. grade of C)]

(3-3-4) (C)

ECE 215

Circuit Analysis I

Ohm's Law, Kirchhoff's Laws, and network element voltage-current relations. Application of mesh and nodal analysis to circuits. Dependent sources, operational amplifier circuits, superposition, Thevenin's and Norton's Theorems, maximum power transfer theorem. Transient circuit analysis for RC, RL, and RLC circuits. Introduction Laplace Transforms. Note: ECE 215 is for non-ECE majors. Course does not satisfy graduation requirements for Computer Engineering, Electrical and Computer Engineering or Electrical Engineering majors.

Prerequisite(s): [(MATH 252*)] An asterisk (*) designates a course which may be taken concurrently.

(3-0-3)

Course Descriptions

ECE 216

Circuit Analysis II

Sinusoidal excitation and phasors. AC steady-state circuit analysis using phasors. Complex frequency, network functions, pole-zero analysis, frequency response, and resonance. Two-port networks, transformers, mutual inductance, AC steady-state power, RMS values, introduction to three-phase systems and Fourier series. Note: ECE 216 is for non-ECE majors. Course does not satisfy graduation requirements for Computer Engineering, Electrical and Computer Engineering or Electrical Engineering majors.

Prerequisite(s): [(ECE 211 with min. grade of C) OR (ECE 215 with min. grade of C)]
(3-0-3)

ECE 218

Digital Systems

Number systems and conversions, binary codes, and Boolean algebra. Switching devices, discrete and integrated digital circuits, analysis and design of combinational logic circuits. Karnaugh maps and minimization techniques. Counters and registers. Analysis and design of synchronous sequential circuits. Concurrent registration in ECE 211 and ECE 212 is strongly encouraged. Requires sophomore standing.
(3-0-3)

ECE 242

Digital Computers & Computing

Basic concepts in computer architecture, organization, and programming, including: integer and floating point number representations, memory organization, computer processor operation (the fetch/execute cycle), and computer instruction sets. Programming in machine language and assembly language with an emphasis on practical problems. Brief survey of different computer architectures.

Prerequisite(s): [(CS 116 and ECE 218)]
(3-0-3)

ECE 307

Electrodynamics

Analysis of circuits using distributed network elements. Response of transmission lines to transient signals. AC steady-state analysis of lossless and lossy lines. The Smith Chart as an analysis and design tool. Impedance matching methods. Vector analysis applied to static and time-varying electric and magnetic fields. Coulomb's Law, electric field intensity, flux density and Gauss's Law. Energy and potential. Biot-Savart and Ampere's Law. Maxwell's equations with applications including uniform-plane wave propagation.

Prerequisite(s): [(ECE 213, MATH 251, and PHYS 221)]
(4-0-4)

ECE 308

Signals & Systems

Time and frequency domain representation of continuous and discrete time signals. Introduction to sampling and sampling theorem. Time and frequency domain analysis of continuous and discrete linear systems. Fourier series convolution, transfer functions. Fourier transforms, Laplace transforms, and Z-transforms.

Prerequisite(s): [(ECE 213 and MATH 333*)] An asterisk (*) designates a course which may be taken concurrently.
(3-0-3)

ECE 311

Engineering Electronics

Physics of semiconductor devices. Diode operation and circuit applications. Regulated power supplies. Bipolar and field-effect transistor operating principles. Biasing techniques and stabilization. Linear equivalent circuit analysis of bipolar and field-effect transistor amplifiers. Laboratory experiments reinforce concepts.

Prerequisite(s): [(ECE 213)]
(3-3-4) (C)

ECE 312

Electronic Circuits

Analysis and design of amplifier circuits. Frequency response of transistor amplifiers. Feedback amplifiers. Operational amplifiers: internal structure, characteristics, and applications. Stability and compensation. Laboratory experiments reinforce concepts.

Prerequisite(s): [(ECE 311)]
(3-3-4) (C)

ECE 319

Fundamentals of Power Engineering

Principles of electromechanical energy conversion. Fundamentals of the operations of transformers, synchronous machines, induction machines, and fractional horsepower machines. Introduction to power network models and per-unit calculations. Gauss-Siedel load flow. Lossless economic dispatch. Symmetrical three-phase faults. Laboratory considers operation, analysis, and performance of motors and generators. The laboratory experiments also involve use of PC-based interactive graphical software for load flow, economic dispatch, and fault analysis.

Prerequisite(s): [(ECE 213)]
(3-3-4) (C)

ECE 401

Communication Electronics

Radio frequency AM, FM, and PM transmitter and receiver principles. Design of mixers, oscillators, impedance matching networks, filters, phase-locked loops, tuned amplifiers, power amplifiers, and crystal circuits. Nonlinear effects, intermodulation distortion, and noise. Transmitter and receiver design specification. Credit will be given for either ECE 401 or ECE 409, but not for both.

Prerequisite(s): [(ECE 307, ECE 312, and ECE 403*)] An asterisk (*) designates a course which may be taken concurrently.
(3-0-3) (P)

ECE 403

Digital & Data Communication Systems

Introduction to Amplitude, Phase, and Frequency modulation systems. Multiplexing and Multi-Access Schemes; Spectral design considerations. Sampling theorem. Channel capacity, entropy; Quantization, wave shaping, and Inter-Symbol Interference (ISI), Matched filters, Digital source encoding, Pulse Modulation systems. Design for spectral efficiency and interference control. Probability of error analysis, Analysis and design of digital modulators and detectors.

Prerequisite(s): [(ECE 308 and MATH 474)]
(3-0-3) (P)

ECE 405

Digital & Data Communication Systems with Laboratory

Introduction to Amplitude, Phase, and Frequency modulation systems. Multiplexing and Multi-Access Schemes; Spectral design considerations. Sampling theorem. Channel capacity, entropy; Quantization, wave shaping, and Inter-Symbol Interference (ISI), Matched filters, Digital source encoding, Pulse Modulation systems. Design for spectral efficiency and interference control. Probability of error analysis, Analysis and design of digital modulators and detectors.

Prerequisite(s): [(ECE 308* and MATH 474)] An asterisk (*) designates a course which may be taken concurrently.
(3-3-4) (C)(P)

ECE 407

Introduction to Computer Networks with Laboratory

Emphasis on the physical, data link, and medium access layers of the OSI architecture. Different general techniques for networking tasks, such as error control, flow control, multiplexing, switching, routing, signaling, congestion control, traffic control, scheduling will be covered along with their experimentation and implementation in a laboratory. Credit given for ECE 407 or ECE 408, not both.

(3-3-4) (C)(P)

ECE 408

Introduction to Computer Networks

Emphasis on the physical, data link and medium access layers of the OSI architecture. Different general techniques for networking tasks, such as error control, flow control, multiplexing, switching, routing, signaling, congestion control, traffic control, scheduling will be covered. Credit given for ECE 407 or ECE 408, not both.

(3-0-3) (P)

ECE 411

Power Electronics

Power electronic circuits and switching devices such as power transistors, MOSFET's, SCR's, GTO's, IGBT's and UJT's are studied. Their applications in AC/DC DC/DC, DC/AC and AC/AC converters as well as switching power supplies are explained. Simulation mini-projects and lab experiments emphasize power electronic circuit analysis, design and control.

Prerequisite(s): [(ECE 311)]

(3-3-4) (C)(P)

ECE 412

Electric Motor Drives

Fundamentals of electric motor drives are studied. Applications of semiconductor switching circuits to adjustable speed drives, robotic, and traction are explored. Selection of motor drives, calculating the ratings, speed control, position control, starting, and braking are also covered. Simulation mini-projects and lab experiments are based on the lectures given.

Prerequisite(s): [(ECE 311 and ECE 319)]

(3-3-4) (C)(P)

ECE 415

Solid-State Electronics

Comprehensive introduction to the basic concepts of Solid State Physics as applied to electronic devices, including heat and charge transport and electron spin effects in materials such as Silicon, Gallium Arsenide, and Gallium Nitride. The electronic structure of crystalline solids is described, as well as their phonon spectra. Carrier dynamics is discussed in detail by emphasizing the importance of the Boltzmann transport equation for both electrons and phonons. Spin transport in semiconductors will be introduced as well. Credit will be given for either ECE 415 or PHYS 415, but not for both.

Prerequisite(s): [(ECE 307) OR (PHYS 348)]

(3-0-3) (P)

ECE 417

Power Distribution Engineering

This is an introduction into power distribution systems from the utility engineering perspective. The course looks at electrical service from the distribution substation to the supply line feeding a customer. The course studies the nature of electrical loads, voltage characteristics and distribution equipment requirements. The fundamentals of distribution protection are reviewed including fast/relay coordination. Finally, power quality and reliability issues are addressed.

Prerequisite(s): [(ECE 319)]

(3-0-3) (P)

ECE 418

Power System Analysis

Transmission systems analysis and design. Large scale network analysis using Newton-Raphson load flow. Unsymmetrical short-circuit studies. Detailed consideration of the swing equation and the equal-area criterion for power system stability studies. Credit will be given for ECE 418 or ECE 419, but not for both.

Prerequisite(s): [(ECE 319)]

(3-0-3) (P)

ECE 419

Power Systems Analysis with Laboratory

Transmission systems analysis and design. Large scale network analysis using Newton-Raphson load flow. Unsymmetrical short-circuit studies. Detailed consideration of the swing equation and the equal-area criterion for power system stability studies. Use of commercial power system analysis tool to enhance understanding in the laboratory.

Prerequisite(s): [(ECE 319)]

(3-3-4) (C)(P)

ECE 420

Analytical Methods in Power Systems

Fundamentals of power systems operation and planning. Economic operation of power systems with consideration of transmission losses. Design of reliable power systems, power systems security analysis, optimal scheduling of power generation, estimation of power system state.

Prerequisite(s): [(ECE 319)]

(3-0-3) (P)

ECE 421

Microwave Circuits & Systems

Maxwell's equations, waves in free space, metallic and dielectric waveguides, microstrips, microwave cavity resonators and components, ultra-high frequency generation and amplification. Analysis and design of microwave circuits and systems. Credit will be given for either ECE 421 or ECE 423, but not for both.

Prerequisite(s): [(ECE 307)]

(3-0-3) (P)

ECE 423

Microwave Circuits & Systems with Laboratory

Maxwell's equations, waves in free space, metallic and dielectric waveguides, microstrips, microwave cavity resonators and components, ultra-high frequency generation and amplification. Analysis and design of microwave circuits and systems. Credit will be given for either ECE 421 or ECE 423, but not for both.

Prerequisite(s): [(ECE 307)]

(3-3-4) (C)(P)

ECE 425

Analysis & Design of Integrated Circuits

Contemporary analog and digital integrated circuit analysis and design techniques. Bipolar, CMOS and BICMOS IC fabrication technologies, IC Devices and Modeling, Analog ICs including multiple-transistor amplifiers, biasing circuits, active loads, reference circuits, output buffers; their frequency response, stability and feedback consideration. Digital ICs covering inverters, combinational logic gates, high-performance logic gates, sequential logics, memory and array structures.

Prerequisite(s): [(ECE 312)]

(3-0-3) (P)

ECE 429

Introduction to VLSI Design

Processing, fabrication, and design of Very Large Scale Integration (VLSI) circuits. MOS transistor theory, VLSI processing, circuit layout, layout design rules, layout analysis, and performance estimation. The use of computer aided design (CAD) tools for layout design, system design in VLSI, and application-specific integrated circuits (ASICs). In the laboratory, students create, analyze, and simulate a number of circuit layouts as design projects, culminating in a term design project.

Prerequisite(s): [(ECE 218 and ECE 311)]

(3-3-4) (C)(P)

ECE 436

Digital Signal Processing I with Laboratory

Discrete-time system analysis, discrete convolution and correlation, Z-transforms. Realization and frequency response of discrete-time systems, properties of analog filters, IIR filter design, FIR filter design. Discrete Fourier Transforms. Applications of digital signal processing. Credit will be given for either ECE 436 or ECE 437, but not for both.

Prerequisite(s): [(BME 330) OR (ECE 308)]

(3-3-4) (C)(P)

ECE 437

Digital Signal Processing I

Discrete-time system analysis, discrete convolution and correlation, Z-transforms. Realization and frequency response of discrete-time systems, properties of analog filters, IIR filter design, FIR filter design. Discrete Fourier Transforms. Applications of digital signal processing. Credit will be given for either ECE 436 or ECE 437, but not for both.

Prerequisite(s): [(BME 330) OR (ECE 308)]

(3-0-3) (P)

ECE 438

Control Systems

Signal-flow graphs and block diagrams. Types of feedback control. Steady-state tracking error. Stability and Routh Hurwitz criterion. Transient response and time domain design via root locus methods. Frequency domain analysis and design using Bode and Nyquist methods. Introduction to state variable descriptions.

Prerequisite(s): [(ECE 308)]

(3-0-3) (P)

ECE 441

Microcomputers

Microprocessors and stored program controllers. Memories. Standard and special interfaces. Hardware design. Software development. Interrupt systems. Hardware and software design tools. System design and troubleshooting. Emphasis on examples.

Prerequisite(s): [(CS 350) OR (ECE 242)] AND [(CS 470) OR (ECE 218)]

(3-3-4) (C)(P)

ECE 443

Introduction to Computer Security

This course introduces threats and defense mechanisms for computer systems by introducing classic cryptographic algorithms, security protocols, computer and network vulnerabilities, attacks, and security management tools. Labs on malicious software scanning, password cracking, DOS attack, OS system patch management, VPN, and windows firewall are practiced.

(3-3-4)

ECE 446

Advanced Logic Design

Design and implementation of complex digital systems under practical design constraints. Timing and electrical considerations in combinational and sequential logic design. Digital system design using Algorithmic State Machine (ASM) diagrams. Design with modern logic families and programmable logic. Design-oriented laboratory stressing the use of programmable logic devices.

Prerequisite(s): [(ECE 218 and ECE 311)]

(3-3-4) (C)(P)

ECE 449

Object-Oriented Programming & Computer Simulation

The use of object-oriented programming to develop computer simulations of engineering problems. Programming with the C++ language in a UNIX environment. OOP concepts including classes, inheritance, and polymorphism. Programming with classes, inheritance, and polymorphism. Programming with class libraries. Event-driven simulation techniques in an object-oriented environment. Programming projects will include the development of a simulator for an engineering application.

Prerequisite(s): [(CS 116 and CS 350) OR (CS 116 and ECE 242)]

(3-0-3) (P)

ECE 481

Image Processing

Mathematical foundations of image processing, including two-dimensional discrete Fourier transforms, circulant and block-circulant matrices. Digital representation of images and basic color theory. Fundamentals and applications of image enhancement, restoration, reconstruction, compression, and recognition.

Prerequisite(s): [(ECE 308 and MATH 474*)] An asterisk (*) designates a course which may be taken concurrently.

(3-0-3) (P)

ECE 485

Computer Organization & Design

This course covers basic concepts and state-of-the-art developments in computer architecture: computer technology, performance measures, instruction set design, computer arithmetic, controller and datapath design, memory systems, pipelining, array processing, parallel processing, multiprocessing, abstract analysis models, input-output systems, relationship between computer design and application requirements, and cost/performance tradeoffs. Students will complete a project implementing a version of multiple-cycle processor. Credit will be given for either ECE 485 or CS 470, but not both.

Prerequisite(s): [(ECE 218 and ECE 242)]

(3-0-3) (P)

ECE 491

Undergraduate Research

Independent work on a research project supervised by a faculty member of the department. Prerequisite: Consents of academic advisor and instructor.

(Credit: Variable) (P)

ECE 494

Undergraduate Projects

Students undertake a project under the guidance of an ECE department faculty member. (1-4 variable) Prerequisite: Approval of the ECE instructor and academic advisor.

(Credit: Variable) (P)

ECE 497**Special Problems**

Design, development, analysis of advanced systems, circuits, or problems as defined by a faculty member of the department. Prerequisite: Consents of academic advisor and instructor.

(Credit: Variable) (P)

Special Note

ECE undergraduate students are not permitted to take any ECE courses via internet, unless they have the written approval of the course instructor, their academic advisor, and the ECE chair.

GRADUATE COURSES

Any ECE undergraduate student wishing to take a graduate course for a degree program must have the written approval of the course instructor, their academic advisor, and the ECE chair. Generally, a 3.5/4.0 major GPA is required for departmental approval. See the current *IIT Bulletin: Graduate Programs* for full descriptions.

ECE 502

Basic Network Theory

ECE 505

Applied Optimization for Engineers

ECE 506

Analysis of Nonlinear Systems

ECE 507

Imaging Theory & Applications

ECE 508

Video Communications

ECE 509

Electromagnetic Field Theory

ECE 511

Analysis of Random Signals

ECE 513

Communication Engineering Fundamentals

ECE 514

Digital Communication Principles

ECE 515

Modern Digital Communications

ECE 519

Coding for Reliable Communications

ECE 521

Quantum Electronics

ECE 524

Advanced Electronic Circuit Design

ECE 525

RF Integrated Circuit Design

ECE 526

Active Filter Design

ECE 527

Performance Analysis of RF Integrated Circuits

ECE 529

Advanced VLSI Systems Design

ECE 530

High Performance VLSI IC Systems

ECE 531

Linear System Theory

ECE 535

Discrete Time Systems

ECE 538

Renewable Energies

ECE 539

Computer Aided Design of Electric Machines

ECE 540

Reliability Theory and System Implementation

ECE 541

Performance Evaluation of Computer Networks

ECE 542

Design and Optimization of Computer Networks

ECE 543

Computer Network Security

ECE 544

Wireless and Mobile Networks

ECE 545

Advanced Computer Networks

ECE 546

Wireless Network Security

ECE 547

Wireless Networks Performance Analysis

ECE 548

Energy Harvesting

ECE 549

Motion Control Systems Dynamics

ECE 550

Power Electronic Dynamics and Control

ECE 551

Advanced Power Electronics

ECE 552

Adjustable Speed Drives

ECE 553

Power System Planning

ECE 554

Power System Relaying

ECE 555

Power Market Operations

ECE 556

Power Market Economics and Security

ECE 557

Fault-Tolerant Power Systems

ECE 558

Power System Reliability

ECE 559

High Voltage Power Transmission

ECE 560

Power Systems Dynamics and Stability

ECE 561

Deregulated Power Systems

ECE 562

Power System Transaction Management

ECE 563

Computational Intelligence in Engineering

ECE 564

Control and Operation of Electric Power Systems

ECE 565

Computer Vision and Image Processing

ECE 566

Statistical Pattern Recognition

ECE 567

Statistical Signal Processing

ECE 568

Digital Speech Processing

ECE 569

Digital Signal Processing II

ECE 570

Fiber-Optic Communication Systems

ECE 571

Nanodevices and Technology

ECE 575

Electron Devices

ECE 576

Antenna Theory

ECE 578

Microwave Theory

ECE 580

Elements of Sustainable Energy

ECE 581

Elements of Smart Grid

ECE 583

High Speed Computer Arithmetic

ECE 584

VLSI Architecture for Signal Processing and Communication Systems

ECE 585

Advanced Computer Architecture

ECE 586

Fault Detection in Digital Circuits

ECE 587

Hardware/Software Codesign

ECE 588

CAD Techniques for VLSI Design

ECE 589

Computer-Aided Design of Analog IC

Economics

ECON 151

Making Strategic Decisions in the Marketplace

This course develops and applies economic models to understand the behavior of firms and consumers in the marketplace. The course explores microeconomic concepts such as demand and supply, market structures and pricing, market efficiency, public goods, externalities, and equilibrium. Combining knowledge from microeconomics and game theory, students will study interactions among firms and consumers given a wide range of market conditions, regulatory regimes, and competitive landscapes.

(3-0-3) (C)(S)

ECON 152

Understanding & Competing in the Global Marketplace

This course exposes students to the economic framework for understanding global macroeconomic events, foreseeing the evolution of macro variables, and applying this knowledge to professional decision-making. Students will use international case studies along with data about global indicators from the international business and economics media to provide different perspectives on monetary, fiscal, and public policy issues in the global marketplace. In addition, the course will explore macroeconomic concepts including inflation, unemployment, trade, GDP, and economic growth and development.

Prerequisite(s): [(ECON 151) OR (ECON 211)]

(3-0-3) (C)(E)(S)

ECON 211

Principles of Economics

The determination of output, employment and the rate of inflation. Topics include a broad-based discussion of the controversies in macro-economics, the appropriate use of fiscal and monetary policy, the effects of a budget deficit, determination of the rate of exchange, and the trade deficit. Offered in fall and spring.

(3-0-3) (S)

ECON 423

Economic Analysis of Capital Investments

This course explores the valuation of proposed capital investments in both the public and private sectors. Students will learn how to determine the relevant cash flows associated with a proposed capital investment. Then, they will subject these cash flows to analysis by three major decision models that incorporate time value of the following money concepts: Net Present Value; Equivalent Uniform Benefit/Cost; and Internal Rate of Return. Students will also learn how to incorporate income taxes, inflation, risk, and capital rationing in the analysis of a project.

(3-0-3) (S)

Engineering Graphics

EG 204

Blueprint Reading for Machine Industries

Industrial prints, views of objects, analysis of edges and surfaces, sectional views, auxiliary views, screw threads and fasteners, dimensioning, shop processes, and welding representation.

(1-3-2)

EG 224

Blueprint Reading for Building Trades

Analysis of building construction drawings and details, dimensioning, shop processes, use of symbols and conventions, material takeoff, and elementary estimating.

(1-3-2)

EG 225

Engineering Graphics for Non-Engineers

Designed for students in business, liberal arts and non-technical programs. Basic drafting techniques and applications, lettering, geometric constructions, charts and graphs, technical sketching, multiview projection, pictorial drawings, dimensioning, blueprint reading and working drawings. Introduction to computer graphics. Credit for this course is not applicable to an engineering degree.

(2-1-3)

EG 305

Advanced Engineering Graphics & Design

Advanced study of auxiliary views and sectioning, gears and cams, threads and fasteners, working drawings, assembly drawings, electronic drafting, ANSI drafting standards, and computer-aided drawing and design. Engineering design project.

Prerequisite(s): [(CAE 101) OR (EG 105) OR (MMAE 232)]
(2-1-3)

EG 306

Engineering Descriptive Geometry

Graphic solutions of problems involving point, line, and plane relationships by auxiliary views and revolutions. Developments and intersections of surfaces. Parallelism and perpendicularity, vectors, mining and civil engineering applications. Shades and shadows, conics, map projection and spherical triangles. Emphasis on applications which promote visualization and introduce new engineering experiences. Applications of computers to problem solving.

Prerequisite(s): [(CAE 101) OR (EG 105)]
(2-2-3)

EG 308

Architectural Drawing I

Elements of architectural drafting. Lettering, symbols, plan layout, and elementary design in basic materials. Standard details of windows, doors, floors, roofs, stairs, framing. Perspective sketching.

(2-2-3)

EG 309

Architectural Drawing II

A continuation of EG 308, with more complicated layout problems of residential, small commercial, and industrial buildings. Detailed study of functions of the building. Methods of construction and use of materials and simple perspectives.

Prerequisite(s): [(EG 308)]
(2-2-3)

EG 310

Architectural Drawing III

Individual problems assigned to each student; each project developed from schematic plan through all stages of design, including sketches, working drawings, and presentation drawings; perspective drawing with rendering in all media.

Prerequisite(s): [(EG 309)]
(2-2-3)

EG 312

Architectural Freehand Drawing

Accurate and rapid sketching, with special emphasis on architectural forms, proportions, perspective; pencil, crayon, chalk, and brush techniques; simple composition problems.

(2-2-3)

EG 313

Architectural Detailing

Comprises design and drawing and the fitting together of various materials used in erecting and finishing contemporary and traditional buildings.

Prerequisite(s): [(EG 309)]
(2-2-3)

EG 325

Advanced Engineering Graphics for Non Engineers

Threads and fasteners, sectioning and auxiliary views, limit dimensioning, detail and assembly drawings, data representation, principles of descriptive geometry, manufacturing processes and computer graphics/CAD. Credit for this course is not applicable to an engineering degree.

Prerequisite(s): [(EG 225)]
(2-1-3)

EG 329

Graphic Representation for Non-Engineers

Basic techniques of graphics applied to communications and report writing. Use of computer graphics to generate charts and graphs including line charts, two- and three-dimensional bar charts, and pie charts. Integration of graphical presentations into technical and business reports. Credit for this course is not applicable to an engineering degree.

Prerequisite(s): [(EG 225)]
(3-0-3)

EG 405

Mechanical Design Graphics

Basic concepts of mechanical design and analysis. Advanced design layouts, details, assemblies, tolerance systems, surface finish control, materials, processes, ANSI drafting standards, engineering design processes, systems and procedures, application of computers to design, and CAD/CAM. Requires junior standing. Requires junior standing.

Prerequisite(s): [(EG 305)]
(2-2-3)

EG 406

Technical & Pictorial Illustration

Theory and construction of parallel and perspective pictorial projections, axonometric and oblique projections, parallel and angular perspective. Exploded pictorial assemblies. Basic rendering techniques used in technical illustration. Introduction to computer-generated pictorials. Requires junior standing. Requires junior standing.

Prerequisite(s): [(CAE 101) OR (EG 105) OR (MMAE 232)]
(2-2-3)

EG 409

Computer-Generated Pictorial Projections

Study of computer-generated representations of three-dimensional objects. Projections include multiview, perspective, axonometric (isometric, dimetric, and trimetric), and oblique.

Prerequisite(s): [(EG 406)]
(2-2-3)

EG 419

Computer Graphics in Engineering

Techniques of PC-based (AutoCAD) computer-aided drawing and design. Study of computer graphic hardware and software systems through demonstrations and use. Both 2D and 3D representation of components and assemblies from various engineering disciplines. Requires junior standing. Requires junior standing.

Prerequisite(s): [(CAE 101) OR (EG 105) OR (MMAE 232)]
(2-2-3)

EG 425

Computer Graphics for Non-Engineers

Principles and applications of computer graphics in business and nontechnical fields. Study of computer graphics hardware and software systems. Use of computer in producing charts, graphs, and technical drawings. Use of PC-CAD in problem solving and design. Credit for this course is not applicable to an engineering degree. Requires junior standing. Requires junior standing.

Prerequisite(s): [(EG 325)]
(2-1-3)

Course Descriptions

EG 429

Computer Graphics for Desktop Publishing

Integration of computer graphic-generated images into technical and business reports produced with popular desktop publishing software. Emphasis on creation and selection of graphical presentations for optimum readability. Scanning and retouching techniques for two- and three-dimensional presentations. Introduction to multi-media and slide presentations. Credit for this course is not applicable to an engineering degree. Junior standing required. Requires junior standing.

Prerequisite(s): [(EG 329)]

(2-2-3)

EG 430

Introduction to Building Information Modeling

Fundamentals and practical use of information technologies in design; basic concepts of building information modeling (BIM); review of software and technology available for BIM; practical use of BIM in design for creating a site, viewing a model, starting a project, working in the AutoDesk "Revit" Environment, adding basic building elements to a project, conceptual energy analysis, designing a preliminary layout, and presenting a project. Requires senior standing.

(3-0-3)

EG 497

Special Problems

Special problems. Requires junior standing. Requires junior standing.

(Credit: Variable)

Engineering Management

EMGT 363

Creativity, Inventions, & Entrepreneurship for Engineers & Scientists

This course will introduce students to theories, processes, and best practices that invoke creativity, innovation, inventions, and entrepreneurship in engineers and scientists to create a patentable technology by the end of the semester. Skills will be developed in understanding and searching for patents, learning and applying brainstorming, team learning, exploring deep needs, market and industry analysis, finding "white space," and creating effective elevator pitches for your idea. Students will learn to support and pitch the need, uniqueness of their approach, cost versus benefits, competition, and alternatives so their ideas can take advantage of the exponential economy.

(3-0-3)

EMGT 406

Entrepreneurship & Intellectual Property Management

This course intends to introduce and develop a number of diversified professional skills necessary for success in an engineering research and development environment. Selected topics in the areas of technology entrepreneurship, opportunity assessment, creativity and innovation, project management, management of organizational change, and entrepreneurial leadership are discussed. Significant effort is placed on understanding and managing intellectual property.

(3-0-3)

EMGT 470

Project Management

Introduction and practice of project form of organization for accomplishing tasks in engineering firms. Develops the attributes required of a project manager. Introduction to project management form most appropriate for engineering tasks, evaluating projects for funding, establishing planning, budgeting, and initiation process, extensive analysis of scheduling techniques, resource allocation during scheduling, monitoring project progress, the project control cycle, avoiding scope creep, auditing projects and completion of the project. The case study method is used throughout the class to provide students experiential-learning opportunities. This class cannot be substituted for courses in the construction management major in CAEE.

(3-0-3)

General Engineering

ENGR 100

Engineering Physics

The overall objective of the course is to prepare secondary school students to be successful in a typical university freshmen-level introduction to engineering curriculum. Students will use hands-on project work, presentations, and discussion to gain a broad perspective of a number of individual engineering disciplines. Students will understand and apply the various aspects of the engineering design process, understand and apply creative and analytical problem solving methods to various situations and improve their ability to use technical-based communication. The format of projects will be written, oral, or graphical.

(3-0-3)

ENGR 111

Introduction to Engineering & Design

This course introduces the student to the basic concepts and practices common to engineering. The engineering design process is presented through examples and hands-on projects. Along with fundamental engineering principles, communication skills, computer applications, and professional ethics will be included. Upon successful completion, the student will have been provided a foundation for further study in engineering.

(2-0-2)

ENGR 200

Entrepreneurship NOW! – Introduction to the Entrepreneurial Mind Set

This course introduces students to the basic skill set that changes a student's perspective from one of passive reception and learning to active participation and purposeful exploration to create value. This is a hands-on course where students learn to climb Mount Everest as a team, learn and practice the five disciplines for creating value, spark creativity and invention, learn the IIT-way to design, prototype, prototype and prototype, elevator pitching, and practice what they have learned by competing in a mini-innovation chase. The winners receive free courses at IIT to continue their journey to perfect the entrepreneurial mind set.

(0-2-2)

Environmental Engineering

ENVE 296

Introduction to IPRO

Introduction to process design. Performance of selected design tasks in project groups. Practice with process design software.

(0-2-1)

ENVE 310

Introduction to Environmental Engineering

Principles and applications of engineering processes for air and water pollution control. Topics include environmental resource management and methods for environmental quality control including identification of pollution sources, effects, and controls.

(3-0-3)

ENVE 401

Introduction to Water-Resources Engineering

Principles of hydraulics and water demand projections as used in the design of reservoirs, water distribution systems, and storm and sanitary sewers; aspects of water resource management and environmental engineering economics.

(3-0-3)

ENVE 404

Water & Wastewater Engineering

Principles and applications of physical, chemical, and biological processes for water and waste purification. Design of engineering treatment systems to meet water quality and effluent standards. Requires junior standing.

(3-0-3)

ENVE 426

Statistical Tools for Engineers

Descriptive statistics and graphs, probability distributions, random sampling, independence, significance tests, design of experiments, regression, time series analysis, statistical process control, and introduction to multivariate analysis. Requires junior standing.

(3-0-3)

ENVE 463

Introduction to Air Pollution Control

Air pollution sources and characteristics of source emissions, atmospheric reactions, effects of pollutants, and techniques of emission control; legal and administrative aspects of air pollution control.

(3-0-3)

ENVE 476

Engineering Control of Industrial Hazards

Design of control systems to enhance occupational safety and health; how to recognize and control existing or potential safety and health hazards.

Prerequisite(s): [(ENVE 426*)] An asterisk (*) designates a course which may be taken concurrently.

(3-0-3)

ENVE 481

Hazardous Waste Engineering

Engineering principles applied to the control of hazardous waste generation, handling, collection, transport, processing, recovery, and disposal. Treatability and design of hazardous waste treatment process.

(2-3-3)

ENVE 485

Pollution Prevention

Industrial Ecology is the study of how to manage human activity on a sustainable basis. It is an interdisciplinary field involving technology (sciences and engineering), public policy and regulatory issues, and business administration. The overall goal of this course is to promote creative and comprehensive problem solving through the application of Industrial Ecology tools such as Industrial Metabolism, Input-Output Analysis, Life Cycle Assessment, Accounting, and Design for the Environment. Same as EM 507.

(3-0-3)

ENVE 496

Chemical Process Design II

Group project in process design. Integration of technical, safety, environmental, economic and societal issues in process development and design.

(3-0-3)

GRADUATE COURSES

Degree-seeking undergraduates may take graduate courses with approval of the course instructor and faculty advisor. For course descriptions, see the *IIT Bulletin: Graduate Programs*.

ENVE 501

Environmental Chemistry

ENVE 506

Chemodynamics

ENVE 513

Biotechnological Processes in Environmental Engineering

ENVE 545

Environmental Regulations and Risk Assessment

ENVE 570

Air Pollution Meteorology

ENVE 572

Ambient Air Monitoring

ENVE 576

Indoor Air Pollution

ENVE 585

Groundwater Contamination and Pollutant Transport

Food Process Engineering

FPE 201

Nutrition & Wellness

Introduction to the basic principles of nutrition and the relationship of the human diet to health. Overview of the nutrition profession, the biological uses of nutrients, and tools for dietary planning and assessment in various settings. Examination of specific issues such as weight management, sports nutrition, food safety, the diet-disease relationship, and global nutrition. Analysis of special nutritional requirements and needs during the life cycle. Same as FST 201.

(3-0-3)

FPE 401

Nutrition, Metabolism & Health

Study of structures, types, and metabolism of carbohydrates, lipids, and proteins. Discussion of the biological roles of vitamins and minerals. Application and integration of metabolic knowledge with health promotion and chronic disease.

(3-0-3)

FPE 402

Research Project: Design, Delivery, & Dissemination

This course is an introduction to designing, conducting, and reporting on scientific research. Topics will include defining a problem and creating a research proposal, experimental design, data collection and analysis, and a written and oral presentation of results. Same as FST 402.

(3-0-3)

Food Safety and Technology

FST 201

Nutrition & Wellness

Introduction to the basic principles of nutrition and the relationship of the human diet to health. Overview of the nutrition profession, the biological uses of nutrients, and tools for dietary planning and assessment in various settings. Examination of specific issues such as weight management, sports nutrition, food safety, the diet-disease relationship, and global nutrition. Analysis of special nutritional requirements and needs during the life cycle. Same as FPE 201.

(3-0-3)

FST 401

Nutrition, Metabolism, & Health

Study of structures, types, and metabolism of carbohydrates, lipids, and proteins. Discussion of the biological roles of vitamins and minerals. Application and integration of metabolic knowledge with health promotion and chronic disease.

(3-0-3)

FST 402

Research Project: Design, Delivery, & Dissemination

This course is an introduction to designing, conducting, and reporting on scientific research. Topics will include defining a problem and creating a research proposal, experimental design, data collection and analysis, and a written and oral presentation of results. Same as FPE 402.

(3-0-3)

History

HIST 300

World History to 1500

Development of Greek and Roman civilization; beginnings of Christianity; Europe in the Middle Ages; feudalism and manorialism; organization of the Church; the Crusades; medieval intellectual life; the Renaissance.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(3-0-3) (C)(H)

HIST 301

World History from 1500

Protestant Reformation; the Scientific Revolution; Age of Louis XIV; Enlightenment; the Age of Democratic Revolution; Industrial Revolution; Nationalism and Imperialism; World War I; Communism and Fascism; World War II and after.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(3-0-3) (C)(H)

HIST 305

Latin America: 1810-Present

The history of Latin America from colonial times emphasizing the political evolution of the several republics. Special consideration will be given to the political, economic, military, and social relations of the U.S. with Latin American countries in the 20th century.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(3-0-3) (C)(H)

HIST 306

Women in Latin American History

This course will students understand how ideas about gender have shaped the lives of women and men in Latin America and how women and men have, in turn, influenced ideas about gender. The course will improve students ability to understand and analyze historical documents, processes, and writings, and will improve students' verbal and written skills though public speaking and writing.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(3-0-3) (C)(H)

HIST 307

History of Latin American Cinema

An overview of the historical development of Latin American film, from early to contemporary films, along with a study of the methods of critical inquiry developed to analyze film and cultural and political history in Latin America. This course provides differing visions of Latin American history as constructed through film. We analyze some of the major films of Latin American cinema with a view to the characteristic marks of this cinema, its aesthetic, major themes, the various ways that it impacts political, social and cultural systems and how social-political changes in turn impact the production and politics of film. Films will be in Spanish and English subtitles.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(3-0-3) (C)(H)

HIST 311

Twentieth Century Europe: 1890-1945

Nationalism and nation states; patterns of diplomacy; origins, conduct, and settlement of World War I; Russian Revolution; fate of democracy; rise of totalitarianism; World War II and the Holocaust.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(3-0-3) (C)(H)

HIST 321

World Religions I: Christianity, Islam, & Hinduism

The history of the "Big 3" of the world's religions – Christianity, Islam, and Hinduism – is traced from antiquity to the present day. Key individuals, texts, theological innovations, and reformations will be discussed and analyzed. This is predominantly a lecture-style course, although there will be occasional class discussions on primary or secondary religious texts. May not be taken for credit by students who have completed HIST 380 World Religions I.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(3-0-3) (C)(H)

HIST 322

World Religions II: Judaism, Buddhism, & Nature Religions

The history of Judaism, Buddhism, and a number of faiths with a similar worldview that have been placed under the heading of Nature Religions is traced from antiquity to the present day. Key individuals, texts, theological innovations, and reformations will be discussed and analyzed. This is predominantly a lecture-style course, although there will be occasional class discussions on primary or secondary religious texts. May not be taken for credit by students who have completed HIST 380 World Religions II.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(3-0-3) (C)(H)

HIST 332

American Women 1840-1990

An examination of how women shaped the course of US history and of how key political and social events shaped their lives. Since no single experience conveys the history of all American women, this course will discuss the diverse realities of women of different races, classes, ethnicities, and political tendencies. It looks at how and why the conditions, representations, and identities of women changed or remained the same. By incorporating women into our vision of history, we develop a more complete understanding of our past.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(3-0-3) (C)(H)

HIST 333

Ethnicity in American History & Life

Examines the creation of the American nationality from its diverse roots, which include almost all the world's great cultures. Special stress on immigration, African American history, and the relationships among concepts of race, class, and gender.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)] (3-0-3) (C)(H)

HIST 336

The Industrialization of America: 1789-1898

Traces America's transformation from agrarian republic to Industrial Empire. Stresses impact of industrialization on all aspects of life, the nature of slavery, the failures of "Reconstruction", and the western and urban frontiers. Explores the adventures that made America a great power.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)] (3-0-3) (C)(H)

HIST 337

The American Century: 1898-1975

Traces how America attained economic and military power and what it did with that power at home and abroad. Discusses the World Wars, the Great Depression, the limits of the "welfare state," the movement for Black equality, and the transformations of the 1960's.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)] (3-0-3) (C)(H)

HIST 338

Contemporary America: 1960 & After

Explores the historical roots of contemporary issues. Topics vary by semester but always include the Cold War and America's international position, tensions over immigration and racial integration, and the historic roots of changes in popular culture and daily life.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)] (3-0-3) (C)(H)

HIST 341

History of the Middle East 600-1650

Presents an overview of developments in the Middle East from prehistory through the Crusades. Readings drawn from history, literature and philosophy.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)] (3-0-3)

HIST 342

History of the Middle East II

This course will introduce students to the development of Middle Eastern culture and political structures from the Mongol Invasions to modern times. The course will enhance students ability to read and interpret primary and secondary sources. The course will enhance students' ability to produce written and oral discourse appropriate to history.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)] (3-0-3) (C)(H)

HIST 344

History of the Ancient Mediterranean

Students gain an understanding of the history and culture of Greece, Rome, and ancient Palestine. Walk a mile in someone else's sandals while tracing the early foundations of Western culture. Using disciplined analysis and creative interpretation to reconstruct aspects of ancient civilizations, students are challenged to escape their own personal and cultural perspectives.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)] (3-0-3) (C)(H)

HIST 345

Women & the World: 20th Century

This course examines how women in different regions of the world have helped to shape their nation's society and history. It also explores the connections and/or lack of connections between women, women's movements, and key political events during the twentieth century. The course will both draw some general themes and look at some specific case studies.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)] (3-0-3) (C)(H)

HIST 350

US Urban History

Basic facts and issues of U.S. urban history; reasons for the growth, development, and decay of cities; origins of contemporary urban political, social, and economic problems.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)] (3-0-3) (C)(H)

HIST 351

The City in World History

This course explores the city throughout world history as both place and space. The course begins by examining the early history of cities in the ancient world around the globe and then moves across time to examine the medieval, early modern, and modern/contemporary city. By the end of the course students will be expected to understand how and why cities have been constructed and how cities and the idea of the city have, over time, been historically interconnected even before the global urban world of today.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)] (3-0-3) (C)(H)

HIST 352

History of Chicago

Basic institutions of the contemporary city studied in their historical context, using Chicago as a case study. Political machines, social and political reform traditions, planning agencies, ethnic neighborhoods, organized crime and many other urban institutions.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)] (3-0-3) (C)(H)

HIST 375

History of Computing

This course addresses the question "How do technologies change the world?" through examining the history of computing. Readings and discussions on the people, technologies, ideas, and institutions of modern computing; and the uses of computers in computation, control, simulation, communication, and recreation. We'll learn about hardware heavyweights, software moguls, and where the World Wide Web came from.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)] (3-0-3) (C)(H)

HIST 380

Topics in History

An investigation into a topic of current or enduring interest in history, which will be announced by the instructor when the course is scheduled.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)] (3-0-3) (C)(H)

HIST 382

Technology in History: 1500-1850

Explores the process of technological change during the birth of industrial societies. Considers the context of early industrial development in Europe, then examines the industrial revolution in Britain and America. Concludes by assessing technology's role in European domination of Asia and Africa.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)] (3-0-3) (C)(H)

Course Descriptions

HIST 383

Technology in History: 1850 to Present

Examines technological change as a characteristic activity of modern societies. Investigates the science-based “second” Industrial Revolution in Europe and America. Explores the varied responses of artists, writers, architects, and philosophers to the machine age. Concludes by discussing technology’s place in the modern nation-state.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(3-0-3) (C)(H)

HIST 491

Independent Reading & Research

Consent of department. For advanced students.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(Credit: Variable) (C)(H)

Humanities

HUM 102

Industrial Culture

An interdisciplinary course that examines the development of modern industrial society and the impact of science and technology on our culture. Readings drawn from history, literature, and philosophy.

Prerequisite(s): [(COM 101) OR (COM 111) OR (IIT Communication Placement: 102)]
(3-0-3) (C)(H)

HUM 104

Age of Darwin

An introduction to the humanities through an investigation of important changes in our culture associated with Darwin’s theory of evolution. Readings drawn from literature, philosophy, and science.

Prerequisite(s): [(COM 101) OR (COM 111) OR (IIT Communication Placement: 102)]
(3-0-3) (C)(H)

HUM 106

Life Stories

An interdisciplinary study of autobiographies, written chiefly by Americans. The syllabus varies, but may include Benjamin Franklin, Harriet Jacobs, Maya Angelou, Malcolm X, Langston Hughes, Richard Rodriguez, Thomas Merton, Frank Lloyd Wright, Judy Chicago. In addition to considering autobiography as a genre, the course examines the historical events and the philosophical issues that have shaped the lives and attitudes of these writers.

Prerequisite(s): [(COM 101) OR (COM 111) OR (IIT Communication Placement: 102)]
(3-0-3) (C)(H)

HUM 321

Introduction to Women’s Studies

Introduction to Women’s Studies is an interdisciplinary course with an American lens that draws on feminist ideas and scholarship to develop a set of tools for analyzing women’s experiences in social, cultural, and political contexts. The course aims to sharpen students’ critical awareness of how gender operates in institutional and cultural contexts and in their own lives as well as to give them an opportunity to imagine participating in social change. May not be taken for credit by students who have completed HUM 380 Introduction to Women’s Studies.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(3-0-3) (C)(H)

HUM 341

Introduction to Music

Introduction to music strives to provide an appreciation and understanding of Western music of the past 1500 years. In addition to its own structure and culture, music is an important reflection of the development of Western civilization. Its understanding will add to one’s other studies of this process. It is also hoped that one’s enjoyment of concerts and recordings will be greatly enhanced. May not be taken for credit by students who completed HUM 380 Music Appreciation.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(3-0-3) (C)(H)

HUM 343

American Music

This course will trace the roots of music in America, from Native American music to the present. It will cover music through the Colonial period, patriotic songs, folk music, jazz, and classical music. The class will attend two live performances.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(3-0-3) (C)(H)

HUM 380

Topics in Humanities

An investigation into a topic of current or enduring interest in the humanities, which does not fit neatly into standard categories.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)] AND Satisfaction of IIT’s Basic Writing Proficiency Requirement
(3-0-3) (C)(H)

HUM 491

Independent Reading/Research

Independent reading or research.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(Credit: Variable) (C)(H)

Industrial Technology and Management

INTM 301

Communications for the Workplace

Review, analyze and practice verbal and written communication formats found in the workplace. Emphasis is on developing skills in technical writing, oral presentations, business correspondence, and interpersonal communication using electronic and traditional media. Credit not granted for both INTM 301 and COM 421.

(3-0-3) (C)

INTM 314

Maintenance Technology & Management

Maintenance of facilities is a major concern for all industrial operations. Course covers technologies involved as well as the management aspects of maintaining buildings, construction and equipment installation and maintenance for all types of operations.

(3-0-3)

INTM 315

Industrial Enterprises

This course provides an introduction to the world of industrial enterprises. The world-wide evolution of business will be considered leading to today’s competitive world. The range of industrial activities is reviewed, and students are introduced to the organization and purpose of various industrial sectors.

(3-0-3)

INTM 319

Electronics in Industry

Basic overview of electrical and electronic technology in industry. Emphasis on electrical and electronic components, industrial devices, electrical theory, application and basic troubleshooting. Students select and complete an electrical or electronic class project.

(3-0-3)

INTM 322

Industrial Project Management

Projects are the driving force behind innovation and improvement in any organization. This course identifies the tools and techniques needed to lead any project to its intended conclusion. Topics include project plans, managing expectations and contingencies, building a winning team, gaining commitments, managing project risks, and development of personal skills critical to the successful project manager.

(3-0-3) (C)

INTM 404

Sales, Marketing & Product Introduction

Covers techniques of marketing research, strategies for new product introduction, and sales management and planning.

(3-0-3) (C)

INTM 406

Quality Control

This course focuses on how organizations manage quality in a competitive marketplace regardless of the nature of the industry. Topics include principles of quality, cost of quality, inspection and receiving, audits, corrective and preventive action systems, supplier performance management (SPM), FEMA and control plans, process capability studies and statistical process control (SPC), measurement system analysis, quality management systems (QMS), process improvement methodologies (Lean, Six Sigma, and Kaizen), and creation of a performance dashboard.

(3-0-3)

INTM 407

Construction Technology

Introduces the full range of technologies involved in construction of both new and modified facilities, including steel, concrete and timber construction as well as supporting specialties such as HVAC, electrical, plumbing, etc. the interaction between the various construction trades will be covered along with the role of the architects and engineers.

(3-0-3)

INTM 408

Cost Management

Accounting basics are introduced with primary emphasis on the costing and estimating procedures as used in industry. The objective of this course is to provide a good understanding of financial activities and hands-on experience in working with a variety of costing and accounting systems.

(3-0-3)

INTM 409

Inventory Control

Fundamentals of inventory control including inventory classifications, i.e. raw materials, work-in-process (WIP), and finished goods. Topics include inventory record keeping, inventory turnover, the 80/20 (or ABC) approach, safety stock, forecasting, dependent and independent demand, lead times, excess/obsolete inventory, and inventory controls. Material Resource Planning (MRP) and Enterprise Resource Planning (ERP) are included.

(3-0-3) (C)

INTM 410

Operations Management

Focuses on core processes within an organization – the activities that add value. An operations strategy depends on the industrial sector as well as the organization. This course introduces a variety of qualitative and quantitative tools for such activities as project management, process analysis, job design, forecasting, resource planning, productivity, quality, inventory, and scheduling. The objective of this course is to provide the framework for integrating approaches covered in other INTM courses.

(3-0-3) (C)

INTM 412

Manufacturing Processes for Metals & Mechanical Systems

A broad range of manufacturing processes are studied including casting, forging, rolling, sheet metal processing, machining, joining, and non-traditional methods such as powder, EDM, and additive processes. Particular attention on interrelationships between manufacturing processes and properties developed in the work piece, both intended and unintended. Economic considerations and tradeoffs as well as computer-integrated manufacturing topics are also covered.

(3-0-3)

INTM 413

Facilities & Construction Administration

This course covers fundamentals of project administration and characteristics of the construction industry. Pre-construction discussion includes technical and economic feasibility, project delivery systems, documents, bonding, and bidding. Duties and liabilities of parties at pre-contract stage and during contract administration to include scheduling and time extensions, payments, retainage, substantial and final completion, change orders, suspension of work, contract termination, and dispute resolution. Labor law, labor relations, safety, and general management of a construction company.

(3-0-3)

INTM 414

Topics in Industry

Provides overview of multiple industrial sectors and the influences that are forcing change. All aspects of industry are considered: history of industry; inventory; supply chain; e-commerce; management; manufacturing; industrial facilities; resource management; electronics and chemical industries; alternate energies; marketing; entrepreneurship; computers as tools; and other specialty areas.

(3-0-3) (C)

INTM 415

Advanced Project Management

This course covers project management in the PMP framework and provides a structured approach to managing projects using Microsoft Project and Excel. Coverage includes creation of key project management charts (Gantt, Pert, CPM, timelines and resource utilization), basic statistics used in estimating task times, critical path generation in Excel and Project, project cost justification in Excel, SPC and acceptance sampling for machine acceptance, project analysis via simulation, and management of personnel, teams, subcontractors and vendors. Case studies are utilized to demonstrate core concepts and dynamic scheduling.

(3-0-3)

INTM 417

Construction Estimating

General approaches for estimating construction costs are covered. Several commercially available software packages are introduced. Emphasis is on acquiring the knowledge required to develop cost estimates for construction, renovation and maintenance projects for buildings, facilities and equipment.

(3-0-3)

Course Descriptions

INTM 418

Industrial Risk Management

Each year, industrial companies are affected by critical incidents which cause disruption in operations and significant monetary losses due to repairs and/or lost revenue. Whether it is a small fire, an extended electrical outage or an incident of a more serious magnitude, all company stakeholders - from the board of directors to the employees to the customers - are impacted. The key to understanding the complexities of industrial resiliency lies in focusing on the issues of preparedness: prevention, mitigation, and control. This course is designed to prepare the student for managing a critical incident, including understanding risk and business impact, emergency preparedness, contingency planning and damage control.

(3-0-3)

INTM 420

Applied Strategies for the Competitive Enterprise

Course covers the application of proven management principles and operational practices. Learn how high performance companies create a competitive advantage despite economic challenges and a transitional customer base. Factors covered include strategy deployment, financial analysis, new product development, quality, customer service, and attaining market leadership. Case studies illustrate variable impacts on business situations.

(3-0-3)

INTM 425

Human Resource Management

This course will introduce students to key aspects of HR management, including legal requirements for all normal HR activities as well as techniques for dealing with employees when hiring, evaluating, promoting and terminating.

(3-0-3) (C)

INTM 427

E-Commerce

This course reviews electronic commerce and its role in industrial organizations. Topics include a history of e-commerce, business-to-business (B2B) models, and business-to-consumer (B2C) models. The impact of this paradigm shift on all aspects of business is also covered.

(3-0-3) (C)

INTM 430

Transportation

This course covers transportation practices and strategies for the 21st century. The role and importance of transportation in the economy and its relationship to the supply chain will be covered in detail. Transportation modes - trucks, rail, air, and water - will be examined for both domestic and global transportation. Costing and pricing strategies and issues will be discussed as well as security issues in domestic and international transportation.

(3-0-3)

INTM 431

Manufacturing Processes for Electronics & Electrical Systems

The materials used in Electronic and Electrical (E&E) manufacturing will be reviewed including materials and components that are used to produce chips, PCBs, and wiring systems. Focus will be on the processes for producing the range of parts and products included in this broad sector. Automation for producing parts and assemblies will be covered. Techniques covered will include surface-mounted technology (SMT), wave soldering, automation insertion, automated inspection, etc. The industrial structure that makes up this sector of manufacturing will be covered.

(3-0-3)

INTM 432

Vendor/Customer Relations

Relations with customers and vendors constitute a critical aspect of company profitability. The course pursues such topics as appropriate involvement of customers and vendors in product development, as well as price and contract negotiations.

(3-0-3) (C)

INTM 433

Manufacturing Processes in Chemical Industries

This course provides a survey overview of the many chemical manufacturing processes found in the energy, food, drug, and synthetic polymer sectors. Related societal, environmental, and regulatory impacts are discussed such as sustainability, OSHA, and EPA. Implications for recovery and reuse as well as new non-polluting processes are explored. The overall industrial structure that makes up this sector of manufacturing will be covered.

(3-0-3) (C)

INTM 441

Supply Chain Management

This course covers the full range of activities involved in the supply chain. This includes management tools for optimizing of supply chains, relationships with other parts of the organization, in-house versus third party approaches, and suitable performance measurements. Topics covered include: Warehouse Management Systems (WMS), Transportation Management Systems (TMS), Advanced Planning and Scheduling Systems (APS), as well as cost benefit analysis to determine the most appropriate approach.

(3-0-3) (C)

INTM 442

Warehousing & Distribution

This course covers warehouse layout and usage based on product requirements such as refrigeration, hazardous material, staging area, and value added activities. Processes covered include receiving, put-away, replenishment, picking and packing. The requirement for multiple trailer/rail cars loading and unloading is considered as well as equipment needed for loading, unloading, and storage. Computer systems for managing the operations are reviewed. Emphasis is on material handling from warehouse arrival through warehouse departure.

(3-0-3) (C)

INTM 443

Purchasing

Purchasing responsibilities, processes, and procedures are included. Topics covered include: supplier selection and administration, qualification of new suppliers, preparing purchase orders, negotiating price and delivery, strategic customer/vendor relationships, and resolution of problems. All aspects of Supplier Relation Management (SRM) are covered.

(3-0-3) (C)

INTM 444

Export/Import

Internationalization of industry requires special expertise and knowledge, which must be taken into consideration throughout all interactions with overseas companies either as customers or suppliers. Topics covered include custom clearance, bonded shipping, international shipping options, import financing and letters of credit, customer regulations, insurance, import duties and trade restrictions, exchange rates, and dealing with different cultures.

(3-0-3) (C)

INTM 446**Manufacturing & Logistics Information Systems**

This course provides an overview of manufacturing and supply chain information systems, tools, and techniques utilized for effective decision making. Current state-of-the-art and commercially available industrial software packages, such as MRP, WMS, TMS, APS, etc., will be used and their impact on management decision making analyzed.

(3-0-3)

INTM 449**Telecommunications Over Data Networks**

This course covers a suite of application protocols known as Voice over IP (VoIP). It describes important protocols within that suite including RTP, SDP, MGCP and SIP, and the architecture of various VoIP installations including on-net to on-net, on-net to PSTN, and Inter-domain scenarios. The functions of the Network Elements that play significant roles in this architecture will be defined. Examples of network elements that are currently available as products will be examined.

Prerequisite(s): [(ITM 440) OR (ITM 540)]

(3-0-3)

INTM 459**Issues in Industrial Sustainability**

Examines the concept of sustainability and its application in the industrial environment. Identifies underlying stresses on natural and human environments and the resultant problems for business and society including legal, ethical, and political issues related to sustainability. Global warming, peak oil, and commodity pricing are considered as indicators of the need for improvements in sustainability. Industrial ecology will be discussed as well as strategies for developing sustainable practices in manufacturing, power generation, construction, architecture, logistics, and environmental quality. Coverage includes case studies on businesses that have developed successful sustainability programs.

(3-0-3)

INTM 460**Sustainability of Critical Materials**

This course explores the limitations in supply and the need for sustainable use of carbon and non-carbon-based materials such as oil, minerals, food, water, and other natural resources used by industry. Limitations in the global availability of such resources pose challenges to industry which will require careful consideration and planning to ensure continued prosperity for current and future generations. Course will cover strategies and options to mitigate anticipated shortages and optimize the use of non-renewable natural resources, review of fuel and raw material pricing, and cost/benefit analysis of sustainable development proposals. Technical analyses will be presented during class discussions, but a technical background is not required.

(3-0-3) (C)

INTM 461**Energy Options for Industry**

Carbon-based fuels are a limited resource and within decades will be in very short supply. Associated energy costs will increase and industry will be required to incorporate alternate fuels and/or power sources, such as uranium (for nuclear power), hydroelectric, geothermal, wind, wave, solar, etc. This course presents such energy options and explores the anticipated impact on industry.

(3-0-3) (C)

INTM 462**Special Topics in Sustainability**

This course allows the student to research and report on an industrial sustainability issue of interest and relevance to their career objectives. Topics may touch on industrial ecology, ethics, regulations, environment, resource use, alternative manufacturing methods, facilities, logistics, etc. This is the fourth course in a specialization in Industrial Sustainability.

(0-0-3)

INTM 477**Entrepreneurship in Industry**

Introduces various forms of entrepreneurship with emphasis towards industrial organizations. Provides helpful tools for developing and implementing significant “game-changing” actions to effect change within an existing organization or develop a new business venture. Students complete an opportunity assessment (OPASS) project wherein they identify, evaluate, and develop an approach for a “real-life” business and produce a formal report and presentation.

(3-0-3) (C)

INTM 491**Undergraduate Research**

Undergraduate research.

(Credit: Variable)

INTM 497**Special Projects INTM**

Special projects.

(Credit: Variable)

Interprofessional Projects

IPro 397**IPro I: Interprofessional by Design**

The IPro I course is an immersive, action-oriented, dynamic learning experience guided by a team of instructors from the fields of design, engineering, business, law, architecture, psychology, and social sciences. IPro I introduces students to the interprofessional project concept and its underlying body of knowledge by: incorporating hands-on, small group, user-centered design projects informed by instructor-lead discussions and guest speakers; stimulating and facilitating project idea development that involves a collaborative innovation process; developing an understanding of the socio-economic context of themed clusters of workplace project possibilities (e.g., venture development, service learning, process improvement, sustainability, research); and forming the core of an IPro II team and developing its project plan. This course has faculty approval through the 2012-2013 academic year.

(1-6-3) (C)

IPro 497**Interprofessional Project (IPro)**

Interprofessional projects allow students to learn teamwork, leadership and project management skills, while working in multidisciplinary teams on projects involving technical, ethical, environmental, economic, public policy, and legal issues. IPro project teams are typically comprised of 10-12 students from sophomore through graduate level and from all disciplines that can contribute to a project. Every effort will be made to accommodate students' first choices; however, it may be necessary to balance students across all projects scheduled for the semester or to consolidate students into fewer projects to meet minimum team requirement. Specific rules about selection of IPro projects may apply to certain degree programs. Some projects may carry Humanities or Social Science credit. Students are encouraged to consult the lead faculty member for the project and their faculty advisor before registering for a project.

(1-6-3) (C)

Information Technology and Management

ITM 100

Introduction to Information Technology as a Profession

This course introduces students to the steps necessary to analyze a problem in information technology and identify and define the computing requirements appropriate to its solution, with a focus on how to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs. Students learn to analyze the local and global impact of computing on individuals, organizations, and society. This course leads students to recognize the need for continuing professional development and imparts an understanding of professional, ethical, legal, security and social issues, and responsibilities in information technology. Students write and present, building their ability to communicate effectively with a range of audiences, and work in teams learning to function effectively together to accomplish a common goal.

(2-0-2) (C)

ITM 300

Communication in the Workplace

Review, analyze and practice verbal and written communication formats found in the workplace. Emphasis on developing skills in technical writing and oral presentations using electronic and traditional media. Credit not granted for both ITM 300 and COM 421. INTM 301 may be substituted for this course.

(0-0-3) (C)

ITM 301

Introduction to Contemporary Operating Systems & Hardware I

Students study the basics of computer architecture and learn to use a contemporary operating system. Hardware requirements, hardware components, software compatibility, and system installation topics are covered along with post-installation, storage, security and system diagnosis, and repair. Topics also include discussion of current and future technology industry trends.

(2-2-3)

ITM 302

Introduction to Contemporary Operating Systems & Hardware II

Introduces features of an advanced operating system, including basic commands, file and directory manipulation, text editing and suitability for server applications. Basic programming in this environment will be addressed through shell scripting for job automation along with shell built-in data types, condition, loops, functions and regular expressions.

(2-2-3)

ITM 311

Introduction to Software Development

A broad introduction to object-oriented programming and the related knowledge necessary to program in a contemporary programming language. This would include coverage of an Application Development Kit, a standard integrated Development environment, and the use of GUI components.

(2-2-3)

ITM 312

Introduction to Systems Software Programming

Introduces basic concepts of systems programming. Students learn to apply basic programming concepts toward solving problems, create source files and implement header files, work with and effectively use basic data types, abstract data types, control structures, code modularization and arrays. Students will be introduced to object paradigm including, classes, inheritance, and polymorphism applications.

(2-2-3)

ITM 497

Independent Study

Special projects.

(Credit: Variable)

Information Technology and Management: Development

ITMD 411

Intermediate Software Development

This course covers a broad spectrum of object-oriented programming concepts and application programming interfaces. The student considers the details of object-orientated development in topics of multi-threading, data structure collections, stream I/O and client interfaces. Software engineering topics of packaging and deployment are covered as well. Hands-on exercises reinforce concepts taught throughout the course.

Prerequisite(s): [(ITM 311)]

(2-2-3)

ITMD 412

Advanced Structured & Systems Programming

Structured programming continues with advanced concepts including strings, arrays, pointers, data structures, file manipulation, and dynamic memory management. Students create more complex applications that work with user input, manipulate user supplied text or text obtained from a file, apply standard library routines for working with literal text, use pointers to store complex structures within arrays, and read and write data from files, the console, and the terminal. The object-oriented programming (OOP) paradigm is covered in depth including the philosophy of OOP, classes and objects, inheritance, template classes, and making use of class libraries.

Prerequisite(s): [(ITM 312)]

(2-2-3)

ITMD 413

Open Source Programming

Contemporary open-source programming languages and frameworks are presented. The student considers design and development topics in system, graphical user interface, network, and web programming. Dynamic scripting languages are covered using object-oriented, concurrent, and functional programming paradigms. Concepts gained throughout the course are reinforced with numerous exercises which will culminate in an open-source programming project.

Prerequisite(s): [(ITM 411) OR (ITMD 411)]

(2-2-3)

ITMD 415

Advanced Software Development

This course considers Web container application development for enterprise systems. The primary focus is on database connectivity (JDBC) integration with Web application programming using an enterprise-level application framework. A Web application term project considers the design and implementation of a database instance that serves as the information tier in a contemporary 3-tier enterprise solution.

Prerequisite(s): [(ITM 411) OR (ITMD 411)]

(2-2-3)

ITMD 419

Topics in Software Development

This course will cover a particular topic in software development, varying from semester to semester, in which there is particular student or staff interest. This course may be taken more than once but only 9 hours of ITM 419/519 or ITMD 419/519 credit may be applied to a degree.

(Credit: Variable)

ITMD 421**Data Modeling & Applications**

Basic data modeling concepts are introduced. Hands-on database design, implementation, and administration of single-user and shared multi-user database applications using a contemporary relational database management system. (2-2-3)

ITMD 422**Advanced Database Management**

Advanced topics in database management and programming including client server application development are introduced. Expands knowledge of data modeling concepts and introduces object-oriented data modeling techniques. Students will learn the use of Structured Query Language in a variety of application and operating system environments. Prerequisite(s): [(ITM 421) OR (ITM 421)] (3-0-3) (C)

ITMD 434**Human/Computer Interaction**

Introduction to human-computer interaction, a discipline concerned with the design, evaluation, and implementation of interactive computing systems for human use. Emphasis is given to the structure of communication between people and computers, capabilities of people to use computers, concerns that arise in designing and building interfaces, design trade-offs, and the process of specification, design, and implementation of user interfaces. Particular emphasis is placed on practical design and usability of computer system user interfaces. (3-0-3)

ITMD 455**Intelligent Device Applications**

Intelligent device application development is covered with various technologies on mobile and robotic platforms. Utilizing contemporary toolkits, the student considers design and development on emulated and real "smart" devices including smart phones, personal digital assistants, sensors, actuators, and robots. Numerous exercises reinforce concepts gained throughout the course. A term project will integrate course topics into a comprehensive intelligent device application. This course may be taken more than once but only for 6 hours of ITM 455/555 or ITMD 455/555. Prerequisite(s): [(ITM 311)] (2-2-3)

ITMD 460**Fundamentals of Multimedia**

Students are introduced to computer-based multimedia theory, concepts, and applications. Topics include desktop publishing, hypermedia, presentation graphics, graphic images, animation, sound, video, multimedia on the World Wide Web and integrated multimedia authoring techniques. (2-2-3) (C)

ITMD 461**Internet Technologies & Web Design**

This course will cover the creation of Web pages and sites using HTML, CSS, Javascript and graphical applications. Networked multimedia distribution technologies are also explored. The design of effective Web site including page layout, user interface design, graphic design, content flow and site structure as well as management of Web site resources including intranet management and design considerations are addressed. Students design and create a major Web site with multiple pages and cross-linked structures. (2-2-3) (C)

ITMD 462**Web Site Application Development**

Programming the Common Gateway Interface (CGI) for Web pages is introduced with emphasis on creation of interfaces to handle HTML form data. CGI programming is taught in multiple languages. Security of Web sites is covered with an emphasis on controlled access sites. Setup, administration and customization of content management systems including blog and portal sites is introduced. Students design and create a Web site including basic CGI programs with Web interfaces and process data flows from online forms with basic database structures.

Prerequisite(s): [(ITM 461) OR (ITMD 461)] (2-2-3) (C)

ITMD 463**Intermediate Web Application Development**

In-depth examination of the concepts involved in the development of Internet applications. Students will learn the differences and similarities between Internet applications and traditional client/server applications. A discussion of the technologies involved in creating these Internet applications is included, and students will learn to use these technologies to create robust server-side applications.

Prerequisite(s): [(ITM 411 and ITM 461) OR (ITMD 411 and ITMD 461)] (2-2-3)

ITMD 464**Advanced Web Application Development**

Strategies for management of electronic commerce allow students to learn to re-engineer established business processes to increase enterprise competitive advantage, provide better customer service, reduce operating costs, and achieve a better return on investment. Students will learn to evaluate, use, and deploy state-of-the-art tools and techniques needed to develop a reliable e-commerce offering on the Web. The course will cover state-of-the-art programming and development tools. This class will provide students with hands-on exposure needed to design and build a fully functional e-commerce Web site.

Prerequisite(s): [(ITM 463) OR (ITMD 463)] (2-2-3)

ITMD 465**Rich Internet Applications**

Students learn to create interactive rich internet applications using web development frameworks, applications, and techniques that primarily operate on the client-side. These applications often exhibit the same characteristics as desktop applications and are typically delivered through a standards-based web browser via a browser plug-in or independently via sandboxes or virtual machines. Current software frameworks used to download, update, verify, and execute these applications are addressed as well as writing applications for deployment in these frameworks.

Prerequisite(s): [(ITM 461) OR (ITMD 461)] (2-2-3)

ITMD 466**Service-Oriented Architecture**

This course covers IT enterprise systems employing web services technologies in SOA and ESB architectural patterns. The student considers SOA which defines and provisions IT infrastructure and allows for a loosely-coupled data exchange over disparate applications participating in business processes. The simplification of integration and flexible reuse of business components within SOA is greatly furthered by ESB. Lab exercises using contemporary tool-kits are utilized to reinforce platform-agnostic course topics.

Prerequisite(s): [(ITM 411 and ITM 461) OR (ITMD 411 and ITMD 461)] (2-2-3)

ITMD 469

Topics in Application Development

This course will cover a particular topic in application development, varying from semester to semester, in which there is particular student or staff interest. This course may be taken more than once but only 9 hours of ITM 469/569 or ITMD 469/569 credit may be applied to a degree.

(Credit: Variable)

Information Technology and Management: Management

ITMM 470

Fundamentals of Management for Technology Professionals

This course explores fundamentals of management for professionals in high-technology fields. It addresses the challenges of the following: managing technical professionals and technology assets; human resource management; budgeting and managerial accounting; management of services, infrastructure, outsourcing, and vendor relationships; technology governance and strategy; and resource planning.

(3-0-3)

ITMM 471

Project Management for Information Technology & Management

Basic principles of project management are taught with a particular focus on project planning for information technology hardware, software and networking project implementation. Management of application development and major Web development projects will also be addressed.

(3-0-3) (C)

ITMM 481

IT Entrepreneurship

This course prepares students to become leaders in information technology and to build ITM companies. Students design and develop a prototype ITM product and prepare a business plan and venture proposal presentation.

(3-0-3)

ITMM 482

Business Innovation

This course is designed to teach innovative thinking through theory, methods, and practice of innovation. The course incorporates Einstein's thinking, and Edison's method to establish the innovation process that can be applied in current business environment. Current economic conditions and global sourcing requires that innovation becomes a leading tool for developing a competitive edge. Innovation has been considered a competency of educated, design engineering, and a selected few employees that has become insufficient today. Corporations and organizations need innovation to develop customer-specific solutions in almost real time.

(3-0-3)

ITMM 485

Legal & Ethical Issues in Information Technology

Current legal issues in information technology are addressed including elements of contracting, payment systems and digital signatures, privacy concerns, intellectual property, business torts, and criminal liability including hacking, computer trespass and fraud. Examination of ethical issues including privacy, system abuse, and ethical practices in information technology equip students to make sound ethical choices and resolve legal and moral issues that arise in information technology.

(3-0-3)

Information Technology and Management: Operations

ITMO 440

Introduction to Data Networking & the Internet

This course covers current and evolving data network technologies, protocols, network components, and the networks that use them, focusing on the Internet and related LANs. The state of worldwide networking and its evolution will be discussed. This course covers the Internet architecture, organization, and protocols including Ethernet, 802.11, routing, the TCP/UDP/IP suite, DNS, SNMP, DHCP, and more. Students will be presented with Internet-specific networking tools for searching, testing, debugging, and configuring networks and network-connected host computers. There will be opportunities for network configuration and hands-on use of tools.

(2-2-3)

ITMO 441

Network Administration & Operations

Students learn the details, use, and configuration of network applications. Currently protocols and application technologies considered include SNMP, SMTP, IMAP, POP, MIME, BOOTP, DHCP, SAMBA, NFS, AFS, X, HTTP, DNS, NetBIOS, and CIFS/SMB. Windows workgroups and domains: file and printer sharing, remote access, and Windows networking are addressed. A research paper in the above topic areas is required.

Prerequisite(s): [(ITM 440) OR (ITM 540 with min. grade of C) OR (ITMO 440) OR (ITMO 540 with min. grade of C)]

(2-2-3)

ITMO 444

Cloud Computing Technologies

Computing applications hosted on dynamically-scaled virtual resources available as services are considered. Collaborative and non-collaborative "cloud-resident" applications are analyzed with respect to cost, device/location independence, scalability, reliability, security, and sustainability. Commercial and local cloud architectures are examined. A group-based integration of course topics will result in a project employing various cloud computing technologies.

Prerequisite(s): [(ITM 411 and ITM 456) OR (ITMD 411 and ITMO 456)]

(2-2-3)

ITMO 451

Distributed Workstation System Administration

Students learn to set up and maintain PC workstations and servers and to administer PC servers and networks. Topics include hardware requirements; software compatibility; and system installation, configuration and options and post-installation topics; administrative practices required for file system security; process management; performance monitoring and tuning; storage management; back-up and restoration of data; and disaster recovery and prevention. A group project or research paper will demonstrate mastery of the subject.

Prerequisite(s): [(ITM 301)]

(4-4-6)

ITMO 452**Client Server System Administration**

Students learn to setup and configure a contemporary operating system, including the actual installation of the operating system on the student workstation in a networked client-server environment. User account management, security, printing, disk configuration, and backup procedures are addressed, with particular attention to coverage of TCP/IP and TCP/IP applications. System installation, configuration and administration issues as well as network file systems, network access and compatibility with other operating systems are also addressed. A group project or research paper will demonstrate mastery of the subject.

Prerequisite(s): [(ITM 302)]
(4-4-6)

ITMO 454**Operating System Virtualization**

This course will cover technologies allowing multiple instances of operating systems to be run on a single physical system. Concepts addressed will include hypervisors, virtual machines, paravirtualization and virtual appliances. Both server and desktop virtualization will be examined in detail, with brief coverage of storage virtualization and application virtualization. Business benefits, business cases and security implications of virtualization will be discussed. Extensive hands-on assignments and a group project will allow students to gain first-hand experience of this technology.

Prerequisite(s): [(ITM 301) OR (ITM 302)]
(2-2-3)

ITMO 456**Introduction to Open Source Operating Systems**

Students learn to set up and configure an industry-standard, open-source operating system including system installation and basic system administration. Also addressed are applications and graphical user interfaces as well as support issues for open-source software.

(2-2-3)

Information Technology and Management: Security

ITMS 428**Database Security**

Students will engage in an in-depth examination of topics in data security including security considerations in applications and systems development, encryption methods, cryptography law and security architecture and models.

Prerequisite(s): [(ITM 421) OR (ITMD 421)]
(3-0-3)

ITMS 443**Vulnerability Analysis & Control**

This course addresses hands-on ethical hacking, penetration testing, and detection of malicious probes and their prevention. It provides students with in-depth theoretical and practical knowledge of the vulnerabilities of networks of computers including the networks themselves, operating systems, and important applications. Integrated with the lectures are laboratories focusing on the use of open source and freeware tools; students will learn in a closed environment to probe, penetrate, and hack other networks. It is recommended, but not required, that students also take ITMS 448 prior to or in parallel with this course.

(2-2-3)

ITMS 448**Cyber Security Technologies**

Prepares students for a role as a network security analyst and administrator. Topics include viruses, worms, and other attack mechanisms, vulnerabilities, and countermeasures; network security protocols, encryption, identity and authentication, scanning, firewalls, security tools, and organizations addressing security. A component of this course is a self-contained team project that, if the student wishes, can be extended into a fully operational security system in a subsequent course.

Prerequisite(s): [(ITM 440) OR (ITM 540 with min. grade of C) OR (ITMO 440) OR (ITMO 540 with min. grade of C)]
(2-2-3) (C)

ITMS 458**Operating System Security**

This course will address theoretical concepts of operating system security, security architectures of current operating systems, and details of security implementation using best practices to configure operating systems to industry security standards. Server configuration, system-level firewalls, file system security, logging, anti-virus and anti-spyware measures and other operating system security strategies will be examined.

Prerequisite(s): [(ITM 456) OR (ITMO 456)]
(2-2-3)

ITMS 478**Cyber Security Management**

In-depth examination of topics in the management of information technology security including access control systems and methodology, business continuity and disaster recovery planning, legal issues in information system security, ethics, computer operations security, physical security and security architecture & models using current standards and models

(3-0-3) (C)

ITMS 479**Topics in Information Security**

This course will cover a particular topic in Information Security, varying from semester to semester, in which there is particular student or staff interest. This course may be taken more than once but only 9 hours of ITM 479/579 or ITMS 479/579 credit may be applied to a degree.

(Credit: Variable)

Information Technology and Management: Theory and Technology

ITMT 491**Undergraduate Research**

Undergraduate research. Written consent of instructor is required.

(Credit: Variable)

ITMT 492**Embedded Systems & Reconfigurable Logic Design**

This course covers reconfigurable intelligent devices programmed with modern high level languages focusing on design and integration to modern environments. The course will also cover the topic and deployment of wireless sensor networks and the use of rapid prototyping for commercial application. Students will discover hardware, software and firmware design trade-offs as well as best practices in current embedded systems development. A final project will integrate course topics into a system using an embeddable single-board microcontroller.

Prerequisite(s): [(ITM 311) OR (ITM 312)]
(3-0-3)

Course Descriptions

ITMT 495

Topics in Information Technology

This course will cover a particular topic varying from semester to semester in which there is particular student or staff interest.

(Credit: Variable)

GRADUATE COURSES

Degree-seeking undergraduates may take graduate courses with approval of the course instructor and faculty advisor. For course descriptions, see the *IIT Bulletin: Graduate Programs*.

ITMD 511

Application Development Methodologies

ITMD 521

Client/Server Technologies & Applications

ITMD 526

Data Warehousing

ITMD 527

Data Analytics

ITMD 529

Advanced Data Analytics

ITMD 532

UML-Based Software Development

ITMD 535

Data Center Architecture

ITMM 572

Process Engineering for Information Technology Managers

ITMM 573

Building & Leading Effective Teams

ITMM 574

Information Technology Management Frameworks

ITMM 575

Networking & Telecommunicastions Management

ITMM 576

Data Center Management

ITMM 577

Case Studies in Mangement of Information Technology

ITMM 582

Business Innovation

ITMM 584

Information Technology at C-Level

ITMM 586

Information Technology Auditing

ITMO 542

Wireless Technologies & Applications

ITMO 545

Telecommunications Technology

ITMO 546

Telecommunications Over Data Networks

ITMO 547

Telecommunications Over Data Networks: Projects & Advanced Methods

ITMO 556

Itelligent Device Projects

ITMO 557

Storage Technologies

ITMS 518

Coding Security

ITMS 538

Cyber Forensics

ITMS 539

Steganography

ITMS 549

Cyber Security Technologies: Projects & Advanced Methods

ITMS 555

Mobile Device Forensics

ITMS 588

Incident Response, Disaster Recovery, and Business Continuity

ITMT 514

Enterprise Application Architecture

ITMT 531

Object-Oriented System Analysis, Modeling & Design

ITMT 533

Operating System Design Implementation

ITMT 537

Instructional Technologies

ITMT 593

Embedded Systems

Landscape Architecture

LA 443

Forests, Preserves, Parks, & Urbanscapes

The growing need for these public site types in America in the 1800s gave rise to the landscape architecture profession. More necessary now than ever, the planning and design approach to these sites is undergoing major change. In this course students will investigate the historical and contemporary environmental and cultural relationships of the American landscape. Themes include landscape use and ecological change, regional and national landscapes, the roles of the National Park Service, state and county park and forest systems, and municipal green spaces. Case studies and analyses of specific sites.

(3-0-3)

LA 497

Special Projects

Special projects. Open only to Architecture majors.

(Credit: Variable)

Literature

LIT 306

Science Fiction

A treatment of select science fiction texts in terms of how they reflect shifting forms of work and social life in the 20th century. The course will focus on how these texts translate shifts in social patterns and popular entertainment.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(3-0-3) (C)(H)

LIT 307**Graphic Novel**

Comics, once a genre associated primarily with superheroes, have evolved since the 1970's to address weighty philosophical and existential issues in extended formats such as the graphic novel. This course will examine the graphic novels from major authors in the genre (e.g., Spiegelman, Eisner, and Moore) as well as "outside" artists. Also covered are the theoretical foundations of comics theory according to Will Eisner and Scott McCloud (among others). May not be taken for credit by students who have completed LIT 380 Graphic Novel.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)] (3-0-3) (C)(H)

LIT 309**Short Fiction**

A formal and thematic analysis of a diverse selection of works of short fiction. The selection will be announced by the instructor when the course is scheduled.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)] (3-0-3) (C)(H)

LIT 315**The Novel**

Analysis of the novel as a literary form with attention to its place in ongoing cultural and political discourse.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)] (3-0-3) (C)(H)

LIT 317**The Novel Today**

An examination of major world fiction since World War II. Readings will be chosen from such writers as Graham Greene, Alexander Solzhenitsyn, Heinrich Boll, Saul Bellow, Robertson Davies, and Gabriel Marquez, Nadine Gordimer, Toni Morrison, and Salman Rushdie.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)] (3-0-3) (C)(H)

LIT 326**World Literatures**

Contemporary networks of global capital and information technologies provide the motivation for the reading strategies of this course. The course will examine literary texts from a variety of global contexts from the perspective of globalism and nationalism.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)] (3-0-3) (C)(H)

LIT 328**Poetry**

Study of poetry and imaginative prose, including an analysis of the theoretical, literary, and socio-cultural contexts of these works. The course may include creative writing by students.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)] (3-0-3) (C)(H)

LIT 337**Shakespeare: Early Work**

Study of Shakespeare's work before 1600, focusing on the histories, early comedies and tragedies. Close reading of the plays' language and form, and emphasis on the place of drama in early modern culture. Syllabus varies but is likely to include Taming of the Shrew, Much Ado About Nothing, Parts 1 and 2 of Henry IV, Henry V, Hamlet.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)] (3-0-3) (C)(H)

LIT 338**Shakespeare: Late Work**

Study of Shakespeare's work after 1600, focusing on the middle and late comedies and tragedies and the romances. Close reading of the plays' language and form, and emphasis on the place of drama in early modern culture. Syllabus varies but is likely to include Twelfth Night, Macbeth, Coriolanus, Othello, King Lear, The Winter's Tale and The Tempest. May be taken independently of LIT 337.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)] (3-0-3) (C)(H)

LIT 339**Shakespeare on Stage & Screen**

While reading is the first step in understanding Shakespeare's work, seeing his words brought to life in a film or stage production comes closest to experiencing the plays as Shakespeare intended 400 years ago: as a performance. For each play discussed, students will view and compare two film versions. Students will also go to a live production of one play. Also covered are a history of Shakespeare in film and an introduction to film analysis. May not be taken for credit by students who have taken LIT 380 Shakespeare on Stage and Screen.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)] (3-0-3) (C)(H)

LIT 342**Theater in Chicago**

Designed to introduce students to the variety of professional theater performances in and around Chicago. Main emphasis on seeing plays, ancient to contemporary; essays and oral reports; study of dramatic genres and theater history.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)] (3-0-3) (C)(H)

LIT 343**Film Analysis**

Examination of the style and language of film as shown in a number of feature films, with emphasis on the various ways individual directors use the cinema for personal and cultural ends.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)] (3-0-3) (C)(H)

LIT 352**Gender & Sexuality in Literature**

This course introduces students to literary texts in Western and other traditions that examine issues of gender and sexuality, exploring how both gender and sexuality are interactive concepts shaped by their interrelationships with other vectors of identity, and with the artistic forms in which they are represented. May not be taken for credit by students who have taken LIT 380 Gender and Sexuality in Literature.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)] (3-0-3) (C)(H)

LIT 354**African American Literature**

This course explores various issues represented within African American literature. Throughout the course the students will read texts that focus on relationships between race, class, gender and identity. Students will discuss and research topics associated with themes outlined by the instructor.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)] (3-0-3) (C)(H)

LIT 366**Twentieth-Century American Literature**

Study of such writers as Steinbeck, Frost, Eliot, Anderson, O'Neill, Hemingway, Cather, Wolfe, Faulkner, and contemporary writers such as Updike and Toni Morrison.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)] (3-0-3) (C)(H)

Course Descriptions

LIT 380

Topics in Literature

An investigation into a topic of current or enduring interest in literature, which will be announced by the instructor when the course is scheduled.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)] (3-0-3) (C)(H)

LIT 411

Workshop in Creative Writing

A workshop demonstrating principles of composition in fiction, poetry, or drama, studied from a writer's vantage point. Works by modern authors are analyzed. Student manuscripts are discussed and evaluated.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)] (3-0-3) (C)(H)

LIT 491

Independent Reading & Research

Consent of department. For advanced students.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)] (Credit: Variable) (C)(H)

Mathematics

Courses indicated by an asterisk (*) do not count toward any computer science, engineering, mathematics, or natural science degree program.

MATH 100

Introduction to the Profession

Introduces the student to the scope of mathematics as a profession, develops a sense of mathematical curiosity and problem solving skills, identifies and reinforces the student's career choices, and provides a mechanism for regular academic advising. Provides integration with other first-year courses. Introduces applications of mathematics to areas such as engineering, physics, computer science, and finance. Emphasis is placed on the development of teamwork skills.

(3-0-3) (C)

MATH 119*

Geometry for Architects

Basic analytic geometry in two and three dimensions; trigonometry. Equations of lines, circles and conic sections; resolution of triangles; polar coordinates. Equations of planes, lines, quadratic surfaces. Applications.

(3-0-3) (C)

MATH 122*

Introduction to Calculus

Basic concepts of calculus of a single variable; limits, derivatives, integrals. Applications.

(3-0-3)

MATH 130*

Thinking Mathematically

This course allows students to discover, explore, and apply modern mathematical ideas. Emphasis is placed on using sound reasoning skills, visualizing mathematical concepts, and communicating mathematical ideas effectively. Classroom discussion and group work on challenging problems are central to the course. Topics from probability, statistics, logic, number theory, graph theory, combinatorics, chaos theory, the concept of infinity, and geometry may be included.

(3-0-3) (C)

MATH 148*

Calculus/Precalculus I

Review of algebra and analytic geometry. Functions, limits, derivatives. Trigonometry, trigonometric functions and their derivatives. Chain rule, implicit and inverse functions, and inverse trigonometric functions.

(4-0-4)

MATH 149

Calculus/Precalculus II

Applications of derivatives; related rates, maxima and minima, monotonicity, concavity, graphing, optimization. Antiderivatives, first order differential equations. Definite integral and applications. Implicit and inverse functions, and inverse trigonometric functions.

Prerequisite(s): [(MATH 148 with min. grade of C)] (4-1-5) (C)

MATH 151

Calculus I

Analytic geometry. Functions and their graphs. Limits and continuity. Derivatives of algebraic, trigonometric and inverse trigonometric functions. Applications of the derivative. Introduction to integrals and their applications.

Prerequisite(s): [(IIT Mathematics Placement: 151) OR (MATH 148 with min. grade of C)] (4-1-5) (C)

MATH 152

Calculus II

Transcendental functions and their calculus. Integration techniques. Applications of the integral. Indeterminate forms and improper integrals. Polar coordinates. Numerical series and power series expansions.

Prerequisite(s): [(MATH 149 with min. grade of C) OR (MATH 151 with min. grade of C)] (4-1-5) (C)

MATH 230

Introduction to Discrete Math

Sets, statements, and elementary symbolic logic; relations and digraphs; functions and sequences; mathematical induction; basic counting techniques and recurrence. Credit will not be granted for both CS 330 and MATH 230.

(3-0-3) (C)

MATH 251

Multivariate & Vector Calculus

Analytic geometry in three-dimensional space. Partial derivatives. Multiple integrals. Vector analysis. Applications.

Prerequisite(s): [(MATH 152)]

(4-0-4)

MATH 252

Introduction to Differential Equations

Linear differential equations of order one. Linear differential equations of higher order. Series solutions of linear DE. Laplace transforms and their use in solving linear DE. Introduction to matrices. Systems of linear differential equations.

Prerequisite(s): [(MATH 152)]

(4-0-4)

MATH 300

Perspectives in Analysis

The course is focused on selected topics related to fundamental concepts and methods of classic analysis and their applications with emphasis on various problem-solving strategies, visualization, mathematical modeling, and interrelation of different areas of mathematics.

Prerequisite(s): [(MATH 251 and MATH 252)]

(3-0-3)

MATH 332

Elementary Linear Algebra

Systems of linear equations; matrix algebra, inverses, determinants, eigenvalues, and eigenvectors, diagonalization; vector spaces, basis, dimension, rank and nullity; inner product spaces, orthonormal bases; quadratic forms.

Prerequisite(s): [(MATH 251*)] An asterisk (*) designates a course which may be taken concurrently.

(3-0-3)

MATH 333

Matrix Algebra & Complex Variables

Vectors and matrices; matrix operations, transpose, rank, inverse; determinants; solution of linear systems; eigenvalues and eigenvectors. The complex plane; analytic functions; contour integrals; Laurent series expansions; singularities and residues. Course does not satisfy graduation requirements for Applied Mathematics majors.

Prerequisite(s): [(MATH 251)]

(3-0-3)

MATH 350

Introduction to Computational Mathematics

Study and design of mathematical models for the numerical solution of scientific problems. This includes numerical methods for the solution on linear and nonlinear systems, basic data fitting problems, and ordinary differential equations. Robustness, accuracy, and speed of convergence of algorithms will be investigated including the basics of computer arithmetic and round-off errors. Same as MMAE 350.

Prerequisite(s): [(CS 104) OR (CS 105) OR (CS 115)] AND [(MATH 251)] AND [(MATH 252)]

(3-0-3) (C)

MATH 400

Real Analysis

Real numbers, continuous functions; differentiation and Riemann integration. Functions defined by series.

Prerequisite(s): [(MATH 251)]

(3-0-3)

MATH 402

Complex Analysis

Analytic functions, conformal mapping, contour integration, series expansions, singularities and residues, and applications. Intended as a first course in the subject for students in the physical sciences and engineering.

Prerequisite(s): [(MATH 251)]

(3-0-3)

MATH 405

Introduction to Iteration & Chaos

Functional iteration and orbits, periodic points and Sharkovsky's cycle theorem, chaos and dynamical systems of dimensions one and two. Julia sets and fractals, physical implications.

Prerequisite(s): [(MATH 251, MATH 252, and MATH 332) OR (MATH 251, MATH 252, and MATH 333)]

(3-0-3) (C)

MATH 410

Number Theory

Divisibility, congruencies, distribution of prime numbers, functions of number theory, diophantine equations, applications to encryption methods.

Prerequisite(s): [(MATH 230)]

(3-0-3)

MATH 420

Geometry

The course is focused on selected topics related to fundamental concepts and methods of Euclidean geometry in two and three dimensions and their applications with emphasis on various problem-solving strategies, geometric proof, visualization, and interrelation of different areas of mathematics. Prerequisite: Permission of instructor.

(3-0-3)

MATH 425

Statistical Methods

Concepts and methods of gathering, describing and analyzing data including basic statistical reasoning, basic probability, sampling, hypothesis testing, confidence intervals, correlation, regression, forecasting, and nonparametric statistics. No knowledge of calculus is assumed. This course is useful for students in education or the social sciences. This course does not count for graduation in any mathematics programs. Credit not given for both MATH 425 and MATH 476. Course does not satisfy graduation requirements for Applied Mathematics majors.

(3-0-3)

MATH 426

Statistical Tools for Engineers

Descriptive statistics and graphs, probability distributions, random sampling, independence, significance tests, design of experiments, regression, time-series analysis, statistical process control, introduction to multivariate analysis. Same as CHE 426. Credit not given for both Math 426 and CHE 426 Course does not satisfy graduation requirements for Applied Mathematics majors. Requires sophomore standing.

(3-0-3)

MATH 430

Applied Algebra

Relations; modular arithmetic; group theory: symmetry, permutation, cyclic, and abelian groups; group structure: subgroups, cosets, homomorphisms, classifications theorems; rings and fields. Applications to crystallography, cryptography, and check-digit schemes.

Prerequisite(s): [(MATH 230) OR (MATH 332)]

(3-0-3) (C)

MATH 431

Applied Algebra II

Ring homomorphisms; factorization and reducibility in polynomial rings; integral domains; vector spaces; fields and their extensions. As time permits, application to one or more of the following: Frieze and crystallographic groups, Caley digraphs, and coding theory.

Prerequisite(s): [(MATH 430)]

(3-0-3)

MATH 435

Linear Optimization

Introduction to both theoretical and algorithmic aspects of linear optimization: geometry of linear programs, simplex method, anticycling, duality theory and dual simplex method, sensitivity analysis, large scale optimization via Dantzig-Wolfe decomposition and Benders decomposition, interior point methods, network flow problems, integer programming. Credit may not be granted for both MATH 435 and MATH 535.

Prerequisite(s): [(MATH 332)]

(3-0-3)

MATH 453

Combinatorics

Permutations and combinations; pigeonhole principle; inclusion-exclusion principle; recurrence relations and generating functions; enumeration under group action.

Prerequisite(s): [(MATH 230)]

(3-0-3)

Course Descriptions

MATH 454

Graph Theory & Applications

Graph theory is the study of systems of points with some of the pairs of points joined by lines. Sample topics include: paths, cycles and trees; adjacency and connectivity; directed graphs; Hamiltonian and Eulerian graphs and digraphs; intersection graphs. Applications to the sciences (computer, life, physical, social) and engineering will be introduced throughout the course. Credit will not be granted for both MATH 454 and MATH 553

Prerequisite(s): [(MATH 230 and MATH 251) OR (MATH 230 and MATH 252)]

(3-0-3) (C)

MATH 461

Fourier Series & Boundary-Value Problems

Fourier series and integrals. The Laplace, heat, and wave equations: Solutions by separation of variables. D'Alembert's solution of the wave equation. Boundary-value problems.

Prerequisite(s): [(MATH 251 and MATH 252)]

(3-0-3)

MATH 474

Probability & Statistics

Elementary probability theory including discrete and continuous distributions, sampling, estimation, confidence intervals, hypothesis testing, and linear regression. Credit not granted for both MATH 474 and MATH 475. Course does not satisfy graduation requirements for Applied Mathematics majors.

Prerequisite(s): [(MATH 251)]

(3-0-3)

MATH 475

Probability

Elementary probability theory; combinatorics; random variables; discrete and continuous distributions; joint distributions and moments; transformations and convolution; basic theorems; simulation. Credit not granted for both MATH 474 and MATH 475.

Prerequisite(s): [(MATH 251)]

(3-0-3)

MATH 476

Statistics

Estimation theory; hypothesis tests; confidence intervals; goodness-of-fit tests; correlation and linear regression; analysis of variance; nonparametric methods.

Prerequisite(s): [(MATH 475)]

(3-0-3) (C)

MATH 477

Numerical Linear Algebra

Fundamentals of matrix theory; least squares problems; computer arithmetic; conditioning and stability; direct and iterative methods for linear systems; eigenvalue problems. Credit may not be granted for both MATH 477 and MATH 577.

Prerequisite(s): [(MATH 350)]

(3-0-3)

MATH 478

Numerical Methods for Differential Equations

Polynomial interpolation; numerical integration; numerical solution of initial value problems for ordinary differential equations by single and multi-step methods, Runge-Kutta, Predictor-Corrector; numerical solution of boundary value problems for ordinary differential equations by shooting method, finite differences and spectral methods. Credit may not be granted for both MATH 478 and MATH 578.

Prerequisite(s): [(MATH 350)]

(3-0-3)

MATH 481

Introduction to Stochastic Processes

This is an introductory course in stochastic processes. Its purpose is to introduce students to a range of stochastic processes which are used as modeling tools in diverse fields of applications, especially in the business applications. The course introduces the most fundamental ideas in the area of modeling and analysis of real World phenomena in terms of stochastic processes. The course covers different classes of Markov processes: discrete and continuous-time Markov chains, Brownian motion and diffusion processes. It also presents some aspects of stochastic calculus with emphasis on the application to financial modeling and financial engineering. Credit will not be granted for MATH 481 and 542.

Prerequisite(s): [(MATH 332 and MATH 475) OR (MATH 333 and MATH 475)]

(3-0-3)

MATH 483

Design & Analysis of Experiments

Review of elementary probability and statistics; analysis of variance for design of experiments; estimation of parameters; confidence intervals for various linear combinations of the parameters; selection of sample sizes; various plots of residuals; block designs; Latin squares; one, two, and 2k factorial designs; nested and cross factor designs; regression; nonparametric techniques.

Prerequisite(s): [(MATH 476)]

(3-0-3)

MATH 484

Regression & Forecasting

Simple linear regression; multiple linear regression; least squares estimates of parameters; hypothesis testing and confidence intervals in linear regression models; testing of models, data analysis, and appropriateness of models; linear time series models; moving average, autoregressive and/or ARIMA models; estimation, data analysis, and forecasting with time series models; forecasting errors and confidence intervals. Credit may not be granted for both MATH 484 and MATH 564.

Prerequisite(s): [(MATH 474) OR (MATH 476)]

(3-0-3) (C)

MATH 485

Introduction to Mathematical Finance

This is an introductory course in mathematical finance. Technical difficulty of the subject is kept at a minimum by considering a discrete time framework. Nevertheless, the major ideas and concepts underlying modern mathematical finance and financial engineering will be explained and illustrated. Credit may not be granted for MATH 485 and MATH 548.

Prerequisite(s): [(MATH 475)]

(3-0-3)

MATH 486

Mathematical Modeling I

The course provides a systematic approach to modeling and analysis of physical processes. For specific applications, relevant differential equations are derived from basic principles – for example, from conservation laws and constitutive equations. Dimensional analysis and scaling are introduced to prepare a model for analysis. Analytic solution techniques, such as integral transforms and similarity variable techniques, or approximate methods, such as asymptotic and perturbation methods, are presented and applied to the models. A broad range of applications from areas such as physics, engineering, biology, and chemistry are studied. Credit may not be granted for both MATH 486 and MATH 522.

Prerequisite(s): [(MATH 461)]

(3-0-3) (C)

MATH 487**Mathematical Modeling II**

The formulation of mathematical models, solution of mathematical equations, interpretation of results. Selected topics from queuing theory and financial derivatives.

Prerequisite(s): [(MATH 252)]
(3-0-3) (C)

MATH 488**Ordinary Differential Equations & Dynamical Systems**

Boundary-value problems and Sturm-Liouville theory; linear system theory via eigenvalues and eigenvectors; Floquet theory; nonlinear systems: critical points, linearization, stability concepts, index theory, phase portrait analysis, limit cycles, and stable and unstable manifolds; bifurcation; and chaotic dynamics.

Prerequisite(s): [(MATH 251 and MATH 252)]
(3-0-3)

MATH 489**Partial Differential Equations**

First-order equations, characteristics. Classification of second-order equations. Laplace's equation; potential theory. Green's function, maximum principles. The wave equation: characteristics, general solution. The heat equation: use of integral transforms.

Prerequisite(s): [(MATH 461)]
(3-0-3)

MATH 491**Reading & Research**

Independent reading and research.
(Credit: Variable) (C)

MATH 497**Special Problems**

Special problems.
(Credit: Variable) (C)

Military Science

MILS 101**Foundation of Officership**

Issues and competencies that are central to a commissioned officer's responsibilities. Establish framework for understanding officership, leadership, and Army values followed and "life skills" such as physical fitness and time management.
(1-2-1) (C)

MILS 102**Basic Leadership**

Establishes foundation of basic leadership fundamentals such as problem solving, communications, briefings and effective writing, goal setting techniques for improving listening and speaking skills, and an introduction to counseling.
(1-2-1) (C)

MILS 107**American Military History**

Study of American military history through examination of involvement of the Army and warfare.
(3-2-3)

MILS 147**Aerobic Conditioning**

Participation in aerobic exercise program; evaluation of the level of cardiovascular fitness.
(0-3-2)

MILS 148**Aerobic Conditioning**

Participation in aerobic exercise program; evaluation of the level of cardiovascular fitness.
(0-3-2)

MILS 199**Military Topics**

Approval of the department. Research and study of selected topics. A practical laboratory is required. May be repeated if topics vary. Students may register in more than one section per term.
(3-0-3)

MILS 201**Individual Leadership Studies**

Students identify successful leadership characteristics through observation of others and self and through experiential learning exercises. Students record observed traits (good and bad) in a dimensional leadership journal and discuss observations in small group settings.
(2-2-2)

MILS 202**Leadership & Teamwork**

Study examines how to build successful teams, various methods for influencing action, effective communication in setting and achieving goals, the importance of timing the decision, creativity in the problem solving process, and obtaining team buy-in through immediate feedback.
(2-2-2)

MILS 247**Aerobic Conditioning**

Participation in aerobic exercise program; evaluation of the level of cardiovascular fitness.
(0-3-2)

MILS 248**Aerobic Conditioning**

Participation in aerobic exercise program; evaluation of the level of cardiovascular fitness.
(0-3-2)

MILS 301**Leadership & Problem Solving**

Students conduct self-assessment of leadership style, develop personal fitness regimen, and learn to plan and conduct individual/ small unit tactical training while testing reason and problem-solving techniques. Students receive direct feedback on leadership abilities.
(3-2-3) (C)

MILS 302**Leadership & Ethics**

Examines the role communications, values, and ethics play in effective leadership. Topics include ethical decision-making, consideration of others, spirituality in the military, and survey Army leadership doctrine. Emphasis on improving oral and written communication abilities.
Prerequisite(s): [(MILS 301)]
(3-2-3) (C)

MILS 347**Aerobic Conditioning**

Participation in aerobic exercise program; evaluation of the level of cardiovascular fitness.
(0-3-2)

MILS 348**Aerobic Conditioning**

Participation in aerobic exercise program; evaluation of the level of cardiovascular fitness.
(0-3-2)

MILS 350

Military Civil & Public Affairs

This course is an expansion of Military Presence in towns, villages, and cities where it would be necessary for a military government to assume responsibilities for the administration of the government functions. An added feature of the course would be the development of positive relationships with civilians and government officials. The preparation of news and information releases and related operations.

(0-0-3)

MILS 394

Advanced Military Topics

Approval of the department. Study of advanced topics in military science. A practical laboratory is required. May be repeated if topics vary. Students may register in more than one section per term.

(3-0-3)

MILS 399

Advanced Independent Research

Approval of the department. Intensive research and study of selected topics. A practical laboratory is required. May be repeated to maximum of 6 hours if topics vary. Students may register in more than one section per term.

(0-0-3)

MILS 401

Leadership & Management

Develops student proficiency in planning and executing complex operations, functioning as a member of a staff, and mentoring subordinates. Students explore training management, methods of effective staff collaboration, and developmental counseling techniques.

Prerequisite(s): [(MILS 301 and MILS 302)]

(3-2-3) (C)

MILS 402

Officership

Study includes case study analysis of military law and practical exercises on establishing an ethical command climate. Students must complete a semester long Senior Leadership Project that requires them to plan, organize, collaborate, analyze, and demonstrate their leadership skills.

Prerequisite(s): [(MILS 301, MILS 302, and MILS 401)]

(3-2-3) (C)

MILS 447

Aerobic Conditioning

Participation in aerobic exercise program; evaluation of the level of cardiovascular fitness.

(0-3-2)

MILS 448

Aerobic Conditioning

Participation in aerobic exercise program; evaluation of the level of cardiovascular fitness.

(0-3-2)

MILS 499

Advanced Independent Research

Intensive research and study of selected topics. May be repeated for a maximum of six credit hours. A practical laboratory is required for Army ROTC cadets.

(Credit: Variable)

Mechanical, Materials, and Aerospace Engineering

MMAE 100

Introduction to the Profession

Introduces the student to the scope of the engineering profession and its role in society, develops a sense of professionalism in the student, confirms and reinforces the student's career choices, and provides a mechanism for regular academic advising. Provides integration with other first-year courses. Applications of mathematics to engineering. Emphasis is placed on the development of professional communications and teamwork skills.

(1-4-3) (C)

MMAE 200

Introduction to Mechanics

Equilibrium concepts. Statics of a particle. Statics of a system of particles and rigid bodies. Distributed forces, centroids and center of gravity. Friction. Kinetics of particles: Newton's Laws of motion, energy and momentum. Kinematics of particles. Dynamics of rotating bodies.

Prerequisite(s): [(MATH 152* and PHYS 123)] An asterisk (*) designates a course which may be taken concurrently.

(3-0-3)

MMAE 202

Mechanics of Solids II

Stress and strain relations, mechanical properties. Axially loaded members. Torsion of circular shafts. Plane stress and strain, Mohr's circle, stress transformation. Elementary bending theory, normal and shear stresses in beams, beam deflection. Combined loading.

Prerequisite(s): [(MMAE 200) OR (MMAE 201)]

(3-0-3)

MMAE 232

Design for Innovation

Product design and development including engineering design, good versus bad design, human-centered design, sketch models and prototyping, material selection, sustainable product development, product tear down, and product architecture. Global topics encompassing intellectual property, innovative thinking, global competitiveness, business economics, and managing product development.

Prerequisite(s): [(MMAE 100)]

(3-1-3)

MMAE 302

Mechanics of Solids III

Analysis of stress and strain. Torsional and bending structural elements. Energy methods and Castigliano's theorems. Curved beams and springs. Thick-walled cylinders and spinning disks. Pressure vessels. Contact stresses. Stability of columns. Stress concentration and stress intensity factors. Theories of failure, yield, and fracture. Fatigue.

Prerequisite(s): [(MATH 251, MATH 252, MMAE 202, and MMAE 232)]

(3-0-3)

MMAE 304

Mechanics of Aerostructures

Loads on aircraft, and flight envelope. Stress, strain and constitutive relations. Torsion of open, closed and multi-cell tubes. Energy methods. Castigliano's theorems. Structural instability.

Prerequisite(s): [(MATH 251, MATH 252, and MMAE 202)]

(3-0-3)

MMAE 305

Dynamics

Kinematics of particles. Kinetics of particles. Newton's laws of motion, energy; momentum. Systems of particles. Kinematics of rigid bodies. Plane motion of rigid bodies: forces and accelerations, energy, momentum.

Prerequisite(s): [(MATH 252* and MMAE 200)] An asterisk (*) designates a course which may be taken concurrently. (3-0-3)

MMAE 311

Compressible Flow

Regimes of compressible perfect-gas flow. Steady, quasi one-dimensional flow in passages. Effects of heat addition and friction in ducts. Design of nozzles, diffusers and wind tunnels. Simple waves and shocks in unsteady duct flow. Steady two-dimensional supersonic flow including oblique shocks and Prandtl-Meyer expansions.

Prerequisite(s): [(MMAE 313 and MMAE 320)] (3-0-3)

MMAE 312

Aerodynamics of Aerospace Vehicles

Analysis of aerodynamic lift and drag forces on bodies. Potential flow calculation of lift on two-dimensional bodies; numerical solutions; source and vortex panels. Boundary layers and drag calculations. Aerodynamic characteristics of airfoils; the finite wing.

Prerequisite(s): [(MMAE 311*, MMAE 313, and MMAE 320)] An asterisk (*) designates a course which may be taken concurrently. (3-0-3)

MMAE 313

Fluid Mechanics

Basic properties of fluids in motion. Lagrangian and Eulerian viewpoints, material derivative, streamlines, etc. Continuity, energy, and linear and angular momentum equations in integral and differential forms. Integration of equations for one-dimensional flows and application to problems. Incompressible viscous flow; Navier-Stokes equations, parallel flow, pipe flow, and the Moody diagram. Introduction to laminar and turbulent boundary layers and free surface flows.

Prerequisite(s): [(MATH 251, MATH 252, and MMAE 320)] AND [(MMAE 201*)] An asterisk (*) designates a course which may be taken concurrently. (3-0-3)

MMAE 315

Aerospace Laboratory I

Basic skills for engineering research are taught, which include: analog electronic circuit analysis, fundamentals of digital data acquisition, measurements of pressure, temperature, flow rate, heat transfer, and static forces and moments; statistical data analysis.

Prerequisite(s): [(MMAE 313 and PHYS 221)] (2-6-4)

MMAE 319

Mechanical Laboratory I

Basic skills for engineering research are taught, which include: analog electronic circuit analysis; fundamentals of digital data acquisition; measurements of pressure, temperature, flow rate, heat transfer, and static forces and moments; and statistical data analysis.

Prerequisite(s): [(MMAE 313 and PHYS 221)] (2-6-4)

MMAE 320

Thermodynamics

Introduction to thermodynamics including properties of matter; First Law of Thermodynamics and its use in analyzing open and closed systems; limitations of the Second Law of Thermodynamics; entropy.

Prerequisite(s): [(MATH 251)] (3-0-3)

MMAE 321

Applied Thermodynamics

Analysis of thermodynamic systems including energy analysis; analysis and design of power and refrigeration cycles; gas mixtures and chemically reacting systems; chemical equilibrium; combustion and fuel cells.

Prerequisite(s): [(MMAE 313* and MMAE 320)] An asterisk (*) designates a course which may be taken concurrently. (3-0-3)

MMAE 323

Heat & Mass Transfer

Basic laws of transport phenomena, including: steady-state heat conduction; multi-dimensional and transient conduction; forced internal and external convection; natural convection; heat exchanger design and analysis; fundamental concepts of radiation; shape factors and network analysis; diffusive and convective mass transfer; phase change, condensation and boiling.

Prerequisite(s): [(MMAE 313 and MMAE 320)] (3-0-3)

MMAE 332

Design of Machine Elements

Students will gain an understanding of the basic elements used in machine design. These include the characteristics of gears, bearings, shafts, keys, couplings, fasteners, springs, electric motors, brakes and clutches, and flexible elements. Students will also learn mechanism types, linkage analysis, and kinematic synthesis.

Prerequisite(s): [(MMAE 302) OR (MMAE 304)] AND [(MS 201)] (3-0-3)

MMAE 350

Computational Mechanics

Explores the use of numerical methods to solve engineering problems in solid mechanics, fluid mechanics and heat transfer. Topics include matrix algebra, nonlinear equations of one variable, systems of linear algebraic equations, nonlinear equations of several variables, classification of partial differential equations in engineering, the finite difference method, and the finite element method. Same as MATH 350.

Prerequisite(s): [(CS 104-201, MATH 251, MATH 252*, and MMAE 202*)] An asterisk (*) designates a course which may be taken concurrently. (3-0-3)

MMAE 361

Fundamentals of Crystalline Solids

Imperfections in metals and ceramics. Dislocations and plastic deformation. The thermodynamic and kinetic principles of binary phase diagrams. Diffusion. Solidification.

Prerequisite(s): [(MMAE 371 and MS 201)] (3-0-3)

Course Descriptions

MMAE 362

Physics of Solids

Introduction of crystallography, crystal structure, crystal systems, symmetry, stereographic representation. Crystal structures in materials. X-ray diffraction; character of X-rays and their interaction with crystals; diffraction methods. Structure of the atom and the behavior of electrons in solids. Band theory of solids. Electrical, thermal and magnetic behavior. Theory of phase stability in alloys. Equivalent to PHYS 437.

Prerequisite(s): [(MS 201)]
(3-0-3) (C)

MMAE 365

Structure & Properties of Materials I

Crystal structures and structure determination. Crystal defects, intrinsic and extrinsic properties, diffusion, kinetics of transformations, evolution and classification of microstructures.

Prerequisite(s): [(MMAE 320* and MS 201)] An asterisk (*) designates a course which may be taken concurrently.
(3-0-3)

MMAE 370

Materials Laboratory I

Introduction to materials characterization techniques including specimen preparation, metallography, optical and scanning electron microscopy, temperature measurement, data acquisition analysis and presentation.

Prerequisite(s): [(MMAE 365*) OR (MMAE 371*)] An asterisk (*) designates a course which may be taken concurrently.
(1-6-3) (C)

MMAE 372

Aerospace Materials Lab

Mechanical behavior and microstructural characterization of aerospace materials including advanced metal alloys, polymers, ceramics, and composites. Introduction to mechanical testing techniques for assessing the properties and performance of aerospace materials. Evaluation of structural performance in terms of materials selection, processing, service conditions, and design.

Prerequisite(s): [(MMAE 202 and MS 201)]
(2-3-3)

MMAE 373

Instrumentation & Measurements Laboratory

Basic skills for engineering research are taught, which include: analog electronic circuit analysis, fundamentals of digital data acquisition and statistical data analysis. Laboratory testing methods including solid mechanics: tension, torsion, hardness, impact, toughness, fatigue and creep. Design of experiments.

Prerequisite(s): [(PHYS 221)]
(2-6-4)

MMAE 406

Mechanical Vibrations

Study of free, forced and damped vibrations of single degree of freedom mechanical systems: resonance, critical damping, and vibration isolation. Two degree of freedom systems: natural frequencies, normal modes, resonances and vibration absorbers. Introduction to vibrations of multiple degree of freedom.

Prerequisite(s): [(MMAE 305 and MMAE 350)]
(3-0-3) (C)

MMAE 407

Biomechanics: Solids

Properties of mathematical models for bone, soft tissues, tendons, ligaments, cartilage, and muscles. Human body structure, posture movement, and locomotion. Spine mechanics and joint mechanics. Mechanics of occlusion and mastication. Exoprosthetics and endoprosthetics. Implants and biomechanical compatibility.

Prerequisite(s): [(MMAE 302) OR (MMAE 304)] AND [(MMAE 430*)] An asterisk (*) designates a course which may be taken concurrently.
(3-0-3) (C)

MMAE 410

Aircraft Flight Mechanics

Airplane performance: takeoff, rate of climb, time to climb, ceilings, range and endurance, operating limitations, descent and landing. Helicopters and V/STOL aircraft. Airplane static stability and control: longitudinal stability, directional stability, and roll stability. Airplane equations of motion: kinematics and dynamics of airplanes, and stability derivatives. Dynamic response: longitudinal modes of motion, lateral modes of motion. Introduction to aircraft control.

Prerequisite(s): [(MMAE 312 and MMAE 443*)] An asterisk (*) designates a course which may be taken concurrently.
(3-0-3)

MMAE 411

Spacecraft Dynamics

Orbital mechanics: two-body problem, Kepler's equation, classical orbital elements, and introduction to orbit perturbations. Spacecraft mission analysis: orbital maneuvers and station keeping, earth orbiting, lunar, and interplanetary missions, introduction to orbit determination. Spacecraft attitude dynamics: three-dimensional kinematics and dynamics of spacecraft, rotating reference frames and orientation angles, and spacecraft equations of motion. Spacecraft attitude stability and control: dual-spin platforms, momentum wheels, control-moment gyros, gravity gradient stabilization, introduction to spacecraft attitude determination and control.

Prerequisite(s): [(MATH 252, MMAE 200, MMAE 305, and MMAE 443*)] An asterisk (*) designates a course which may be taken concurrently.

(3-0-3)

MMAE 412

Spacecraft Design I

Launch vehicle design including a system engineering, payload mission definition, propulsion and staging, structural design, trajectory analysis and guidance, launch window considerations, navigation and attitude determination, booster re-entry, range safety, and reliability. Semester-long project is focused on the integration of multiple systems into a coherent launch vehicle design to achieve specific mission requirements.

Prerequisite(s): [(MMAE 302) OR (MMAE 304)] AND [(MMAE 411*)] AND [(MMAE 452)] An asterisk (*) designates a course which may be taken concurrently.

(2-3-3)

MMAE 413

Spacecraft Design II

Spacecraft systems design including real world mission analysis and orbit design, launch vehicle requirements, attitude determination and control, propulsion, structural design, power systems thermal management, and telecommunications. Semester-long project is focused on the integration of multiple systems into a coherent spacecraft design to achieve specific mission requirements.

Prerequisite(s): [(MMAE 411 and MMAE 412)]

(1-6-3)

MMAE 414

Aircraft Design I

Aircraft design including aerodynamic, structural, and power plant characteristics to achieve performance goals. Focus on applications ranging from commercial to military and from manpowered to high-speed to long-duration aircraft. Semester project is a collaborative effort in which small design groups complete the preliminary design cycle of an aircraft to achieve specific design requirements.

Prerequisite(s): [(MMAE 302) OR (MMAE 304)] AND [(MMAE 312)] AND [(MMAE 410*)] AND [(MMAE 452)]
An asterisk (*) designates a course which may be taken concurrently.

(2-3-3)

MMAE 415

Aerospace Laboratory II

Advanced skills for engineering research are taught, which include experiments with digital electronic circuit analysis, dynamic data acquisition techniques, fundamentals of fluid power system design, GPS and inertial guidance systems, air-breathing propulsion, and fly-by-wire control.

Prerequisite(s): [(MMAE 315) OR (MMAE 319)] AND [(MMAE 443*)] An asterisk (*) designates a course which may be taken concurrently.

(2-6-4)

MMAE 416

Aircraft Design II

Team project that includes conceptual design, detail design, prototyping, and testing (or simulation) of an aircraft model or aircraft subsystem to meet performance specifications.

Prerequisite(s): [(MMAE 410 and MMAE 414)]

(1-6-3)

MMAE 417

Advanced Aerodynamics

Unsteady aerodynamics, nonlinear flight regimes at high angle of attack, missile aerodynamics, hypersonic flight, and other topics relevant to the aerospace industry.

Prerequisite(s): [(MMAE 410*)] An asterisk (*) designates a course which may be taken concurrently.

(3-0-3)

MMAE 418

Fluid Power for Aerospace Applications

Basic principles and concepts needed for the design and troubleshooting of fluid power systems. An emphasis is placed on flight control and simulation of hydraulic systems and is extended to mobile and industrial applications.

Prerequisite(s): [(MMAE 313 and MMAE 443*)] An asterisk (*) designates a course which may be taken concurrently.

(2-3-3)

MMAE 419

Mechanical Laboratory II

Laboratory testing methods including solid mechanics: tension, torsion, hardness, impact, toughness, fatigue and creep; heat and mass transfer: conduction, fins, convection, radiation, diffusion; vibrations and control. Design of experiments.

Prerequisite(s): [(MMAE 302)] AND [(MMAE 315) OR (MMAE 319)] AND [(MMAE 323)] AND [(MMAE 443*)] An asterisk (*) designates a course which may be taken concurrently.

(2-6-4)

MMAE 425

Direct Energy Conversion

A study of various methods available for direct conversion of thermal energy into electrical energy. Introduction to the principles of operation of magneto-hydrodynamic generators, thermoelectric devices, thermionic converters, fuel cells and solar cells.

Prerequisite(s): [(MMAE 321 and PHYS 224)]

(3-0-3)

MMAE 426

Nuclear, Fossil-Fuel, & Sustainable Energy Systems

Principles, technology, and hardware used for conversion of nuclear, fossil-fuel, and sustainable energy into electric power will be discussed. Thermodynamic analysis – Rankine cycle. Design and key components of fossil-fuel power plants. Nuclear fuel, reactions, materials. Pressurized water reactors (PWR). Boiling water reactors (BWR). Canadian heavy water (CANDU) power plants. Heat transfer from the nuclear fuel elements. Introduction to two phase flow: flow regimes; models. Critical heat flux. Environmental effects of coal and nuclear power. Design of solar collectors. Direct conversion of solar energy into electricity. Wind power. Geothermal energy. Energy conservation and sustainable buildings. Enrichment of nuclear fuel. Nuclear weapons and effects of the explosions.

Prerequisite(s): [(CHE 302) OR (MMAE 323)]

(3-0-3)

MMAE 432

Design of Mechanical Systems

Small-group design projects drawn from industry. Requires senior standing.

Prerequisite(s): [(MMAE 304) OR (MMAE 332)]

(1-6-3)

MMAE 433

Design of Thermal Systems

Application of principles of fluid mechanics, heat transfer, and thermodynamics to design of components of engineering systems. Examples are drawn from power generation, environmental control, air and ground transportation, and industrial processes, as well as other industries. Groups of students work on projects for integration of these components and design of thermal systems.

Prerequisite(s): [(MMAE 321)] AND [(MMAE 323)]

(2-3-3) (C)

MMAE 434

Design for Mechanical Reliability

Reliability and hazard functions; statics and dynamic reliability models for series, parallel and complex systems; reliability allocation. Probabilistic design; stress and strength distributions; safety factors; loading random variables; geometric tolerances, linear and nonlinear dimensional combinations; stress as random variable; material properties as random variables; failure theories; significant stress-strength models; reliability confidence intervals.

Prerequisite(s): [(MMAE 332)]

(3-0-3)

MMAE 435

Design for Safety in Machines

A critical study of the interface between law and safety engineering, which embraces not only statutory law, such as OSHA and the Consumer Products Safety Act, but also case law arising from product liability suits. Detailed analysis of actual industrial and consumer accidents from the investigative stages through their litigation. Formulation of general safety design techniques for mechanical engineering systems and the development of courtroom communication skills for expert witnesses. Requires senior standing.

(3-0-3)

MMAE 440

Introduction to Robotics

Classification of robots; kinematics and inverse kinematics of manipulators; trajectory planning; robot dynamics and equations of motion; position control.

Prerequisite(s): [(MMAE 305)] AND [(MMAE 315) OR (MMAE 319)]

(3-0-3)

MMAE 443

Systems Analysis & Control

Mathematical modeling of dynamic systems; linearization. Laplace transform; transfer functions; transient and steady-state response. Feedback control of single-input, single-output systems. Routh stability criterion. Root-locus method for control system design. Frequency-response methods; Bode plots; Nyquist stability criterion.

Prerequisite(s): [(MATH 252)] AND [(MMAE 200) OR (MMAE 305)]
(3-0-3)

MMAE 444

Design for Manufacture

The materials/design/manufacturing interface in the production of industrial and consumer goods. Material and process selection; process capabilities; modern trends in manufacturing. Life cycle engineering; competitive aspects of manufacturing; quality, cost, and environmental considerations.

Prerequisite(s): [(MMAE 485)]
(3-0-3)

MMAE 445

Computer-Aided Design

Principles of geometric modeling, finite element analysis and design optimization. Curve, surface, and solid modeling. Mesh generation, Galerkin method, and Isoparametric elements. Optimum design concepts. Numerical methods for constrained and unconstrained optimization. Applications of CAD/CAE software for mechanical design problems.

Prerequisite(s): [(MMAE 304) OR (MMAE 332)] AND [(MMAE 350)]
(3-0-3)

MMAE 450

Computational Mechanics II

Explores the use of numerical methods to solve engineering problems in continuum mechanics, fluid mechanics, and heat transfer. Topics include partial differential equations and differential and integral eigenvalue problems. As tools for the solution of such equations, we discuss methods of linear algebra, finite difference and finite volume methods, spectral methods, and finite element methods. The course contains an introduction to the use of a commercial finite element package for the solution of complex partial differential equations.

Prerequisite(s): [(MATH 350) OR (MMAE 350)]
(3-0-3)

MMAE 451

Finite Element Methods in Engineering

Principles of minimum potential energy of structures—stiffness matrices, stress matrices and assembly process of global matrices. The finite element method for two-dimensional problems: interpolation functions, area coordinates, isoperimetric elements, and problems of stress concentration. General finite element codes: data generation and checks, ill-conditioned problems, and node numbering.

Prerequisite(s): [(MATH 252, MMAE 202, and MMAE 350)]
(3-0-3)

MMAE 452

Aerospace Propulsion

Analysis and performance of various jet and rocket propulsive devices. Foundations of propulsion theory. Design and analysis of inlets, compressors, combustion chambers, and other elements of propulsive devices. Emphasis is placed on mobile power plants for aerospace applications.

Prerequisite(s): [(MMAE 311)]
(3-0-3)

MMAE 455

Cardiovascular Fluid Mechanics

Anatomy of the cardiovascular system. Scaling principles. Lumped parameter, one-dimensional linear and nonlinear wave propagation, and three-dimensional modeling techniques applied to simulate blood flow in the cardiovascular system. Steady and pulsatile flow in rigid and elastic tubes. Form and function of blood, blood vessels, and the heart from an engineering perspective. Sensing, feedback, and control of the circulation. Possible project using custom software to run blood flow simulations. Same as BME 455.

Prerequisite(s): [(BME 301) OR (MMAE 313)]
(3-0-3)

MMAE 463

Structure & Properties of Materials II

Continuation of MMAE 365. Solidification structures, diffusional and diffusionless transformations. Structure-property relationships in commercial materials.

Prerequisite(s): [(MMAE 365)]
(3-0-3)

MMAE 464

Physical Metallurgy

Principles of microstructure evolution with emphasis on phase transformations in metals and alloys. Processing-microstructure-property relationships. Fundamentals of alloy design for commercial applications.

Prerequisite(s): [(MMAE 361) OR (MMAE 365)]
(3-0-3)

MMAE 465

Electrical, Magnetic & Optical Properties of Materials

Electronic structure of solids, semiconductor devices and their fabrication. Ferroelectric and piezoelectric materials. Magnetic properties, magnetocrystalline anisotropy, magnetic materials and devices. Optical properties and their applications, generation and use of polarized light. Same as PHYS 465.

Prerequisite(s): [(MMAE 365) OR (PHYS 348)]
(3-0-3) (C)

MMAE 466

Microstructural Characterization of Materials

Advanced optical microscopy. Scanning and transmission electron microscopes. X-ray microanalysis. Surface characterization. Quantitative microscopy.

Prerequisite(s): [(MMAE 370)]
(2-3-3) (C)

MMAE 468

Introduction to Ceramic Materials

The structure and structure/properties relationships of ceramic materials. Topics include: crystal structure types; crystal defects; structure of glass; phase equilibria and how these affect applications for mechanical properties; electrical properties; and magnetic properties. Sintering and ceramic reactions are related to microstructure and resultant properties.

Prerequisite(s): [(MS 201)]
(3-0-3)

MMAE 470

Introduction to Polymer Science

An introduction to the basic principles that govern the synthesis, processing and properties of polymeric materials. Topics include classifications, synthesis methods, physical and chemical behavior, characterization methods, processing technologies and applications. Credit will only be granted for CHE 470, CHEM 470, MMAE 470.

Prerequisite(s): [(CHEM 124, MATH 251, and PHYS 221)]
(3-0-3) (C)

MMAE 472

Advanced Aerospace Materials

Principles of materials and process selection for minimum weight design in aerospace applications. Advanced structural materials for aircraft fuselage and propulsion applications. Materials for space vehicles and satellites. Environmental degradation in aerospace materials.

Prerequisite(s): [(MMAE 372)]
(3-0-3)

MMAE 476

Materials Laboratory II

Advanced synthesis, processing and characterization of metallic, non-metallic and composite materials. Experimental investigation of relationships between materials structures, processing routes and properties. Design of experiments/statistical data.

Prerequisite(s): [(MMAE 370)]
(1-6-3)

MMAE 482

Composites

This course focuses on metal, ceramic and carbon matrix composites. Types of composite. Synthesis of precursors. Fabrication of composites. Design of composites. Mechanical properties and environmental effects. Applications.

Prerequisite(s): [(MS 201)]
(3-0-3)

MMAE 484

Materials & Process Selection

Decision analysis. Demand, materials and processing profiles. Design criteria. Selection schemes. Value and performance oriented selection. Case studies.

(3-0-3) (C)

MMAE 485

Manufacturing Processes

Principles of material forming and removal processes and equipment. Force and power requirements, surface integrity, final properties and dimensional accuracy as influenced by material properties and process variables. Design for manufacturing. Factors influencing choice of manufacturing process.

Prerequisite(s): [(MMAE 332) OR (MMAE 372)]
(3-0-3)

MMAE 490

Crystallography & Crystal Defect

Geometrical crystallography - formal definitions of lattices, systems, point groups, etc. Mathematical methods of crystallographic analysis. Diffraction techniques: X-ray, electron and neutron diffraction. Crystal defects and their influence on crystal growth and crystal properties.

(3-0-3)

MMAE 491

Undergraduate Research

Student undertakes an independent research project under the guidance of an MMAE faculty member. Requires the approval of the MMAE Department Undergraduate Studies Committee.

(Credit: Variable)

MMAE 494

Undergraduate Design Project

Student undertakes an independent design project under the guidance of an MMAE faculty member. Requires the approval of the MMAE Department Undergraduate Studies Committee.

(Credit: Variable)

MMAE 497

Undergraduate Special Topics

Special individual design project, study, or report as defined by a faculty member of the department. Requires junior or senior standing and written consent of both academic advisor and course instructor.

(Credit: Variable)

Materials Science

MS 201

Materials Science

The scientific principles determining the structure of metallic, polymeric, ceramic, semiconductor and composite materials; electronic structure, atomic bonding, atomic structure, microstructure and macrostructure. The basic principles of structure-property relationships in the context of chemical, mechanical and physical properties of materials.

Prerequisite(s): [(CHEM 122) OR (CHEM 124)]
(3-0-3)

Mathematics and Science Education

MSED 200

Analysis of Classrooms

This is an introductory course providing students background in learning theory, motivation theory, classroom management, aspects of effective teaching, critical classroom variables, and the school as a system. This course includes a two-hour weekly seminar along with a practicum experience of five hours per week in an area school.

(2-5-3) (C)

MSED 250

Middle & Secondary Curriculum/Foundations

This course focuses on history/sociology of education, rationales, and goals of current reform efforts, curriculum design, development, and curriculum analysis. This course is designed to develop the participant's understanding of mathematics and science curricula in middle and secondary schools. Studies will include the roles of goals, standards, and learning theories in the development and selection of instructional materials, assessments, and technology. The course includes consideration of issues of equity and student diversity on middle and secondary school curricula. The course will involve readings, reflections, curriculum development, and evaluation projects.

(3-0-3) (C)

MSED 300

Instructional Methods/Strategies I

Discussion/laboratory oriented course that focuses on instructional planning, implementation considerations of various teaching methods, and development of instructional activities. Students are also provided with opportunities to practice instructional skills in peer teaching lessons.

Prerequisite(s): [(MSED 200 and MSED 250) OR (MSED 500 and MSED 554) OR (MSED 500 and MSED 555)]
(3-0-3) (C)

MSED 320

Inquiry & Problem Solving in Mathematics & Science

This course provides students with opportunities for reflection on aspects of inquiry and problem solving and nature of science and mathematics. It provides background for student development of instructional materials focusing on inquiry/problem solving, nature of science/mathematics, and how to modify and differentiate instructional materials to include the participation of all students. Must have received a passing score on the ISBE Basic Skills Exam.

Prerequisite(s): [(MSED 200 and MSED 250) OR (MSED 500 and MSED 554) OR (MSED 500 and MSED 555)]
(3-0-3) (C)

Course Descriptions

MSED 350

Informal Education Practicum & Seminar

This course will help students develop an understanding of the roles community resources and informal settings can play in math/science achievement and the ability to create instructional materials that capitalize on the use of these resources to better design instructional materials and experiences to meet the diverse needs of their students. Students spend approximately five hours per week in an informal education venue (e.g., museum, aquarium, zoo) along with a weekly two-hour, on-campus course per week. Students will reflect on how their students can learn in informal settings, teaching to public student audiences and designing curricular materials. Assessments will include the development of a curriculum unit that includes formal and informal lessons.

Prerequisite(s): [(MSED 200, MSED 250, and MSED 300) OR (MSED 300, MSED 500, and MSED 554) OR (MSED 300, MSED 500, and MSED 555)]

(2-5-3) (C)

MSED 400

Instructional Methods/Strategies II

Follow-up course to Instructional Methods/Strategies I with a strong focus in various advanced instructional models such as inductive, deductive, problem solving, and inquiry role development as well as cooperative learning and assessment. The course will emphasize the development, implementation, and assessment of differentiated instructional materials and plans that are consistent with current cognitive and social theories on student learning and personal development for all aspects of intellectual, social, and emotional development of all students regardless of cultural, social, and ethnic background. Students will have several opportunities to practice instructional models in peer teaching lessons.

Prerequisite(s): [(MSED 300)]

(3-0-3) (C)

MSED 450

Professional Internship

Capstone experience in which students assume continuous teaching responsibilities in at least three classes in an area school. Students will spend a full semester in the area school under the supervision of a classroom teacher and university supervisor. Students must have received a passing score of the ISBE Content Exam and faculty approval.

Prerequisite(s): [(MSED 300)] AND [(MSED 320) OR (MSED 538)] AND [(MSED 350) OR (MSED 540)] AND [(MSED 400)]

(0-40-6) (C)

MSED 480

Adolescent Psychology

This course is designed to develop the participants' understanding of adolescent psychology. The main foci throughout the course are the unique aspects of adolescents and how those aspects influence behavior, learning, and social interactions, especially with regard to middle schools. Studies will include educational psychology theories and models, motivation and learning, developmental changes during adolescence, cognitive abilities, human ecology, diversity, and cultures. Additionally, participants will examine historical and philosophical perspectives of adolescent psychology and synthesize how these perspectives have influenced teaching, learning, and cultures in middle schools. The course will involve weekly readings and reflections, classroom experiences, short assignments, tests/quizzes, research projects, and formal class presentations. Mandatory for students seeking middle school optional endorsements.

(3-0-3)

MSED 497

Special Projects

Special projects.

(Credit: Variable)

Naval Science

Naval Science courses are open to non-ROTC students with departmental approval.

NS 101

Introduction to Naval Science

A general introduction to the USN and USMC that emphasizes organizational structure, warfare components, and assigned roles/missions of USN/USMC, covers all aspects of Naval Science from its relative position within DoD to the specific warfare communities/career paths, and includes basic elements of leadership and Navy Core Values. The course will provide students with initial exposure to many elements of Naval culture and provides conceptual framework/working vocabulary for students to use on summer cruise.

(2-2-2)

NS 102

Naval Ships Systems I (Engineering)

Students learn detailed ship design, hydrodynamic forces, stability, propulsion, electrical theory and distribution, hydraulic theory and ship control, and damage control. The course includes basic concepts of theory/design of steam, gas turbine, diesel, and nuclear propulsion. Case studies on leadership/ethical issues in the engineering arena are also covered. Not required for Nurse and Marine Corps options.)

(3-2-3)

NS 201

Naval Ships Systems II (Weapons)

The course outlines the theory and employment of weapons systems. Students explore the processes of detection, evaluation, threat analysis, weapon selection, delivery, guidance, and explosives. Fire control systems and major weapon types are discussed, including capabilities and limitations. The physical aspects of radar and underwater sound are described. Facets of command, control, communications, computers, and intelligence are explored as a means of weapons systems integration. The tactical and strategic significance of command and control warfare and information warfare is discussed. This course is supplemented with review/analysis of case studies involving the moral and ethical responsibilities of leaders in the employment of weapons. Not required for Nurse and Marine Corps options.

(3-2-3)

NS 202

Seapower & Maritime Affairs

A study of the U. S. Navy and the influence of sea power upon history that incorporates both a historical and political science process to explore the major events, attitudes, personalities, and circumstances that have done the following: imbued the U. S. Navy with its proud history and rich tradition; deals with issues of national imperatives in peacetime, as well as war, varying maritime philosophies that were interpreted into Naval strategies/doctrines, budgetary concerns which shaped force realities, and the pursuit of American diplomatic objectives; and concludes with a discussion of the Navy's strategic and structural changes at the end of the Cold War and its new focus, mission, and strategy in the post September 11, 2001, world. For Nurse Corps only; course may be taken in sophomore year.

(3-2-3) (C)

NS 301

Navigation

In-depth study of the theory, principles, procedures, and application of plotting, piloting, and electronic navigation as well as an introduction to maneuvering boards. Students learn piloting techniques, the use of charts, the use of visual and electronic aids, and the theory of operation of both magnetic and gyrocompasses. Students develop practical skills in plotting and electronic navigation. Other topics include tides, currents, effects of wind/weather, voyage planning, and an application and introduction to the international/inland rules of navigation. The course is supplemented with a review/analysis of case studies involving moral/ethical/leadership issues pertaining to the concepts listed above. Not required for Nurse and Marine Corps options.

(3-2-3)

NS 302

Naval Operations & Seamanship

A continued study of relative motion, formation tactics, and ship employment. Introductions to naval operations and operations analysis, ship behavior and characteristics in maneuvering, applied aspects of ship handling, afloat communications, naval command and control, naval warfare areas, and joint warfare are also included. The course is supplemented with a review/analysis of case studies involving moral/ethical/leadership issues pertaining to the concepts listed above. Not required for Nurse and Marine Corps options.

(3-2-3)

NS 310

Evolution of Warfare

Students trace the development of warfare to the present day. This course is designed to cover the causes of continuity and change in the means and methods of warfare. It addresses the influence of political, economic, and societal factors on the conduct of war with significant attention focused on the role of technological innovation in changing the battlefield. Students will explore the contribution of preeminent military theorists and battlefield commanders to our modern understanding of the art and science of war. Required for Marine option and MECEP students; optional for Navy students.

(3-2-3) (C)

NS 401

Leadership & Management

The course introduces the student to many of the fundamental concepts of leading Sailors and Marines which shall be expanded upon during the continuum of leadership development throughout NROTC, and develops the elements of leadership vital to the effectiveness of Navy/Marine Corps officers by reviewing the theories and parameters of leadership and management within and outside of the Naval service and progressing through values development, interpersonal skills, management skills, and application theory. Practical applications are explored through the use of experiential exercises, readings, case studies, and laboratory discussions.

(3-2-3) (C)

NS 402

Naval Leadership & Ethics

The course completes the final prepatations of ensigns and second lieutenants for service in the Fleet and Marine Corps. The course integrates an intellectual exploration of Western moral traditions and ethical philosophy with a variety of topics such as the following: military leadership, core values, and professional ethics; the UCMJ and Navy regulations; and discussions relating to the roles of enlisted members, junior and senior officers, command relationships, and the conduct of warfare. The course provides midshipmen with a foundation of moral traditions combined with a discussion of actual current and historical events in the United States Navy and Marine Corps to prepare them for the role and responsibilities of leadership in the Naval Science of the 21st century.

(3-2-3) (C)(E)

NS 405

Leadership & Management Seminar

A six-hour seminar augmenting Theory of Organization and Management (BUS 301). This seminar addresses leadership, management, and other organizational behavior issues facing junior officers, to include strategic and tactical planning, time-management, communication, counseling, team-building, and decision-making in a stressful environment. Required for Naval ROTC students. Normally taken concurrently with BUS 301 and in place of NS 401.

Corequisite(s): (MGT 351)

(1-0-0)

NS 410

Amphibious Warfare

Students learn the fundamental terms, concepts, and theories of general warfare and amphibious warfare. These terms, concepts, and theories shall be applied through a historical analysis of amphibious operations, identifying the evolution of amphibious doctrine, tactics, and technology. Focuses on the evolution of the U. S. Marine Corps into a specialized amphibious force with particular attention devoted to the structure and capabilities of the present day U. S. Marine Corps as a forward deployed and rapid deployment force and the development of expeditionary maneuver warfare concepts.

(3-2-3) (C)

NS 497

Special Topics

This course provides midshipmen with an opportunity to work under the supervision of an officer/instructor on projects related to professional development. Department permission required.

(Credit: Variable)

NS 499

Naval Science Laboratory

Topics deal with general Navy/Marine Corps mission and policies, force protection, operational security, watch standing, physical fitness, nutrition, stress management, and other professional development subjects.

(0-2-0)

Philosophy

PHIL 301

Ancient Philosophy

A study of major works by Plato, Aristotle, and other important ancient philosophers.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]

(3-0-3) (C)(H)

Course Descriptions

PHIL 302

Origins of Modern Philosophy

The study of major 17th and 18th century philosophers, such as Descartes, Hobbes, Spinoza, Locke, Leibniz, Berkeley, Hume, and Kant.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(3-0-3) (C)(H)

PHIL 305

20th Century Philosophy

A study of recent philosophical trends (or movements), including logical positivism, existentialism, ordinary language philosophy, etc.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(3-0-3) (C)(H)

PHIL 311

Great Philosophers

An in-depth study of a single outstanding philosopher, chosen by the instructor. The focus of the course will be announced when the course is scheduled.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(3-0-3) (C)(H)

PHIL 326

Philosophy of Language

An analysis of the concept of language in both the works of philosophers and the works of linguists. The course looks into theories of linguistic meaning, sentence structure, speech acts, and the assumptions underlying research in modern linguistics.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(3-0-3) (C)(H)

PHIL 328

Comparative Philosophy

This course draws upon two or more widely different traditions in considering one or more topics of philosophical interest. Usually, the course will include both Western and non-Western sources. The course may be organized around a given philosophical issue or may compare and contrast two or more thinkers from the relevant traditions.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(3-0-3) (C)(H)

PHIL 332

Political Philosophy

Examination of different conceptions of legitimate political authority; includes discussion of ideas of social justice, natural rights, sovereignty.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(3-0-3) (C)(H)

PHIL 333

Social Philosophy

A systematic examination of contemporary Social issues such as abortion, euthanasia, war, environmental destruction, poverty, terrorism, and sexual morality.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(3-0-3) (C)(H)

PHIL 336

Metaphysics

Metaphysics.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(3-0-3) (C)(H)

PHIL 341

Philosophy of Science

Through an analysis of the concepts of explanation, theory, hypothesis, experiment, and observation, this course seeks an understanding of how the growth of scientific knowledge is possible.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(3-0-3) (C)(H)

PHIL 342

Philosophy of Mind

An examination of the conception of “mind” as opposed to body implications for psychology, artificial intelligence, and neuroscience.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(3-0-3) (C)(H)

PHIL 343

Philosophy of Social Inquiry

An examination of the methods and theories of the social sciences, especially sociology and anthropology, and their relationships to the natural sciences.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(3-0-3) (C)(H)

PHIL 350

Science & Method

A history of interaction between science and philosophy showing how changing conceptions of metaphysics and scientific method have influenced the development of Renaissance astronomy, nineteenth century atomic theory, ether theories, theories of geological and biological change, etc.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(3-0-3) (C)(H)

PHIL 351

Science & Values

This course will consider questions such as: What role should values play in scientific inquiry? Should scientists consider only epistemic or cognitive values, or should they also take into account social and cultural values? Could science be objective and make progress if it is shaped by social and cultural values?

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(3-0-3) (C)(H)

PHIL 360

Ethics

A study of the fundamental issues of moral philosophy.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(3-0-3) (C)(H)

PHIL 362

Philosophy of Law

An analysis of the concept of law and how it differs from custom, religion, and morality. The course looks into issues of judicial reasoning, the assumptions that underlie the criminal justice system and the imposition of liability, and legal ethics.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(3-0-3) (C)(H)

PHIL 363

Aesthetics

The philosophy of the fine arts, including an analysis of the concepts of beauty, representation, expression and the purpose of art.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(3-0-3) (C)(H)

PHIL 370

Engineering Ethics

A study of the problems of moral and social responsibility for the engineering profession, including such topics as safety, confidentiality and government regulation.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(3-0-3) (C)(H)

PHIL 371

Ethics in Architecture

A study of the moral problems architects must resolve in the practice of their profession, including problems of confidentiality, candor, esthetics, their and economy arising from the special responsibilities of architects to and public, client, employer, and colleagues.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)] (3-0-3) (C)(H)

PHIL 373

Business Ethics

Ethical issues relating to individual and corporate responsibility, self and governmental regulation, investment, advertising, urban problems, the environment, preferential hiring.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)] (3-0-3) (C)(H)

PHIL 374

Ethics in Computer Science

Moral problems that confront professionals in computer-related fields, including questions raised by the concept of intellectual property and its relationship to computer software, professional codes of ethics for computer use, responsibility for harm resulting from the misuse of computers.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)] (3-0-3) (C)(H)

PHIL 377

Communication Law & Ethics

This course explores ethical and legal issues concerning communication in diverse contexts, such as: the mass media - e.g. print, broadcast, and electronic; government and politics; organizational hierarchies - e.g. public and private sector workplaces; academic life - e.g. the classroom, student, and faculty affairs; and interpersonal relations - e.g. love, friendship, marriage.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)] (3-0-3) (C)(H)

PHIL 380

Topics in Philosophy

An investigation into a topic of current interest in philosophy; which will be announced by the instructor when the course is scheduled.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)] (3-0-3) (C)(H)

PHIL 491

Independent Study

Supervised individual research for advanced students.

Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)] (Credit: Variable) (C)(H)

Physics

PHYS 100

Intro to the Profession

Introduction to the physical sciences, scientific method, computing tools, and interrelations of physical sciences with chemistry, biology and other professions.

(2-0-2) (C)

PHYS 120

Astronomy

A descriptive survey of observational astronomy, the solar system, stellar evolution, pulsars, black holes, galaxies, quasars, the origin and fate of the universe.

(3-0-3)

PHYS 123

General Physics I: Mechanics

Vectors and motion in one, two and three dimensions. Newton's Laws. Particle dynamics, work and energy. Conservation laws and collisions. Rotational kinematics and dynamics, angular momentum and equilibrium of rigid bodies. Gravitation. Oscillations.

Prerequisite(s): [(MATH 149*) OR (MATH 151*)] An asterisk (*) designates a course which may be taken concurrently. (3-3-4) (C)

PHYS 200

Basic Physics for Architects

This class is a one-semester course primarily for students of architecture. The course will address the basic physical principles and concepts associated with structures and buildings. Although quantitative at times, the course will stress conceptual understanding and practical applications. Hands-on exercises will be conducted both in class, and out of class.

(4-0-4)

PHYS 211

Basic Physics I

Intended to give students in liberal arts, business, and psychology an understanding of the basic principles of physics and an appreciation of how the results of physics influence contemporary society. This course does not satisfy graduation in any engineering or physical science program.

Prerequisite(s): [(MATH 122) OR (MATH 148) OR (MATH 151)] (3-0-3)

PHYS 212

Basic Physics II

Intended to give students in the liberal arts, business, and psychology an understanding of the basic principles of physics and an appreciation of how the results of physics influence contemporary society. This course does not count for graduation in any engineering or physical science program.

Prerequisite(s): [(MATH 122) OR (MATH 148) OR (MATH 151)] (3-0-3)

PHYS 221

General Physics II : Electricity & Magnetism

Waves charge, electric field, Gauss' Law and potential. Capacitance, resistance, simple a/c and d/c circuits. Magnetic fields, Ampere's Law, Faraday's Law, induction, and Maxwell's equations. Traveling waves, electromagnetic waves, and light.

Prerequisite(s): [(PHYS 123*)] An asterisk (*) designates a course which may be taken concurrently. (3-3-4) (C)

PHYS 223

General Physics III

Sound, fluid mechanics and elasticity. Temperature, first and second laws of thermodynamics, kinetic theory and entropy. Reflection, refraction, interference and diffraction. Special relativity. Quantization of light, charge and energy.

Prerequisite(s): [(PHYS 221)] (3-3-4)

PHYS 224

General Physics III for Engineers

Sound and fluid mechanics. Temperature, first and second laws of thermodynamics, kinetic theory and entropy. Reflection, refraction, interference and diffraction. Special relativity. Light and quantum physics, structure of the hydrogen atom. Atomic physics, electrical conduction in solids, nuclear physics, particle physics and cosmology.

Prerequisite(s): [(PHYS 221)] (3-0-3)

Course Descriptions

PHYS 240

Computational Science

This course provides an overview of introductory general physics in a computer laboratory setting. Euler-Newton method for solving differential equations, the trapezoidal rule for numerical quadrature and simple applications of random number generators. Computational projects include the study of periodic and chaotic motion, the motion of falling bodies and projectiles with air resistance, conservation of energy in mechanical and electrical systems, satellite motion, using random numbers to simulate radioactivity, the Monte Carlo method, and classical physical models for the hydrogen molecule and the helium atom.

Prerequisite(s): [(PHYS 221)]

(2-3-3) (C)

PHYS 300

Instrumentation Laboratory

Basic electronic skills for scientific research. Electrical measurements, basic circuit analysis, diode and transistor circuits. Transistor and integrated amplifiers, filters, and power circuits. Basics of digital circuits, including Boolean algebra and design of logic circuits.

Prerequisite(s): [(PHYS 221)]

(2-4-4) (C)

PHYS 304

Thermodynamics & Statistical Physics

Statistical basis of thermodynamics, including kinetic theory, fundamentals of statistical mechanics, fluctuations and noise, transport phenomena and the Boltzmann equation. Thermodynamic functions and their applications, first and second laws of thermodynamics.

Prerequisite(s): [(PHYS 223) OR (PHYS 224)]

(3-0-3)

PHYS 308

Classical Mechanics I

Newton's Laws, one-dimensional motion, vector methods, kinematics, dynamics, conservation laws, and the Kepler problem. Collisions, systems of particles, and rigid-body motion. Approximation techniques, Lagrangian and Hamiltonian formulations of classical mechanics, small oscillations.

Prerequisite(s): [(MATH 252)] AND [(PHYS 223) OR (PHYS 224)]

(3-0-3)

PHYS 309

Classical Mechanics II

Newton's Laws, one dimensional motion, vector methods, kinematics, dynamics, conservation laws, and the Kepler problem. Collisions, systems of particles, and rigid-body motion. Approximation technique, Lagrangian and Hamiltonian formulations of classical mechanics, small oscillations.

Prerequisite(s): [(MATH 252)] AND [(PHYS 223) OR (PHYS 224)]

(3-0-3)

PHYS 348

Modern Physics for Scientists & Engineers

An introduction to modern physics with the emphasis on the basic concepts that can be treated with elementary mathematics. Subjects covered include Bohr atom, elementary wave mechanics and an introduction to quantum mechanics, atom and molecular spectra, nuclear, and particle physics.

Prerequisite(s): [(PHYS 223)]

(3-0-3)

PHYS 403

Relativity

Introduction to the special and general theories of relativity. Lorentz covariance. Minkowski space. Maxwell's equations. Relativistic mechanics. General coordinate covariance, differential geometry, Riemann tensor, the gravitational field equations. Schwarzschild solution, astronomical and experimental tests, relativistic cosmological models.

Prerequisite(s): [(MATH 251 and PHYS 308)]

(3-0-3)

PHYS 404

Subatomic Physics

Historical introduction; general survey of nuclear and elementary particle physics; symmetries and conservation laws; leptons, quarks, and vector bosons; unified electromagnetic and weak interactions; the parton model and quantum chromodynamics.

Prerequisite(s): [(PHYS 348)]

(3-0-3)

PHYS 405

Fundamentals of Quantum Theory I

A review of modern physics including topics such as black-body radiation, the photoelectric effect, the Compton effect, the Bohr model of the hydrogen atom, the correspondence principle, and the DeBroglie hypothesis. Topics in one-dimensional quantum mechanics such as the particle in an infinite potential well, reflection and transmission from potential wells, barriers, and steps, the finite potential well and the quantum harmonic oscillator. General topics such as raising and lowering operators, Hermitian operators, commutator brackets and the Heisenberg Uncertainty Principle are also covered. Many particle systems and the Pauli Exclusion Principle are discussed. Three-dimensional quantum mechanical systems, orbital angular momentum, the hydrogen atom.

Prerequisite(s): [(MATH 252, PHYS 308*, and PHYS 348)] An asterisk (*) designates a course which may be taken concurrently.

(3-0-3)

PHYS 406

Fundamentals of Quantum Theory II

Zeeman and Stark Effects. Addition of spin and orbital angular momenta, the matrix representation of quantum mechanical operators, the physics of spin precession and nuclear magnetic resonance. Time independent and time dependent perturbation theory, Fermi's Golden Rule and the physics of radiation emitted in the course of atomic transitions. Indistinguishable particles in quantum mechanics, the helium atom. Scattering theory, using partial wave analysis and the Born approximation.

Prerequisite(s): [(PHYS 405)]

(3-0-3)

PHYS 409

Energy & Environment

This course aims to deal with topics like energy demands and energy resources, environmental problems of energy production, nuclear power, renewable energy sources (e.g. hydro-electric, wave and wind power, biomass, solar energy). After providing an in-depth understanding of the sources of energy and its efficient use, the course will teach how to reduce negative environmental impacts from energy production, conversion, and distribution. Since energy is arguably the most critical environmental and social challenge facing the globe today, the course will conclude with a brief discussion on socio-economic consequences and public policy issues of energy use.

Prerequisite(s): [(PHYS 348)]

(3-0-3)

PHYS 410**Molecular Biophysics**

The course covers thermodynamic properties of biological molecules, irreversible and open systems, information theory, biophysical measurements, the structure and properties of proteins, enzyme action, the structure and properties of nucleic acids, genetics at the molecular level, and molecular aspects of important biological systems.

Prerequisite(s): [(MATH 252 and PHYS 304)]
(3-0-3)

PHYS 411**Astrophysics**

Celestial mechanics and planetary motion; stellar structure and evolution; energy generation in stars; theory of white dwarfs, pulsars (neutron stars), and black holes; quasars; cosmology, background microwave radiation, and the big bang model.

Prerequisite(s): [(PHYS 223) OR (PHYS 224)]
(3-0-3)

PHYS 412**Modern Optics & Lasers**

Geometrical and physical optics. Interference, diffraction, and polarization. Coherence and holography. Light emission and absorption. Principles of laser action, characterization of lasers, and laser applications.

Prerequisite(s): [(CS 105 and PHYS 348)]
(3-0-3)

PHYS 413**Electromagnetism I**

Differentiation and integration of vector fields, and electrostatics and magnetostatics. Calculation of capacitance, resistance, and inductance in various geometries.

Prerequisite(s): [(MATH 252 and PHYS 308)]
(3-0-3)

PHYS 414**Electromagnetism II**

Propagation and generation of electromagnetic radiation. Antennas and waveguides. Maxwell's equations. Electromagnetic properties of materials. Classical electrodynamics; special relativity.

Prerequisite(s): [(PHYS 413)]
(3-0-3)

PHYS 415**Solid State Electronics**

Energy bands and carrier transport in semi-conductors and metals. Physical principles of p-n junction devices, bipolar junction transistors, FETS, Gunn diodes, IMPATT devices, light-emitting diodes, semiconductor lasers.

Prerequisite(s): [(PHYS 348)]
(3-0-3)

PHYS 418**Introduction to Lasers**

Nature of light. Coherence and holography. Light emission and absorption. Principles of laser action. Characteristics of gas lasers, organic dye lasers, solid state lasers. Laser applications.

Prerequisite(s): [(PHYS 348)]
(3-0-3)

PHYS 420**Bio-Nanotechnology**

In this multidisciplinary course, we will examine the basic science behind nanotechnology and how it has infused itself into areas of nanofabrication, biomaterials, and molecular medicine. This course will cover materials considered basic building blocks of nanodevices such as organic molecules, carbon nanotubes, and quantum dots. Top-down and bottom-up assembly processes such as thin film patterning through advanced lithography methods, self-assembly of molecular structures, and biological systems will be discussed. Students will also learn how bionanotechnology applies to modern medicine, including diagnostics and imaging and nanoscale, as well as targeted, nanotherapy and finally nanosurgery.

Prerequisite(s): [(PHYS 348)]
(3-0-3)

PHYS 427**Advanced Physics Laboratory I**

Experiments related to our present understanding of the physical world. Emphasis is on quantum phenomena in atomic, molecular, and condensed matter physics, along with the techniques of measurement and data analysis. The second semester stresses project-oriented experiments on modern topics including spectroscopy, condensed matter physics, and nuclear physics.

Prerequisite(s): [(PHYS 348)]
(3-2-3) (C)

PHYS 428**Advanced Physics Laboratory II**

Experiments related to our present understanding of the physical world. Emphasis is on quantum phenomena in atomic, molecular, and condensed matter physics, along with the techniques of measurement and data analysis. The second semester stresses project-oriented experiments on modern topics including spectroscopy, condensed matter physics and nuclear physics.

Prerequisite(s): [(PHYS 348)]
(2-3-3) (C)

PHYS 431**Nanoscience**

An introduction to the study of phenomena at the nanoscale including their physics, chemistry, biology, and materials science; synthesis and fabrication of nanomaterials and nanostructures; methods of characterization; nanoscale properties including quantum effects.

Prerequisite(s): [(CHEM 344) OR (PHYS 224) OR (PHYS 348)]
(3-0-3)

PHYS 437**Solid State Physics**

Crystal structure and binding, lattice vibrations, phonons, free electron model, band theory of electrons. Electrical, thermal, optical, and magnetic properties of solids. Superconductivity.

Prerequisite(s): [(PHYS 348)]
(3-0-3)

Course Descriptions

PHYS 440

Computational Physics

Root finding using the Newton-Raphson method; interpolation using Cubic Splines and Least Square Fitting; solving ordinary differential equations using Runge-Kutta and partial differential equations using Finite Difference and Finite Element techniques; numerical quadrature using Simpson's Rule, Gaussian Quadrature and the Monte Carlo method; and spectral analysis using Fast Fourier Transforms. These techniques are applied to a wide range of physics problems such as finding the energy levels of a finite quantum well using a root finding technique, solving the Schrodinger equation using the Runge-Kutta-Fehlberg method, using random numbers to simulate stochastic processes such as a random walk, using the Fast Fourier Transform method to perform a spectral analysis on non-linear chaotic systems such as the Duffing oscillator, and using auto-correlation functions to simulate sonar or radar ranging problems.

Prerequisite(s): [(PHYS 240, PHYS 308, PHYS 348, and PHYS 405)]

(2-3-3) (C)

PHYS 444

Physics for High School Teachers

Physics for high school teachers.

(1-0-1)

PHYS 445

Physics for High School Teachers

Physics for high school teachers.

(3-0-3)

PHYS 465

Electrical, Magnetic, & Optical Properties

Electronic structure of solids, semiconductor devices, and their fabrication. Ferroelectric and piezoelectric materials. Magnetic properties, magnetocrystalline anisotropy, magnetic materials and devices. Optical properties and their applications, generation, and use of polarized light. Same as MMAE 465.

(3-0-3)

PHYS 485

Physics Colloquium

Lectures by prominent scientists. This course exposes students to current and active research in physics both within and outside the IIT community. It helps prepare students for a career in research. It is complementary to our academic courses and provides examples of professional/scientific presentations. This course may not be used to satisfy the natural science general education requirement.

Prerequisite(s): [(PHYS 223) OR (PHYS 224)]

(1-0-1)

PHYS 491

Undergraduate Research

Recommendation of advisor and approval of the department chair. Student participation in undergraduate research, usually during the junior or senior year.

(Credit: Variable) (C)

PHYS 497

Special Topics in Physics

Special topics in physics.

(Credit: Variable) (C)

PHYS 498

Research Honors Thesis Preparation

Background and research following a summer research honors project, preparing to write a research honors thesis in Physics 499. Student will organize a review committee to direct and review the research.

(Credit: Variable)

PHYS 499

Research Honors Thesis

Background and laboratory research and thesis writing following a summer research project and thesis preparation. The student will meet regularly with his or her committee during thesis preparation and will write and defend thesis.

(Credit: Variable)

GRADUATE COURSES

Degree-seeking undergraduates may take graduate courses with approval of the course instructor and faculty advisor. For course descriptions, see the *IIT Bulletin: Graduate Programs*.

PHYS 501

Methods of Theoretical Physics I

PHYS 502

Methods of Theoretical Physics II

PHYS 505

Electromagnetic Theory

PHYS 507

Electrodynamics

PHYS 508

Analytical Dynamics

PHYS 509

Quantum Theory I

PHYS 510

Quantum Theory II

PHYS 515

Statistical Mechanics

PHYS 537

Solid State Physics I

PHYS 538

Solid State Physics II

PHYS 553

Quantum Field Theory

PHYS 561

Radiation Biophysics

PHYS 570

Introduction to Synchrotron Radiation

PHYS 571

Radiation Physics

PHYS 572

Radiation Physics II

PHYS 573

Standards, Statutes and Regulations

PHYS 575

Case Studies in Health Physics

PHYS 576

Internal Dosimetry

PHYS 577

External Dosimetry

Political Science

PS 100

Introduction to the Profession: Political Science

Intended for first-year political science majors. The course exposes students to quasi-experimental methods, quantitative and qualitative approaches, the history of the profession, and career possibilities. Students will examine several fundamental works in the discipline.

(3-0-3) (C)

PS 200

American Government

Surveys American politics and government. Informal political institutions, such as parties and interest groups, are analyzed and related to formal governmental institutions, such as the presidency and the Congress. Emphasis is placed on how the American political culture shapes these institutions and how public policies are produced.

(3-0-3) (C)(S)

PS 202

Introduction to Political Science

Introduces students to modern political science covering American politics, comparative political science, and research methods.

(3-0-3) (C)(S)

PS 209

Research Methods for Social & Political Science

Introduces students to explanation in the social sciences and both qualitative and the quantitative research methods. Topics covered include the formulation of research questions, measurement, data collection, survey research, significance tests, experimental and quasi-experimental design, sampling, and various techniques of qualitative research. Same as SOC 209.

(3-0-3) (C)(S)

PS 210

Social & Political Thought

Examines central social and political theories and their ideas concerning such things as the relationship between individual and society, social harmony and conflict, social equality, and the role of the state. Same as SOC 210.

(3-0-3) (C)(S)

PS 220

Global Chicago

Through readings, lectures, and field trips to local neighborhoods, this course will look at the ways that Chicago has become a global city and what that means for local government, businesses, educators, and the non-profit sector. We will explore the extent to which Chicago has become and continues to be connected to the global economy, its history as a gateway to immigrants from all over the world, and how the local non-profit community is engaged in international development across the globe. Some key questions we will study include: In what ways and to what extent is Chicago a global city? What forces have driven Chicago's development as a global city? What are the broad consequences of Chicago being a global city? Same as SOC 220.

(3-0-3) (C)(S)

PS 221

Social Inequality

Evaluates the patterns and dimensions of social, economic, and political inequality in American society and how these compare with other societies, who gets ahead and why, the relationship of social class to other features of society, some consequences of social stratification, and outlooks for the future of inequality in developed countries like the United States. Formerly known as PS 321. Same as SOC 221.

(3-0-3) (C)(S)

PS 230

International Relations

Examines relations among countries from the perspective of both the international system and the nation-state. Emphasis is placed on the transformation in the international system caused by weapons, production, and communication technologies. Special attention is given to the international policies of the United States toward various regions and its role in international organizations.

(3-0-3) (C)(S)

PS 232

Introduction to Comparative Politics

Introduces students to the most common theories and approaches in contemporary comparative political analysis. Students then employ the tools of comparison developed in an examination of the causes and consequences of political instability and conflict and transitions to stable democracy.

(3-0-3) (S)

PS 273

Great Political Thinkers

Introduces students to the ideas of the world's great political philosophers. Plato, Aristotle, Hobbes, Locke, Rousseau, Marx, and others will be covered.

(3-0-3) (C)(S)

PS 303

Politics & the Media

Analyzes the media's role in contemporary American politics and government. Emphasis is placed on how the media – newspapers, television, and electronic forms – manufacture the news and how the news influences political and government agenda, decision making, and public policies.

Prerequisite(s): [(PS 190-299) OR (SOC 209) OR (SOC 210) OR (SOC 221)]

(3-0-3) (C)(S)

PS 306

Politics & Public Policy

Analyzes public policy processes with a primary focus on the United States and a secondary focus on cross-country comparisons involving the U. S. The overarching concern is the effectiveness of government intervention given our market-based system. The student will become familiar with models and determinants of policy making. Beyond theories of policy making, the course also surveys a number of timely policy issues. In this way, a balance is reached between theory and application. There will be an underlying focus on the American political economy and public policy making, but students do not need an extensive background in either economics or policy making.

Prerequisite(s): [(PS 190-299) OR (SOC 209) OR (SOC 210) OR (SOC 221)]

(3-0-3) (C)(S)

PS 312

Analysis & Evaluation of Public Policy

Explores techniques of policy analysis and program evaluation having practical application in such fields as transportation, education, housing, criminal justice, and environmental quality. The course includes the research and analytical methods most frequently applied in governmental decision making.

Prerequisite(s): [(PS 190-299) OR (SOC 209) OR (SOC 210) OR (SOC 221)]

(3-0-3) (S)

Course Descriptions

PS 313

Comparing Public Policy

Considers why policies on issues like social welfare, health care, education, immigration, and others differ from country to country, looking for answers in such factors as political culture, level of economic development and equality, institutional frameworks and actors, social organization, or some mix of those explanations.

Prerequisite(s): [(PS 190-299) OR (SOC 209) OR (SOC 210) OR (SOC 221)]
(3-0-3) (S)

PS 314

State & Local Government

Investigates the relationships among federal, state/provincial, metropolitan/regional, and local units of government, examining theories of federalism, constitutional foundations, judicial interpretations, administrative actions, and current trends and debates. The United States and other federal systems serve as case countries. The course also explores how federalism is being shaped by such factors as globalization, environmental challenges, tribal sovereignty, and terrorism.

Prerequisite(s): [(PS 190-299) OR (SOC 209) OR (SOC 210) OR (SOC 221)]
(3-0-3) (C)(S)

PS 315

Urban Politics

Examines city and metropolitan politics and government. The course emphasizes how economic and demographic changes influence local politics, how local politics work, and how state and national policies influence local politics.

Prerequisite(s): [(PS 190-299) OR (SOC 209) OR (SOC 210) OR (SOC 221)]
(3-0-3) (C)(S)

PS 316

Political Party Election Process

Examines election and campaigns from different perspectives, including the historical development of elections in the United States and other countries, the rules by which campaigns are governed, the strategies that candidates follow in pursuit of office, and the role of political parties.

Prerequisite(s): [(PS 190-299) OR (SOC 209) OR (SOC 210) OR (SOC 221)]
(3-0-3) (S)

PS 317

Chicago Politics

Studies Chicago's politics and government from both historical and contemporary perspectives. Emphasis is placed on changes that have significantly shaped the direction of Chicago's politics. Special attention is devoted to social class, ethnicity, race, and ideology as factors that have influenced the Democratic political machine and its opponents.

Prerequisite(s): [(PS 190-299) OR (SOC 209) OR (SOC 210) OR (SOC 221)]
(3-0-3) (C)(S)

PS 318

Contemporary Constitutional Issues

Examines how decisions about some of our basic rights are made. The course focuses on U.S. Supreme Court decisions in the areas of criminal law, desegregation, education, welfare, housing, and consumer law. Supreme Court decisions are read and supplemented by textual material.

Prerequisite(s): [(PS 190-299) OR (SOC 209) OR (SOC 210) OR (SOC 221)]
(3-0-3) (C)(S)

PS 319

Comparative Health Systems

Surveys and compares health care systems in a range of developed and developing countries. The course examines why countries facing similar health problems have sometimes developed different policy responses, what has been the nature of those policies, and how (in)effective they have been. Health insurance, payment methods, the role of providers, the relationship between medicine and culture, and recent reforms and innovations in health care policy are among the issues discussed.

Prerequisite(s): [(PS 190-299) OR (SOC 209) OR (SOC 210) OR (SOC 221)]
(3-0-3) (S)

PS 320

Urban Institutions

Examines the politics of social class, ethnicity, and race in American cities. Receiving particular attention are social welfare institutions and the rise and fall of manufacturing.

Prerequisite(s): [(PS 190-299) OR (SOC 209) OR (SOC 210) OR (SOC 221)]
(3-0-3) (S)

PS 323

Problems of Multi-Ethnic, Multi-Religious States

Focuses on the political challenges arising in multiethnic, multi-language, and multi-religious societies in which there has been substantial conflict or balkanization. Developed and developing countries receive attention.

Prerequisite(s): [(PS 190-299) OR (SOC 209) OR (SOC 210) OR (SOC 221)]
(3-0-3) (S)

PS 328

Vietnam War: Politics, Ideology, Societal Issues

Examines the politics, rationale, and societal conflicts relating to the Vietnam War and the impact of the war and related politics on current politics and current ideological disputes in the United States and Vietnam.

Prerequisite(s): [(PS 190-299) OR (SOC 209) OR (SOC 210) OR (SOC 221)]
(3-0-3) (S)

PS 329

Politics of Global Warming

Reviews politics and policies relating to global warming using a multi-disciplinary approach. Students look at its anthropogenic causes, impacts on human society, potential mitigation strategies, and policy responses. The course also examines the different issue areas connected to global warming: the environment; public safety; national security; economics; and national prestige.

Prerequisite(s): [(PS 190-299) OR (SOC 209) OR (SOC 210) OR (SOC 221)]
(3-0-3) (S)

PS 332

Politics of Science & Technology

Explores the complex interrelationships among science, technology, and politics, with emphasis on the political issues created by contemporary scientific advances. The course gives roughly equal attention to the politics of scientific discovery; the development of organizations providing scientific advice to government; the impact of industrialized science and advanced technology on the economy and society; and the growing debate over the social implications of science and technology and how they can be predicted, measured, and controlled.

Prerequisite(s): [(PS 190-299) OR (SOC 209) OR (SOC 210) OR (SOC 221)]
(3-0-3) (C)(S)

PS 333**Politics of National Security**

Examines the formulation and implementation of national security and military policy in the United States. The course surveys the emergence and growth of military strategy and the defense establishment, highlighting the impact of nuclear weapons on military strategy and security and the post-Cold War struggle over forces and missions.

Prerequisite(s): [(PS 190-299) OR (SOC 209) OR (SOC 210) OR (SOC 221)]
(3-0-3) (C)(S)

PS 335**Issues in United States Space Policy**

Examines the origins, evolution, current status, and future prospects of U.S. space policies and programs. The course provides students with an understanding of the governmental and non-governmental actors that make up the space policy community. Discussions are cast in the context of the space activities of other countries and of international competition and cooperation in space.

Prerequisite(s): [(PS 190-299) OR (SOC 209) OR (SOC 210) OR (SOC 221)]
(3-0-3) (S)

PS 338**Energy & Environmental Policy**

Traces the economic and political implications of dependence on fossil fuels and the attempt to develop alternate energy sources and promote conservation. Assessed are the environmental effects of resource consumption and the effort to control these effects through increased efficiency and regulation of pollution. The course explores such problems as nuclear waste, acid rain, global warming, and deforestation, and examines national and international attempts at economic, political, and technological solutions.

Prerequisite(s): [(PS 190-299) OR (SOC 209) OR (SOC 210) OR (SOC 221)]
(3-0-3) (C)(S)

PS 340**Social Organization & Control**

Surveys theories explaining the organization and structure of complex societies. The problem of social control, or the capacity of society to regulate itself formally or informally according to its desired principles, is viewed as a central problem of social organization. Same as SOC 340.

Prerequisite(s): [(ANTH 200) OR (PS 190-299) OR (SOC 190-299)]
(3-0-3) (C)(S)

PS 341**School Politics**

This course examines how urban public schools have been governed over time, who have been the principal beneficiaries of these governance arrangements, and how the governance arrangements have come into being. The course includes material on recent efforts as well as historical governance.

Prerequisite(s): [(PS 190-299) OR (SOC 209) OR (SOC 210) OR (SOC 221)]
(3-0-3) (S)

PS 345**The American Presidency**

Surveys the evolution of the office and powers of the presidency as a result of historical forces, institutional factors, and the actions of those who have served as president. The course looks at the relationships of presidents with political parties, Congress, the bureaucracy, media, and the public, emphasizing both domestic and foreign policy.

Prerequisite(s): [(PS 190-299) OR (SOC 209) OR (SOC 210) OR (SOC 221)]
(3-0-3) (C)(S)

PS 351**Public Administration**

Examines the nature of administrative organization, decision-making in organization, and organizational structures and processes: division of work, authority, communications, and planning. The course considers the role of the government executive and analyzes the relationship between fiscal procedures and personnel management in organizations.

Prerequisite(s): [(PS 190-299) OR (SOC 209) OR (SOC 210) OR (SOC 221)]
(3-0-3) (C)(S)

PS 353**The Promise & Problems of Policy**

Analyzes the policymaking process, including both policy formulation and implementation. Subjects covered include the necessity for policy, environmental factors and their effect on policymaking, the policymaking process, and a brief introduction to methods of analysis. Same as SOC 353.

Prerequisite(s): [(ANTH 200) OR (PS 190-299) OR (SOC 190-299)]
(3-0-3) (C)(S)

PS 354**Urban Policy**

Explores major dilemmas facing cities today, including changing economic and tax bases, fiscal stresses, immigration, marginalized populations, new forms of consumption, and adaptation to structural change. Responses of politicians to pressures to develop new policies and leverage the productive capacity of the city and the impact of citizen preferences are analyzed. Same as SOC 354.

Prerequisite(s): [(ANTH 200) OR (PS 190-299) OR (SOC 190-299)]
(3-0-3) (C)(S)

PS 356**Law in American Society**

Examines the nature of law and the legal system in American society. Special attention is paid to the institutions of the legal system, how they are supposed to function, and how they actually function. The courts, ranging from the U. S. Supreme Court to local trial courts, are studied.

Prerequisite(s): [(PS 190-299) OR (SOC 209) OR (SOC 210) OR (SOC 221)]
(3-0-3) (C)(S)

PS 360**Globalization: Global Political Economy**

Examines the economic, socio-political, and cultural aspects of globalization within the context of both contemporary discussions about the phenomenon and wider debates in the field of political economy. The course also covers aspects of international development, both economic and political.

Prerequisite(s): [(PS 190-299) OR (SOC 209) OR (SOC 210) OR (SOC 221)]
(3-0-3) (C)(S)

PS 361**Theories of Capitalism**

Examines the sociological and political literatures on capitalism. Themes include labor value, bureaucratic theory, problems of exploitation, class conflicts, status anxiety, and the internationalization of capital. Same as SOC 361.

Prerequisite(s): [(ANTH 200) OR (PS 190-299) OR (SOC 190-299)]
(3-0-3) (C)(S)

Course Descriptions

PS 362

Technology & Social Change

Examines the social implications of selected emerging and cutting-edge technologies, with an emphasis on recent developments and events. The course investigates the consequences of those technologies for society, using both short-term and long-term perspectives and including moral, ethical, socioeconomic, and educational considerations. Same as SOC 362.

Prerequisite(s): [(ANTH 200) OR (PS 190-299) OR (SOC 190-299)]

(3-0-3) (C)(S)

PS 365

Introduction to Legal Analysis

Designed to provide upper-level undergraduate students with an introduction to legal analysis and effective legal writing through the preparation of a legal memorandum, judicial opinion, and other written assignments. For students interested in attending law school, this course bridges the gap between the undergraduate experience and law school.

Prerequisite(s): [(PS 190-299) OR (SOC 209) OR (SOC 210) OR (SOC 221)]

(3-0-3) (C)(S)

PS 372

Government & Politics in Africa

Surveys contemporary African politics in its historical, economic, and cultural context. Both individual country cases and regional issues are examined, and approaches to comparative political analysis are used to understand the causes and consequences of observed patterns of political similarities and differences.

Prerequisite(s): [(PS 190-299) OR (SOC 209) OR (SOC 210) OR (SOC 221)]

(3-0-3) (S)

PS 373

Politics of East Asia

Surveys contemporary East Asian politics in its historical, economic, and cultural context. Both individual country cases and regional issues are examined, and approaches to comparative political analysis are used to understand the causes and consequences of observed patterns of political similarities and differences.

Prerequisite(s): [(PS 190-299) OR (SOC 209) OR (SOC 210) OR (SOC 221)]

(3-0-3) (C)(S)

PS 374

Politics of Europe

Surveys contemporary European politics in its historical, economic, and cultural context. Both individual country cases and regional issues are examined, and approaches to comparative political analysis are used to understand the causes and consequences of observed patterns of political similarities and differences.

Prerequisite(s): [(PS 190-299) OR (SOC 209) OR (SOC 210) OR (SOC 221)]

(3-0-3) (S)

PS 375

Politics of Latin America

Surveys contemporary Latin American politics in its historical, economic, and cultural context. Both individual country cases and regional issues are examined, and approaches to comparative political analysis are used to understand the causes and consequences of observed patterns of political similarities and differences.

Prerequisite(s): [(PS 190-299) OR (SOC 209) OR (SOC 210) OR (SOC 221)]

(3-0-3) (S)

PS 376

Politics of Global Migration

Explores the economic, political, and humanitarian forces that are driving the complex phenomenon of contemporary global migration. The course examines the causes, lived experiences, and consequences of migration, working to acquire a sound understanding of its social, political, legal, and cultural dimensions.

Prerequisite(s): [(PS 190-299) OR (SOC 209) OR (SOC 210) OR (SOC 221)]

(3-0-3) (S)

PS 380

Technology for Development

This course explores meaningful ways to use advanced technologies to support development from a social sciences perspective. Students will review the history and politics of development over the last century and learn about the economic and social contexts in which development work takes place and current applications of advanced technology for sustainable development. Students will also explore a variety of advanced technologies and their potential for new applications in the context of global development. This course requires an interest in understanding and evaluating information and communication technologies and how they are and could be employed around the world. Same as ANTH 380 and SOC 380.

Prerequisite(s): [(ANTH 200) OR (PS 190-299) OR (SOC 190-299)]

(3-0-3) (C)(S)

PS 385

Topics in Political Science

Investigates a topic of current interest in Political Science, which will be announced by the instructor when the course is scheduled.

Prerequisite(s): [(ANTH 200) OR (PS 190-299) OR (SOC 190-299)]

(3-0-3) (S)

PS 399

Japanese for Social Scientists II

A continuation of Japanese for Social Scientists I (PS 299).

Prerequisite(s): [(PS 299)]

(3-0-3) (S)

PS 401

Terrorism, Security & Civil Liberties

Acquaints students with the new kinds of organized violence, the theories and technology of terrorism, and possible policy responses. The impact of the responses to terrorist threats on individual freedom, civil liberties, and security are closely examined, along with normative issues associated with increases in governmental monitoring and control over individuals.

Prerequisite(s): [(PS 190-299 and PS 300-399)]

(3-0-3) (C)(S)

PS 403

Issues in Urban Affairs

Covers selected issues in contemporary urban politics and policy. The seminar serves as the required capstone course for the Urban Affairs specialization. Same as SOC 403.

Prerequisite(s): [(PS 190-299 and PS 300-399) OR (PS 190-299 and SOC 300-399) OR (PS 300-399 and SOC 190-299) OR (SOC 190-299 and SOC 300-399)]

(3-0-3) (S)

PS 408

Methods of Policy Analysis

Introduces students to the field of policy analysis and acquaints them with basic methods of policy analysis and urban planning. Emphasis is on these methods and problem solving rather than on politics or the political process. Topics include decision theory, benefit/cost analysis, problem simulation, population projection, and problem definition and formulation. This seminar serves as the required capstone course for the Policy Analysis/Technology specialization.

Prerequisite(s): [(PS 190-299 and PS 300-399)]
(3-0-3) (C)(S)

PS 420

Comparative Urban Politics

Compares major urban systems in a variety of settings in both developed and developing countries. The seminar gives special attention to political and economic factors shaping urbanization processes and distinctive policy issues in these different settings.

Prerequisite(s): [(PS 190-299 and PS 300-399)]
(3-0-3) (S)

PS 422

Complex Organizations

Introduces students to the significant theoretical frameworks that have emerged over time to describe and explain public and non-profit organizations, as well as organizational actors and actions. The seminar includes consideration of relations between organization and its environment, the importance of interorganizational networks, and the role of power in organizational life. Same as SOC 422.

Prerequisite(s): [(PS 190-299 and PS 300-399) OR (PS 190-299 and SOC 300-399) OR (PS 300-399 and SOC 190-299) OR (SOC 190-299 and SOC 300-399)]
(3-0-3) (S)

PS 438

Energy & Environmental Policy

Places energy and environmental policy in domestic and global context. The seminar traces the economic and political implications of dependence on fossil fuels, the attempt to develop alternate energy sources and promote conservation, the environmental effects of resource consumption, and the effort to control these effects through increased efficiency and regulation of pollution. Explored are such problems such as nuclear waste, acid rain, global warming, and deforestation.

Prerequisite(s): [(PS 190-299 and PS 300-399)]
(3-0-3) (S)

PS 440

Issues in Globalization

Examines globalization, which has become a buzzword in social science and in popular discourse. This seminar investigates the economic, socio-political, and cultural aspects of globalization, laying the stress on theoretical debates in the field of political economy.

Prerequisite(s): [(PS 190-299 and PS 300-399)]
(3-0-3) (C)(S)

PS 453

U.S. Regulatory Politics & Policy

Examines the changing role of government regulation of private and public activities from a political and administrative perspective, from the Progressive Era to the present. The seminar investigates the regulatory process, including administrative law, standards for rule-making, and the involvement of organized groups and the courts.

Prerequisite(s): [(PS 190-299 and PS 300-399)]
(3-0-3) (C)(S)

PS 455

Political Sociology

Surveys major issues and problems in the field of political sociology. Topics include the forms of political power structures, elitist approaches to politics, community and national power structures, and political socialization. Same as SOC 455.

Prerequisite(s): [(PS 190-299 and PS 300-399) OR (PS 190-299 and SOC 300-399) OR (PS 300-399 and SOC 190-299) OR (SOC 190-299 and SOC 300-399)]
(3-0-3) (S)

PS 462

Issues in American Politics

Intended to develop knowledge and analytical skills to assess how well our government works and how it might work better. The seminar focuses on the following: the operation of the federal executive, legislative, and judicial institutions; the policymaking process (including the role of administrators); and the power exercised by organized groups, experts, and the media. This seminar serves as the required capstone course for the American and Comparative Politics specialization.

Prerequisite(s): [(PS 190-299 and PS 300-399)]
(3-0-3) (C)(S)

PS 465

Political Economy

Introduces students to advanced theories of political economy, exploring the relationship between the economy and the political system. The impact of economic ideologies will be examined, as will the structure of political and economic interests and the mediating effects of institutions on outcomes.

Prerequisite(s): [(PS 190-299 and PS 300-399)]
(3-0-3) (C)(S)

PS 480

Introduction to Survey Methodology

This course will introduce advanced undergraduate students to the set of principles of survey research design that are the basis of standard practices in the social sciences. The course will discuss how to formulate research questions and develop hypotheses suitable for testing. Same as SOC 480.

Prerequisite(s): [(BUS 221) OR (PS 209) OR (PSYC 203) OR (SOC 209)]
(3-0-3) (S)

PS 490

Senior Seminar

This is the capstone course for political science majors. It is intended to bring together a number of concepts, methodological approaches, and research skills while exploring a particular topic of current significance within the discipline.

Prerequisite(s): [(PS 190-299 and PS 300-399)]
(3-0-3) (C)(S)

PS 491

Undergraduate Research in Political Science

Working with a member of the political science faculty, students will choose a topic, conduct research, and complete an original, independent research project.

Prerequisite(s): [(PS 190-299 and PS 300-399)]
(3-0-3) (C)

PS 495

Power & Domination

Uses concepts learned in political science and sociology classes and brings them to bear on the topic of power and domination with the obvious concomitant of resistance. The seminar serves as the required capstone course for the Society, Politics, and Value specialization. Same as SOC 495.

Prerequisite(s): [(PS 190-299 and PS 300-399) OR (PS 190-299 and SOC 300-399) OR (PS 300-399 and SOC 190-299) OR (SOC 190-299 and SOC 300-399)]
(3-0-3) (S)

Course Descriptions

PS 497

Directed Readings in Political Science

Consists of independent reading and analysis, centered on particular problems and supervised by a member of the Political Science faculty. (Credit: Variable; maximum 3 credit hours)

Prerequisite(s): [(PS 190-299 and PS 300-399)]

(Credit: Variable) (C)(S)

Psychology

PSYC 100

Introduction to the Profession I

Topics include problem formulation and career opportunities, spreadsheets and relevant computer applications, as well as data search tools.

(2-0-2) (C)

PSYC 101

Introduction to Profession II

Topics include problem formulation and career opportunities, spreadsheets and relevant computer applications, as well as data search tools.

(2-0-2) (C)

PSYC 120

First Year Seminar

First year seminar.

(1-0-1)

PSYC 203

Undergraduate Statistics for the Behavioral Sciences

The objectives of this course are to develop skills in using statistical data analysis commonly used in the behavioral sciences (e.g. descriptive statistics, ANOVA, regression, correlation, and meta-analysis). At the end of the course students should be able to comprehend statistical research findings, run basic statistical analysis, as well as make inferences from the results.

(3-0-3)

PSYC 204

Research Methods in Behavioral Science

Introduction to experimental, survey, and field study methodology, including: ethics; research design; collection, preparation, analysis of data; and writing research reports.

Prerequisite(s): [(PSYC 203)] AND [(PSYC 221) OR (PSYC 222)]

(2-2-3) (C)(N)

PSYC 221

Human Behavior, Growth & Learning

This is one of two courses intended to introduce basic topics in psychology; they can be taken either independently or in sequence. The survey includes overviews of clinical psychology, social psychology and personality. Experimental design and ethical issues will also be addressed.

(3-0-3) (C)(S)

PSYC 222

Brain, Mind & Behavior

This one of two courses intended to introduce basic topics in psychology; they can be taken either independently or in sequence. The survey includes overviews of cognition, intelligence, neuroscience, aging and development, as well as controversies in experimental design and ethics.

(3-0-3) (C)(S)

PSYC 238

Professional Skills

Didactic and applied approach to professional skill development in the areas of oral communication, conflict management and interpersonal dimensions of the work setting.

(3-0-3)

PSYC 301

Industrial Psychology

Survey of practical applications of psychology to problems of business and industry: work attitudes and behavior; employee selection; morale; safety; turnover; absenteeism; and training.

(3-0-3) (C)(S)

PSYC 303

Abnormal Psychology

Overview of various cognitive, emotional, and behavioral disorders, focusing on diagnostic criteria, causal factors, and treatment, and emphasizing scientific, research-oriented perspectives.

Prerequisite(s): [(PS 190-298) OR (PSYC 190-299) OR (SOC 190-299)]

(3-0-3) (C)(S)

PSYC 310

Social Psychology

Description and analysis of behavior and experience as determined by social conditions. Includes social issues, human relations, prejudice, and leadership.

(3-0-3) (S)

PSYC 380

Topics in Psychology

An investigation into a topic of current interest in psychology. The specific topic will be announced by the instructor when the course is scheduled.

Prerequisite(s): [(PSYC 221) OR (PSYC 222)]

(3-0-3) (S)

PSYC 406

History & Systems of Psychology

Historical development of influential psychological systems: structuralism, functionalism, behaviorism, psychoanalysis, and Gestalt psychology. Requires 12 hours of psychology.

Prerequisite(s): [(PSYC 203) OR (PSYC 204) OR (PSYC 409)] AND [(PSYC 221, PSYC 222, and PSYC 301) OR (PSYC 221, PSYC 222, and PSYC 303) OR (PSYC 221, PSYC 301, and PSYC 303) OR (PSYC 222, PSYC 301, and PSYC 303)]

(3-0-3) (S)

PSYC 409

Psychological Testing

Survey of current group tests, emphasizing basic concepts, e.g., validity and reliability, as well as practical applications and measurement techniques.

Prerequisite(s): [(PSYC 203, PSYC 221, and PSYC 222)]

(3-0-3)

PSYC 410

Vocational Rehabilitation

Historical, philosophical and legal bases of rehabilitation. Study of vocational, independent living, public and private rehabilitation, service delivery systems, and roles and functions of the practitioner.

Prerequisite(s): [(PSYC 221)]

(3-0-3) (C)(S)

PSYC 411

Medical Aspects of Disabling Conditions

Survey of human organ systems, medical terminology, unique characteristics of disabling conditions, including severe disabilities. Vocational consequences, environmental impact and implications for the rehabilitation process. One of a two course sequence.

Prerequisite(s): [(PSYC 221) OR (PSYC 222)]

(3-0-3) (N)

PSYC 412**Multicultural & Psychosocial Aspects of Disability**

Review of diversity issues in rehabilitation, including culture, disability, gender, aging, socio-economic status, and spirituality and religion. Study of individual and family adaptation and coping processes following disability; psychological and sociological consequences of disability; attitudes toward persons with disabilities; impact of social and environmental barriers. One of two-course sequence.

Prerequisite(s): [(PSYC 221 and PSYC 222)]
(3-0-3) (C)(S)

PSYC 414**Physiological Psychology**

An introduction to the biological bases of behavior with an emphasis on neuroanatomy and neurophysiology of sensory and central nervous systems.

Prerequisite(s): [(PSYC 221 and PSYC 222)]
(3-0-3) (N)

PSYC 420**Single Subject Design & Applied Behavior Analysis**

Single-subject experimental designs for the evaluation of environmental variables on behavior of individuals. Applied behavior analysis, precision teaching, and frequency measures for logical inference. Ethical, logical, scientific, and practical aspects of real-world experimentation for optimizing performance or learning in education, treatment, and training.

(3-0-3) (S)

PSYC 423**Learning Theory**

Seminar course examining major areas of research in learning theory, starting with the behaviorists and gestalt psychologists, and working up to modern examinations of memory, metacognition, evolutionary psychology and social modeling.

Prerequisite(s): [(PSYC 222)]
(3-0-3) (C)(S)

PSYC 426**Cognitive Processes**

This is a seminar course examining major areas of research in cognitive psychology, including attention, perception, memory, language, problem solving and creativity. Focus within these areas will vary depending on student interest, but throughout the semester we will be drawing connections between the study of the human mind and real-world applications in multiple fields.

Prerequisite(s): [(PSYC 222)]
(3-0-3) (S)

PSYC 431**Measurement of Attitudes**

Survey of methods used in attitude scale construction. Development and use of such scales. Multidimensional scaling.

Prerequisite(s): [(PSYC 203)]
(3-0-3)

PSYC 435**Early Development**

Processes and theories of mental, social, emotional and physical development of infants, children and adolescents. Requires 9 hours of psychology.

Prerequisite(s): [(PSYC 221 and PSYC 222)]
(3-0-3) (S)

PSYC 436**Adult Development**

Explores processes and changes in cognitive, social, physical and emotional functioning across adult life. Requires 9 hours of psychology.

Prerequisite(s): [(PSYC 221 and PSYC 222)]
(3-0-3) (S)

PSYC 449**Practicum in Rehabilitation Services**

Seminar and supervised fieldwork experience in a rehabilitation setting with disabled individuals. Emphasizes service delivery, interviewing techniques, and caseload management.

Prerequisite(s): [(PSYC 410, PSYC 411, PSYC 412*, and SOC 480)] An asterisk (*) designates a course which may be taken concurrently.
(3-0-3)

PSYC 452**Personality Theory**

Survey of personality theories and their application to everyday life.

Prerequisite(s): [(PSYC 221 and PSYC 222)]
(3-0-3) (S)

PSYC 455**Development & Evaluation of Training in Organizations**

The goal of this course is to provide the learner with a systems perspective to training in organizations. Through readings, discussions, in class exercises and project work students will learn to identify organizational issues that can be solved using a training intervention and develop appropriate training. The focus of the course will primarily be on knowledge application. Students will learn about the various steps involved in designing a training program including needs assessment, influence of learner characteristics, transfer of training and training evaluation. Through project work students will gain skills in implementing these steps.

Prerequisite(s): [(PSYC 221) OR (PSYC 301)]
(3-0-3) (S)

PSYC 456**Engineering Psychology**

Theory of human physical and psychological abilities as they relate to design of transportation, housing, workplace, defense and recreational systems. Topics include theories relating to psychophysiology, anthropometry, communications, man-machine interactions, training, maintainability, safety, and engineering evaluation.

Prerequisite(s): [(PSYC 221 and PSYC 222)]
(3-0-3) (S)

PSYC 481**Groups & Leadership at Work**

The course will review a system's model of groups and will discuss developmental stages of groups as they relate to communication behaviors. It will also review various approaches to leadership including individual, contingency, and relationship. The course engages students in various activities to help them become aware of themselves as team members and team leaders.

Prerequisite(s): [(PSYC 221 and PSYC 301)]
(3-0-3) (S)

PSYC 482**Undergraduate Research Seminar I**

An introduction to applied research in psychology. Includes a didactic review of basic and current issues in psychological research as well as an experiential component. Students actively participate in ongoing faculty research programs and are exposed to all areas of research.

Prerequisite(s): [(PSYC 204, PSYC 221, and PSYC 222)]
(1-2-3)

PSYC 483**Undergraduate Research Seminar II**

An introduction to applied research in psychology. Includes a didactic review of basic and current issues in psychological research as well as an experiential component. Students actively participate in ongoing faculty research programs and are exposed to all areas of research.

Prerequisite(s): [(PSYC 204, PSYC 221, and PSYC 222)]
(1-2-3)

Course Descriptions

PSYC 485

Senior Capstone Project I

The Psychology Capstone Project is an independent study that consists of a formal project and may include a research component, a literature review component as well as a data analysis component or may include an internship or fellowship experience as discussed by you and your project advisor. The project should incorporate and expand upon the depth of knowledge gained from previous years of study and include predetermined deliverables which may include a final thesis or poster. The project should focus on an area of psychology that is of interest to you as a means to expand your knowledge on the subject and to solidify your future goals. Requires senior standing.

(3-0-3)

PSYC 486

Senior Capstone Project II

Continuation of the Psychology Capstone Project. This is an independent study that consists of a formal project and may include a research component, a literature review component as well as a data analysis component or may include an internship or fellowship experience as discussed by you and your project advisor. The project should incorporate and expand upon the depth of knowledge gained from previous years of study and include predetermined deliverables which may include a final thesis or poster. The project should focus on an area of psychology that is of interest to you as a means to expand your knowledge on the subject and to solidify your future goals. Requires senior standing.

(3-0-3)

PSYC 487

Integrative Psychology Seminar I

A synthesis of issues and areas in psychology. Requires 21 credit hours in psychology. Requires junior standing.

Prerequisite(s): [(PSYC 203)]

(3-0-3)

PSYC 488

Integrative Psychology Seminar II

Seminar integrating seminal and cutting edge psychological writings both empirical and conceptual to address key issues in contemporary psychology. Requires 24 credits in psychology. Requires junior standing.

(3-0-3)

PSYC 489

Undergraduate Psychology Seminar

Reports and discussion of current problems and issues in psychology.

Prerequisite(s): [(PSYC 204, PSYC 221, and PSYC 222)]

(3-0-3) (S)

PSYC 497

Special Problems

Independent study involving compilation and analysis of data bearing on a significant problem. Requires junior standing.

(Credit: Variable)

GRADUATE COURSES

Degree-seeking undergraduates may take graduate courses with approval of the course instructor and faculty advisor. For course descriptions, see the *IIT Bulletin: Graduate Programs*.

PSYC 501

Biological Bases of Behavior

PSYC 502

Social Bases of Behavior

PSYC 503

Learning, Cognition and Motivation

PSYC 504

Individual and Cultural Differences

PSYC 513

Assessment in Rehabilitation Counseling

PSYC 523

Introduction to Theories of Psychotherapy

PSYC 529

Personnel Selection and Evaluation

PSYC 545

Graduate Statistics I

PSYC 556

Organizational Psychology

PSYC 557

Pre Practicum in Rehabilitation Counseling

PSYC 561

Applied Counseling Techniques

PSYC 562

Job Placement

PSYC 563

Human Growth and Career Development

PSYC 583

Rehabilitation Engineering Technology I: Survey of Interdisciplinary Application of RET

PSYC 590

Psychiatric Rehabilitation

Sociology

SOC 100

Introduction to the Profession

Intended for first-year political science, sociology, and social science majors. The course exposes students to quasi-experimental methods, quantitative and qualitative approaches, the history of these professions, and career possibilities. Students will examine several fundamental works in the disciplines.

(3-0-3) (C)

SOC 200

Introduction to Sociology

Introduces students to the structure and operation of society. The course analyzes individual behavior and emphasizes social problems.

(3-0-3) (C)(S)

SOC 203

Engaging Sociology

A more visual and performative, communication-intensive alternative to SOC 200. Students read and take short quizzes on chapters from a standard text and prepare weekly assignments that apply the associated concepts and insights. Assignments vary, from reviewing scholarly articles and identifying and exploring sociological databases to taking photographs to bringing in music and film clips illustrating political and social cartoons and designing and/or identifying spaces, devices, and clothing that illustrate the topics at hand.

(3-0-3) (C)(S)

SOC 208**Social Psychology & Society**

Explores different aspects of everyday judgments and their sometimes undesirable social consequences, especially the Fundamental Attribution Error. Other topics include various types of group influences on individual judgment and behavior, as well as persuasion, "brainwashing," helping behavior, and prejudice. Formerly called SOC 308.

(3-0-3) (C)(S)

SOC 209**Research Methods for Social & Political Science**

Introduces students to explanation in the social sciences and both qualitative and quantitative research methods. Topics covered include the formulation of research questions, measurement, data collection, survey research, significance tests, experimental and quasi-experimental design, sampling, and various techniques of qualitative research. Same as PS 209.

(3-0-3) (C)(S)

SOC 210**Social & Political Thought**

Examines central social and political theories and their ideas concerning such things as the relationship between individual and society, social harmony and conflict, social equality, and the role of the state. Same as PS 210.

(3-0-3) (C)(S)

SOC 211**Introduction to the Sociology of Space**

This introductory sociology course deals with people's general experience of space and how space and spatial arrangements affect people, social interaction, and the sense of community. It is designed to develop knowledge and understanding as well as analytical and perceptive skills. Our experiences of the spatial dimension of reality will be examined from various perspectives: emotional; cognitive; functional; symbolic; and cross-cultural. Our study objects range from everyday experiences to questions of community and city planning. Basic sociological concepts and research methods will be introduced and related to the topics covered. This course is required for SOC 311 (Social Use of Space).

(3-0-3) (C)(S)

SOC 212**Contemporary Social Problems**

Investigates various "social problems" and how they came to be defined as problematic. The course covers such general sociological concepts and theoretical perspectives as symbolic interactionism, conflict theory, structural functionalism, and constructionism. Students also examine the role of state advocates and the media in defining social problems. Case studies illustrate how different theoretical perspectives lead to different "solutions" and policy recommendations.

(3-0-3) (C)(S)

SOC 220**Global Chicago**

Through readings, lectures, and field trips to local neighborhoods, this course will look at the ways that Chicago has become a global city and what that means for local government, businesses, educators, and the non-profit sector. We will explore the extent to which Chicago has become and continues to be connected to the global economy, its history as a gateway to immigrants from all over the world, and how the local non-profit community is engaged in international development across the globe. Some key questions we will study include: In what ways and to what extent is Chicago a global city? What forces have driven Chicago's development as a global city? What are the broad consequences of Chicago being a global city? Same as PS 220.

(3-0-3) (C)(S)

SOC 221**Social Inequality**

Evaluates the patterns and dimensions of social, economic, and political inequality in American society and how these compare with other societies, who gets ahead and why, the relationship of social class to other features of society, some consequences of social stratification, and outlooks for the future of inequality in developed countries like the United States. Formerly known as SOC 321. Same as PS 221.

(3-0-3) (C)(S)

SOC 285**Introductory Special Topics in Sociology**

Investigates a topic of current interest at an introductory level. Topic will be announced by instructor at scheduling time. There are no prerequisites for this course. Course may be taken multiple times, provided the topic is different each time.

(3-0-3) (S)

SOC 301**The Social Dimension of Science**

Examines how social and psychological factors influence the reasoning and behavior of scientists. By contrasting traditional views of science with actual scientific practice, the course aims to understand such phenomena as "hype," resistance to scientific discovery, controversy, vicious competition, error, self-deception, and fraud.

Prerequisite(s): [(ANTH 200) OR (PS 209) OR (PS 210) OR (PS 221) OR (SOC 190-299)]

(3-0-3) (C)(S)

SOC 302**Science & Belief**

Explores the relationship between science and belief by comparing Western science with other belief systems, science with religion, and science with pseudo-science. The course also examines cultural and ideological influences on scientific knowledge and public faith in science.

Prerequisite(s): [(ANTH 200) OR (PS 209) OR (PS 210) OR (PS 221) OR (SOC 190-299)]

(3-0-3) (C)(S)

SOC 303**Science in Society**

Examines the role of the institution of science, scientific knowledge, and scientists in society. The course focuses on areas where science significantly influences and is influenced by political, economic, and cultural institutions and contexts.

Prerequisite(s): [(ANTH 200) OR (PS 209) OR (PS 210) OR (PS 221) OR (SOC 190-299)]

(3-0-3) (C)(S)

SOC 305**Social Communication**

Studies the variety of subtle ways, verbal and nonverbal, in which humans communicate in personal, professional, and public life, and how to identify and solve problems and misunderstandings that typically arise. Topics include the social nature of humans, interpersonal communication, interaction within and between groups, teamwork, leadership, and intercultural communication.

Prerequisite(s): [(ANTH 200) OR (PS 209) OR (PS 210) OR (PS 221) OR (SOC 190-299)]

(3-0-3) (C)(S)

SOC 311**Social Use of Space**

Gives students basic insights into people's experience of space and the effect of spatial arrangements on people's behavior. The course explores the differences in conceptions between planners and users and the need to take the user into account in spatial design.

Prerequisite(s): [(SOC 211)]

(3-0-3) (S)

Course Descriptions

SOC 340

Social Organization & Control

Surveys theories explaining the organization and structure of complex societies. The problem of social control, or the capacity of a society to regulate itself formally and informally according to its desired principles, is viewed as a central problem of social organization. Same as PS 340.

Prerequisite(s): [(ANTH 200) OR (PS 190-299) OR (SOC 190-299)]

(3-0-3) (C)(S)

SOC 342

Industrial Society

Analyzes social issues of particular relevance to scientists and engineers: demographic trends and their effects on schools, labor markets, workplaces, and other institutions; the changing role of the United States in the global economy; the impact of changing technology on work and employment; and the shift to a service economy.

Prerequisite(s): [(ANTH 200) OR (PS 209) OR (PS 210) OR (PS 221) OR (SOC 190-299)]

(3-0-3) (C)(S)

SOC 348

Deviant Behavior & Conformity

Analyzes the definition, development, and control of deviant behavior in relation to social processes. Societal reaction to and the amount, distribution, and behavioral systems of various forms of deviance (drug addiction, suicide, crime, alcoholism, illegitimacy, etc.) are examined.

Prerequisite(s): [(ANTH 200) OR (PS 209) OR (PS 210) OR (PS 221) OR (SOC 190-299)]

(3-0-3) (C)(S)

SOC 350

Urban Sociology

Examines the historical origins of cities and their present place in society and culture. Important themes include: the impact of industrialization and globalization; the significance of racial, ethnic, and economic structures; and the consequences of residential segregation and alternative physical structures in urban areas.

Prerequisite(s): [(ANTH 200) OR (PS 209) OR (PS 210) OR (PS 221) OR (SOC 190-299)]

(3-0-3) (C)(S)

SOC 351

Sociology of Work

Begins with a brief comparison of the nature, role, and meaning of work across time and space. The course continues with a survey of some of today's most important topics in the study of work, primarily looking at the United States and other developed countries.

Prerequisite(s): [(ANTH 200) OR (PS 209) OR (PS 210) OR (PS 221) OR (SOC 190-299)]

(3-0-3) (C)(S)

SOC 352

Sociology of Education

Analyzes the organization and purpose of schooling in American society, including the historical development of American education, the relationship of schooling to life chances and individual success, the bureaucratic characteristics of schooling, contemporary problems facing American education, and how the U.S. educational system compares with those of other societies.

Prerequisite(s): [(ANTH 200) OR (PS 209) OR (PS 210) OR (PS 221) OR (SOC 190-299)]

(3-0-3) (C)(S)

SOC 353

The Promise & Problems of Policy

Analyzes the policymaking process, including both policy formulation and implementation. Subjects covered include the necessity for policy, environmental factors and their effect on policy-making, the process of policymaking, and a brief introduction to methods of analysis. Same as PS 353.

Prerequisite(s): [(ANTH 200) OR (PS 190-299) OR (SOC 190-299)]

(3-0-3) (C)(S)

SOC 354

Urban Policy

Explores major dilemmas facing cities today, including changing economic and tax bases, fiscal stresses, immigration, marginalized populations, new forms of consumption, and adaptation to structural change. Responses of politicians to pressures to develop new policies and leverage the productive capacity of the city and the impact of citizen preferences are analyzed. Same as PS 354.

Prerequisite(s): [(ANTH 200) OR (PS 190-299) OR (SOC 190-299)]

(3-0-3) (C)(S)

SOC 356

Transformative Technologies

Focuses on major technological innovations and charts the social transformations that have historically accompanied their introduction. Examples include writing, the plow, the clock, the automobile, and the computer. Attention is directed to issues of institutional interdependence, the question of technological determinism, and Luddism/resistance.

Prerequisite(s): [(ANTH 200) OR (PS 209) OR (PS 210) OR (PS 221) OR (SOC 190-299)]

(3-0-3) (C)(S)

SOC 359

Humans, Ecology, & Environment

Examines the relationship between humans and nature, including reasons for some well-known ecological catastrophes in human history. The course traces changing attitudes to the environment and explores various measures that have been offered to solve problems, for instance, the Green Revolution, sustainable development, renewable energy, "clean" technologies, and the potential social and ecological consequences of these solutions. Same as ANTH 359.

Prerequisite(s): [(ANTH 200) OR (PS 209) OR (PS 210) OR (PS 221) OR (SOC 190-299)]

(3-0-3) (C)(S)

SOC 361

Theories of Capitalism

Examines the sociological and political literatures on capitalism. Themes include labor value, bureaucratic theory, problems of exploitation, class conflicts, status anxiety, and the internationalization of capital. Same as PS 361.

Prerequisite(s): [(ANTH 200) OR (PS 190-299) OR (SOC 190-299)]

(3-0-3) (C)(S)

SOC 362

Technology & Social Change

Examines the social implications of selected emerging and cutting-edge technologies with an emphasis on recent developments and events. The course investigates the consequences of those technologies for society using both short-term and long-term perspectives and including moral, ethical, socio-economic, and educational considerations. Same as PS 362.

Prerequisite(s): [(ANTH 200) OR (PS 190-299) OR (SOC 190-299)]

(3-0-3) (C)(S)

SOC 371

Occupations & Professions

Considers all factors affecting work, including the transition from school to work, the determinants of earnings and other job benefits, job satisfaction, labor unions and professional associations, class position in American society, the effects of foreign competition, government labor market policies, and the work environment in a comparative perspective.

Prerequisite(s): [(ANTH 200) OR (PS 209) OR (PS 210) OR (PS 221) OR (SOC 190-299)]
(3-0-3) (C)(S)

SOC 380

Technology for Development

This course explores meaningful ways to use advanced technologies to support development from a social sciences perspective. Students will review the history and politics of development over the last century and learn about the economic and social contexts in which development work takes place and current applications of advanced technology for sustainable development. Students will also explore a variety of advanced technologies and their potential for new applications in the context of global development. This course requires an interest in understanding and evaluating information and communication technologies and how they are and could be employed around the world. Same as ANTH 380 and PS 380.

Prerequisite(s): [(ANTH 200) OR (PS 190-299) OR (SOC 190-299)]
(3-0-3) (C)(S)

SOC 385

Topics in Sociology

Investigates a topic of current interest in Sociology which will be announced by the instructor when the course is scheduled.

Prerequisite(s): [(ANTH 200) OR (PS 190-299) OR (SOC 190-299)]

(3-0-3) (C)(S)

SOC 403

Issues in Urban Affairs

Covers selected issues in contemporary urban politics and policy. The seminar serves as the required capstone seminar for the Urban Affairs specialization. Same as PS 403.

Prerequisite(s): [(PS 190-299 and PS 300-399) OR (PS 190-299 and SOC 300-399) OR (PS 300-399 and SOC 190-299) OR (SOC 190-299 and SOC 300-399)]
(3-0-3) (S)

SOC 422

Complex Organizations

Introduces students to the significant theoretical frameworks that have emerged over time to describe and explain public and non-profit organizations as well as organizational actors and actions. The seminar includes consideration of relations between an organization and its environment, the importance of interorganizational networks, and the role of power in organizational life. Same as PS 422.

Prerequisite(s): [(PS 190-299 and PS 300-399) OR (PS 190-299 and SOC 300-399) OR (PS 300-399 and SOC 190-299) OR (SOC 190-299 and SOC 300-399)]
(3-0-3) (C)(S)

SOC 425

Privacy

This course explores current conceptualizations of and behaviors about privacy. It is a reading-intensive, film-based, senior-level seminar on the design and engineering of privacy, the case law and policy aspects of privacy, professions deeply engaged in issues of privacy, the commercial business of privacy, and the cultural and cross-cultural cognitive, personal, and interpersonal behaviors of privacy.

Prerequisite(s): [(SOC 190-299 and SOC 300-399)]
(3-0-3) (C)(S)

SOC 431

Development of Sociological Thought

Surveys ideas and issues that have influenced the history of sociology and continue to bear significantly on current theory. The seminar analyzes major figures, schools of thought, conceptual themes, and controversies.

Prerequisite(s): [(SOC 190-299 and SOC 300-399)]
(3-0-3) (C)(S)

SOC 442

Race & Ethnicity in International Perspective

Examines the conceptual construction of race and ethnicity in different societies around the world in various eras. The seminar pays special attention to the causes and consequences of racial and ethnic conflict and cooperation for cultural groups and for public policy.

Prerequisite(s): [(SOC 190-299 and SOC 300-399)]
(3-0-3) (C)(S)

SOC 454

Gender & Work Through Film

Examines the ways that gendered expectations and the opportunities based on them translate into workplace realities for women and men. The goals of the seminar are to introduce students to the sociological study of gender and work and to help develop the observational and analytical skills necessary to understand what is going on in today's workplace.

Prerequisite(s): [(SOC 190-299 and SOC 300-399)]
(3-0-3) (C)(S)

SOC 455

Political Sociology

Surveys major issues and problems in the field of political sociology. Topics include the forms of political power structures, elitist approaches to politics, community and national power structures, and political socialization. Same as PS 455.

Prerequisite(s): [(PS 190-299 and PS 300-399) OR (PS 190-299 and SOC 300-399) OR (PS 300-399 and SOC 190-299) OR (SOC 190-299 and SOC 300-399)]
(3-0-3) (S)

SOC 480

Introduction to Survey Methodology

This course will introduce advanced undergraduate students to the set of principles of survey research design that are the basis of standard practices in the social sciences. The course will discuss how to formulate research questions and develop hypotheses suitable for testing. Same as PS 480.

Prerequisite(s): [(BUS 221) OR (PS 209) OR (PSYC 203) OR (SOC 209)]
(3-0-3) (S)

SOC 491

Undergraduate Research in Sociology

Working with a member of the sociology faculty, students will choose a topic, conduct research, and complete an original, independent research project.

Prerequisite(s): [(SOC 190-299 and SOC 300-399)]
(Credit: Variable) (C)

SOC 495

Power & Domination

Uses concepts learned in political science and sociology classes and brings them to bear on the topic of power and domination with the obvious concomitant of resistance. The seminar serves as the required capstone course for the Society, Politics, and Value specialization. Same as PS 495.

Prerequisite(s): [(PS 190-299 and PS 300-399) OR (PS 190-299 and SOC 300-399) OR (PS 300-399 and SOC 190-299) OR (SOC 190-299 and SOC 300-399)]
(3-0-3) (S)

Course Descriptions

SOC 497

Directed Readings

Consists of independent reading or analysis, centered on particular problems and supervised by a member of the Sociology faculty. Credit: Variable; maximum 3 credit hours. Prerequisite(s): [(SOC 190-299 and SOC 300-399)]

(Credit: Variable) **(C)(S)**

SOC 498

Exercises in Behavioral Observation

Provides students with an opportunity to acquire better field-work skills by providing a forum for discussing and practicing the craft. This is a seminar in advanced ethnographic methods. Permission of instructor is required.

(3-0-3) **(C)(S)**



Academic Policies and Procedures

Academic Policies and Procedures

Academic Loads

The average full-time academic load during the fall or spring semester is 15 credit hours. The minimum registration required for full-time status for those semesters is 12 credit hours. Full-time degree-seeking students who wish to enroll for more than 18 credit hours or part-time degree-seeking students who wish to enroll in 9 to 11 credit hours must obtain permission from their academic dean.

Students who wish to enroll in more than two courses during the summer term must obtain permission from their academic dean.

Non-degree students requesting a course overload (more than eight credit hours) must obtain permission from the Office of Undergraduate Academic Affairs.

Academic Program Audit

An academic audit provides a summary of a student's academic status to date and lists the courses to be completed in order to receive a degree. Students can request an official academic audit from the Office of Undergraduate Academic Affairs after they have earned a minimum of 60 semester hours, 90 semester hours for architecture

students. Students may request an official academic audit through the Academic Affairs channel in the IIT Portal.

Students may also review academic progress towards their degree through the DegreeWorks channel in the IIT portal.

Academic Progress, Probation, and Academic Suspension

All students who are degree candidates are expected to maintain satisfactory academic progress. This includes earning satisfactory grade point averages (GPA) and maintaining a satisfactory rate of progress toward the completion of their degree programs.

Students who do not earn at least a 2.00 cumulative GPA, a 1.85 current GPA, or a 2.00 major GPA are placed on academic probation.

Degree-seeking students are required to maintain a satisfactory rate of progress.

- Full-time students must earn a minimum of 12 credit hours per semester applicable to their degrees.
- Part-time students must maintain a satisfactory rate of progress which will enable them to graduate within 12 academic years after achieving degree-seeking status.

Students who do not maintain a satisfactory rate of progress in a given semester may be placed on probation based on the recommendation from the student's academic advisor, department associate chair, and academic dean. Probation may affect financial aid. See Student Eligibility Requirements to Receive Federal and State Financial Assistance on page 15.

Students on probation are not permitted to:

- Register for more than 15 credit hours per semester unless they receive approval from the associate dean of their college.
- Hold an elected or appointed office in any student organization. Probation does not affect membership in a student organization.
- Participate in the Cooperative Education Program unless approved by the vice provost for Undergraduate Affairs.

Academic probation may affect a student's eligibility to participate in varsity athletic sports.

Students who are on academic probation for two consecutive semesters are candidates for academic suspension from IIT.

The progress of non-degree students also is reviewed and any student who does not maintain good academic standing is subject to being placed on probation or academic suspension.

A student placed on academic suspension by the University may petition the Academic Standing Committee to review the suspension. The student must present substantial academic or other relevant new evidence not available at the time of suspension in support of the petition for reinstatement. The chair of the Academic Standing Committee will determine whether the new documentation warrants a further review of the case.

Advising

Each undergraduate student is assigned a faculty academic advisor who is available to discuss opportunities and career plans in the student's chosen field and to plan and approve coursework to meet departmental and university requirements. Students are urged to consult their advisors when questions arise.

Department advisors, the director of undergraduate advising, and advisors in Office of Undergraduate Academic Affairs are also available to answer questions and interpret policies regarding university requirements and academic procedures.

Change of Major or Declaration of Additional Majors

Students considering either a change of major or concurrently pursuing a second undergraduate degree or major should consult the departmental associate chair regarding program requirements and career opportunities in the new degree program.

Students may also review requirements for the new degree program by performing a "What If" audit using DegreeWorks. Students may access the DegreeWorks channel

through the IIT portal.

An advisor in the Office of Undergraduate Academic Affairs can also assist a student in the selection of a suitable major. A student who wishes to change or declare a major or concurrently pursue an additional undergraduate degree program must obtain these forms from the Office of Undergraduate Academic Affairs or at www.iit.edu/ugaa. Approval from the intended major department is required.

Change of Status

Students who wish to change a classification and/or registration status must complete the applicable procedures listed below no later than two weeks prior to registration.

- Students changing from full-time degree-seeking status to part-time degree-seeking status must notify the Office of Financial Aid if they are receiving financial aid. International students with student visas must be registered as full-time students and are not permitted to change to part-time status.
- Students changing from part-time degree-seeking status to full-time degree-seeking status must inform their department and obtain the necessary advisor's approval for a full-time course load. Also, students in this category who wish to apply for financial aid must notify the Office of Financial Aid regarding their change of status.

- Students changing from non-degree status to full-time or part-time degree-seeking status must contact the Office of Undergraduate Academic Affairs. Students must have completed at least one semester of relevant coursework at IIT and must be in academic good standing in order to be eligible for changing their status.
- Students changing from graduate status to undergraduate full-time or part-time status must submit an application for admission to the Office of Undergraduate Admission.

Code of Academic Honesty

IIT expects students to maintain high standards of academic integrity. Students preparing for the practice of a profession are expected to conform to a code of integrity and ethical standards commensurate with the high expectations society places on practitioners of a learned profes-

sion. No student may seek to gain an unfair advantage over another. The Code of Academic Honesty is explained in the IIT Student Handbook and all students are expected to know and adhere to this code.

Academic Policies and Procedures

Credit by Examination

Credit may be earned through one or more of the following examination procedures. Total credit from proficiency examinations and the College Level Examination Program

may not exceed 18 semester hours. There is no limit for Advanced Placement credit.

College Level Examination Program (CLEP)

For these examinations, which are administered by the College Entrance Examination Board, IIT will award credit under the following conditions:

- The CLEP examination and the score achieved meet the standards of the IIT department that offers courses in the area of the examination.
- The CLEP examination is taken before the student enters IIT.

- Students must observe all rules of the College Level Examination Program regarding the taking of CLEP examinations.

NOTE: Previous acceptance of the examination by another institution does not imply acceptance by IIT.

Proficiency Examinations

Any student who believes that, through self-study or outside experience, he or she has gained the substantive equivalent of the content of a specific course may ask for an examination. With the approval of the chair of the department offering the course and the Office of Undergraduate Academic Affairs, a proficiency examination will be administered. This is a graded exam and the letter grade will be

entered on the permanent record. Proficiency examinations are not allowed for courses in which the student has previously enrolled and must be completed before a student's final 45 semester hours of enrollment at IIT. The Credit by Examination Form may be obtained in the Office of the Registrar and a per-credit-hour fee is charged for each examination.

Dean's List

Every semester the names of all undergraduate students who have completed at least 12 graded hours with a

semester GPA of 3.50 or better appear on the Dean's List.

Grade Appeal

The assignment of letter grades (A, B, C, D, and E) is at the discretion of the course instructor, and except for unusual circumstances, the assigned course grade is final.

Undergraduate students who want to appeal a letter grade assigned in a course should first confer directly with the course instructor. If the student and instructor cannot come to an agreement, a clear and concise written appeal should be submitted to the Office of Undergraduate Academic Affairs. All appropriate documentation supporting this appeal must be submitted at this time. This ap-

peal must be submitted before the end of the next regular semester.

The Office of Undergraduate Academic Affairs will review the documentation and if appropriate, the appeal will be forwarded to the chair of the department offering the course. The chair will review the appeal with the course instructor and, if necessary, the dean of the college offering the course. The Office of Undergraduate Academic Affairs will monitor the progress of the appeal and inform the student of the final decision.

Grades

| Grade | Grade Description | Instructor Assigned | Performance Evaluated | Attempted Hours | Earned hours | Quality Points | Quality Hours | GPA Hours | FinAid Hours |
|-------|--------------------|------------------------|--------------------------|--------------------|-----------------|-------------------|------------------|--------------|-----------------|
| A | excellent | ✓ | ✓ | ✓ | ✓ | 4.00 | ✓ | ✓ | ✓ |
| B | above average | ✓ | ✓ | ✓ | ✓ | 3.00 | ✓ | ✓ | ✓ |
| C | average | ✓ | ✓ | ✓ | ✓ | 2.00 | ✓ | ✓ | ✓ |
| D | below average | ✓ | ✓ | ✓ | ✓ | 1.00 | ✓ | ✓ | ✓ |
| E | fail | ✓ | ✓ | ✓ | | 0.00 | ✓ | ✓ | ✓ |
| I | incomplete | ✓ | | ✓ | | 0.00 | | | ✓ |
| R | research | ✓ | | ✓ | | 0.00 | | | ✓ |
| NA | non-attendance | ✓ | | ✓ | | 0.00 | ✓ | ✓ | ✓ |
| S | satisfactory | ✓ | ✓ | ✓ | ✓ | 0.00 | | | ✓ |
| U | unsatisfactory | ✓ | ✓ | ✓ | | 0.00 | | | ✓ |
| AU | audit | | | | | 0.00 | | | |
| W | withdrawal | | | ✓ | | 0.00 | | | ✓ |
| X | no grade submitted | | | ✓ | | 0.00 | | | ✓ |
| NG | non-graded | | | | | 0.00 | | | |

Grade Notes

- X Temporary administrative grade automatically applied to blank grade rosters at grading deadline.
- AU Grade basis elected by student at point of registration. A *Request to Audit Form* must be submitted at the time of registration and courses may not be changed to or from audit after registration. There is no credit given for an audited course. Regular tuition rates apply.
- I This temporary grade requested in writing of instructor, by student, prior to week of finals, is automatically posted when the Registrar's Office receives the grade. The student must have substantial equity in the course with no more than four weeks of coursework remaining to be completed. The written agreement between the student and instructor must detail the remaining requirements to complete the course. A grade of I will be assigned only in case of illness or for unusual or unforeseeable circumstances that were not encountered by other students in the class and that prevent the student from completing the course requirements by the end of the semester. Grade of I will automatically change to E on the published deadline of the subsequent term.
- R Temporary grade indicating coursework is scheduled to extend beyond the end of term. Grade of R has same impact as I until final letter grade is submitted. Does not expire or change to another grade.
- NA Apparent withdrawal due to non-attendance. Impacts record as a grade of E.
- W Permanent administrative grade automatically applied when student withdraws before deadline (60% of term). Grade of W does not affect GPA. No credit hours are awarded for a grade of W.
- NG Grade basis for a course in which no evaluation is recorded. Permanent administrative grade automatically applied.

Grading Procedure

Online submission of final grades are due on the published deadline following final exams. Grades of X are posted for all missing (blank) grades at that time and are resolved through the grade change process. All grade changes are initiated by the instructor of record or authorized academic officer. Current temporary grades of I, R, and X can be changed by the instructor directly with the Registrar's Office to a final letter grade of: A, B, C, D, E, or S/U, or if the class has a pass/fail grading basis of satisfac-

tory/unsatisfactory. Temporary grades of I or R cannot be changed to another temporary or a non-letter, administrative grade of: I, R, NA, AU, W, or X. Other grade changes may require an additional level of approval by an academic officer or appeals committee. Changes to final grades cannot be made once a degree has been posted for the career in which the course was taken, or in the case of a student's voluntary separation from the University.

Academic Policies and Procedures

Grade Point Average

The grade point average (GPA) is determined by dividing the total number of grade points earned by the total number of graded semester hours. Graded semester hours

include courses graded A, B, C, D, and E. All courses taken at IIT apply to the cumulative GPA, including those that do not apply toward graduation.

Repeating Courses for a Grade Change

Undergraduate students may repeat a course for a change of grade. A request to repeat a course for a change of grade must be submitted through DegreeWorks, the online degree audit system, during registration. Both grades will be recorded on all transcripts issued. Only the second grade will be used to compute the GPA, even if the second grade is lower, except when the second grade is I, R, S, U, W, X, or AU. The course repeat policy is as follows:

- A course repeated for a grade change must be taken within one calendar year after initial enrollment in that course or the next time it is offered (whichever is longer).
 - The same course may be repeated only once for a change of grade.
 - No more than three courses may be repeated for a grade change in a student's career.
 - Re-registration for courses in which a student received a passing grade requires the approval of the student's academic advisor and academic dean.
 - If a course is no longer offered by the University, the provision to repeat the course for a grade change does not apply.
-

Graduate Course Enrollment Approval

All undergraduate students who wish to enroll in a graduate 500-level course must obtain approval from their faculty advisor. All undergraduate students who enroll in gradu-

ate courses are governed by the graduate grading system for those courses.

Graduation Requirements

Every student is responsible for fulfilling graduation requirements as specified in the IIT Bulletin in effect at the time of his or her admission to IIT. If those curriculum requirements change before the student completes a specified degree program, he or she may follow a curriculum in a subsequent IIT Bulletin with the approval of his or her academic unit head. When an earlier curriculum is no longer available, the individual degree program of a student who has been following this earlier curriculum will be modified by his or her academic unit head.

The student has the ultimate responsibility to fulfill degree requirements, to attain eligibility to enroll in particular courses, and to comply with all applicable academic rules governing his or her academic program.

NOTE: Students must file an Application for Graduation Form with the Office of Undergraduate Academic Affairs at the beginning of the semester in which they plan to graduate. Failure to do so may result in the postponement of the student's graduation. Please refer to the IIT Calendar on page 3 for specific deadlines.

Undergraduate students must complete:

- All required courses in their major program.
- Credit hour requirements as appropriate to their major (a minimum of 126 hours).
- General education and special academic requirements as shown on page 25.
- Residence requirements as outlined on page 270.
- A minimum cumulative GPA of 2.00 and a minimum GPA of 2.00 in the student's major department courses. A student who completes all course requirements with an average below the minimum grade point requirements may, with permission of his or her department chair and academic dean, take additional courses to raise the GPA.
- Completion of all the above within a period of eight calendar years from the semester of initial admission for full-time students or 12 calendar years for part-time students after achieving degree-seeking status. A student may petition their major department and academic dean to have this period extended. If the petition is approved, this extension may involve additional compensating academic requirements.
- Payment of all financial obligations to the University.

All incomplete coursework must be submitted to the instructor prior to the date of graduation. A recorded grade of I (incomplete) in a course required for graduation will result in deferral of that student's graduation until the next semester. A new application for graduation must be submitted for that semester.

Graduation with Honors

A student must complete a minimum of 60 graded semester hours at IIT in order to receive the award of “summa cum laude”, “magna cum laude”, or “cum laude”. A student who has a GPA of 3.90 and higher will graduate with

“summa cum laude” honors; a student who has a GPA between 3.80-3.89 will graduate with “magna cum laude” honors; and a student who has a GPA between 3.50-3.79 will graduate with “cum laude” honors.

Leave of Absence

Undergraduate degree-seeking students who wish to withdraw from the University with the intention of returning to complete their degree program may apply for a Leave of Absence. All requests for a Leave of Absence begin with the Office of Undergraduate Academic Affairs. This designation cannot exceed one academic year; however, it may be extended if the proper documentation is submitted. The Leave of Absence form can be found on the Academic Affairs channel in the IIT Portal.

to contact the Student Health and Wellness Center and/or submit documentation from a health care professional relating to treatment prior to resuming their studies.

International students must comply with additional regulations when requesting a Leave of Absence. See www.iit.edu/~internat for additional details.

The Leave of Absence policy is explained in more detail in the IIT Student Handbook.

Students on a medical Leave of Absence may be required

Return from Leave

Students wishing to return from a Leave of Absence should contact the Office of Undergraduate Academic Affairs (ugaa@iit.edu) to begin the process. The request for Return from Leave and all supporting documents must be submitted prior to the deadline specified on the IIT Calendar (see page 3).

and universities attended since last enrolled at IIT. In some cases, additional interviews may be required to process a Return from Leave.

International students must contact the International Center in addition to submitting a request to Return from Leave. See www.iit.edu/~internat.

Students must submit official transcripts from all colleges

Registration

Registration and Class Attendance

Students are required to be registered for all classes in which they participate, attend, and/or submit coursework for evaluation. No credit will be granted for any course for which the student did not properly register before the last day to add a class for the semester. Students are required to be registered to make use of university facilities. Students who are in an exchange, study abroad, or cooperative education program also must be registered for their particular programs.

All students are expected to attend classes regularly. Excessive absences may be grounds for a failing grade. Non-attendance does not constitute an official withdrawal. When illness or emergency requires a student to miss more than two days of class, the student must notify the course instructor. It is also recommended that the student contact the dean of students and the director of undergraduate advising.

Registration Appointments

Undergraduate students are allowed to register for an upcoming term based on their student classification. Appointment dates to begin registration are assigned on a priority basis to fifth-year undergraduates on the first day of regis-

tration, fifth- and fourth- year undergraduates on the second day of registration, and so on. Open registration begins once first-year students are allowed to register on the fifth day of the registration period.

Academic Policies and Procedures

Registration Holds and Controls

Students with unpaid balances, disciplinary sanctions, unmet immunization requirements, or other such conditions to warrant a registration hold are prevented from enrolling in classes until the condition is resolved and the hold is removed.

Registration controls including prerequisites, corequisites, maximum hours, level, and program restrictions may also

exist to limit or prevent registration in specific circumstances. Students should consult their advisor, resolve all holds, and take note of any registration restrictions that pertain to their student status and course selection, prior to their appointed registration date for an upcoming term.

For more information, go to www.iit.edu/registrar/registration_tools.

Residence Requirements

All undergraduate degree-seeking students must observe the following residence requirements:

- Once enrolled at IIT, a student is not permitted to enroll at another institution without obtaining permission. A student must submit an academic petition to the Office of Undergraduate Academic Affairs for approval prior to registration at another institution.
 - A course failed at IIT must be repeated at IIT. No transfer credit will be awarded for any course equivalent to a course failed at IIT.
 - The final 45 semester hours of work must be completed in residence at IIT. Any proficiency examinations or enrollment at another institution must be completed before this period.
 - A student must complete a minimum of 45 semester hours at IIT in order to be eligible for a Bachelor's degree from IIT.
-

Second Bachelor's Degree

A student whose first degree is granted by IIT must complete a minimum of 15 additional credit hours at IIT. A student whose first degree was awarded by another institution must complete a minimum of 45 additional credit

hours at IIT. All other graduation requirements apply for the second degree. The GPA required for "summa cum laude", "magna cum laude", and "cum laude" for the second degree includes all IIT coursework.

Student Academic Petitions

A student may request a review of decisions concerning academic status or regulations by submitting an academic petition to the Office of Undergraduate Academic Affairs. Students who wish to take a course at another institution

during the summer must submit an academic petition to the Office of Undergraduate Academic Affairs prior to the registration at another institution to guarantee transfer of credit in accordance with university policies.

Student Classification

The following table describes classifications for undergraduate students currently in effect at the Illinois Institute of Technology. Classification is based on total earned hours in a student's undergraduate career.

| <i>Classification</i> | <i>Earned Hours</i> |
|--------------------------------|---------------------|
| First-Year Undergraduate (U1) | 0-29.9 |
| Second-Year Undergraduate (U2) | 30-59.9 |
| Third-Year Undergraduate (U3) | 60-89.9 |
| Fourth-Year Undergraduate (U4) | 90-130.9 |
| Fifth-Year Undergraduate (U5+) | 131+ |

Transcripts

Official transcripts are requested through the Office of the Registrar and are only released with the expressed consent and authorization of the student, in compliance with (FERPA) the Family Educational Rights and Privacy Act of 1974. The secured document is certified as of the printing date and is not valid if altered in any way or opened by someone other than the intended recipient.

Official transcripts are released only after the student has fulfilled all financial obligations to the University. Official transcripts issued directly to the student making the request are stamped "ISSUED TO STUDENT". A fee is charged for each transcript issued.

Unit of Credit

Academic credit is recorded in semester hours. Each semester hour represents one 50-minute period per week

for a 16-week semester.

Withdrawal from the University

Undergraduate degree-seeking students who withdraw from all of their courses are in effect withdrawing from the University. Non-attendance does not imply withdrawal. All requests for Withdrawal begin with the Office of Undergraduate Academic Affairs which will provide assistance with the successful resolution of all outstanding obligations to the University. The Withdrawal Form can be found in the Academic Affairs channel in the IIT Portal.

International students must comply with additional regulations when withdrawing from the University. See www.iit.edu/~internat.

Any undergraduate student who is not in attendance for a semester must apply for Reinstatement in the Office of Undergraduate Academic Affairs.

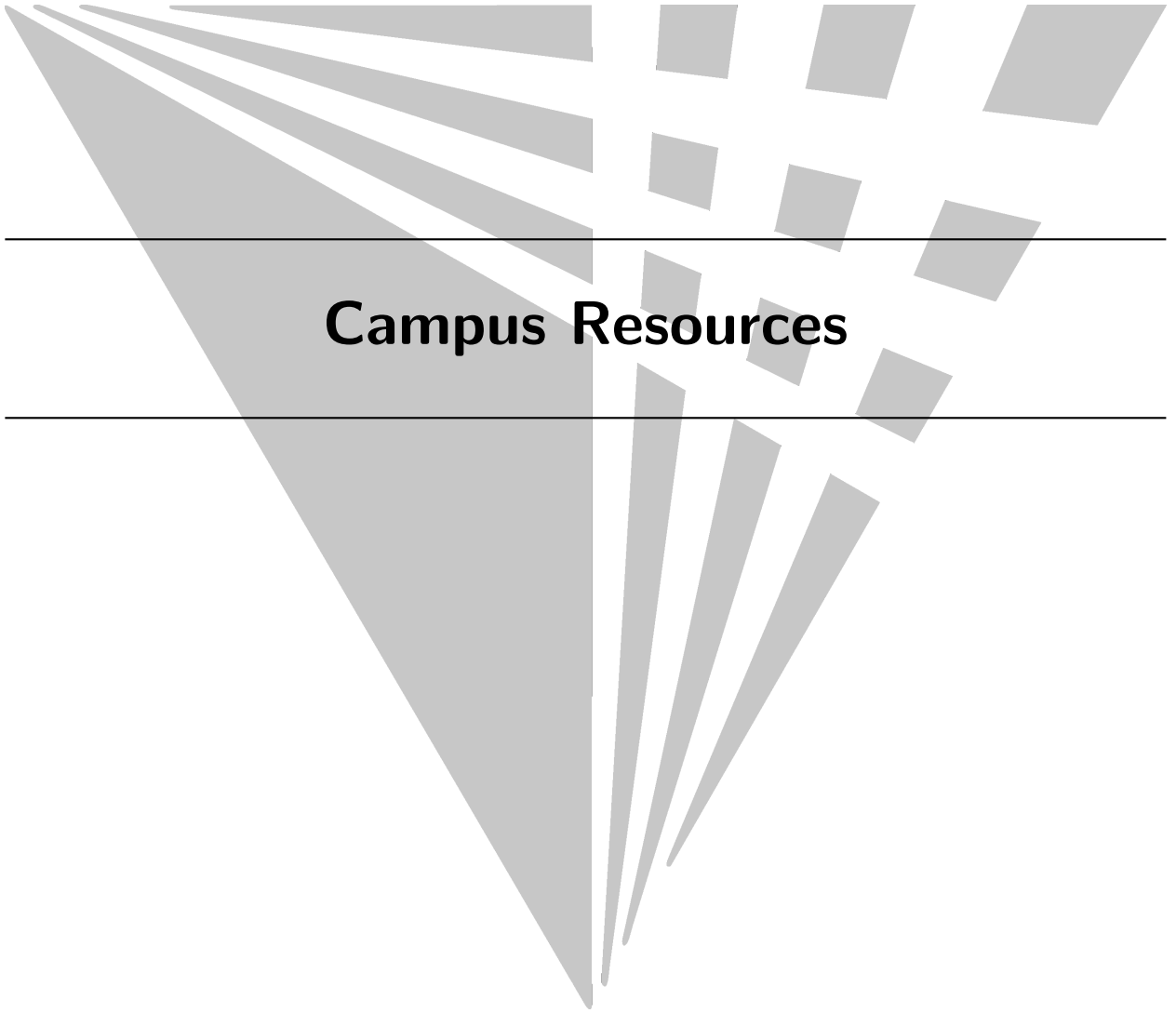
Reinstatement

Students who have withdrawn and now wish to return to IIT should contact the Office of Undergraduate Academic Affairs (ugaa@iit.edu) to begin the process. The request for Reinstatement must be submitted prior to the deadline specified on the IIT calendar (see page 3).

Students must submit official transcripts from all colleges and universities attended since last enrolled at IIT. In some

cases, additional interviews may be required for Reinstatement.

International students must contact the International Center in addition to submitting an application for Reinstatement. See www.iit.edu/~internat for more information.



Campus Resources

Campus Resources

Academic Resource Center

Website: www.iit.edu/arc

The Academic Resource Center (ARC) is a comprehensive center with a variety of services for students and faculty. The ARC's mission is to enrich the academic experience through a student-centered approach to learning. The ARC provides peer tutoring in mathematics and the sciences on a drop-in basis and by appointment.

Undergraduate and graduate peer tutors are available during the fall, spring, and summer semesters. In addition to peer tutoring, the ARC also offers exam reviews, workshops, supplemental instruction, group study space, and an

OTS computer laboratory including PCs and Macs. The ARC also keeps textbooks, e-textbooks, and iPads with academic apps for your reference.

The ARC is located in the northwest corner of the Hermann Hall Building, Room 112. The ARC is open Monday through Thursday, 10:00 a.m. to 8:00 p.m., Friday, 10:00 a.m. to 3:00 p.m., and Sunday from 6:00 p.m. to 9:00 p.m. For more details, visit the ARC website: www.iit.edu/arc or call 312.567.5216.

Access, Card, and Parking Services

Website: www.hawcard.iit.edu or www.parking.iit.edu

The Access, Card, and Parking Services Office issues HawkCards and parking permits for the University. The HawkCard is the picture identification card for IIT students, staff, and faculty. Not only does it serve as an ID, it also grants access to buildings, parking lots, computer labs, Keating Athletic Center, the shuttle bus, library materi-

als' check-out services, and TechCash balances. Permits to park in IIT lots are available for purchase on an annual, academic year, or monthly basis. Students should visit Access, Card, and Parking Services in Hermann Hall, Room 201, for more information, or visit www.hawcard.iit.edu or www.parking.iit.edu.

Athletics and Recreation

Website: www.illinoistechathletics.com

The Department of Athletics offers a comprehensive program of varsity sports, intramural competition, instruction,

and formal recreation activities for both men and women.

Athletics

The Scarlet Hawks men's varsity teams compete in intercollegiate baseball, cross-country, soccer, swimming and diving, indoor track and field, and outdoor track and field. Women's varsity teams compete in cross-country, swim-

ming and diving, soccer, volleyball, indoor track and field, and outdoor track and field. The University is a member of the National Association of Intercollegiate Athletics (NAIA).

Recreation

The Intramurals and Recreation program offers a variety of fun, recreational, social, and competitive activities for IIT students regardless of experience and ability. Traditional offerings include basketball, volleyball, flag football, dodgeball, soccer, and softball. Other sports include, racquetball, badminton, cricket, kickball, and ultimate frisbee. Fitness classes are also available for students including but

not limited to yoga, Zumba, Salsa dancing, and Pilates. In addition, we offer open recreational play in basketball and volleyball along with open swimming in the Keating Sports Center pool. Moreover, IIT has the only disc golf course in Chicago proper, which gives students another recreational outlet and makes our university a popular destination for local area disc golf enthusiasts.

Campus Life

Website: www.iit.edu/campus.life

The Office of Campus Life provides campus programs and events designed to enhance the student educational experience outside of the classroom. Campus Life manages the campus Orientation Program, Freshman Year Experience (FYE) programming, and provides direct oversight to more

than 100 student organizations, including the Student Government Association and Union Board. Other registered student organizations represent a variety of student interests in areas such as culture, recreation, academics, and the arts.

Career Management Center

Website: www.cmc.iit.edu

Located in Herman Hall, the Career Management Center (CMC) offers individual career advising and testing, résumé critiques, job search strategies, mock interviews, and labor market and salary data. The CMC also administers the Cooperative Education Program and the Internship Program, whereby qualified students gain experience in their field of study prior to graduation. Both programs are options for domestic and international students at the undergraduate or graduate level.

The CMC conducts a variety of professional development workshops on topics including résumé and cover letter writing, job search strategies, communications, and interviewing skills. The CMC also hosts biannual career fairs, employer spotlights, and on-campus interviews. Career related resources, workshop schedules, and a link to job postings may be accessed by students and alumni registered in NACELink (www.cmc.iit.edu). Individual sessions with a career counselor may be scheduled by appointment at 312.567.6800.

Cooperative Education Program

Cooperative education is a learning approach that integrates college studies with professional work experience in industry, business, or government. Salaries among IIT co-op students are competitive and help defray educational expenses. The co-op experience improves employment opportunities upon graduation. Full-time IIT students must meet the co-op and internship eligibility requirements at IIT and maintain at least a 2.50 GPA. Students with a GPA lower than 2.50 may participate only with the per-

mission of the vice provost for undergraduate affairs. Email ugaa@iit.edu for more information.

Interested students must attend an Introduction to Cooperative Education and Internship Workshop conducted by the CMC.

For more information, contact the CMC at 312.567.6800 or visit their website: www.cmc.iit.edu.

Part-Time Employment

Part-time employment opportunities may be available for students both on and off campus. Positions may be career related co-ops or internships, non-Federal Work Study jobs, part-time, or seasonal work. Co-ops, internships, and on campus jobs are posted in the Career Management Center (CMC) NACELink database. Federal Work Study positions and information can be found on the Financial Aid website www.iit.edu/financial_aid/student_employment.

Students interested in and eligible for employment off campus in their field of study may get job search assistance from the CMC and must attend an Introduction

to Cooperative Education and Internship Workshop conducted by the CMC. Workshop schedules are posted at www.cmc.iit.edu. Appointments for individual career counseling may be made by calling 312.567.6800.

International students (on F1 visa) are restricted to on-campus employment for their first academic year of study at any school in the United States. After completing one academic year in the country, students on an F1 visa may be eligible for opportunities off campus (only if related to their field of study) through the Cooperative Education Program or the Internship Program.

Communication Across the Curriculum Program

Website: www.iit.edu/cac

The Communication Across the Curriculum (CAC) Program helps students understand the role of writing and speaking in their academic and professional lives. Both on its website (www.iit.edu/cac) and through the IIT Writing Center (see page 281), located in Siegel Hall 232/233/234, the CAC provides assistance in communication skills for academic inquiry, professional research, and the workplace. The CAC also assists IIT instruc-

tors in developing materials relevant to written, oral, electronic, and interpersonal communication in discipline-specific courses – particularly Introduction to the Profession (ITP), communication-intensive courses (C-Courses), and Interprofessional Projects (IPROs). The CAC director also administers IIT's Basic Writing Proficiency requirement.

Disability Resources

Website: www.iit.edu/cdr

Services for persons with disabilities are coordinated by the Center for Disability Resources. Persons with disabilities who are interested in applying for admission to any of IIT's education programs are invited to call the center or to email disabilities@iit.edu prior to their arrival on

campus to discuss their individual needs. Enrolled students with disabilities are encouraged to contact the director of the Center for Disability Resources to register and request accommodations.

Fraternity and Sorority Life

Website: www.iit.edu/housing/greek_life

The Greek community at IIT is focused on giving students the chance to learn both inside and outside of the classroom. IIT's seven fraternities and three sororities uphold their own missions through brotherhood and sisterhood activities. These groups also concentrate heavily on the values of their organizations by participating in regular philanthropic and community service events. Each fraternity

and sorority has its own operating structure and allows students to develop valuable leadership and interpersonal skills. Academics and scholarship are an integral part of the Greek system, and the community works hard to uphold rigorous scholastic standards as a part of their daily functioning. Membership is open to both residential and commuter students.

Idea Shop

Website: ipro.iit.edu/ideashop

A catalyst for innovation, the Idea Shop is a 13,000-square-foot facility composed of a state-of-the-art 3D rapid prototyping lab, a Dell laptop lab, an iPad library, an iMac lab for mobile app development and video editing, collaborative teaming areas, formal classrooms, and flexible open spaces. The Idea Shop is home to IIT's Interprofessional Projects Program (IPRO), entrepreneurship initiatives, and the Exelon Summer Institute, an accelerated program for incoming first-year students. The Idea Shop is located in the University Technology Park at IIT, a newly remodeled incubator space for researchers and companies

requiring robust infrastructure.

The Idea Shop helps to build the competency and professional perspectives of IIT students at all levels. It is an inviting place for returning alumni, students, and prospective students to interact and participate in workshops. The Idea Shop also serves the Chicago-area entrepreneurial community and facilitates the process by transforming student and faculty generated ideas into actual businesses, products, and patents.

International Center

Website: www.ic.iit.edu

The purpose of the International Center is to promote international education and cultural exchange by (1) supporting international students, faculty, staff, and students studying abroad, (2) assisting in the compliance of immigration and other related regulations, (3) providing study abroad advising for students interested in studying in another country, and (4) providing services and resources to the IIT community. These services include: individual and group orientations to the University and community; assistance with document preparation for employment and

other related non-immigrant benefits; workshops for faculty, staff, and students on issues affecting international students and scholars; cross-cultural activities and programs that promote intercultural perspectives and address adjustment issues; study abroad advising for students interested in studying in another country.

All international students, scholars, and faculty are required to report to the International Center immediately upon arrival.

Leadership Academy

Website: leadershipacademy.iit.edu

The Leadership Academy is an integral component of IIT's interprofessional approach to undergraduate education. Its objectives are to create and implement an effective leadership development curriculum for IIT undergraduate students, to identify and support students with exceptional leadership potential, and to evaluate leadership development outcomes at individual and program levels. Cur-

rently, the academy offers scholarships and mentors to the scholarship recipients. It also offers the Sophomore Leadership Retreat, a series of engaging leadership development seminars, which any IIT full-time undergraduate student can attend and earn points toward a certificate in leadership studies.

Libraries

Website: library.iit.edu

IIT's libraries include Paul V. Galvin Library; the Center for the Study of Ethics in the Professions (Main Campus); the Graham Resource Center (Main Campus); the Louis W. Biegler Library (Rice Campus); the Downtown

Campus Library, serving the Chicago-Kent College of Law and the Stuart School of Business; the Institute for Food Safety and Health Library (Moffett Campus); and the IIT Archives (Main Campus).

Paul V. Galvin Library

Website: library.iit.edu

As the University's central library, Paul V. Galvin Library combines cutting-edge information technology with traditional library services. The library's holdings include more than 1.2 million volumes, including books, journals, government publications, and microforms. Digital services provide 24-hour internet access to more than 100 online databases indexing millions of journal articles; approximately 40,000 full-text online journals; electronic course reserves; and I-Share, a statewide resource sharing system of 76 academic libraries. Galvin Library also provides web-based delivery of a variety of materials, including

documents requested via interlibrary loan. The library's instruction program serves the IIT community by teaching skills needed to locate, retrieve, and evaluate information. Library instructors teach at all levels from introductory to advanced and cover a broad range of all types of information and retrieval techniques. Library workshops are offered regularly throughout a semester or can be specifically tailored for a course or program by library subject specialists.

Phone number: 312.567.3616

Campus Resources

Graham Resource Center

Website: library.iit.edu/grc

Housed in Crown Hall, the Graham Resource Center (GRC) is IIT's architecture library, serving students and faculty of the College of Architecture (COA), and a branch of Paul V. Galvin Library. The GRC supports the educational and curricular goals of the COA by acquiring, preserving, and serving materials in various media to COA students, faculty, and staff; providing reference and research assistance to patrons about architecture, landscape architecture, and city planning, and offering bibliographic instruction to all GRC and architecture researchers and users.

The collections of the Graham Resource Center includes more than 15,000 books, 40 journal titles, and many electronic resources to meet research and reference needs. The GRC also holds special collections focused on Mies van der Rohe and Chicago architecture, as well as a circulating collection of iconic chairs.

Phone number: 312.567.3256

Louis W. Biegler Library

Website: library.iit.edu/biegler

The Louis W. Biegler Library, a branch located at the Rice Campus in Wheaton, provides access to a circulating collection, reserve materials, and journals, as well as access to digital resources. Services for distance learners are coordinated at Biegler, and include interlibrary loan, web-based

document delivery, research and reference consultations, and library instruction.

Phone number: 630.682.6050

Center for the Study of Ethics in the Professions

Website: ethics.iit.edu

The Center, located in Hermann Hall, contains a variety of materials dealing with topics in practical and professional ethics, such as autonomy, confidentiality, conflict of interest, and self regulation. The library provides bibliographic

assistance to students and researchers and assists visiting scholars and practitioners.

Phone number: 312.567.6913

Downtown Campus Library

Website: library.kentlaw.edu

Serving Chicago-Kent College of Law and IIT's graduate Business program, the Downtown Campus Library (DTC) also includes an extensive collection of U.S. Government, United Nations, and European Union documents. The DTC library provides access to digital resources, as well

as services such as reference, instruction, and interlibrary loan.

Phone number: 312.906.5600

Institute for Food Safety and Health Library

Website: library.iit.edu/ifsh

Located on IIT's Moffett Campus in Bedford Park, the Institute for Food Safety and Health (IFSH) branch library supports research on food technology and food safety. A depository library for the FAO (Food and Agriculture Organization of the United Nations), the library provides

digital access to all of the Galvin Library databases, as well as services such as interlibrary loan, web-based document delivery, and library instruction.

Phone number: 708.563.8163

One Stop

Website: onestop.iit.edu

The One Stop has been established to provide services to students with maximum efficiency and a minimum of confusion. This office, representing the Offices of the Registrar, Financial Aid, Academic Affairs, and Student Accounting will be the starting point for all IIT students (prospective, new, and continuing) seeking administrative and academic assistance.

At the One Stop, you can get assistance, ask questions, and be pointed in the right direction for registration, change of major, student petitions, enrollment verification, transcripts, and more. You can get personal assistance with financial account information, paying tuition and fees, housing bills, and parking tickets, as well as obtaining information about financial aid. For more details, see onestop.iit.edu or call 312.567.3810.

Registrar

Website: www.iit.edu/registrar

The Office of the Registrar serves as the official data steward of institutional academic information and student records to support the needs of students, faculty, staff, and alumni at Illinois Institute of Technology. The office main-

tains accurate, timely, and secure information to enforce academic policy, registration, grading, enrollment certification, course information, the production of diplomas and official transcripts, and other related university functions.

Residence and Greek Life

Website: www.iit.edu/housing

More than half of IIT's full-time undergraduates live on campus. Residence and Greek Life offers a wide range of accommodations, programs, and services designed to enhance campus life. Residence and Greek Life maintains residence halls and apartments designed to meet the different needs of IIT students, faculty, and staff. Within

these buildings, the staff members coordinate academic and social programming, assist students with personal and academic concerns, supervise resident advisors and community desk assistants, and advise the Residence Hall Association. Please contact Residence and Greek Life for further information about these options.

Spiritual Life and Service Learning

Website: www.iit.edu/spiritual.life

The Office of Spiritual Life and Service Learning serves students of all faith traditions, as well as secular humanists and atheists. Together with student religious organizations and other university offices, the office sponsors activities for faith development, worship, socializing, and service. The office sponsors interfaith learning opportunities on campus, and provides information about religious resources both on and off campus. The director is also available to discuss personal or spiritual issues.

Home to IIT's Service Learning programs, the office sponsors and supports regular community service activities, advises the Service Learning theme community, and connects interested students with volunteer opportunities both on and off campus.

The Office of Spiritual Life is located in MTCC 213. The director can be contacted at 312.567.3160, spiritual.life@iit.edu, or service@iit.edu.

Student Affairs

Website: www.iit.edu/student_affairs

The Office of the Dean of Students oversees many areas of student life and serves as the primary advocate and ombudsperson for students. The office also manages the student conduct process. Students, faculty, and staff are encouraged to contact the office for help or referrals.

Activities outside the classroom and laboratory complement and enhance IIT's central educational mission. IIT

encourages all students to participate in athletics, student organizations, and professional societies. Students are also encouraged to take advantage of the cultural, educational, and recreational resources on campus, as well as in the Chicago area. For additional information on activities, organizations, and services, consult the IIT Student Handbook.

Student Center for Diversity and Inclusion

Website: www.iit.edu/scdi

Illinois Institute of Technology is dedicated and committed to building and sustaining a diverse and inclusive campus community that values and respects all members. The purpose of the Student Center for Diversity and Inclusion is to provide programs, research, advocacy, and advice on issues, policies, and practices that affect the University's commitment to diversity and inclusion. In support of that

commitment, the work of the Center is organized around a concept of diversity that is practical and includes multiple social and cultural identities, such as race, gender, sexual orientation, class, group affiliation, ability, national origin, and religion. For additional information on the Center, please visit www.iit.edu/scdi.

Student Health and Wellness Center

Website: www.iit.edu/shwc

The Student Health and Wellness Center (SHWC) at Illinois Institute of Technology provides quality and cost-sensitive healthcare tailored to the unique and diverse needs of our students. The goal of SHWC is to provide campus health and wellness resources that enable students to successfully achieve their academic goals and promote lifelong wellness. The SHWC provide primary care, specialty care, urgent care, diagnostic services, psychotherapy and mental health support, health promotion, and wellness programs.

SHWC provides diagnosis and treatment of common illnesses and injuries with the ability to dispense medication and/or provide appropriate prescriptions. We also provide immunizations, allergy injections, and walk-ins for urgent care. In addition, SHWC provides gynecological care and sexual health screening for men and women. A small fee may incur for labs, diagnostic tests, immunizations, and medication given on site.

The SHWC provides administrative oversight of the IIT Student Health Insurance Plan. Aetna Health insurance is

offered to currently enrolled students at IIT. Health insurance is not a requirement to use the SHWC.

Our counseling services include psychotherapy, referral, and medication management. Treatment length varies, depending on individual needs, and can last up to 16 individual counseling sessions per student while group therapy imposes no session limits. Our counselors are experienced to address many issues students may face including, but not limited to, loneliness, relationship concerns, family issues, self-esteem, depression, anxiety, concentration difficulties, sleeping difficulties, eating disorders, addiction, sexual concerns, anger management, cultural adjustment, and other personal issues.

The SHWC clinical services are provided by a team of culturally sensitive professionals. We provide comprehensive clinical services and outreach programs to IIT students. In addition, SHWC is a resource for consultation to faculty, staff, and parents of IIT students. We are located in the IIT Tower, 3rd Floor. To schedule an appointment call 312.567.7550.

Technology Services

Website: www.iit.edu/ots

The Office of Technology (OTS) supports IIT's primary technology services including administrative systems, myIIT, and network and telephone infrastructure. OTS maintains over 500 computers in its classrooms, labs, and public terminals throughout the Main, Adams Street, and Rice Campuses. The computers in the classrooms and labs are refreshed on a three-year cycle, to ensure that students have access to equipment that supports their academic activities. The classroom and lab instructional software is reviewed and updated every semester by the IIT Software Committee. OTS also supports remote printing from personal laptops/desktops to printing release stations located in various computer labs and public areas. Additional information about this service is available on the IIT Print channel and the OTS portal website, accessible through the myIIT Training and Support tab.

OTS manages the myIIT web portal my.iit.edu, which provides personalized access to email, online course registration, Blackboard, OTS Support, student life, and other content. All IIT students receive an email address in the format: username@hawk.iit.edu. IIT email is integrated into each student's Google Apps for Education account, which is accessed via the myIIT portal. Google Apps for Education also includes collaboration tools such as Google Docs, Sites, Groups, and more. Supplemental class materials are available through Blackboard, IIT's course management system, where instructors post lec-

tures, notes, IIT Online video lectures, and other course information.

The OTS Support Desk is the central point of contact for technology support at IIT. Support Desk staff provide technical troubleshooting, account management, and configuration assistance to students, faculty, and staff. OTS Support is available through myIIT, including a knowledge database with how-to information for common technical issues and questions. A request for technical support may be submitted by opening a ticket through the OTS Support tool in myIIT, sending a request via email (supportdesk@iit.edu), or by calling the Support Desk at 312.567.3375 (on-campus ext.7-DESK).

IIT provides Internet access through its wired and wireless networks. Most Main Campus buildings have wired Internet access and wireless is available in all residence halls and academic buildings, as well as in most other Main Campus buildings. Visit the OTS website to view IIT's current WiFi coverage and to learn how to connect to the IIT network.

Visit the OTS website: www.iit.edu/ots and the portal website on the *Training and Support* tab in myIIT for the most up-to-date information and useful details about IIT's technology.

Undergraduate Academic Affairs

Website: www.iit.edu/ugaa

The Office of Undergraduate Academic Affairs (UGAA) provides a variety of academic support services for all undergraduate students from the time of admission to graduation. These services include academic advising; evaluation of transfer credits from both United States and international schools; academic program audits; student petitions; course repeats for a change of grade; change of major; monitoring of academic progress; certification of student's eli-

gibility for degree conferral; granting an official leave of absence; and official withdrawal from the University. In addition, this office reinstates former undergraduate students to the University and maintains the official academic files for all undergraduate students. DegreeWorks, the online degree audit system is monitored and maintained by the Office of Undergraduate Academic Affairs.

Writing Center

Website: www.iit.edu/csl/hum/resources/writing_center.shtml

IIT students can seek assistance with written and oral assignments at the IIT Writing Center, located in Siegel Hall 232/233/234. Tutors are available to assist students enrolled in writing-intensive courses (Introduction to the Profession, C-courses, and IPROs). Tutors specializing in English as a Second Language are also available to assist stu-

dents whose primary language is not English. Appointments can be made in advance on the sign-up sheets on Siegel 232/233/234 doors. Walk-in appointments are also possible when tutors are not working with other students. Tutoring is free of charge, and both undergraduate and graduate students are welcome.



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B.A., M.P.A., J.D.
Assistant Dean for Student
Professional Development

Dawn E. Rupcich

B.S.
Assistant Dean for Administration,
Finance, CLE/CPE, Financial Aid,
and the Center for Law and
Computers

Stephen D. Sowle

B.A., J.D.
Assistant Dean for Academic
Administration and Student Affairs

Nicole Vilches

B.A., M.S.Ed.
Assistant Dean for Admissions

Dawn K. Young

B.A., J.D., LL.M.
Director of Institutional Projects

Institute of Design

Patrick F. Whitney

B.F.A., M.F.A.
Dean of the Institute of Design

Jeremy Alexis

B.Arch., M.Des.
Assistant Dean

Hugh Musick

B.A., M.B.A.
Associate Dean and Director of
Executive Education

Margo Schwartz

B.A., B.M., M.M.
Assistant to the Dean and Events
Manager

Faculty

Year shown indicates initial appointment

Javad Abbasian

B.S., Abadan Institute of Technology (Iran); M.S., Ph.D., Illinois Institute of Technology; M.B.A., University of Chicago
Associate Professor of Chemical Engineering, 2000

Susan J. Adams

B.A., M.A., University of Wisconsin; J.D., Valparaiso University School of Law
Professor of Legal Research and Writing, Associate Director of the Legal Research and Writing Program, and Director of Writing Services, 1993

Nader Aderangi

B.S., University of Tehran (Iran); M.S., University of Colorado; Ph.D., Illinois Institute of Technology
Senior Lecturer of Chemical Engineering and Director of the Undergraduate Laboratories, 1997

Andre B. Adler

B.S., State University of New York-Binghamton; M.S., Purdue University; Ph.D., University of Florida
Associate Professor of Applied Mathematics, 1988

Gady Agam

B.S., M.S., Ph.D., Ben-Gurion University (Israel)
Associate Professor of Computer Science, 2000

Jeremy Alexis

B.Arch., Illinois Institute of Technology; M.Des., IIT Institute of Design
Senior Lecturer of Design and Assistant Dean, 2005

Smriti Anand

B.S., Ranchi University (India); M.B.A., Northwestern University; M.S., Ph.D., University of Illinois-Chicago
Assistant Professor of Management, 2011

John L. Anderson

B.S., University of Delaware; Ph.D., University of Illinois, Urbana-Champaign
Professor of Chemical Engineering and President of the Illinois Institute of Technology, 2007

Paul R. Anderson

B.S., Purdue University; M.S., University of California-San Diego; Ph.D., University of Washington
Associate Professor of Environmental Engineering, 1986

Lori B. Andrews

B.A., Yale College; J.D., Yale Law School
Distinguished Professor of Law and Director of the Institute for Science, Law, and Technology, 1994

Tricha Anjali

B.S., M.S., Indian Institute of Technology; Ph.D., Georgia Institute of Technology
Associate Professor of Electrical and Computer Engineering, 2004

Olga Antipova

B.Sc., M.S., Nizhny Novgorod Technical University (Russia); Ph.D., Illinois Institute of Technology
Research Assistant Professor of Biology, 2011

Hamid Arastooipour

B.S., Abadan Institute of Technology (Iran); M.S., Ph.D., G.E., Illinois Institute of Technology
Professor of Chemical Engineering and Mechanical Engineering, Henry R. Linden Professor of Engineering, and Director of the Wanger Institute for Sustainability and Energy Research (WISER), 1979

David Arditi

B.S., M.S., Middle East Technical University (Turkey); Ph.D., Loughborough University (United Kingdom)
Professor of Civil and Architectural Engineering, 1981

Wiel Arets (Incoming)

M.Arch., Technical University of Eindhoven (Netherlands)
John H. and Jeanne M. Rowe Professor of Architecture and Dean of the College of Architecture, 2012

Konstantinos Arfanakis

B.S., University of Athens (Greece); M.S., Ph.D., University of Wisconsin-Madison
Associate Professor of Biomedical Engineering and Director of the MRI Program in the Pritzker Institute, 2003

Shlomo Argamon

B.S., Carnegie-Mellon University; M.S., Ph.D., Yale University
Associate Professor of Computer Science, 2002

Weslynn Ashton

B.S., Massachusetts Institute of Technology; Master of Environmental Science, Ph.D., Yale University
Assistant Professor of Environmental Management and Sustainability, 2010

Guillermo E. Atkin

B.S., Universidad F. Santa Maria (Chile); Ph.D., University of Waterloo (Canada)
Associate Professor of Electrical and Computer Engineering, 1986

Bernadette Atuahene

B.A., University of California-Los Angeles; M.P.A., Harvard University; J.D., Yale Law School
Associate Professor of Law, 2005

Roya Ayman

B.A., M.A., Ph.D., University of Utah
Professor of Psychology and Division Head of Industrial, Organizational, and Business Psychology, 1983

Kimberly D. Bailey

B.A., Indiana University-Bloomington; J.D., University of Michigan Law School
Assistant Professor of Law, 2007

Katharine K. Baker

B.A., Harvard-Radcliffe College; J.D., University of Chicago Law School
Professor of Law, 1993

Siva K. Balasubramanian

B.S., M.B.A., Osmania University; Ph.D., State University of New York at Buffalo
Harold L. Stuart Professor of Marketing, Associate Dean of the Stuart School of Business, and Co-Director Ph.D. Program, 2008

Martin L. Bariff

B.S., M.A.S., Ph.D., University of Illinois, Urbana-Champaign
Associate Professor of Information Management, 1983

Doug Barnett

Lt. Col., U.S. Army (Retired)
B.S., University of Idaho; M.B.A., Chadwick University; U.S. Army Command and General Staff College
Assistant Professor of Military Science and IIT Program Director, 2011
ROTC Faculty

Felice J. Batlan

B.A., Smith College; J.D., Harvard Law School; Ph.D., New York University
Associate Professor of Law and Co-Director of the Institute for Law and the Humanities, 2006

Matthew J. Bauer

B.S., M.S., Illinois Institute of Technology
Senior Lecturer of Computer Science, Director of Undergraduate Computer Science Programs, Associate Dean for Academic Affairs, College of Science and Letters, and Director of Undergraduate Academic Advising, 1996

Matthew J. Bauer

B.A., University of Minnesota-Duluth; M.S., Ph.D., Georgetown University
Associate Professor of Linguistics and Co-Director of Graduate Studies, 2006

A. Mattox Beckman, Jr.

B.S., Ph.D., University of Illinois, Urbana-Champaign
Senior Lecturer of Computer Science, 2003

Tanya I. Bekyarova

M.S., University of Plovdiv (Bulgaria); Ph.D., Illinois Institute of Technology
Senior Lecturer of Biology and Associate Chair of Biology, 2009

Jason D. Bennett

Capt., USAF
B.S., United States Air Force Academy; M.B.A., University of Colorado
Assistant Professor of Aerospace Studies, 2010
ROTC Faculty

R. Russell Betts

B.A., M.A., Oxford University; M.S., Ph.D., University of Pennsylvania
Professor of Physics and Dean of the College of Science and Letters, 2008

Tomasz R. Bielecki

M.Sc., Ph.D., Warsaw School of Economics
Professor of Applied Mathematics, 2003

Mustafa Bilgic

B.S., University of Texas; M.S., Ph.D., University of Maryland
Assistant Professor of Computer Science, 2010

John Bilson

B.Econ., M.Econ., Monash University-Melbourne (Australia); Ph.D., University of Chicago
Professor of Finance, Interim Associate Dean and Director of Master's of Finance Programs, 2005

William A. Birdthistle

B.A., Duke University; J.D., Harvard Law School
Associate Professor of Law, 2006

Daniel E. Bliss

B.A., Grinnell College; M.A., University of Iowa; Ph.D., University of Illinois - Chicago
Assistant Professor of Political Science, 2010

William R. Boland

Capt., USAF
B.A., Creighton University
Assistant Professor of Aerospace Studies, 2009
ROTC Faculty

Richard J. Bonaccorsi

B.A., DePauw University; Master of International Management, Thunderbird University; Ph.D., Case Western Reserve University
Senior Lecturer of Public Administration and Director of the M.P.A. Program, 2004

Suresh R. Borkar

B. Tech., Indian Institute of Technology (India); M.S., Ph.D., Illinois Institute of Technology
Senior Lecturer of Electrical and Computer Engineering, 2006

Keith J. Bowman

B.S., M.S., Case Western Reserve University; Ph.D., University of Michigan
Duchossois Leadership Professor of Materials Engineering and Chair, Mechanical, Materials, and Aerospace Engineering, 2011

Mark W. Bowman

CSM, U.S. Army
B.A., North Central College; M.A., Chicago State University
Assistant Professor of Military Science and Assistant Program Director, 2007
ROTC Faculty

Colin Boynton

Capt., USMC
B.A., University of Arizona
Assistant Professor of Naval Science and Marine Officer Instructor, 2012
ROTC Faculty

James M. Braband

B.S., University of Notre Dame; M.B.A. University of Chicago
Senior Lecturer of Entrepreneurship, 2006

Robert E. Brackett

B.S., M.S., Ph.D., University of Wisconsin-Madison
Professor of Biology in the School of Applied Technology, Vice President, and Director of the Institute for Food Safety and Health (IFSH), 2010

Jovan G. Brankov

Diploma, University of Belgrade (Serbia); M.S., Ph.D., Illinois Institute of Technology
Assistant Professor of Electrical and Computer Engineering, 2008

Sanford A. Bredine

B.A., Trinity College; M.B.A., University of Chicago
Senior Lecturer of Marketing Communication, 2003

Eric M. Brey

B.S., M.Eng., University of Louisville; Ph.D., Rice University
Associate Professor of Biomedical Engineering, 2004

Ralph L. Brill

A.B., J.D., University of Illinois, Urbana-Champaign
Professor of Law, 1961

Santos Briones

Maj., USAF
B.S., DeVry University; M.P.M., Keller Graduate School of Management
Assistant Professor of Aerospace Studies, 2010
ROTC Faculty

Thomas E. Brock

B.Arch., University of Cincinnati; M.Arch., University of Pennsylvania
Studio Associate Professor of Architecture and Director of the Master of Integrated Building Delivery Program, 2003

Evelyn Brody

B.A., Yale University; J.D., Georgetown University Law Center
Professor of Law, 1992

Bartram S. Brown

B.A., Harvard University; J.D., Columbia Law School; Ph.D., Graduate Institute of International Studies (Switzerland)
Professor of Law and Co-Director of the Program in International and Comparative Law, 1991

Gerald Brown

B.S.C., DePaul University; J.D., University of Chicago
Director of the Graduate Program in Taxation and Senior Instructor, 1990

Ian Brown

B.S., Swarthmore College; M.S., Ph.D., University of Wisconsin-Madison
Assistant Professor of Electrical and Computer Engineering, 2012

Marshall Brown

B.A., Washington University-St. Louis; M.A.U.D., M.Arch., Harvard University
Assistant Professor of Architecture, 2008

Timothy B. Brown

B.S.Arch., Clemson University; M.Arch., University of Illinois-Chicago
Studio Associate Professor of Architecture and Director of the College of Architecture International Affairs, 1990

Christopher J. Buccafusco

B.S., Georgia Institute of Technology;
J.D., University of Georgia School of
Law
Assistant Professor of Law, 2009

Jeffrey S. Budiman

B.S., Bandung Institute of Technology
(Indonesia); M.S., Illinois Institute of
Technology; Ph.D., University of
Colorado - Boulder
Associate Professor of Civil and
Architectural Engineering, 1986

Grant B. Bunker

B.A., Evergreen State College; Ph.D.,
University of Washington
Professor of Physics, Acting Chair for
Biological and Chemical Sciences, and
Associate Dean for Research, College
of Science and Letters, 1991

Britt Burton-Freeman

B.S., California State University; M.S.,
Ph.D., University of California-Davis
Research Assistant Professor of
Biology and Director of the Nutrition
Center at the Institute for Food Safety
and Health, 2010

Brant Cage

B.S., University of West Florida;
Ph.D., Florida State University
Assistant Professor of Chemistry, 2007

Li Cai

B.S., Wuhan University (China);
M.Sc., Warwick Business School
(England); Ph.D., University of
Massachusetts
Assistant Professor of Finance, 2011

Roland Calia

B.A., University of Redlands; M.A.,
Claremont Graduate School; Ph.D.,
University of Chicago
Senior Lecturer of Public
Administration, 2006

Gruia Calinescu

M.S., University of Bucharest
(Romania); Ph.D., Georgia Institute
of Technology
Associate Professor of Computer
Science, 2000

Roberto A. Cammino

B.S., M.S., Ph.D., Illinois Institute of
Technology
Lecturer of Mechanical and Aerospace
Engineering, 2009

C. Robert Carlson

B.A., Augustana College; M.S., Ph.D.,
University of Iowa
Professor of Computer Science in the
School of Applied Technology, Dean of
the School of Applied Technology,
Director of the Rice Campus, and
Academic Director of Information
Technology and Management
Programs, 1984

Kevin W. Cassel

B.S., Messiah College; M.S., Ph.D.,
Lehigh University
Associate Professor of Mechanical and
Aerospace Engineering and Associate
Chair, Department of Mechanical,
Materials, and Aerospace Engineering,
1996

John C. Cesarone

B.S., M.S., University of Illinois;
Ph.D., Northwestern University
Senior Lecturer of Mechanical
Engineering, 1999

Arjun Chakravarti

B.A., University of Colorado; M.B.A.,
Ph.D., University of Chicago
Assistant Professor of Management,
2009

Howard S. Chapman

B.S., J.D., University of Illinois,
Urbana-Champaign
Professor of Law, 1971

Soma Chattopadhyay

B.S., M.S., University of Calcutta
(India); Ph.D., Tata Institute of
Fundamental Research (India)
Research Assistant Professor of
Physics, 2010

Gregory S. Chaudoin

B.S., University of Louisville; M.S.,
University of Illinois
Instructor of Finance, 2005

Yu Cheng

B.E., M.E., Tsinghua University
(China); Ph.D., University of
Waterloo (Canada)
Associate Professor of Electrical and
Computer Engineering, 2006

Edward Chlebus

M.S., Ph.D., Cracow University
(Poland)
Industry Associate Professor of
Computer Science, 2001

Donald J. Chmielewski

B.S., Illinois Institute of Technology;
M.S., Ph.D., University of
California-Los Angeles
Associate Professor of Chemical
Engineering, 2000

Sungjoon Cho

LL.B., M.P.A., Seoul National
University (Korea); LL.M., University
of Michigan Law School; S.J.D.,
Harvard Law School
Professor of Law, 2003

Kyuwon Choi

B.S., M.S., KyungHee University
(Korea); Ph.D., Georgia Institute of
Technology
Assistant Professor of Electrical and
Computer Engineering, 2007

Hyun-soon Chong

B.S., M.S., Kyung-Hee University;
Ph.D., University of North Texas
Associate Professor of Chemistry, 2003

Igor Cialenco

B.S., Ph.D., Moldova State University;
M.S., Ph.D., University of Southern
California
Assistant Professor of Applied
Mathematics, 2007

Ali Cinar

B.S., Robert College (Turkey);
M.Eng., Ph.D., Texas A&M University
Professor of Chemical Engineering and
Biomedical Engineering, Vice Provost
for Research, Dean of the Graduate
College, and Director of Engineering
Center for Diabetes Research and
Education, 1982

Herek L. Clack

B.S., Massachusetts Institute of
Technology; Ph.D., University of
California-Berkeley
Associate Professor of Mechanical and
Aerospace Engineering, 1999

Liam Coffey

B.A., Trinity College (Ireland); Ph.D.,
University of Chicago
Associate Professor of Physics, 1990

Susan Conger-Austin

B.A., Stanford University; M.Arch.,
Princeton University
Studio Associate Professor of
Architecture and Masters Projects
Director, 1993

Richard J. Conviser

B.A., J.D., University of
California-Berkeley; Dr. Jur.,
University of Cologne (Germany)
Professor of Law, 1973

Rick A. Cooper

B.S., University of Chicago; M.B.A.,
Ph.D., Vanderbilt University
Assistant Professor of Finance, 2011

Tina K. Cooper

B.F.A., Syracuse University; M.A.,
University at Albany - SUNY; M.B.A.,
DePaul University
Senior Lecturer and Assistant Dean,
Stuart School of Business, 2012

Patrick W. Corrigan

B.S., Creighton University; M.A.,
Roosevelt University; Psy.D., Illinois
School of Professional Psychology
Distinguished Professor of Psychology
and Associate Dean for Research,
College of Psychology, 2005

Daniel T. Coyne

B.A., University of Illinois-Chicago;
J.D., The John Marshall Law School
Clinical Professor of Law, 2005

Alan W. Cramb

B.Sc., University of Strathclyde (Scotland); Ph.D., University of Pennsylvania
Professor of Materials Science and Engineering, Provost, and Senior Vice President for Academic Affairs, 2008

James R. Dabbert

B.A., M.S., Indiana University
Senior Lecturer of English, Director of Humanities Writing Center, and Associate Director for ESL Programs, 1989

Seebany Datta-Barua

B.S., M.S., Ph.D. Stanford University
Assistant Professor of Mechanical and Aerospace Engineering, 2012

Carol R. Davids

B.S.E.E., Cornell University;
M.I.T.M., Illinois Institute of Technology
Industry Professor of Information Technology and Management and Director, School of Applied Technology Real-Time Communications Laboratory, 2005

Michael Davis

B.A., Western Reserve University;
M.A., Ph.D., University of Michigan
Professor of Philosophy, 1986

Elizabeth D. De Armond

B.S., Georgia Institute of Technology;
J.D., University of Notre Dame Law School; LL.M., Harvard Law School
Professor of Legal Research and Writing, 2003

Rhonda E. de Freitas

B.A., Florida International University;
J.D., Loyola University of Chicago School of Law
Clinical Assistant Professor of Law, 2008

Natacha DePaola

B.S., Simon Bolivar University (Venezuela); M.S., Massachusetts Institute of Technology; Ph.D., Harvard Medical School - Massachusetts Institute of Technology
Professor of Biomedical Engineering and the Carol and Ed Kaplan Armour Dean of Engineering, 2009

Jonathan P. Decatorsmith

B.A., University of Illinois, Urbana-Champaign; J.D., University of Colorado Law School
Clinical Assistant Professor of Law, 2000

Zoe N. Demou

Diploma in Chemical Engineering, Aristotle University of Thessaloniki (Greece); Ph.D., Rice University
Research Assistant Professor of Biomedical Engineering, 2010

Dirk S. Denison

B.Arch., M.B.A., Illinois Institute of Technology; M.Arch., Harvard University
Professor of Architecture, 1988

John DeSalvo

B.S. Arch, University Illinois, Urbana-Champaign; B.Arch., M.Arch., Cornell University
Studio Associate Professor of Architecture and Director of Graduate Admission, 2011

Nicole Ditchman

B.S., M.S., University of Illinois, Urbana-Champaign; Ph.D., University of Wisconsin-Madison
Assistant Professor of Psychology, 2010

Lili Du

B.S., Xi'an Jiaotong University (China); M.S., Tsinghua University (China); M.S., Ph.D., Rensselaer Polytechnic Institute
Assistant Professor of Civil and Architectural Engineering, 2012

Jinqiao Duan

B.S., Wuhan University (China); M.S., University of Massachusetts-Amherst; Ph.D., Cornell University
Professor of Applied Mathematics, 2000

Elizabeth Durango-Cohen

B.S., Sonoma State University; M.S., Ph.D., University of California-Berkeley
Assistant Professor of Operations Management, 2005

Mitchell S. Dushay

B.A., Brown University; Ph.D., Brandeis University
Assistant Professor of Biology, 2008

Warren S. Edelstein

B.A., Lehigh University; M.A., Duke University; Ph.D., Brown University
Professor of Applied Mathematics, 1965

Indika Edirisinghe

B.Sc., University of Delphi (India); M.Phil., Ph.D., University of Peradeniya (Sri Lanka)
Research Assistant Professor of Biology and Senior Scientist of the Nutrition Center at the Institute of Food Safety and Health, 2010

James Edminister

LT., USN
B.S., Miami University of Ohio
Assistant Professor of Naval Science, 2011
ROTC Faculty

Howard C. Eglit

B.A., University of Michigan; J.D., University of Chicago Law School
Professor of Law, 1975

Suzanne Ehrenberg

B.A., Williams College; J.D., University of Chicago Law School
Professor of Legal Research and Writing, 2004

David G. Ehrlich

M.A., University of Michigan; M.P.P., Georgetown University; Ph.D., Wayne State University
Clinical Assistant Professor of Business, 2011

J. Kemp Ellington

B.S., Appalachian State University; M.S., Ph.D., North Carolina State University
Assistant Professor of Psychology, 2007

Robert B. Ellis

B.S., M.S., Virginia Tech; Ph.D., University of California-San Diego
Associate Professor of Applied Mathematics, 2005

Mahjoub Elneimeiri

B.S., University of Khartoum (Sudan); M.S., University of London, Imperial College (England); Ph.D., Northwestern University
Professor of Architecture and Director of the College of Architecture Doctorate Program, 1989

Paul Endres

B.S., University of Illinois, Urbana-Champaign; M.A., M.S., University of California-Berkeley
Studio Associate Professor of Architecture, 2011

Wendy Netter Epstein

B.A., University of Illinois, Urbana-Champaign; J.D., Harvard Law School
Visiting Assistant Professor of Law, 2011

The Honorable David A. Erickson

B.A., Northern Illinois University; J.D., The John Marshall Law School
Senior Instructor, Director of the Trial Advocacy Program, and Director of the Program in Criminal Litigation, 1983

John F. Erickson

B.S., M.S., University of Illinois-Chicago; M.S., Northeastern Illinois University; Ph.D., Illinois Institute of Technology
Lecturer of Applied Mathematics, 2012

Krishna M. Erramilli

M.S., M.B.A., University of Poona (India); Ph.D., University of Arkansas
Professor of Marketing and Director of Master's of Business Programs, 2007

Kim Erwin

B.A., Loyola University; M.Des., IIT Institute of Design
Assistant Professor of Design, 2009

Yiwei Fang

B.S., Dalian University of Technology (China); M.S., Xi'an Jiaotong University (China); Ph.D., Rensselaer Polytechnic Institute
Assistant Professor of Finance, 2012

LTC Peter Farrell

Professor of Military Science, 2012
ROTC Faculty

Gregory E. Fasshauer

Diplom, Universitat Stuttgart (Germany); M.A., Ph.D., Vanderbilt University
Professor of Applied Mathematics, Associate Chair and Director of Undergraduate Studies, Department of Applied Mathematics, 1997

Martin S. Felsen

B.Arch., Virginia Polytechnic Institute; M.S., Columbia University
Studio Associate Professor of Architecture, 1996

Hualong Feng

B.E., Beijing Institute of Post and Telecom (China); M.S., Southern Illinois University, Ph.D., University of Michigan
Visiting Assistant Professor of Applied Mathematics, 2011

Maureen A. Flanagan

B.A., Dominican College; Ph.D., Loyola University of Chicago
Professor of History and Chair of the Department of Humanities, 2010

Alexander J. Flueck

B.S., M.E., Ph.D., Cornell University
Associate Professor of Electrical and Computer Engineering, 1996

Frank C. Flury

M.Arch., Diplom., University of Karlsruhe (Germany)
Associate Professor of Architecture, 2000

Laura E. Forlano

B.A., Skidmore College; Diploma, John Hopkins University; Master of International Affairs, Master of Philosophy, Ph.D., Columbia University
Assistant Professor of Design, 2011

Gongkang Fu

B.S., M.S., Tongji University (China); Ph.D., Case Western Reserve University
Professor of Civil and Architectural Engineering and Chair of the Department of Civil, Architectural, and Environmental Engineering, 2011

Alison Cain Fukuchi

B.A., University of Georgia; M.A., Hawaii Pacific University
Instructor of English as a Second Language Programs, School of Applied Technology, 2011

Eliezer Geisler

B.A., M.B.A., Tel Aviv University (Israel); Ph.D., Northwestern University
Distinguished Professor of Organizational Behavior, 1999

David J. Gerber

B.A., Trinity College; M.A., Yale University; J.D., University of Chicago Law School
Distinguished Professor of Law and Co-Director of the Program in International and Comparative Law, 1982

David Gidalevitz

B.S., M.S., Urals Technical University (Russia); Ph.D., Weizmann Institute of Technology (Israel)
Associate Professor of Physics, 2004

Ellen C. Glassman

B.A., M.A., University of Cincinnati; Ph.D., Northwestern University
Senior Lecturer of Art and Architectural History, 2007

Boris Glavic

M.Sc., RWTH Aachen University (Germany); Ph.D., University of Zurich (Switzerland)
Assistant Professor of Computer Science, 2012

Alan G. Glodowski

B.S., University of Wisconsin; M.S., Creighton University
Senior Lecturer of Physics and Associate Chair, 2006

Douglas W. Godfrey

B.A., M.A., University of Illinois, Urbana-Champaign; J.D., University of Michigan Law School
Professor of Legal Research and Writing, 1998

Joel D. Goldhar

B.Ch.E., Rensselaer Polytechnic Institute; M.B.A., Harvard University; D.B.A., George Washington University
Professor of Operations and Technology Management, 1983

Jerry Goldman

A.B., M.A., Brooklyn College; Ph.D., Johns Hopkins University
Research Professor of Law, 2012

Richard J. Gonzalez

B.A., Northwestern University; J.D., Ohio State University College of Law
Clinical Professor of Law, 1988

Michael J. Gorham

B.A., University of Notre Dame; M.S., University of Florida; M.S., Ph.D., University of Wisconsin
Industry Professor of Finance, 2002

Michael R. Gosz

B.S., Marquette University; M.S., Ph.D., Northwestern University
Associate Professor of Mechanical and Materials Engineering and Vice Provost for Undergraduate Affairs, 1996

Sanford N. Greenberg

A.B., Princeton University; J.D., George Washington University Law School; M.A., Ph.D., University of California-Berkeley
Professor of Legal Research and Writing, 1994

Vivien C. Gross

B.A., Northwestern University; M.A., University of Illinois, Urbana-Champaign; J.D., Indiana University School of Law-Bloomington
Clinical Professor of Law, 1979

Stephen F. Grove

B.App.Sci., B.App.Sci.(Hons.), RMIT University (Australia); Ph.D., University of Tasmania (Australia)
Research Assistant Professor of Biology and Scientist at the Institute for Food Safety and Health, 2010

Xiyun (Richard) Guan

B.S., China University of Geosciences (China); M.S., Chinese Academy of Geological Sciences (China); Ph.D., University of Kentucky
Associate Professor of Chemistry, 2012

Philip N. Hablutzel

B.A., Louisiana State University; M.A., J.D., University of Chicago
Professor of Law and Director of the Institute of Illinois Business Law, 1971

Alissa Haedt-Matt

B.S., M.A., Ph.D., University of Iowa
Assistant Professor of Psychology, 2012

Bonnie Haferkamp

B.S., Iowa State University; M.S., Ph.D., Illinois Institute of Technology
Senior Lecturer of Biomedical Engineering, 2012

Jeremy R. Hajek

B.I.T.M., M.I.T.M., Illinois Institute of Technology
Industry Associate Professor of Information Technology and School of Applied Technology Systems Analyst, 2012

Charles T. Hamilton

B.S., M.A.S., Ph.D., University of Illinois, Urbana-Champaign; Certified Public Accountant
Clinical Associate Professor of Accounting, 1991

Pierrick Hanlet

B.S., State University of New York-Stony Brook; Ph.D., University of Virginia
Research Assistant Professor of Physics, 2011

Jon Hanrath

Ph.D., Michigan State University
Senior Instructor of Computer Science, 2002

Sarah K. Harding

B.A., McGill University (Canada); LL.B., Dalhousie Law School (Canada); B.C.L., Oxford University (England); LL.M., Yale Law School
Associate Professor of Law and Associate Dean for Faculty, 1995

Vinay Harpalani

B.A., University of Delaware; M.S., Master of Bioethics, Ph.D., University of Pennsylvania; J.D., New York University School of Law
Visiting Assistant Professor of Law, 2012

Heather F. Harper

B.A., Northwestern University; J.D., Boston College Law School
Clinical Assistant Professor of Law, 2012

Edward C. Harris

B.A., Loyola University-Chicago; J.D., IIT Chicago-Kent College of Law
Associate Professor of Legal Writing and Assistant Dean for the International LL.M. Programs, 2004

Steven L. Harris

B.A., J.D., University of Chicago
Professor of Law, 1996

M. Zia Hassan

B.Sc., University of Panjab (Pakistan); M.S., Ph.D., Illinois Institute of Technology
Professor of Management Science, Dean Emeritus, and Co-Director, Ph.D. Program, 1960

Todd Haugh

B.A., Brown University; J.D., University of Illinois College of Law
Visiting Assistant Professor of Law, 2012

Libby Hemphill

A.B., University of Chicago; M.S., Ph.D., University of Michigan
Assistant Professor of Communication and Information Sciences, 2010

Robert A. Hendry

B.S., Aurora University; M.S., University of Maryland
Industry Professor of Information technology, 2012

Steven J. Heyman

A.B., Harvard College; J.D., Harvard Law School
Professor of Law, 1989

Fred J. Hickernell

B.A., Pomona College; Ph.D., Massachusetts Institute of Technology
Professor of Applied Mathematics and Chair, 2005

Marie Hicks

A.B., Harvard University; M.A., Ph.D., Duke University
Assistant Professor of History, 2011

Adam Hock

B.S., University of Delaware; Ph.D., Massachusetts Institute of Technology
Assistant Professor of Chemistry, 2010

Cynthia S. Hood

B.S., Rensselaer Polytechnic Institute; M.S., Stevens Institute of Technology; Ph.D., Rensselaer Polytechnic Institute
Associate Professor of Computer Science and Engineering and Associate Chair, Department of Computer Science, 1996

Joyce Hopkins

B.A., McGill University; M.A., Tufts University; Ph.D., University of Pittsburgh
Associate Professor of Psychology, 1992

Laura Hosman

B.A., Wheaton College; M.A., University of Amsterdam; M.A., Ph.D., University of Southern California
Assistant Professor of Political Science and Associate Chair, Department of Social Sciences, 2009

Eric Houston

B.A., Carlton College; M.A., Ph.D., University of Illinois-Chicago
Assistant Professor of Psychology, 2012

Andrew J. Howard

B.A., Pomona College; Ph.D., University of California-San Diego
Associate Professor of Biology and Physics, 1995

Colleen M. Humer

B.F.A., B.Arch., University of British Columbia (Canada); M.A., University of Toronto (Canada)
Studio Assistant Professor of Architecture, 2011

Tomoko Ichikawa

B.A., International Christian University (Japan); M.S., Illinois Institute of Technology
Visiting Assistant Professor of Design, 2011

Tsutomu Indei

B.S., M.S., Ph.D., University of Tsukuba (Japan)
Visiting Assistant Professor of Chemical Engineering, 2012

Patrick R. Ireland

B.A., University of Notre Dame; M.P.H., University of Texas; M.A., Ph.D., Harvard University
Professor of Political Science, 2007

Thomas C. Irving

B.Sc., M.Sc., Ph.D., University of Guelph (Canada)
Professor of Biology, Physics, and Biomedical Engineering and Executive Associate Chair - Biology, Biological and Chemical Sciences, 1994

Ivan Ginchev Ivanov

M.S., University of Wroclaw (Poland); Ph.D., Warsaw University of Technology (Poland)
Visiting Professor of Applied Mathematics, 2012

Kari L. Aamot Johnson

B.A., St. Olaf College; J.D., University of Minnesota Law School
Professor of Legal Research and Writing, 2002

Leslie M. Johnson

B.Arch., Illinois Institute of Technology; M.Arch., Bartlett School of the Built Environment, University College London (England)
Studio Assistant Professor of Architecture, 2010

Harvey Kahalas

B.S., Boston University; M.B.A., University of Michigan; Ph.D., University of Massachusetts
Harold L. Stuart Professor of Management and Economic Development, and Dean of Stuart School of Business, 2006

John S. Kallend

B.A., M.A., Ph.D., Cambridge University (England)
Professor of Materials Engineering and Physics, 1978

Derek G. Kamper

B.S., Dartmouth College; M.S., Ph.D., Ohio State University
Associate Professor of Biomedical Engineering, 2005

Lulu Kang

B.S., Nanjing University (China); Ph.D., Georgia Institute of Technology
Assistant Professor of Applied Mathematics, 2010

Sang Baum Kang

B.A., Yonsei University (Korea); M.S., University of Wisconsin; M.S., Carnegie Mellon University; Ph.D. McGill University
Assistant Professor of Finance, 2012

Jennifer Kang-Mieler

B.A., M.S., Ph.D., Northwestern University
Associate Professor of Biomedical Engineering, 2001

Daniel M. Kaplan

B.A., Haverford College; Ph.D., State University of New York-Stony Brook
Professor of Physics, 1994

Sanjiv Kapoor

Ph.D., University of Illinois, Urbana-Champaign
Professor of Computer Science, 2001

Nancy W. Karuri

B.Eng., University of South Wales (Australia); Ph.D., University of Wisconsin - Madison
Assistant Professor of Chemical Engineering, 2009

Hemanshu Kaul

B.Sc., St. Stephen's College (India); M.Sc., Indian Institute of Technology (India); Ph.D., University of Illinois, Urbana-Champaign
Associate Professor of Applied Mathematics, 2006

Kelly A. Kazukauskas

B.S., Texas A&M University; M.S., Ph.D., Illinois Institute of Technology
Clinical Assistant Professor of Psychology, 2012

Thomas M. Kearns

B.Arch., Iowa State University
Studio Associate Professor of Architecture, 2003

Cherish M. Keller

B.S., University of Illinois, Urbana-Champaign; J.D., IIT Chicago-Kent College of Law
Visiting Assistant Professor of Legal Research and Writing, 2010

Sean Keller

B.A., M.Arch., Princeton University; Ph.D., Harvard University
Assistant Professor of Architecture, 2007

Pamela A. Kentra

B.A., University of Illinois, Urbana-Champaign; J.D., IIT Chicago-Kent College of Law
Clinical Professor of Law, 1995

Nasrin R. Khalili

B.Sc., M.S.P.H., Tehran University (Iran); Ph.D., Illinois Institute of Technology
Associate Professor of Environmental Management, 1995

M. Ishaque Khan

Ph.D., Indian Institute of Technology (India)
Professor of Chemistry and Executive Associate Chair - Chemistry, Department of Biological and Chemical Sciences, 1994

Samer Khanafseh

B.S., Jordan University of Science and Technology (Jordan); M.S., Ph.D., Illinois Institute of Technology
Research Assistant Professor of Mechanical and Aerospace Engineering, 2011

Steve Kibler

B.S., M.Arch., University of Illinois, Urbana-Champaign
Studio Associate Professor of Architecture, 2009

Joohee Kim

B.S., M.S., Yonsei University (Korea); Ph.D., Georgia Institute of Technology
Assistant Professor of Electrical and Computer Engineering, 2009

Joel King

LT., USN
B.S., United States Naval Academy
Assistant Professor of Naval Science, 2012
ROTC Faculty

Richard S. Kling

B.A., University of Illinois-Chicago; J.D., Northwestern University School of Law
Clinical Professor of Law, 1981

Valerie Gutmann Koch

A.B., Princeton University; J.D., Harvard Law School
Visiting Assistant Professor of Law, 2012

Carly A. Kocurek

B.A., Rice University; M.A., Ph.D., University of Texas
Assistant Professor of Digital Humanities and Media Studies, 2012

Brian Koehr

CAPT., USN
B.S., Notre Dame University; M.A., Naval War College
Professor of Naval Science, 2012
ROTC Faculty

Bogdan Korel

M.S., Technical University of Kiev; Ph.D., Oakland University
Associate Professor of Computer Science and Engineering and Associate Chair, Department of Computer Science, 1994

George Koutsogiannakis

B.S., M.S., M.B.A., DePaul University; M.S., Illinois Institute of Technology
Instructor of Computer Science, 2000

Adam Kowalke

LT., USN
B.S., Cornell University
Assistant Professor of Naval Science, 2011
ROTC Faculty

Edward M. Kraus

B.A., University of Michigan; J.D., Georgetown University Law Center
Clinical Associate Professor of Law, 1999

Robert J. Krawczyk

B.Arch., University of Illinois-Chicago
Professor of Architecture and Associate Dean of Undergraduate Academic Affairs, College of Architecture, 1991

Harold J. Krent

A.B., Princeton University; J.D., New York University School of Law
Professor of Law and Dean, IIT Chicago-Kent College of Law, 1994

Charles Krikorian

B.S., University of Illinois, Urbana-Champaign; Ph.D., Loyola University; J.D., DePaul University
Senior Lecturer of Biology and Director of Master's Program, 2012

Kathiravan Krishnamurthy

B.E., Tamil Nadu Agricultural University (India); M.S., Ph.D., Pennsylvania State University
Research Assistant Professor of Chemical Engineering, 2010

Mahesh Krishnamurthy

B.E., Amravati University (India); M.S., University Missouri-Rolla; Ph.D., University of Texas-Arlington
Assistant Professor of Electrical and Computer Engineering, 2008

Ronald Krueck

B.Arch., Illinois Institute of Technology
Studio Professor of Architecture, 1992

Eva Kultermann

B.Arch., University of Arkansas; M.S., Oxford Brooks University
Associate Professor of Architecture, 2004

Vijay S. Kumar

M.S., Illinois Institute of Technology
Professor of Design, 2002

Zhiling Lan

B.S., Beijing Normal University (China); M.S., Chinese Academy of Sciences (China); Ph.D., Northwestern University
Associate Professor of Computer Science, 2002

Peter David Land

A.A. Dipl., M.Arch., Carnegie Institute of Technology; M.C.P., Yale University
Professor of City and Regional Planning, 1976

Ronald S. Landis

B.A., Pennsylvania State University; M.A., Ph.D., Michigan State University
Nambury S. Raju Professor of Psychology, 2011

Frank J. Lane

B.A., St. Leo College; M.H.S., Ph.D., University of Florida
Associate Professor of Psychology and Head of Rehabilitation Psychology Division, 2006

Jonathan E. Larson

B.A. Western Illinois University; M.S., Southern Illinois University; Ed.D., Roosevelt University
Assistant Professor of Psychology, 2006

Gary S. Laser

B.B.A., J.D., University of Miami
Associate Professor of Law, Director of Clinical Education, and Co-Director of the Program in Criminal Litigation, 1975

Laurie E. Leader

A.B., Washington University; J.D., Cleveland-Marshall College of Law
Clinical Professor of Law, 1999

Judith S. Lederman

B.A., Rhode Island College; M.S., Worcester Polytechnic Institute, Ph.D., Curtin University of Technology (Australia)
Associate Professor of Mathematics and Science Education and Director of Teacher Education, 2001

Norman G. Lederman

B.S., M.S., Bradley University; M.S., New York University; Ph.D., Syracuse University
Distinguished Professor of Mathematics and Science Education, 2001

Alvin Lee

B.App.Sci., Ph.D., RMIT University (Australia)
Research Associate Professor of Biology and Director of Microbiology at the Institute for Food Safety and Health, 2010

Edward Lee

B.A., Williams College; J.D., Harvard Law School
Professor of Law and Director of the Program in Intellectual Property Law, 2010

Eun-Jeong Lee

B.A., M.A., The Catholic University of Korea; Ph.D., University of Wisconsin-Madison
Assistant Professor of Psychology, 2007

Wu-Hon F. Leung

Ph.D., University of California-Berkeley
Industry Professor of Computer Science, 2006

Shuwang Li

B.E., Tongji University (China); M.S., Ph.D., University of Minnesota
Assistant Professor of Applied Mathematics, 2008

Xiang-Yang Li

B.E., Tsinghua University; M.S., Ph.D., University of Illinois, Urbana-Champaign
Professor of Computer Science, 2000

Xiaofan Li

B.A., Zhejiang University (China); M.A., Ph.D., University of California-Los Angeles
Associate Professor of Applied Mathematics, Director of Graduate Studies in the Department of Applied Mathematics, and Associate Dean of Graduate Admission 1999

Zongzhi Li

B.S., Shanghai Jiaotong University; B.E., Chang'an University, (China); M.S., Ph.D., Purdue University
Associate Professor of Civil and Architectural Engineering, 2004

Zuyi Li

B.S., Shanghai Jiaotong University; M.S., Tsinghua University; Ph.D., Illinois Institute of Technology
Associate Professor of Electrical and Computer Engineering and Associate Director of the Smart Grid Center, 2004

Jianwen Liao

B.S., Northeast University (China); M.B.A., People's (Renmin) University of China (China); Ph.D., Southern Illinois University-Carbondale
Associate Professor of Entrepreneurship, 2006

Carl Liberman

CDR., USN
B.S., Virginia Polytechnic Institute and State University
Associate Professor of Naval Science, 2011
ROTC Faculty

Bill Lidinsky

B.S.E.E., M.S.E.E., Illinois Institute of Technology; M.B.A., University of Chicago
Industry Professor of Information Technology and Management and Director, School of Applied Technology Security and Forensics Laboratory, 2002

Arthur R. Lubin

B.S., Michigan State University; M.A., Ph.D., University of Wisconsin
Associate Professor of Applied Mathematics, 1975

Peter G. Lykos

B.S., Northwestern University; Ph.D., Carnegie Institute of Technology
Professor of Chemistry, 1955

Benjamin T. Lynerd

B.A., University of Maryland; M.A., Ph.D., University of Chicago
Visiting Assistant Professor of Political Science, 2012

Thomas J. MacTavish

B.A., Central Michigan University; M.A., University of Iowa; M.A., University of Michigan
Assistant Professor of Design, 2008

Martin H. Malin

B.A., Michigan State University; J.D., George Washington University Law School
Professor of Law and Director of the Institute for Law and the Workplace, 1980

Harry F. Mallgrave

B.E.S., M.Arch., University of Detroit; Ph.D., University of Pennsylvania
Professor of Architecture, 2005

Braja K. Mandal

B.Sc., University of Calcutta (India); M.Sc., M.Tech., Ph.D., Indian Institute of Technology
Professor of Chemistry, 1991

Nancy S. Marder

B.A., Yale University; M.Ph., University of Cambridge; J.D., Yale Law School
Professor of Law, 1999

David J. Maslanka

B.A., St. Xavier University; M.S., Ph.D., Illinois Institute of Technology
Senior Lecturer in Applied Mathematics, 1992

Anijo P. Mathew

B.Arch., Birla Institute of Technology (India); M.DesS., Harvard University
Assistant Professor of Design, 2008

Mary Pat Mattson

B.A., College of William and Mary; M.L.A., University of Virginia
Studio Assistant Professor of Architecture, 2011

William M. Maurer

B.S., University of Illinois; M.S., Keller Graduate School of Management
Industry Associate Professor of Industrial Technology & Management and Coordinator of Outreach Activities, 1994

Matthew Mayfield

B.S., Illinois Institute of Technology; M.C.S., University of Chicago
Visiting Assistant Professor of Design, 2011

Noah McClain

B.A., Sarah Lawrence College; M.A., Ph.D., New York University
Assistant Professor of Sociology, 2012

David L. McCormick

B.A., Middlebury College; Ph.D., New York University
IITRI Professor of Biology, Senior Vice President and Director, IIT Research Institute, 1979

Abigail McWilliams

B.S., M.A., Ph.D., The Ohio State University
Visiting Professor of Management and Associate Dean, Stuart School of Business, 2012

Alan D. Mead

B.A., M.A., Ph.D., University of Illinois, Urbana-Champaign
Assistant Professor of Psychology and Scientific Advisor to the Center for Research and Service, 2006

Kevin P. Meade

B.S., M.S., Illinois Institute of Technology; Ph.D., Northwestern University
Professor of Mechanical Engineering, 1982

Rajendra Mehta

B.S., M.S., Gujarat University (India); Ph.D., University of Nebraska
Professor of Biological Sciences and Head, Carcinogenesis and Chemoprevention, IIT Research Institute, 2004

Cindy L. Menches

B.S., University of Southern California; M.S., The Pennsylvania State University; Ph.D., University of Wisconsin - Madison
Assistant Professor of Civil and Architectural Engineering, 2009

Ana Mendez Mencini

B.A., Lake Forest College; M.A., DePaul University; J.D., IIT Chicago-Kent College of Law
Clinical Assistant Professor of Law, 2011

Nicholas G. Menhart

B.Sc., Ph.D., University of Waterloo (Canada)
Associate Professor of Biology, 2000

Daniel Z. Meyer

B.A., Swarthmore; Ed.M., Harvard University; Ph.D., Cornell University
Visiting Assistant Professor of Mathematics and Science Education, 2005

Jennifer L. Miller

B.A., University of Tennessee; M.S., Ph.D., Indiana University
Assistant Professor of Psychology, 2011

Jonathan Miller

B.A., Yale University; M.F.A., New York University
Studio Associate Professor of Architecture, 1994

Bhoopesh Mishra

B.Sc., Science College, Patna University (India); M.Sc., Indian Institute of Technology (India); Ph.D., University of Notre Dame
Research Assistant Professor of Physics, 2012

M. Ellen Mitchell

B.A., Hamilton/Kirkland College; Ph.D., University of Tennessee
Professor of Psychology, Dean of the College of Psychology, and Deputy Director of the Institute of Science, Law, and Technology, 1987

Mehdi Modares

B.S., Tehran Azad University (Iran); M.S., Cleveland State University; Ph.D., Case Western Reserve University
Assistant Professor of Civil and Architectural Engineering, 2009

Hassan Modir Shanechi

B.S., M.S., Tehran University (Iran); Ph.D., Michigan State University
Senior Lecturer of Electrical and Computer Engineering, 2007

David J. Mogul

B.S., Cornell University; M.S., M.B.A., Ph.D., Northwestern University
Associate Professor of Biomedical Engineering and Interim Chair, 2002

Jamshid Mohammadi

B.S., M.S., University of Teheran (Iran); M.S., Ph.D., University of Illinois, Urbana-Champaign
Professor of Civil and Architectural Engineering and Associate Dean for Academic Affairs in the Graduate College, 1979

Arlen Moller

B.A., Cornell University; M.A., Ph.D., University of Rochester
Associate Professor of Psychology, 2012

Scott B. Morris

B.A., University of Northern Iowa; M.A., Ph.D., University of Akron
Professor of Psychology and Associate Dean, College of Psychology, 1993

Timothy I. Morrison

B.A., Western Michigan University; Ph.D., University of Illinois, Urbana-Champaign
Professor of Physics and Faculty Laboratory Safety Coordinator, 1987

Demetrios J. Moschandreas

B.S., Stetson University; M.S., University of Kentucky; M.S., Ph.D., University of Cincinnati
Professor of Environmental Engineering, 1991

Herbert F. Munsterman

B.S., Iowa State University; J.D., Drake University Law School; M.S., Northwestern University
Lecturer and Director of the Intellectual Property Management and Markets Program, IIT Chicago-Kent College of Law, 2012

Hassan M. Nagib

B.S., M.S., Ph.D., Illinois Institute of Technology
John T. Rettaliata Professor of Mechanical and Aerospace Engineering, 1971

Kathleen S. Nagle

B.A., Williams College; M.Arch., Harvard University
Studio Associate Professor of Architecture, 2003

Sheldon H. Nahmod

A.B., A.M.R.S., University of Chicago; LL.B., LL.M., Harvard Law School
Distinguished Professor of Law and Co-Director of the Institute for Law and the Humanities, 1977

Sudhakar E. Nair

B. Sc., Regional Engineering College (India); M.E., Indian Institute of Science; Ph.D., University of California-San Diego
Professor of Mechanical and Aerospace Engineering and Applied Mathematics, 1977

Philip G. Nash

B.S., City of London Polytechnic; Ph.D., Queen Mary College, London University (England)
Professor of Materials Engineering and Director of the Thermal Processing Technology Center, 1981

Richard E. Nelson

B.A., M.Arch., Washington University-St. Louis
Studio Associate Professor of Architecture and Director of Buildings and Operations, College of Architecture, 1993

Diep T. Nguyen

B.S., Ph.D., McGill University
Industry Professor of Chemistry, 2006

Mariusz Nieweglowski

M.S., Ph.D., Warsaw University of
Technology (Poland)
Visiting Assistant Professor of Applied
Mathematics, 2012

Alexander Nikolov

B.S., Ph.D., University of Sofia
(Bulgaria)
Research Professor of Chemical
Engineering, 1991

Christena E. Nippert-Eng

B.A., State University of New York at
Cortland; M.A., Temple University;
Ph.D., State University of New
York-Stony Brook
Professor of Sociology and Chair of the
Department of Social Sciences, 1994

Kenneth E. Noll

B.S., Michigan Technological
University; M.S., Ph.D., University of
Washington
Professor of Environmental
Engineering, 1975

James E. Novak

B.S., M.S., Illinois Institute of
Technology
Senior Lecturer of Engineering
Graphics, 1967

Brendan O'Brien

Lt. Col., USAF
B.S., United States Air Force
Academy; M.S.M., Embry-Riddle
Aeronautical University
Professor of Aerospace Studies, 2012
ROTC Faculty

Michael K. Ong

B.S., University of the Philippines;
M.A., M.S., Ph.D., State University of
New York at Stony Brook
Professor of Finance, 2003

Joseph P. Orgel

B.Sc. (Hons), Ph.D., Stirling
University
Associate Professor of Biology, 2005

Erdal Oruklu

B.S., Technical University of Istanbul
(Turkey); M.S., Bogazici University
(Turkey); Ph.D., Illinois Institute of
Technology
Assistant Professor of Electrical
Engineering, 2006

Peter Osler

B.S., University of Michigan; M.L.A.,
M.Arch., Harvard University
Assistant Professor of Architecture
and Director of M.L.A. Program, 2007

Aleksandar G. Ostrogorsky

Dipl.Ing., University of Belgrade
(Serbia); M.S., Rensselaer Polytechnic
Institute; Sc.D., Massachusetts
Institute of Technology
Professor of Mechanical and Materials
Engineering, 2009

Jahna Otterbacher

B.A., M.A., Ph.D., University of
Michigan; M.A., Boston University
Assistant Professor of Communication
and Information Sciences, 2010

Krishna R. Pagilla

B.E., Osmania University (India);
M.S., University of Oklahoma; Ph.D.,
University of California-Berkeley
Professor of Environmental
Engineering, 1995

Georgia Papavasiliou

B.S., Ph.D., Illinois Institute of
Technology
Assistant Professor of Biomedical
Engineering, 2007

Satish J. Parulekar

B.Ch.E., University of Bombay
(India); M.S., University of
Pittsburgh; Ph.D., Purdue University
Professor of Chemical Engineering and
Interim Chair, Department of
Chemical and Biological Engineering,
1985

Michael Pelsmajer

B.A., Williams College; M.S., Ph.D.,
University of Illinois,
Urbana-Champaign
Associate Professor of Applied
Mathematics, 2002

Alphonso J. Peluso

B.Arch., Illinois Institute of
Technology
Studio Associate Professor of
Architecture and Director of Digital
Curriculum, 2009

Victor Perez-Luna

B.S., M.S., University of Guadalajara
(Mexico); Ph.D., University of
Washington
Associate Professor of Chemical
Engineering, 2000

Henry H. Perritt, Jr.

S.B., S.M., Massachusetts Institute of
Technology; J.D., Georgetown
University Law Center
Professor of Law and Director of the
Graduate Program in Financial
Services Law, 1997

Boris S. Pervan

B.S., University of Notre Dame; M.S.,
California Institute of Technology;
Ph.D., Stanford University
Professor of Mechanical and Aerospace
Engineering, 1999

Scott Peters

B.A., Macalester College; J.D.,
Washington University; Ph.D.,
University of Illinois-Chicago
Senior Lecturer of Public
Administration, 1993

Paul Pettigrew

B.S., University of Illinois,
Urbana-Champaign; M.Arch.,
Massachusetts Institute of Technology
Studio Associate Professor of
Architecture, 2006

Mickie A. Piatt

B.A., M.L.S., J.D., University of Texas
- Austin
Associate Professor of Law and
Deputy Director of the Program in
Intellectual Property Law, 1990

Gorjana Popovic

B.S., University of Belgrade (Serbia);
M.S., Ph.D., Illinois Institute of
Technology
Instructor of Mathematics and Science
Education, 2011

Natalie Brouwer Potts

B.A., University of Chicago; J.D.,
Cornell Law School
Clinical Assistant Professor of Law
and Director of the Center for Open
Government, 2011

Margaret M. Power

B.A., Georgetown University; M.A.,
San Francisco State University; Ph.D.,
University of Illinois
Professor of History and Chair of the
Pre-Law Advisory Committee, 2000

Jai Prakash

B.S., M.S., Ph.D., University of Delhi
(India); Ph.D., Case Western Reserve
University
Professor of Chemical Engineering and
Director of the Center for
Electrochemical Science and
Engineering, 1998

Gregory J. Pulliam

B.A., Memphis State University;
M.A., Ph.D., University of Missouri
Senior Lecturer of Communication,
Rhetoric, and Linguistics, Director of
English as a Second Language
Programs, Undergraduate Advisor,
and Associate Chair, Department of
Humanities, 1993

Xiaoping Qian

B.S., M.S., Huazhong University of
Science and Technology (China);
Ph.D., University of Michigan
Associate Professor of Mechanical and
Aerospace Engineering, 2005

Ioan Raicu

B.S., M.S., Wayne State University;
M.S., Ph.D., University of Chicago
Assistant Professor of Computer
Science, 2010

Ganesh G. Raman

B.T., Indian Institute of Technology (India); M.S., Cleveland State University; Ph.D., Case Western Reserve University
Associate Professor of Mechanical and Aerospace Engineering and Associate Dean of the Graduate College for Research, 1999

Ram Ramanan

B.Tech., India Institute of Technology (India); M.S., UICIT Bombay University (India); M.B.A., University of Texas-Austin; Ph.D., University of Texas-Dallas
Associate Industry Professor of Environmental Management, 2012

Vijay K. Ramani

B.E., Annamalai University (India); Ph.D., University of Connecticut
Hyosung S.R. Cho Associate Professor of Chemical Engineering, 2005

Edward M. Reingold

B.S., Illinois Institute of Technology; M.S., Ph.D., Cornell University
Professor of Computer Science, 2000

Dietmar Rempfer

M.S., Ph.D., Universität Stuttgart (Germany)
Professor of Mechanical and Aerospace Engineering and Applied Mathematics and Associate Dean, Armour College of Engineering, 2001

Shangping Ren

Ph.D., University of Illinois, Urbana-Champaign
Associate Professor of Computer Science, 2003

David W. Richardson

B.A., Rice University; Ph.D., University of Texas-Dallas
Assistant Professor of Entrepreneurship, 2011

Benjamin R. Riley

B.Arch., Illinois Institute of Technology
Studio Associate Professor of Architecture, 1999

Dennis A. Roberson

B.S., Washington State University; M.S., Stanford University
Research Professor of Computer Science and Vice Provost for Corporate Relations and Strategic Initiatives, 2003

Donna V. Robertson

B.A., Stanford University; M.Arch., University of Virginia
John H. and Jeanne M. Rowe Professor of Architecture, 1996

Christopher Rockey

B.S., M.Arch., University of Illinois
Assistant Professor of Architecture, 2008

John J. Ronan

B.S., University of Michigan; M.Arch., Harvard University Graduate School of Design
Professor of Architecture, 1992

César F. Rosado Marzán

B.A., Haverford College; M.A., Ph.D., Princeton University; J.D., University of Pennsylvania Law School
Assistant Professor of Law, 2008

Mark D. Rosen

B.A., Yale College; J.D., Harvard Law School
Professor of Law, 1999

Marsha L. Ross-Jackson

B.A., Hampton University; M.P.A., Roosevelt University; J.D., DePaul University College of Law
Assistant Dean for Student Professional Development, Executive Director of the Institute for Law and the Workplace, and Lecturer, 2012

David S. Rudstein

B.S., LL.M., University of Illinois, Urbana-Champaign; J.D., Northwestern University School of Law
Professor of Law and Co-Director of the Program in Criminal Litigation, 1973

Stan Ruecker

B.A., B.Sc., University of Regina; M.Des., Ph.D., University of Alberta (Canada);
Associate Professor of Design, 2011

Francisco Ruiz

B.S.M.E., Universidad Politécnica de Madrid (Spain); M.E., Ph.D., Carnegie Mellon University
Associate Professor of Mechanical and Aerospace Engineering, 1987

Michael J. Rybak

B.S., Illinois State University; M.B.A., DePaul University
Senior Lecturer of Finance, 2012

Navid Sabbaghi

B.A., B.S., University of California-Berkeley; M.S., Ph.D., Massachusetts Institute of Technology
Assistant Professor of Management Science, 2008

Michael K. Saelee

B.S., M.S., Illinois Institute of Technology
Senior Instructor of Computer Science, 2004

Mazin Safar

B.S., Al-Hikma University (Iraq); M.B.A., University of Chicago; M.S., Illinois Institute of Technology
Industry Professor of Industrial Technology and Management and Director, 2004

Jafar Saniie

B.S., University of Maryland; M.S., Case Western Reserve University; Ph.D., Purdue University
Filmer Professor of Electrical and Computer Engineering and Associate Chair, 1983

James T. Sasaki

B.S., Illinois Institute of Technology; M.S., Ph.D., Cornell University
Senior Lecturer of Computer Science and Director of the Professional Master's Program, 2003

Keiichi Sato

B.S., M.S., Osaka Institute of Technology (Japan); M.S., IIT Institute of Design
Charles Owen Professor of Design, 1998

Mahima Saxena

B.A., University of Delhi (India); M.Sc., Goldsmiths, University of London (United Kingdom)
Visiting Assistant Professor of Psychology, 2012

Andrew D. Schachman

B.A., University of Chicago; M.Arch., University of Illinois - Chicago
Studio Associate Professor of Architecture and Director of the Paris Program, 2009

Jay D. Schieber

Ph.D., University of Wisconsin-Madison
Professor of Chemical Engineering and Physics and Director of the Center for the Molecular Study of Condensed Soft Matter, 1995

George Schipporeit

Associate Professor of Architecture, 1980

Robert C. Schleser

B.A., Rutgers University; M.S., Ph.D., Memphis State University
Professor of Psychology, 1982

Warren S. Schmaus

A.B., Princeton University; M.A., Ph.D., University of Pittsburgh
Professor of Philosophy, 1980

Christopher W. Schmidt

B.A., Dartmouth College; M.A., Ph.D., Harvard University; J.D., Harvard Law School
Assistant Professor of Law, 2008

David L. Schwartz

B.S., University of Illinois, Urbana-Champaign; J.D., University of Michigan Law School
Associate Professor of Law, 2009

Michael A. Scodro

B.A., Dartmouth College; J.D., Yale Law School
Assistant Professor of Law (on leave), 1996

H. Larry Scott

B.S., Ph.D., Purdue University
Professor of Physics, 2000

Ullica C. Segerstrale

M.S., M.A., University of Helsinki (Finland); M.A., University of Pennsylvania; Ph.D., Harvard University
Professor of Sociology and Camras Program Development Director, 1988

Javier Segovia

M.S., Complutense University of Madrid (Spain); Ph.D., Technical University of Madrid (Spain)
Visiting Professor of Chemical Engineering, 2012

Carlo U. Segre

B.S. (Physics), B.S. (Chemistry), University of Illinois, Urbana-Champaign; M.S., Ph.D., University of California-San Diego
Duchossois Leadership Professor of Physics and Director of the Center for Synchrotron Radiation Research and Instrumentation (CSRRI), 1983

Shawn C. Shadden

B.S., University of Texas - Austin; Ph.D., California Institute of Technology
Assistant Professor of Mechanical and Aerospace Engineering, 2009

Mohammad Shahidehpour

B.S., Arya-Mehr University of Technology (Iran); M.S., Ph.D., University of Missouri Columbia
Bodine Professor of Electrical and Computer Engineering, Director of the Smart Grid Center, and Associate Director of the Wanger Institute for Sustainable Energy Research (WISER), 1983

Carolyn E. Shapiro

B.A., University of Chicago; M.A., University of Chicago Harris Graduate School of Public Policy; J.D., University of Chicago Law School
Associate Professor of Law, 2003

Matthew A. Shapiro

B.A., University of California at San Diego; M.A., Yonsei University (South Korea); M.A., Ph.D., University of Southern California
Assistant Professor of Political Science, 2008

Leon L. Shaw

B.S., M.Eng., Fuzhou University (China); M.S., Ph.D., University of Florida
Rowe Family Professor of Materials Science and Engineering, 2012

Jiehua J. Shen

B.S., Hefei University (PRC); M.S., Chinese Academy of Sciences; Ph.D., University of California-Berkeley
Associate Professor of Civil and Architectural Engineering, 1993

Zheng John Shen

B.S., Tsinghua University (China); M.S., Ph.D., Rensselaer Polytechnic Institute
Grainger Professor of Electrical and Computer Engineering, 2012

Tomohiro Shibata

B.Sc., M.Sc. Doctor of Science, University of Tokyo (Japan)
Research Assistant Professor of Physics, 2010

John W. Snapper

B.A., Princeton University; M.A., Ph.D., University of Chicago
Associate Professor of Philosophy and Academic Policy Coordinator, 1979

Pavel Snopok

M.S., Ph.D., Saint-Petersburg State University (Russia); M.S., Ph.D., Michigan State University;
Assistant Professor of Physics, 2011

Mark E. Snyder

B.S., M.S., Creighton; Ph.D., Texas Tech University; M.S., Illinois Institute of Technology
Senior Lecturer of Civil and Architectural Engineering, 2006

Marius D. Soneru

Ph.D., Illinois Institute of Technology
Senior Lecturer of Computer Science, 2001

Stephen D. Sowle

B.A., Williams College; J.D., Yale Law School
Senior Lecturer and Assistant Dean for Academic Administration and Student Affairs, IIT Chicago-Kent College of Law, 1994

Michael I. Spak

B.S., J.D., DePaul University; LL.M., Northwestern University School of Law
Professor of Law, 1974

Matthew Spenko

B.S., Northwestern University; M.S., Ph.D., Massachusetts Institute of Technology
Assistant Professor of Mechanical Engineering, 2007

Linda K. Spentzouris

B.A., Colorado College; Ph.D., Northwestern University
Associate Professor of Physics, 2001

Kathryn M. Spink

B.S., Michigan Technological University; Ph.D., Michigan State University
Senior Lecturer of Biology and Chair of the Pre-Medical Advisory Committee, 2005

Steven J. Stanard

B.A., Illinois State University; M.A., Xavier University; Ph.D., Illinois Institute of Technology
Visiting Associate Professor of Psychology, 2009

Benjamin C. Stark

B.S., University of Michigan; M.Ph., Ph.D., Yale University
Professor of Biology, 1983

Ronald W. Staudt

B.S., B.A., St. Joseph's College; J.D., University of Chicago Law School
Professor of Law and Director of the Center for Access to Justice and Technology, 1978

Rebecca J. Steffenson

B.A., DePaul University; M.A., University College Dublin (Ireland); Ph.D., University of Glasgow (Scotland)
Senior Lecturer of Political Science and Associate Chair of the Department of Social Sciences, 2012

Joan E. Steinman

A.B., University of Rochester, J.D., Harvard Law School
Distinguished Professor of Law, 1977

Brent Stephens

B.S., Tennessee Technological University; M.S., University of Texas-Austin
Assistant Professor of Civil and Architectural Engineering, 2012

Stephanie M. Stern

B.A., Brown University; J.D., Yale Law School
Associate Professor of Law, 2009

Margaret G. Stewart

B.A., Kalamazoo College; J.D., Northwestern University School of Law
Professor of Law, 1979

Keith Ann Stiverson

B.S., Rio Grande College; M.S.L.S., Catholic University of America; J.D., Georgetown University Law Center
Senior Lecturer and Director of the IIT Downtown Campus Library, 2001

Karl A. Stolley

B.A., Milikin University; M.A., Ph.D., Purdue University
Associate Professor of Digital Writing and Rhetoric and Co-Director of Graduate Studies, Department of Humanities, 2007

Kent D. Streseman

B.A., University of California-Davis;
J.D., Cornell Law School
Clinical Associate Professor of
Appellate Advocacy and Director,
Ilana Diamond Rovner Program in
Appellate Advocacy, 1998

Mary Rose Strubbe

B.A., Mundelein College; J.D., IIT
Chicago-Kent College of Law
Professor of Legal Research and
Writing, Director of the Legal
Research and Writing Program, and
Assistant Director of the Institute for
Law and the Workplace, 1994

Zack Sullivan

B.A., John Hopkins University; M.S.,
Ph.D., University of Illinois,
Urbana-Champaign
Assistant Professor of Physics, 2008

Jiong Sun

B.Sc., Shanghai Jiao Tong University;
M.Eng., National University of
Singapore; M.S., Ph.D., Carnegie
Mellon University
Assistant Professor of Management,
2007

Xian-He Sun

Ph.D., Michigan State University
Professor of Computer Science and
Chair, 1999

Steven J. Szmurlo

B.A., University of Illinois-Chicago;
M.A., Northeastern Illinois University
Instructor of English as a Second
Language Programs, School of Applied
Technology, 2010

Arthur S. Takeuchi

B.S., M.S.Arch., Illinois Institute of
Technology
Associate Professor of Architecture,
1965

Martha (Maria) Tanner

B.S., University of Illinois,
Urbana-Champaign; M.A., Seattle
University; Ph.D., University of North
Carolina
Lecturer of Chemistry and Associate
Chair of Chemistry, Department of
Biological and Chemical Sciences, 2011

A. Dan Tarlock

A.B., LL.B., Stanford University
Distinguished Professor of Law and
Director of the Program in
Environmental and Energy Law, 1981

Jeffrey H. Terry

B.S., University of Chicago; Ph.D.,
Stanford University
Associate Professor of Physics, 2005

Fouad A. Teymour

B.Sc., M.Sc., Cairo University
(Egypt); Ph.D., University of
Wisconsin-Madison
S.C. Johnson Professor of Chemical
Engineering and Director of the
Center of Complex Systems and
Dynamics, 1992

Martin Thaler

B.F.A., Rhode Island School of
Design; M.F.A., Royal College of Art
(England)
Visiting Associate Professor of Design,
2008

Charles Tier

Ph.D., Courant Institute (NYU)
Senior Lecturer in Applied
Mathematics, 2007

Sammy Tin

B.S., California Polytechnic State
University-San Luis Obispo; M.S.,
Carnegie Mellon University; Ph.D.,
University of Michigan
Associate Professor of Materials
Engineering, 2006

Andrew Tinucci

B.Arch., University of Arizona; B.S.,
University of Illinois,
Urbana-Champaign
Studio Assistant Professor of
Architecture, 2011

Yagmar Torun

B.S., Middle East Technical
University; Ph.D., Stony Brook
University
Associate Professor of Physics and
Guest Scientist at Fermi National
Accelerator Laboratory, 2006

Khairy A. Tourk

B.S., University of Alexandria
(Egypt); M.A., Vanderbilt University;
Ph.D., University of
California-Berkeley
Professor of Economics/International
Business, 1972

Barbara L. Trommer

B.A., Queens College; M.D., Columbia
College, College of Physicians and
Surgeons
Research Professor of Biomedical
Engineering, 2012

Philip R. Troyk

B.S., University of Illinois,
Urbana-Champaign; M.S., Ph.D.,
University of Illinois-Chicago
Associate Professor of Biomedical
Engineering and Associate Dean,
Armour College of Engineering, 1984

Ray E. Trygstad

B.S., United States Naval Academy;
M.S.S.M., University of Denver
Industry Professor of Information
Technology and Management,
Associate Director for Information
Technology and Management and
Director of Information Technology for
the School of Applied Technology,
1992

Vincent Turitto

B.ChE., Manhattan College;
D.Eng.Sci., Columbia University
Pritzker Professor of Biomedical
Engineering and Director of the
Pritzker Institute of Biomedical
Science and Engineering, 2000

John R. Twombly

B.S., University of Pennsylvania;
M.B.A., Ph.D., University of Chicago;
Certified Public Accountant
Clinical Professor of Accounting and
Finance and Director of
Undergraduate Programs, Stuart
School of Business, 1992

Aditya K. Unni

B.A., St. Olaf College; M.S., Ph.D.,
University of Chicago
Assistant Professor of Chemistry, 2009

Benjamin E. Van Vliet

B.A., Calvin College; M.S., Ph.D.,
Illinois Institute of Technology
Assistant Professor of Finance, 2012

David C. Venerus

B.S., University of Rhode Island; M.S.,
Ph.D., Pennsylvania State University
Professor of Chemical Engineering and
Director of the Center of Excellence in
Polymer Science and Engineering,
1989

Murat Vural

B.Sc., M.Sc., Ph.D., Istanbul
Technical University (Turkey)
Associate Professor of Mechanical and
Aerospace Engineering, 2003

Liad Wagman

B.A., B.S., University of North
Carolina; M.S., Stanford University;
M.A., Ph.D., Duke University
Assistant Professor of Economics, 2009

Adrian J. Walters

B.A., University of Cambridge;
Graduate Diploma in Law,
Nottingham Polytechnic
Ralph L. Brill Professor of Law, 2011

Jason Wan

B.S., Hunan Agricultural University
(China); M.S., Northeast Agricultural
University (China); Ph.D., Deakin
University (Australia)
Research Professor of Biology and
Director of Education and
International Outreach at the Institute
for Food Safety and Health, 2010

Peng-Jun Wan

B.S., Tsinghua University (China);
Ph.D., University of Minnesota
Professor of Computer Science, 1997

Haizhi Wang

B.S., Wuhan University (China); M.S.,
East China Normal University
(China); Ph.D., Rensselaer
Polytechnic Institute
Assistant Professor of Finance, 2008

Jia Wang

B.S., Tsinghua University (China);
M.S., Ph.D., Northwestern University
Assistant Professor of Electrical and
Computer Engineering, 2008

Rong Wang

B.S., M.S., Jilin University (China);
Ph.D., University of Tokyo (Japan)
Associate Professor of Chemistry, 2000

Candace Wark

B.S., M.S., Michigan State University;
Ph.D., Illinois Institute of Technology
Professor of Mechanical and Aerospace
Engineering, 1988

Richard Warner

B.A., Stanford University; Ph.D.,
University of California-Berkeley; J.D.,
University of Southern California Law
Center
Professor of Law and Faculty Director
of the Center for Law and Computers,
1990

Darsh T. Wasan

B.S., University of Illinois,
Urbana-Champaign; Ph.D., University
of California-Berkeley
Distinguished Motorola Professor of
Chemical Engineering and Vice
President for International Affairs,
1964

Fred Weening

B.S., Carnegie-Mellon University,
Ph.D., University of California-San
Diego
Senior Lecturer of Applied
Mathematics, 2011

Vivian M. Weil

A.B., M.A., University of Chicago;
Ph.D., University of Illinois
Professor of Ethics and Director of the
Center for the Study of Ethics in the
Professions, 1972

Suzanne Weiss

B.A., University of Rochester; M.B.A.,
University of Chicago
Senior Lecturer of Business, 2003

Miles N. Wernick

B.A., Northwestern University; Ph.D.,
University of Rochester
Motorola Professor of Electrical and
Computer Engineering and Director of
Medical Imaging in the Pritzker
Institute of Biomedical Science and
Engineering, 1994

Catherine Q. Wetzel

B.Arch., University of Cincinnati;
M.Arch., University of Pennsylvania
Associate Professor of Architecture
and Associate Dean for Graduate
Academic Affairs, College of
Architecture, 1989

Christopher G. White

B.S., University of Illinois; Ph.D.,
University of Minnesota
Professor of Physics and Chair, 1998

Patrick F. Whitney

B.F.A., University of Alberta
(Canada); M.F.A., Cranbrook
Academy of Art
Steelcase/Robert C. Pew Professor of
Design and Dean of the IIT Institute
of Design, 1983

David R. Williams

B.S.E., Stevens Institute of
Technology; M.S.E., Ph.D., Princeton
University
Professor of Mechanical and Aerospace
Engineering and Director of the Fluid
Dynamics Research Center, 1983

Geoffrey A. Williamson

B.S., M.S., Ph.D., Cornell University
Professor of Electrical and Computer
Engineering and Interim Chair, 1989

Vida J. Winans

B.A., Cornell University; M.S., Illinois
Institute of Technology
Senior Instructor of Computer Science
and Graduate Coordinator, 2000

Thomas Tang Yum Wong

B.S., University of Hong Kong; M.S.,
Ph.D., Northwestern University
Professor of Electrical and Computer
Engineering, 1981

Antony D. Wood

B.A., Diploma in Architecture,
PGCHE, University of Nottingham;
PG.Dip.Arch.Prac., De Montford
University - Leicester
Studio Associate Professor of
Architecture, 2006

Richard W. Wright

B.S., California Institute of
Technology; J.D., Loyola University of
Los Angeles; LL.M., Harvard Law
School
Distinguished Professor of Law, 1985

Benxin Wu

B.S., Tsinghua University; M.S.,
University of Missouri-Rolla; Ph.D.,
Purdue University
Associate Professor of Mechanical
Engineering, 2007

Tao L. Wu

B.A., Columbia University; Ph.D.,
Wharton School
Assistant Professor of Finance, 2008

Jialing Xiang

M.D., Xuzhou Medical College;
Ph.D., University of
Alabama-Birmingham
Associate Professor of Biology, 2003

Yang Xu

B.S., M.S., Fudan University (China);
Ph.D., Carnegie-Mellon University
Assistant Professor of Electrical and
Computer Engineering, 2007

Yongyi Yang

B.S.E.E., M.S.E.E., Northern Jiatong
University (China); M.S., Ph.D.,
Illinois Institute of Technology
Harris Perlstein Professor of Electrical
and Computer Engineering, 1995

Iman S. Yetik

B.S., Bogazici University (Turkey);
M.S., Bilkent University (Turkey);
Ph.D., University of Chicago
Assistant Professor of Electrical and
Computer Engineering, 2006

Michael A. Young

A.B., University of Chicago; M.A.,
Ph.D., Adelphi University
Professor of Psychology and Division
Head of Clinical Programs, 1996

John F. Zasadzinski

B.S., Illinois Benedictine College;
Ph.D., Iowa State University
Paul and Suzie Schutt Professor of
Science, 1982

Chunbo Zhang

B.Agr., M.Agr., Zhejiang Fisheries
College (China); Ph.D., University of
Manitoba (Canada)
Research Assistant Professor of
Biology, 2004

Wei Zhang

B.S., M.S., Huazhong Agricultural
University; Ph.D., Pennsylvania State
University
Associate Professor of Biology, 2005

Hong Zhang-Sun

B.S., Beijing Normal University; M.S.,
Ph.D., Michigan State University
Research Professor of Computer
Science, 2010

Chi Zhou

B.S., Tsinghua University (China);
M.S., Ph.D., Northwestern University
Associate Professor of Electrical and
Computer Engineering, 2006

Benjamin D. Zion

B.A., Lawrence University; Ph.D.,
University of Chicago
Lecturer of Chemistry, 2012

Faculty Emeritus

Wilbur Applebaum

Associate Professor of History,
1972-1995

Ralph E. Armington

Professor of Electrical Engineering,
1966-1982

Robert C. Arzbaecher

Professor of Electrical Engineering and
Director of the Pritzker Institute of
Medical Engineering, 1981-2001

Charles R. Bauer

Associate Professor of Computer
Science, 1985-1996

David R. Beam

Associate Professor of Political
Science, 1987-2004

Barry Bernstein

Professor of Chemical Engineering and
Applied Mathematics, 1966-2008

Robert J. Bonthron

Professor of Mechanical and Aerospace
Engineering, 1947-1991

Fred P. Bosselman

Professor of Law, 1991-2003

Harold W. Bretz

Associate Professor of Microbiology,
1957-1991

Norman N. Breyer

Professor of Metallurgical and
Materials Engineering, 1964-1991

Ilene J. Burnstein

Associate Professor of Computer
Science, 1986-2003

Ray A. Burnstein

Professor of Physics, 1965-2001

George D. Byrne

Professor of Applied Mathematics,
1994-1998

Thomas M. Calero

Associate Professor of Management,
1968-1993

Joseph S. Chung

Professor of Economics, 1964-1995

Lewis M. Collens

Professor of Law and President
Emeritus, Illinois Institute of
Technology, 1970-2009

Paul H. DeForest

Associate Professor of Political
Science, 1969-2010

Rollin C. Dix

Professor of Mechanical Engineering,
1964-2004

John T. Dygdon

Professor of Engineering Graphics,
1952-1996

Walter C. Eisenberg

Professor of Chemistry, 1987-2003

Thomas Erber

Distinguished Professor of Physics and
Mathematics, 1957-2007

Joseph A. Erwin

Associate Professor of Biology,
1967-2001

Martha W. Evens

Professor of Computer Science,
1975-2003

Dale E. Fahnstrom

Professor of Design, 1966-2011

Susan G. Feinberg

Professor of English, 1980-2010

Robert Filler

Professor of Chemistry, 1955-1994

Maurice J. Frank, Jr.

Professor of Applied Mathematics,
1976-2008

Glen O. Geist

Professor of Psychology, 1971-2003

Dimitri Gidaspow

Distinguished Professor of Chemical
Engineering, 1962-2010

Lois Graham

Professor of Mechanical Engineering,
1949-1985

Nicholas Grecz

Professor of Microbiology, 1963-1982

Peter H. Greene

Associate Professor of Computer
Science, 1974-2003

John R. Grimes

Professor of Photography, 1974-2011

William J. Grimshaw

Professor of Political Science.
1978-2012

Sidney A. Guralnick

Perlstein Distinguished Professor of
Engineering, 1958-2004

Kevin P. Harrington

Professor of Architectural History,
1978-2010

Boyd A. Hartley

Associate Professor of Fire Protection
and Safety Engineering, 1966-1985

Isidore Hauser

Professor of Physics, 1958-1986

Barbara R. Heller

Associate Professor of Applied
Mathematics, 1980-2009

Geoffrey T. Higgins

Professor of Materials Engineering,
1969-1998

Margaret H. Huyck

Professor of Psychology, 1969-2009

Robert F. Irving

Associate Professor of English,
1967-1995

Peter Y. Johnson

Professor of Chemistry, 1976-2011

Porter W. Johnson

Professor of Physics, 1969-2008

Serope Kalpakjian

Professor of Mechanical and Materials
Engineering, 1963-2001

C. Jotin Khisty

Professor of Civil and Architectural
Engineering, 1990-2002

Thomas W. Knowles

Professor of Management Science,
1969-2009

Sudhir Kumar

Professor of Mechanical Engineering,
1995-2010

Willis G. Labas

Professor of Fire Protection and
Safety Engineering, 1946-1979

Robert F. Ladenson

Professor of Philosophy, 1969-2012

Chow S. Lam

Distinguished Professor of Psychology,
1985-2011

Robert J. Malhiot

Professor of Physics, 1956-1987

Fred R. McMorris

Professor of Applied Mathematics,
1999-2009

Mark V. Morkovin

Professor of Mechanical Engineering,
1967-1982

Sheldon Mostovoy

Associate Professor of Mechanical and
Materials Engineering, 1972-2011

John R. O'Leary

Associate Professor of Civil and
Architectural Engineering, 1980-2011

Charles L. Owen

Professor of Research, Institute of
Design, 1965-2010

H Lennart Pearson

Associate Professor of Applied Mathematics and Dean of Graduate Studies, 1954-1994

Robert W. Porter

Professor of Mechanical and Aerospace Engineering, 1966-2001

Gregory Prygrocki

Associate Professor of Design, 1987-2009

Bernard Rasof

Professor of Mechanical Engineering, 1964-1982

Kathryn L. Riley

Professor of English, 2004-2012

Robert M. Roth

Professor of Biology, 1968-2003

Howard A. Rubin

Professor of Physics, 1966-2010

Gerald F. Saletta

Associate Professor of Electrical and Computer Engineering, 1962-2006

Kenneth R. Schug

Professor of Chemistry, 1956-2012

Cesar A. Sciammarella

Professor of Mechanical and Aerospace Engineering, 1972-2010

J. Robert Selman

Distinguished Professor of Chemical Engineering, 1975-2010

David C. Sharpe

Associate Professor of Architecture, 1962-2010

Jeffrey G. Sherman

Professor of Law, 1978-2010

Abe Sklar

Professor of Mathematics, 1956-1995

Spencer B. Smith

Professor of Management Sciences and Industrial Management, 1966-1996

Harold N. Spector

Professor of Physics, 1966-2001

Henry Stark

Professor of Electrical and Computer Engineering, 1988-2008

Edwin F. Stueben

Associate Professor of Applied Mathematics, 1962-2006

Nick T. Thomopoulos

Research Professor of Management Science, 1966-2011

San Utsunomiya

Associate Professor of Architecture, 1966-1993

John L. Way

Professor of Mechanical and Aerospace Engineering, 1970-2001

Erwin W. Weber

Associate Professor of Electrical and Computer Engineering, 1961-1998

Dale A. Webster

Professor of Biology, 1968-2001

Allen H. Wolach

Professor of Psychology, 1969-2007

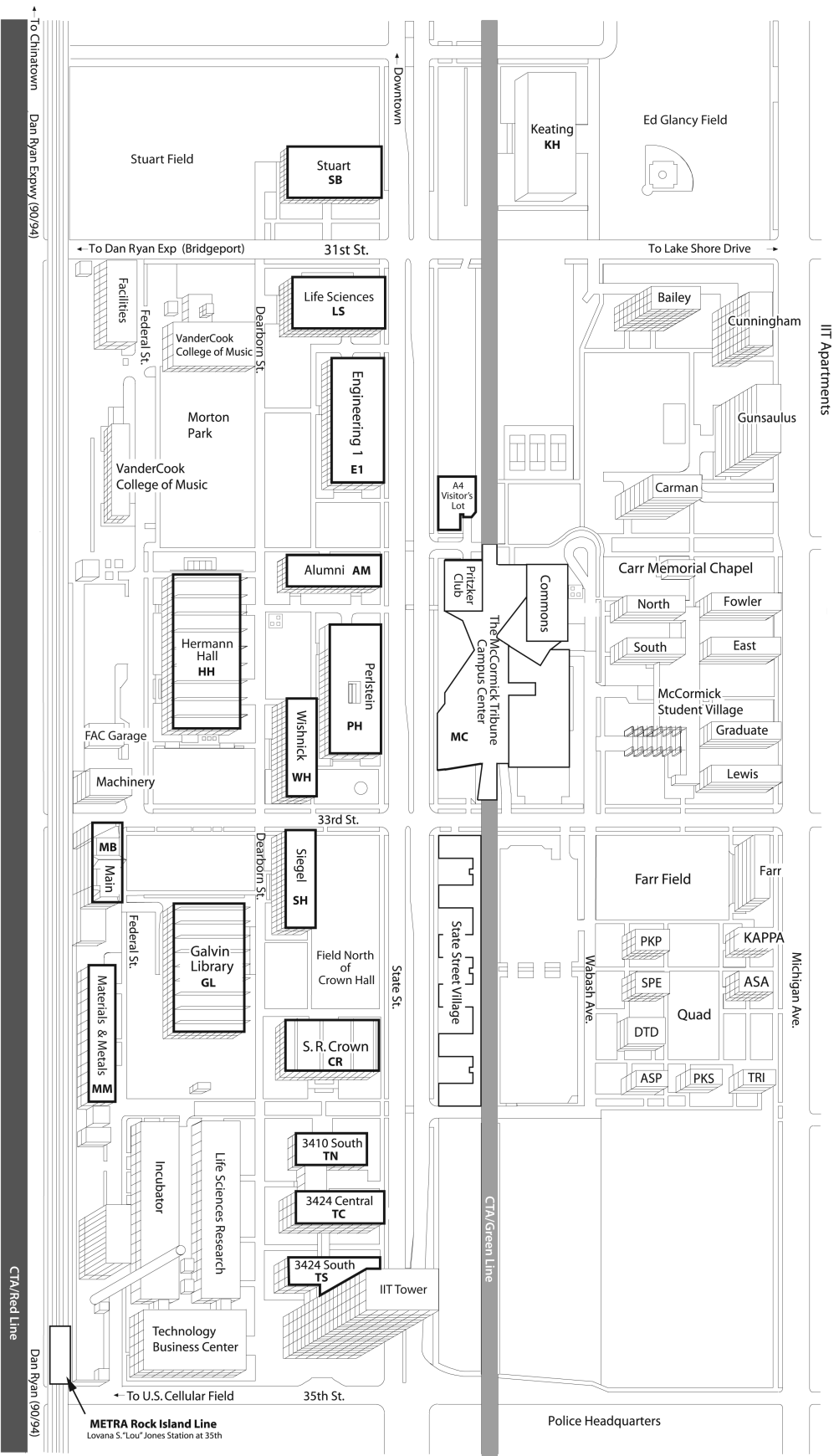
David M. Zesmer

Professor of English, 1962-1992

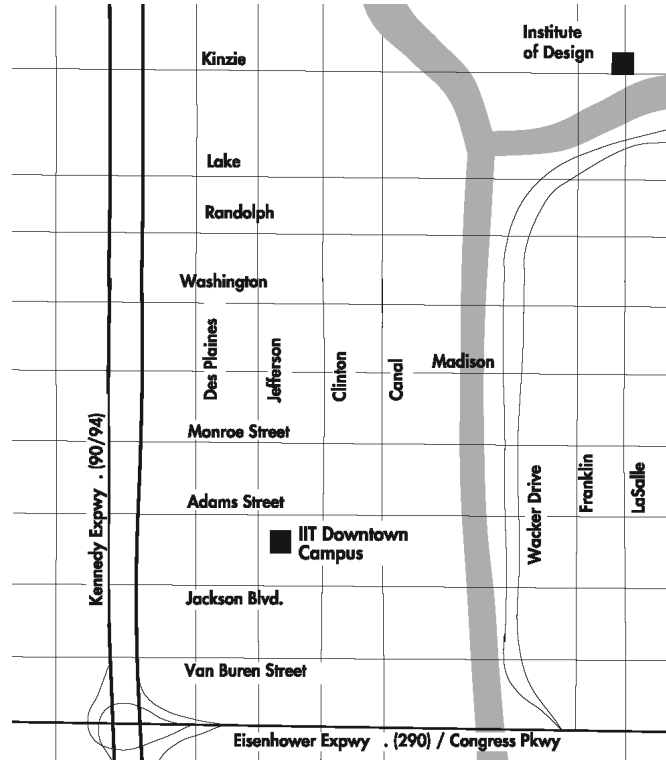
Earl F. Zwicker

Professor of Physics, 1956-1991

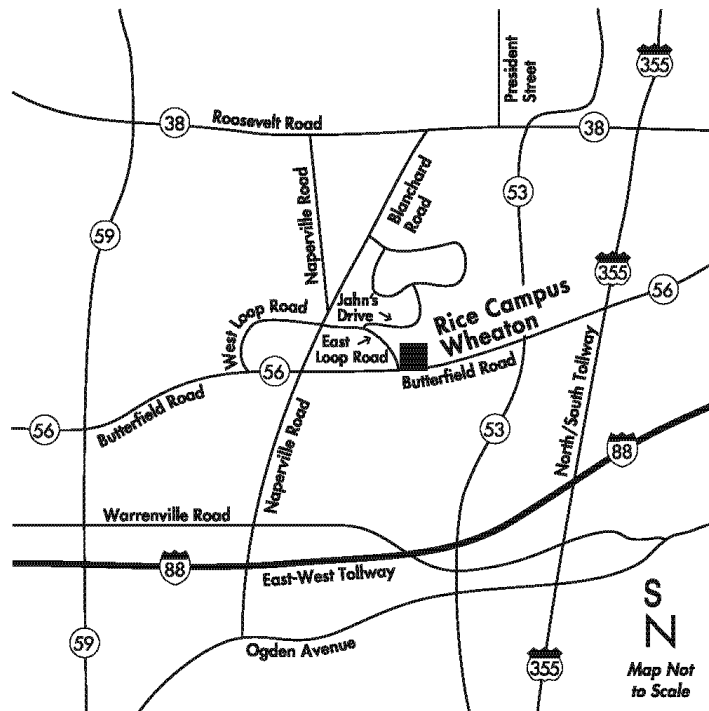
Main Campus



Downtown Campus and Institute of Design



Rice Campus



Getting to Main Campus

Airports

IIT and Chicago are served by O'Hare International Airport and Midway International Airport. Public and private transportation is available from the airports to downtown Chicago and IIT campuses.

Train

Metra Rail Rock Island District line to 35th Street/Lou Jones/Bronzeville station.

Other commuter railroad lines to Union and Northwestern train stations (both off Canal Street), then public transportation, taxi, or IIT shuttle bus from the Downtown Campus at 565 West Adams Street to Main Campus.

Bus

To Greyhound or Continental Trailways terminal, then taxi or public transportation to IIT.

Public Transportation

1. CTA Red Line (Howard-Dan Ryan) to 35th Street Station.
2. CTA Green Line (Lake-Englewood-Jackson Park) to 35-Bronzeville-IIT station.
3. CTA bus lines with stops on State Street (#29) or Michigan Avenue (#35).

Automobile

From North: Dan Ryan Expressway east to 31st Street exit, continue south to 33rd Street, turn left (east). Metered parking is located along Federal Street north and south of 33rd Street, and in the Visitor's Parking Lot (Lot A4) at 32nd Street and State Street, on the east side of State Street.

From South: Dan Ryan Expressway west to 35th Street exit, continue north to 33rd Street, turn right (east). Metered parking is located along Federal Street north and south of 33rd Street, and in the Visitor's Parking Lot (Lot A4) located at 32nd Street and State Street, on the east side of State Street.

From Lake Shore Drive: Exit at 31st Street, go inland (west) to State Street, turn left (south). Metered parking is available in the Visitor's Parking Lot (Lot A4) located at 32nd Street and State Street, on the east side of State Street.

Parking

Pay station parking is available to all visitors and is located in designated lots on State Street between 31st and 35th street. Special event parking may be available in other parking lots on campus. Please contact the Access, Card, and Parking Services Office for more details on parking, or visit the parking web page for current parking locations at www.parking.iit.edu. Please call the parking administrator at 312.567.8968 if you need assistance in finding parking.



Index

| | | | |
|--------------------------------------|-----|---|-------|
| Academic Calendar | 3 | Chemical and Biological Engineering | 294 |
| Academic Honesty | 265 | Courses | 308 |
| Academic Loads | 264 | Program | 16 |
| Academic Resource Center | 274 | Chemistry | 15-17 |
| Access, Card, and Parking Services | 274 | Courses | 276 |
| Accreditation | 8 | Minor | 13 |
| Administration of IIT | 286 | Program | 25 |
| Admission | | Chicago-Kent College of Law | 268 |
| <i>see</i> Undergraduate Admission | | Civil Engineering | 267 |
| <i>see</i> Transfer Admission | | Courses | 7 |
| Advanced Placement | 13 | Program | 7 |
| <i>see also</i> College-Level Credit | | College-Level Credit | 268 |
| Advising | 265 | College of Architecture | 269 |
| Aerospace Engineering | | College of Psychology | |
| Courses | 238 | College of Science and Letters | |
| Program | 129 | Communication | |
| Air Force | | Courses | 208 |
| <i>see</i> ROTC | | Minor | 162 |
| Anthropology | 179 | Program | 105 |
| Applied Mathematics | | <i>see also</i> Humanities | |
| Courses | 234 | Communication Across the Curriculum | |
| Minor | 162 | Program | 276 |
| Program | 26 | Computer Engineering | |
| Architectural Engineering | | Courses | 213 |
| Courses | 198 | Program | 98 |
| Program | 82 | Computer Information Systems | 92 |
| Architecture | | Computer Science | |
| Courses | 180 | Courses | 209 |
| Minor | 162 | Program | 88 |
| Program | 36 | Cooperative Education Program | 275 |
| Armour College of Engineering | 5 | Co-Terminal Degrees | 166 |
| Art and Architectural History | 179 | Counseling Center | |
| Athletics | 274 | <i>see</i> Student Health & Wellness Center | |
| Audit, Academic Program | 264 | Credit by Examination | 266 |
| Audit, Course | 267 | Dean's List | 266 |
| Biochemistry | | Disability Resources | 276 |
| Minor | 162 | Dismissal | 264 |
| Program | 45 | Diversity and Inclusion, Student Center | 280 |
| Biology | | Dual Degree Programs | 166 |
| Courses | 188 | Economics | 218 |
| Minor | 162 | Electrical Engineering | |
| Program | 47 | Courses | 213 |
| Biomedical Engineering | | Program | 95 |
| Courses | 191 | Emeritus | |
| Program | 60 | <i>see</i> Faculty Emeritus | |
| Board of Trustees | 284 | Employment Programs | 275 |
| Business | | <i>see also</i> Career Management Center | |
| Courses | 194 | <i>see also</i> Federal Work Study | |
| Minor | 162 | Engineering Graphics | |
| Program | 68 | Certificate | 85 |
| Calendar | | Courses | 218 |
| <i>see</i> Academic Calendar | | Minor | 163 |
| Campus Life | 275 | Engineering Management | |
| Campuses | 8 | Courses | 220 |
| <i>see also</i> Maps | | Program | 86 |
| Career Management Center | 275 | Environmental Engineering | |
| Certificate Programs | 173 | Courses | 198 |
| Change of Major | 265 | Minor | 163 |
| Change of Status | 265 | Expenses | |
| | | <i>see</i> Student Accounting | |
| | | Faculty | 294 |
| | | Faculty Emeritus | 308 |
| | | Federal Work Study | 16 |
| | | Financial Aid | 15-17 |
| | | Fraternity and Sorority Life | 276 |
| | | General Certificate of Education | 13 |
| | | <i>see also</i> College-Level Credit | |
| | | General Education Requirements | 25 |
| | | Grade Point Average | 268 |
| | | Grades | 267 |
| | | Graduate College | 7 |
| | | Graduation Requirements | 268 |
| | | Graduation with Honors | 269 |
| | | Greek Life | |
| | | <i>see</i> Fraternity and Sorority Life | |
| | | Health Center | |
| | | <i>see</i> Student Health & Wellness Center | |
| | | History | |
| | | Courses | 222 |
| | | Minor | 163 |
| | | History of IIT | |
| | | Holidays | |
| | | <i>see</i> Academic Calendar | |
| | | Honors | |
| | | <i>see</i> Graduation with Honors | |
| | | Humanities | |
| | | Courses | 224 |
| | | Program | 102 |
| | | Idea Shop | 276 |
| | | Immunization | 14 |
| | | Industrial Technology & Management | |
| | | Courses | 224 |
| | | Minor | 163 |
| | | Program | 109 |
| | | Information Technology & Management | |
| | | Courses | 228 |
| | | Minor | 163 |
| | | Program | 113 |
| | | Institute of Design | 7 |
| | | International Baccalaureate | 13 |
| | | <i>see also</i> College-Level credit | |
| | | International Center | 277 |
| | | International Students | 12 |
| | | Interprofessional Project | 227 |
| | | <i>see also</i> General Education Reqs | |
| | | Joint Engineering Programs | 175 |
| | | Journalism | 107 |
| | | <i>see also</i> Humanities | |
| | | Landscape Architecture | 232 |
| | | <i>see also</i> Architecture | |
| | | Law | 104 |
| | | <i>see also</i> Chicago-Kent College of Law | |
| | | Leave of Absence | 269 |
| | | Leadership Academy | 277 |
| | | Libraries | 277 |
| | | Literature | |
| | | Courses | 232 |
| | | Minor | 163 |
| | | Loans | 16 |
| | | <i>see also</i> Financial Aid | |
| | | Maps | 310 |

Index

| | | | | | |
|--------------------------------|---------|--|-----|-------------------------------------|---------|
| Materials Science | | Placement Testing | 14 | Sociology | |
| Courses | 238 | PLUS Loan | 17 | Courses | 258 |
| Minor | 163 | <i>see also</i> Financial Aid | | Minor | 165 |
| Program | 127 | Political Science | | Program | 159 |
| Math and Science Education | | Courses | 251 | Special Programs | 166-175 |
| Courses | 243 | Minor | 164 | Spiritual Life and Service Learning | 279 |
| Minor | 163 | Program | 155 | Stafford Loan | 16 |
| Program | 121 | Premedical Studies | | <i>see also</i> Financial Aid | |
| Mathematics | | Minor | 164 | Stuart School of Business | 6 |
| <i>see</i> Applied Mathematics | | Program | 171 | <i>see also</i> Business | |
| Mechanical Engineering | | Pre-Pharmacy Program | 173 | Student Accounting | 18 |
| Courses | 238 | Probation | 264 | Student Affairs | 280 |
| Program | 123 | Prof & Tech Communication | 105 | Student Classification | 270 |
| Military Science | | Psychology | | Student Demographics | 9 |
| <i>see</i> ROTC | | Courses | 256 | Student Health & Wellness Center | 280 |
| Minors | 162-165 | Minor | 164 | Study Abroad | 174 |
| Molecular Biochem & Biophysics | 54 | Program | 139 | Summer School | 12 |
| NAIA | | Registrar | 279 | Technology Services | 281 |
| <i>see</i> Athletics | | Registration | 269 | Transcripts | 271 |
| Naval Science | | Reinstatement | | Transfer Admission | 12 |
| <i>see</i> ROTC | | <i>see</i> Undergraduate Reinstatement | | Transfer Credit | 13 |
| One Stop | 279 | Repeating Courses | 268 | <i>see also</i> Transfer Admission | |
| Part-Time Employment | 275 | Residence and Greek Life | 279 | Undergraduate Academic Affairs | 281 |
| Part-Time Students | 10 | Residence Requirements | 270 | Undergraduate Admission | 10 |
| Pell Grant | 16 | ROTC | 146 | Unit of Credit | 271 |
| <i>see also</i> Financial Aid | | Air Force Aerospace Studies | 188 | Trustees | 284 |
| Perkins Loan | 16 | Military Science Courses | 237 | VanderCook College of Music | 175 |
| <i>see also</i> Financial Aid | | Naval Science Courses | 244 | <i>see also</i> Special Programs | |
| Petition, Academic | 270 | School of Applied Technology | 6 | Veterans' Educational Benefits | 17 |
| Philosophy | | Second Bachelor's Degree | 270 | <i>see also</i> Financial Aid | |
| Courses | 245 | Shimer College | 175 | Withdrawal | 271 |
| Minor | 164 | <i>see also</i> Special Programs | | Writing Center | 281 |
| Physics | | Social Sciences (Department) | 154 | | |
| Courses | 247 | Social Sciences (Program) | 157 | | |
| Minor | 164 | | | | |
| Program | 131 | | | | |

Telephone Directory

Administrative and Service

| | | | |
|--|--------------|---|--------------|
| Academic Resource Center | 312.567.5216 | IPRO Program | 312.567.3986 |
| Access, Card, and Parking Services | 312.567.8968 | Library, Galvin (Main Campus) | 312.567.3616 |
| Admission, Undergraduate | 312.567.3025 | Marketing and Communications | 312.567.3104 |
| Alumni Relations | 312.567.5000 | McCormick Tribute Campus Center | 312.567.3700 |
| Athletics and Recreation | 312.567.3296 | Moffett Campus | 708.563.1576 |
| Bookstore - Barnes & Noble | 312.567.3120 | One Stop | 312.567.3810 |
| Career Management Center | 312.567.6800 | Public Safety | 312.808.6300 |
| Dean of Students | 312.567.3080 | Registrar's Office | 312.567.3100 |
| Disability Resources | 312.567.5744 | Residence and Greek Life | 312.567.5075 |
| Financial Aid | 312.567.7219 | Daniel F. and Ada L. Rice Campus | 630.682.6000 |
| Graduate Admission | 312.567.3020 | Spiritual Life and Service Learning | 312.567.3160 |
| Graduate College | 312.567.3024 | Student Accounting Office (Bursar) | 312.567.3794 |
| Fraternity and Sorority Life | 312.567.5075 | Student Activities | 312.567.3720 |
| Hermann Hall | 312.567.5179 | Student Center for Diversity and Inclusion | 312.567.5250 |
| Housing Office | 312.567.5075 | Student Health and Wellness Center | 312.567.7550 |
| Idea Shop | 312.567.3162 | Undergraduate Academic Affairs | 312.567.3300 |
| IIT Online Technical Services | 312.567.3375 | | |
| International Center | 312.567.3680 | | |

Colleges and Academic Units

| | | | |
|--|--------------|--|--------------|
| Armour College | 312.567.3009 | Institute of Design | 312.595.4900 |
| Biomedical Engineering | 312.567.5324 | School of Applied Technology | 630.682.6000 |
| Chemical and Biological Engineering | 312.567.3040 | Industrial Technology and Management | 312.567.3650 |
| Civil, Architectural, and Environmental Engineering | 312.567.3540 | Information Technology and Management | 312.567.5290 |
| Electrical and Computer Engineering | 312.567.3400 | Stuart School of Business | 312.906.6500 |
| Mechanical, Materials, and Aerospace Engineering | 312.567.3175 | | |
| Chicago-Kent College of Law | 312.906.5050 | Air Force – Aerospace Studies | 312.567.3525 |
| College of Architecture | 312.567.3230 | Army – Military Science | 312.808.7140 |
| College of Psychology | 312.567.3500 | Navy – Naval Science | 312.567.3530 |
| College of Science and Letters | 312.567.3800 | | |
| Applied Mathematics | 312.567.8980 | | |
| Biological and Chemical Sciences | 312.567.3480 | | |
| Computer Science | 312.567.5150 | | |
| Humanities | 312.567.3465 | | |
| Mathematics and Science Education | 312.567.3661 | | |
| Physics | 312.567.3579 | | |
| Social Sciences | 312.567.5128 | | |



Main Campus

33rd and State Street
Chicago, Illinois 60616

Downtown Campus

565 West Adams Street
Chicago, Illinois 60661

Institute of Design

350 North LaSalle Street
Chicago, Illinois 60610

Rice Campus

201 East Loop Road
Wheaton, Illinois 60189

Moffett Campus

6502 South Archer Road
Bedford Park, Illinois 60501

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