Illinois Institute of Technology Bulletin

Undergraduate Programs

1999-2001

Degrees Offered at IIT

Field	Bachelor's	Master's	Doctorate	Page
Architecture	Yes	Yes	Yes	35
Engineering				
Aerospace	Yes	Yes	Yes	80
Architectural	Yes	No	No	63
Chemical	Yes	Yes	Yes	51
Civil	Yes	Yes	Yes	59
Computer	Yes	Yes	Yes	75
Electrical	Yes	Yes	Yes	73
Environmental	Yes	Yes	Yes	56
Mechanical	Yes	Yes	Yes	80
Metallurgical and Materials		Yes	Yes	80
Science				
Applied Mathematics	Yes	No	No	32
Biology	Yes	Yes	Yes	40
Chemistry	Yes	Yes	Yes	42
Computer	Yes	Yes	Yes	66
Physics	Yes	Yes	Yes	46
Social Science				
Political Science	Yes	No	No	101
Psychology	Yes	Yes	Yes	86
Technology				
Manufacturing	Yes	No	No	78

Post-Baccalaureate Only

Business Administration	No	Yes	No
Design	No	Yes	Yes
Environmental Management	No	Yes	No
Financial Markets and Trading	No	Yes	No
Food Process Engineering	No	Yes	No
Food Safety and Technology	No	Yes	No
Law	No	Yes	Yes
Management Science	No	No	Yes
Manufacturing Engineering	No	Yes	No
Marketing Communication	No	Yes	No
Operations and Technology Management	No	Yes	No
Personnel and Human Resources Development	No	Yes	No
Public Administration	No	Yes	No
Public Works	No	Yes	No
Rehabilitation Counseling	No	Yes	No
Technical Communication and Information Design	No	Yes	No
Telecommunications and Software Engineering	No	Yes	No

Foreword for the IIT Undergraduate 1999-2001 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, the 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 entered IIT in the academic years 1999-2000 and 2000-2001. 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 adviser from the student's major department is the best source for current curriculum information. The Undergraduate College can refer students to the appropriate administrative office for current policies and procedures.

It is the intention of Illinois Institute of Technology to act in accordance with all regulations of the federal, state and local governments with respect to providing equality of opportunity in employment and in education, insofar as those regulations may pertain to IIT. IIT prohibits and will act to eliminate discrimination on the basis of race, color, religion, national origin, sex, age, handicap or veteran status.

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 affirmative action officer, Room 224, Perlstein Hall, Illinois Institute of Technology.

For descriptions of graduate programs and courses, see the ***IIT Bulletin: Graduate Programs.*** For descriptions of law programs and courses, ***see the Chicago-Kent College*** *of Law Bulletin.*

Note: The information in this bulletin is subject to change without notice.

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Calendar

IIT Academic Calendar for Fall

	Fall 1998	Fall 1999	Fall 2000	Fall 2001
Last day for reinstatement	Aug 4	Aug 10	Aug 8	Aug 7
Registration & orientation period	Aug 17-20	Aug 23-26	Aug 21-24	Aug 20-24
Classes begin	Aug 24	Aug 30	Aug 28	Aug 27
Labor Day holiday	Sept 7	Sept 6	Sept 4	Sept 3
Last day to submit appl. for grad.	Sept 4	Sept 10	Sept 8	Sept 7
Last day to remove "I" grades	Oct 2	Oct 8	Oct 6	Oct 5
Last day for official withdrawal	Oct 30	Nov 5	Nov 3	Nov 2
Adv. registration and advising	Nov 9-20	Nov 8-19	Nov 6-17	Nov 5-16
Thanksgiving Day holiday	Nov 26-28	Nov 25-27	Nov 23-25	Nov 22-24
Classes end	Dec 5	Dec 11	Dec 9	Dec 8
Final exam period	Dec 7-12	Dec 13-18	Dec 11-16	Dec 10-15
Semester ends	Dec 12	Dec 18	Dec 16	Dec 15
Commencement*	Dec 12	Dec 18	Dec 16	Dec 15

IIT Academic Calendar for Spring

	Spring 1999	Spring 2000	Spring 2001	Spring 2002
Last day for reinstatement	Dec 28, 1998	Dec 27, 1999	Dec 27, 2000	Dec 31, 2001
Registration & orientation period	Jan 11-14	Jan 10-13	Jan 8-11	Jan 14-17
MLK, Jr. holiday	Jan 18	Jan 17	Jan 15	Jan 21
Classes begin	Jan 19	Jan 18	Jan 16	Jan 22
Last day to submit appl. for grad.	Jan 29	Jan 28	Jan 26	Feb 1
Last day to remove "I" grades	Feb 26	Feb 25	Feb 23	Mar 1
Spring vacation	Mar 15-20	Mar 13-18	Mar 12-16	Mar 18-23
Last day for official withdrawal	Apr 2	Mar 31	Mar 30	Apr 5
Adv. registration and advising	Apr 12-23	Apr 10-21	Apr 9-20	Apr 15-26
Classes end	May 8	May 6	May 5	May 11
Final exam period	May 10-15	May 8-13	May 7-12	May 13-18
Semester ends	May 15	May 13	May 12	May 18
Commencement*	May 15	May 13	May 12	May 18

IIT Academic Calendar for Summer

	Summer 1999	Summer 2000	Summer 2001	Summer 2002
Last day for reinstatement	May 19	May 17	May 16	May 15
Registration period	June 2-3	May 31-June 1	May 30-31	May 29-30
Classes begin	June 7	June 5	June 4	June 3
Last day to submit appl. for grad.	June 11	June 9	June 8	June 7
Independence Day holiday	July 3-5	July 4	July 4	July 4
Last day for official withdrawal	July 16	July 14	July 13	July 12
End of eight-week session	July 31	July 29	July 28	July 27

* tentative

Objective of Education at IIT

IIT's mission is to educate individuals for complex professional roles in a changing world and to advance knowledge through research and scholarship. The guiding principle of the university is that a modern, innovative education for students expecting to enter complex professional roles is only possible with a faculty that both maintains close ties to the technical professions and an outstanding reputation in academic research. The university is committed to the educational ideal of small undergraduate classes and individual mentoring. Our unique Introduction to the Profession program brings students and senior faculty members together each week in small groups, where students interact with their advisers as both teachers and mentors. Throughout the curricula, the IIT interprofessional projects provide a learning environment in which interdisciplinary teams of students apply theoretical knowledge gained in the classroom and laboratory to real-world projects sponsored by industry and government. IIT seeks to offer an educational experience that is second to none.

The Colleges of Illinois Institute of Technology

IIT was founded in 1940 through the merger of the Armour Institute of Technology (established in 1890) and Lewis Institute (established in 1896). The Institute of Design joined the university in 1949, and Chicago-Kent College of Law became part of IIT in 1969. The Midwest College of Engineering (established in 1967) joined the university in 1986, forming the nucleus for IIT's west-suburban Rice Campus. Today, IIT offers degree programs through eight colleges, institutes and schools, with classes taught on five campuses in the Chicago area.

College of Architecture

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, one of Mies' most significant buildings and a major contribution to Chicago's rich architectural heritage. The college emphasizes applied studio work under the tutelage of a faculty of practicing architects: the study of architectural theory; interdisciplinary learning; and foreign study.

Armour College

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: Applied Mathematics; Biological, Chemical and Physical Sciences; Chemical and Environmental Engineering; Civil and Architectural Engineering; Computer Science; Electrical and Computer Engineering; the Lewis Department of Humanities; Mechanical, Materials and Aerospace Engineering; and Social Sciences. The college is also home to the Pritzker Institute of Medical Engineering and the Manufacturing Productivity Center.

Chicago-Kent College of Law

The Chicago-Kent College of Law is the second oldest law college in Illinois. When Chicago-Kent 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 and Master of Laws. Although the college does not offer an undergraduate degree, it offers a specialized minor to undergraduates in double-degree programs. The Chicago-Kent Library is open to IIT students conducting research in relevant fields.

Institute of Design

The Institute of Design, founded by Laszlo Moholy-Nagy in 1937 and named the "New Bauhaus" after Germany's International School of Design, merged with IIT in 1949. The Institute of Design is the first U.S. school to offer a Ph.D. in design; its program also includes a Master of Science in Design and a Master of Design.

Institute of Psychology

Established in 1995, the Institute of Psychology was created from the Department of Psychology, previously housed within IIT's Lewis College of Liberal Arts. It 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.

Stuart School of Business

The Stuart School of Business was established in 1970 from a gift from the estate of IIT alumnus and Chicago financier Harold Leonard Stuart. Although its primary educational focus is master's and doctoral-level education, the Stuart School offers courses in economics and management for undergraduates. The school houses the Center for Research on Industrial Strategy and Policy, the Center for Research on the Impact of Information Systems, and the Center for Research in Financial Markets & Trading.

The Undergraduate College

The Undergraduate College coordinates the programs of the undergraduate curriculum offered by the departments and colleges of the university, The college sets minimum standards for all undergraduate students, represents the university in national forums for undergraduate education, and serves as an advocate for undergraduate education across the university. The dean of the Undergraduate College chairs the Undergraduate Studies Committee. The Interprofessional Project initiative (IPRO) and the Reserve Officer Training Corps for Navy and Marines, Air Force, and Army report to the dean. Academic support services, including the Career Development Office, the Center for Multicultural Programs, the Educational Technology Center, the Office of Educational Services, the Women's Educational Development Center, and the Writing Center report to the dean of the Undergraduate College.

The Graduate College

The Graduate College coordinates the programs of advanced study offered by the departments and colleges of the university, The dean of the Graduate College chairs the Graduate Studies Committee and Research Council, sets minimum standards for all graduate students, represents the university in national forums for graduate education, and serves as an advocate for promoting graduate education across the university.

IIT Campuses

IIT's 120-acre Main Campus is located on the Near South Side of Chicago. The master plan of the Main 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 Research Institute (IITRI) has its headquarters on the IIT Main Campus and operates facilities at 16 sites throughout the country. The VanderCook College of Music, an independent institution, is also located on the Main Campus. The Main Campus is easily accessible by public transportation, and a shuttle bus provides transportation between the Main and Downtown campuses.

The Chicago-Kent College of Law, Stuart School of Business and the Department of Social Sciences' Master of Public Administration programs are housed in the Downtown Campus in the West Loop business district, a short walk from the Union and Northwestern train stations. The Institute of Design is in the North Loop business district, near the Merchandise Mart and a short walk from the River North art gallery district. IIT's Daniel F. and Ada L. Rice Campus, located in west-suburban Wheaton, offers evening and Saturday classes leading to selected undergraduate and graduate degrees.

The university's fifth site is IIT's Moffett Campus, which houses the National Center for Food Safety and Technology, a multidisciplinary food safety research facility in southwest-suburban Bedford Park. The Moffett Campus, created by a gift from CPC International, Inc., has enabled the university to develop academic programs in food safety and technology. A master's degree and a certificate program in food safety and technology are offered at this facility.

Students also may take classes through the William F. Finkl Interactive Instructional Network (IITV), which links classroom studios on campus with remote TV receiving sites. IITV's talk-back feature permits students in remote classrooms to participate in class discussions. IITV has arrangements with the Chicago Medical School, Oakton Community College, the IIT Rice Campus, William Rainey Harper College, South Cook Educational Service Center #7 and the IIT Moffett Campus. In addition, more than 20 companies offer IITV courses to their employees at their places of employment.

Accreditation

IIT is accredited by the North Central Association of Colleges and Secondary Schools (30 N. LaSalle Street, #2400, Chicago, IL 60602-2504). Specific professional curricula are accredited by their respective professional associations and accrediting agencies. The professional accreditation of specific degree programs is noted with the description of the degree requirements.

A Snapshot of the IIT Community

Enrollment (Fall 1998)

Undergraduate	1,718 students
Graduate	2,925 students
Law	1,263 students
Total	**5,906 students**

Student Demographics

Male	69%
Female	31%
Minority	25%
(includes African American, Asian American, Hispanic American, and Native American)	
International	19%
Countries of Origin	80+
Student/Faculty Ratio	11: 1

Degrees Awarded 1997-98

Bachelor's	393
Master's and Professional	**678**
Law	361
Ph.D.	**75**
Total	**1,507**

Admission, Financial Aid and Expenses

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Undergraduate Admission

Classification of Students

Undergraduate admission to IIT is processed in two offices, based on a student's classification. Be sure to contact the correct office for application materials.

All full-time, degree-seeking freshmen or transfer students should contact:

Office of Undergraduate Admission
10 W. 33rd Street
Perlstein Hall 101
Chicago, IL 60616
Telephone: 312.567.3025
Outside Chicago: 1.800.448.2329
Fax: 312.567.6939
E-mail: admission@vax1.ais.iit.edu
On-line application: http://www.iit.edu/admission/undergrad

All part-time degree and non-degree students, special-status students, summer school students, and re-admit applicants should contact:

Office of Educational Services
3300 S. Federal Street
Main Building 101
Chicago, IL 60616
Telephone: 312.567.3300
Fax: 312.567.3302
E-mail: edsvcs@vax1.ais.iit.edu
Online application: http://edserve.iit.edu

Full-Time Freshman Admission

Office of Undergraduate Admission
10 W. 33rd Street
Perlstein Hall 101
Chicago, IL 60616
Telephone: 312.567.3025
Outside Chicago: 1.800.448.2329
Fax: 312.567.6939
Email: admission@vax1.ais.iit.edu
On-line application: http://www.iit.edu/admission/undergrad

The Office of Undergraduate Admission is responsible for admission decisions for all first-year (freshmen and transfer), full-time, degree-seeking undergraduates. To be full-time, a student must register for 12 or mote credit hours each semester.

Application as a Freshman

IIT admits freshmen students on a tolling basis beginning in September, with most admission decisions having been made by mid-Match. Students will be admitted after Match if there are spaces available.

Some honors programs and some scholarships have January deadlines, Students need to adhere to those deadlines stated in the admission or scholarship applications. Students have until May 1 (National Candidates' Reply Date) to accept IIT's offer of admission. Students admitted after May 1 will have two weeks from the receipt of their admission and/or financial aid award letters to respond to IIT's offer.

Undergraduate Admission

Obtaining Freshman Application

Freshman applicants must submit a completed application, application fee or fee waiver, transcripts of all high schools attended, transcripts from all colleges attended (when applicable), standardized test scores, and a letter of recommendation. The freshman application may be obtained by contacting the Office of Undergraduate Admission or from the following on-line sources:

IIT on-line application = www.iit.edu/admission/undergrad
College Link = www.collegelink.com
Princeton Review's Apply = www.weapply.com
CollegeQuest® = www.collegequest.com

IIT also accepts the Common Application.

*International students should request the International Student Application.

Standardized Test Scores for Freshman Applicants

All students are requited to submit scores from either the College Entrance Examination Board's Scholastic Aptitude Test (SAT1) or The American College Test (ACT). The tests may be taken at any time, but preferably by the December testing date in the high school senior year. Applicants for admission to the spring semester must have taken the SAT1 or ACT by the preceding November. IIT recommends SAT2 tests in math and science, but does not requite SAT2 test scores for admission or scholarship applications.

High School Requirements for Freshman Applicants

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.

	Required	Recommended
English	4 years	
Mathematics	4 years *	Calculus
Laboratory Science	2 years **	3 years

* Material should include depth in algebra, geometry, trigonometry, analytic geometry and pre-calculus skills.

** Material should include physics.

Transfer of College-Level Credit for Freshman Applicants

IIT recognizes the CEEB Advanced Placement Program and encourages student to take A.P. examinations and have the scores sent to the IIT Office of Undergraduate Admission. Acceptable credit and placement varies by subject. IIT will accept scores of 4 and 5, and, in some cases, scores of 3.

International Baccalaureate Program

Students holding an International Baccalaureate (LB.) 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 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.

College Coursework

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

New-Student Financial Aid

Financial aid for all admitted freshmen and new transfer students is processed in the Office of Undergraduate Admission. Continuing-student financial aid is processed by the IIT Office of Financial Aid. IIT offers both need-based and merit-based aid to domestic students. To be considered for need-based aid and merit scholarships at IIT, students must submit a Free Application for Federal Student Aid (FAFSA) to the Department of Education. Financial aid and scholarship deadlines are described in the IIT application for admission. International students do not submit a FAFSA. Each admitted international student is reviewed for IIT scholarship eligibility.

Decision to Matriculate

To accept IIT's offer of admission, students need to return the Enrollment Confirmation Form and a non-refundable $100 matriculation deposit. The deposit is credited to the student's account and will go toward the cost of attendance. The Enrollment Confirmation Form is sent to every admitted student and may be returned at any time, but students have until May 1 to submit their confirmation forms and deposits. Students admitted after May 1 will have two weeks from the time they are notified of their admission and/or financial aid award to respond to IIT's offer.

Immunization Requirement

In accordance with Illinois law, all students born on or after January 1, 1957, and enrolling at IIT for the first time after July 1, 1989, must supply health-provider documented evidence of vaccination for diphtheria, tetanus, measles, rubella and mumps. Transfer students are considered first-time enrolled students. Students enrolling for the first time during a summer session may be permitted to enroll in the subsequent fall term before providing proof of immunization. Students who wish to enroll only in one class pet semester or via IITV at corporate sites may file a written request for an exemption. Exemption from one or mote of the specific requirements may also be granted based on documented medical or religious reasons. A student who fails to provide acceptable evidence of immunization shall be prevented from registering for classes in the next semester. Questions regarding the immunization policy should be directed to IIT's Counseling and Health Service at 312.808.7199.

Full-Time Transfer Admission for Domestic Students

Application as a Transfer Student

The Office of Undergraduate Admission is responsible for admission decisions for full-time transfer students. Full-time status requites that students enroll in a minimum of 12 credit hours each semester. Transfer students may apply for the fall or spring term in all majors except architecture, which is a fall-entry program only. IIT admits transfer students on a tolling basis. The deadline to apply for the fall term (beginning late August) is July 1; for the spring term (beginning mid-January), the deadline is November 1. Earlier deadlines apply to international students and are listed in the International Application for Admission.

Obtaining an Application

The transfer application may be obtained by contacting the Office of Undergraduate Admission with a request, or by visiting the on-line application:
www.iit.edu/admission/undergrad

Students must submit the IIT Transfer Application, application fee or fee waiver, transcripts from all colleges and universities attended, a personal statement, and a letter of recommendation to the IIT Office of Undergraduate Admission.

Undergraduate Admission

Requirements for Transfer

Transfer applicants must be in good academic standing at their previous colleges to be considered for admission to IIT Admission is based upon a cumulative GPA and individual grades in all classes that apply to the major selected. A minimum cumulative GPA of 3.0 is expected 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 less than 30 hours of transferable graded college coursework must submit high school transcripts and SAT1 or ACT scores as part of their application.

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, test scores and agency recommendations for CLEP (see page 172), Dames and military experience. IIT, however, does not grant credit for vocational courses or life/work experience. In addition, technology courses will not be accepted in any engineering program.

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 must be completed at IIT. (See page 175.)

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. In certain instances, the academic department must approve transfer credit if a long period of time has elapsed since the course was completed.

Transfer articulation agreements that list course equivalents are available for most two-year Chicago-area colleges from the Office of Undergraduate Admission, the Office of Educational Services or on-line:
www.iit.edu/admission/undergrad

Transfer-Student Financial Aid

Financial aid for all admitted freshmen and new transfer students is processed in the Office of Undergraduate Admission. Continuing-student financial aid is processed by the IIT Office of Financial Aid. IIT offers both need- and merit-based aid. To be considered for need-based aid and merit scholarships at IIT, students must submit a Free Application for Federal Student Aid (FAFSA) to the Department of Education. Financial aid and scholarship information is included with the IIT application for admission. International transfer students do not submit a FAFSA. Each admitted international student is reviewed for IIT scholarship eligibility

Decision to Matriculate

To accept IIT's offer of admission, students must return the Enrollment Confirmation Form and a non-refundable $100 matriculation deposit. The deposit is credited to the student's account and will go toward the cost of attendance. The Enrollment Confirmation Form is sent to every admitted student.

Immunization Requirement

In accordance with Illinois law, all students born on or after January 1, 1957, and enrolling at IIT for the first time after July 1, 1989, must supply health-provider documented evidence of vaccination for diphtheria, tetanus, measles, rubella and mumps. Transfer students are considered first-time enrolled students. Students enrolling for the first time during a summer session may be permitted to enroll in the subsequent fall term before providing proof of immunization. Students who wish to enroll only in one class per semester or via IITV at corporate sites may file a written request for an exemption. Exemption from one or more of the specific requirements may also be granted based on documented medical or religious reasons. A student who fails to provide acceptable evidence of immunization shall be prevented from registering for classes in the next semester. Questions regarding the immunization policy should be directed to IIT's Counseling and Health Service at 312.808.7199.

Part-Time Admission

Office of Educational Services
3300 S. Federal Street
Main Building 101
Chicago, IL 60616
Telephone: 312.567.3300
Fax: 312.567.3302
E-mail: edsvcs@vax1.ais.iit.edu
Online application: http://edserve.iit.edu

Part-Time Degree-Seeking Students

Students who wish to enroll in less than 12 credit hours per semester are classified as part-time students. All undergraduate programs, except architecture, can be completed on a part-time basis, with both day and evening courses being offered. However, only the following degree programs can be completed in their entirety through evening classes:

- Chemical Engineering;
- Computer Engineering;
- Electrical Engineering;
- Manufacturing Technology; and
- Mechanical Engineering.

The graduation requirements for full-time and part-time students are identical.

Application as a Degree-Seeking Part-Time Student

Part-time students must meet the same admission requirements as full-time students. Students with previous college work will be evaluated by the same criteria used for full-time undergraduate transfer admission. (See page 16.) Students who have less than 30 hours of transferable college coursework may be required to submit high school transcripts and standardized test scores. Students who have not attended college must meet the high school requirements listed on page 14 and must submit high school transcripts and standardized test scores.

Prospective students submit the completed application, application fee or fee waiver, and official transcripts of all coursework to the Office of Educational Services.

Undergraduate Admission

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; or
- taking courses to transfer to another institution.

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

Campus Locations for Part-Time Students

Part-time 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 courses taught at the Rice Campus are 300- and 400-level mechanical engineering, electrical engineering and manufacturing technology courses, as well as 400-level computer science courses.

IITV, a live talk-back system that links classroom studios with remote TV receiving sites, is another option for the part-time student. For more information about IITV, ***see*** the ***IIT Bulletin Schedule of Classes.***

Summer School Admission

Students who attend another college or university and who 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 Office of Educational Services:

- a Summer School Application;
- a $30 application fee; and
- a transcript and/or a letter of good standing that indicates completion of the prerequisites for the requested courses at IIT.

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

Reinstatement of Undergraduate Students

Former IIT students who wish to re-enter IIT as full-time or part-time undergraduate students must contact the Office of Educational Services for ***an Application for Undergraduate Reinstatement.*** No fee is required. The application and all supporting documents must be submitted at least three weeks prior to the beginning of classes for the semester of intended enrollment. Please refer to the IIT Calendar on page 4 for specific deadlines. Students who have attended other schools since their latest attendance at IIT must submit official transcripts from all colleges or universities attended.

International students with a student visa requesting reinstatement must contact the International Center Office in addition to submitting the application for reinstatement.

Financial Aid

Comprehensive Financial Aid Program

IIT administers a comprehensive financial aid program for full-time undergraduate students, which includes federal, state and institutional funds. Federal programs include grants, loans and employment salaries. State programs include grant funds. All 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, athletic and service achievements. IIT uses the formula established by the U.S. Congress to determine financial need for assistance. IIT offers limited academic scholarship assistance to international students.

Determining Financial Need for Assistance

Financial need is the difference between a student's total annual cost of attending IIT and the amount the student and the student's family is expected to contribute toward that cost of education. The total cost of attendance at IIT includes tuition and mandatory fees, room and board, books and supplies, transportation, and personal expenses. The amount that the student and family is expected to contribute is called the expected family contribution (EFC). The U.S. Congress has established the formula used to calculate the EFC. The EFC is subtracted from the cost of education, 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.

Student Eligibility Requirements to Receive Financial Assistance

Students must be U.S. citizens or eligible non-citizens and be enrolled in a degree-seeking program for at least half-time (six credit hours or more per semester).

Application Process

All students applying for financial assistance need to complete the Free Application for Federal Student Aid (FAFSA). This application is available after January 1 and should be filed by the student as soon as possible after January 1 of the academic year in which the student is attending college. (The IIT Title IV School Code is 001691.) The priority date for financial aid consideration at IIT is March 15. All 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 financial aid will be required to submit tax information upon request.

New Freshman Students

The Free Application for Federal Student Aid (FAFSA) for freshmen entering IIT is available from high schools, IIT's Office of Undergraduate Admission, the IIT Student Services Center, or on-line at www.fafsa.ed.gov. The priority date for financial aid consideration is March 15; therefore, new students should not wait for a final admission decision before filing the FAFSA. International students do not submit a FAFSA.

New Transfer Students

All new transfer students will file either a renewal or an original FAFSA. The priority date for financial aid consideration is March 15; therefore, new transfer students should not wait for a final admission decision before filing the FAFSA.

Financial Aid

Continuing Students

All continuing students must submit either a renewal or original FAFSA to the Department of Education by March 15. The priority date for financial aid consideration is March **15.** FAFSAs are available at the Student Services Center.

Federal Financial Aid Programs

Federal Pell Grant

A 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 professional degree. Pell Grants are awarded based on demonstrated financial need. Students apply for a Pell Grant by filing the FAFSA. All students who file the FAFSA receive a Student Aid Report (SAR). If a student does not qualify for a Pell Grant, he or she may still be eligible for other forms of financial aid. The Pell Grant levels for this academic year have not yet been set, but the maximum Pell Grant award for the 1998-99 academic year was $3,000 for a full-time student attending for a full year. Students can designate IIT as a SAR recipient by using the code 001691 in section H of the FAFSA.

Federal Supplemental Opportunity Grant (FSEOG)

A FSEOG is a federal grant that does not have to be repaid. This grant is for undergraduate students who demonstrate exceptional financial need. Students apply for the FSEOG by filing the FAFSA.

Federal Perkins Loan

A Federal Perkins Loan is a low-interest (5 percent) federal loan for both undergraduate and graduate students with exceptional financial need. IIT is the lender, and the loan is made with government funds. There is no interest charged while the student is attending school. When a student leaves school or drops below half-time attendance, there is a nine-month, interest-free grace period before the student begins repayment. All repayments are made to IIT on a quarterly basis. Students apply for a Perkins Loan by filing the FAFSA.

Federal Work Study Program (FWSP)

The FWSP provides salaries for jobs for undergraduate and graduate students with demonstrated financial need. Students awarded FWSP funds can earn money to help pay education expenses. Students can work either on- or off-campus. Off-campus jobs will be with private, non-profit organizations or public agencies that encourage community service work. Students awarded FWS are paid at least the current federal minimum wage or higher, depending on the type of work performed. Students are paid by the hour and receive a paycheck. FWS students are not permitted to work more than 20 hours per week during the academic year and may not work during their scheduled class times. Students apply for FWS by filing the FAFSA.

Federal Family Education Loan Program (FFELP).

The FFELP loan program includes the Stafford subsidized and unsubsidized loan programs for undergraduate and graduate students, as well as the Parent Loan for Undergraduate Students (PLUS) Program. The Stafford Loan Program provides low-interest loans to assist students with paying educational costs. The interest rate for new loans is set on July 1 and will vary annually. The maximum rate is 8.25 percent. These loans must be repaid over a period of time after a student leaves school. The funds for these loans come from banks, credit unions or other participating lenders.

The Subsidized Stafford Loan is awarded based on demonstrated financial need, and students do not pay interest on the principal while they are in school. The Unsubsidized Stafford Loan is not awarded based on demonstrated financial need; however, interest is charged from the time that the loan funds are disbursed to the student. Students have the option of paying the interest or having the interest added onto the principal. Fees of up to 4 percent are charged on each loan, and these fees are deducted before a student receives the loan funds.

PLUS loans enable parents with a good credit history to borrow money to help pay education expenses for their dependent undergraduate student. The interest rate is set on July 1 and varies annually. The maximum rate is 9 percent. Students apply for all FFELP loans by filing the FAFSA.

Illinois Student Assistance Commission (ISAC) Financial Aid Programs

Monetary Award Program (MAP)

This program is for undergraduate Illinois residents and provides state grants that do not have to be repaid. To receive a MAP grant, students must demonstrate financial need, be a resident of Illinois, and be enrolled at an Illinois institution. The maximum grant for 1998-99 was $4,320 for a full-time student attending a full academic year. The MAP grant can only be applied toward tuition and mandatory fees. Students can receive 10 semesters of the MAP grant. Students apply for the MAP grant by filing the FAFSA. ISAC notifies students of their award.

Merit Recognition Scholarship (MRS)

The MRS program provides a one-time $1,000 state grant to qualified Illinois high school students who rank in the top 5 percent of their class at the end of the seventh semester in high school, Demonstrated financial need is not a factor in determining MRS recipients. The top 5 percent of seniors from all Illinois high schools are automatically considered for the MRS program, Once ISAC selects all eligible recipients, an MRS application is sent to the student. The student completes the application and gives it to the IIT Office of Undergraduate Admission.

Illinois Incentive for Access Program (IIA)

The IIA Program provides a one-time state grant of up to $500 for freshmen who have an expected family contribution (EFC) of zero, which is determined by filing the FAFSA. Students must be enrolled at least half-time in an Illinois institution, be an Illinois resident, and have not yet received a bachelor's degree.

IIT-Funded Financial Aid Programs

More than 90 percent of IIT students receive some form of financial assistance. All students who submit a FAFSA are considered for all federal, state and institutional financial aid for which they qualify. IIT grants and loans are funded by the university and are awarded on the basis of demonstrated financial need. In addition, each year a number of talented students receive IIT scholarships that ***are*** based on talent and/or merit.

Transfer-Student Scholarships

Merit scholarships of up to full tuition are awarded to transfer students who have strong college records. Awards are renewable based on grade point average at IIT and reasonable academic progress. All admitted students are reviewed for eligibility.

Athletic Scholarships

As a National Association of Intercollegiate Athletics (NAIA) member, IIT awards athletic scholarships based solely on athletic ability, regardless of need. In compliance with NAIA rules, athletic scholarships are officially made by financial aid officers, upon recommendation of the athletic director. Students with demonstrated financial need will be reviewed for federal, state and other IIT financial aid for which they are eligible.

IIT Endowed Scholarships

These scholarships are made possible through donations to IIT by individuals, corporations and foundations. First-year IIT students will be reviewed by the Office of Undergraduate Admission for scholarship eligibility. Continuing students will be reviewed by the Office of Financial Aid.

Financial Aid

IIT Loans

Loans are available to undergraduate students demonstrating financial need and will be listed on a student's financial aid award notification letter.

Part-lime Employment

Parr-time employment for students who are not awarded Federal Work Study (FWS) is available on and off campus in the greater Chicago area. On-campus jobs are usually advertised on department bulletin boards (electronic and otherwise) and at the IIT Career Development Center. Off-campus jobs are advertised by the Career Development Center. This office also assists students in finding summer employment and permanent jobs after graduation.

ROTC Programs

IIT offers scholarship supplements to admitted students who have been awarded U.S. Air Force, Army or Naval ROTC scholarships. In combination, the ROTC scholarships and the IIT supplemental scholarship often cover the entire cost of tuition and room and board. To be considered, students must send a copy of their ROTC Scholarship Award letter to the Office of Undergraduate Admission and to the Army, Air Force or Naval ROTC offices on IIT's campus.

Veterans' Educational Benefits

Veterans enrolling at IIT for the first time should obtain VA. application forms from the Office of Student Records and Registration, Room 104, Main Building, 312.567.6741. Subsequent applications will be processed by the university's Veterans Affairs representative upon notification of intentions to re-enroll.

Continued Eligibility for Financial Assistance

All students receiving federal and/or state financial aid funds must demonstrate reasonable academic progress toward graduation from IIT. Reasonable academic progress includes both a satisfactory cumulative and major grade point average and sufficient credit hours earned each semester toward the completion of a degree program. IIT has established a Reasonable Academic Progress Policy in compliance with federal and state regulations. Failure to comply with IIT's Reasonable Academic Progress Policy will lead to the student's losing eligibility for financial assistance.

Additional Information

All financial aid awards and scholarships for entering freshmen and transfer students are processed by the Office of Undergraduate Admission. These students should submit all information regarding financial assistance to: IIT Office of Undergraduate Admission, 10 W. 33rd Street, Chicago, IL 60616, Telephone 312.567.3025. If outside of Chicago, please call 1.800.448.2329 or fax 312.567.6939.

All financial aid awards for continuing undergraduate students and for all graduate students (excluding law students) are processed by the IIT Office of Financial Aid. Students should submit all information regarding financial assistance to: Office of Financial Aid, 3300 S. Federal Street, Chicago, IL 60616, Telephone 312.567.7219. The office is open 8:30 a.m. to 5 p.m., Monday through Friday.

Expenses

All expenses listed herein are for the 1998-99 academic year and are subject to change without notice. The university regrets that continually rising costs do not permit it to guarantee that published charges will not change. Students and parents are cautioned to anticipate periodic increases in the years ahead.

Admission Application Fee

All applications for admission from U.S. citizens must be accompanied by a nonrefundable fee of $30 or a fee waiver. For international students, the fee is $40.

Undergraduate Tuition

Tuition for full-time undergraduates is $17,000 for the 1998-99 academic year. Part-time undergraduate students (those taking fewer than 12 credit hours) will be charged at the rate of $535 per credit hour.

Enrollment Deposit

Each student admitted as a degree-seeking undergraduate student is required to make a $100 non-refundable enrollment deposit, which is credited toward the student's cost of attendance and holds a place in class for the initial semester of enrollment.

Student Health Insurance

All students are required to purchase the basic student health insurance policy or to submit proof of equivalent insurance. This requirement applies to students who are:

- registered for 12 or more credit hours;
- participants in the co-op program;
- considered full-time by their departments;
- research or teaching assistants; or
- occupants of IIT residence halls.

A charge for the basic insurance program will be added to a student's tuition and fees by the third billing cycle (usually eight to nine weeks into the semester) unless he or she submits a valid declination to the plan's underwriters by the dates listed in the Insurance Brochure issued at registration. Once a student declines the insurance, he or she does not have to decline it again in subsequent, continuously enrolled years. Other students, spouses and dependents of students may participate in the student health program. Consult Counseling and Health Service in Farr Hall, 312.808.7101, for further details.

Student Activity Fee

A student activity fee of $100 for full-time students and $5.00 per credit hour for part-time students will be charged each semester. This applies only to students at the Main Campus. The student activity fee provides funding to registered student organizations in support of co-curricular activities. The fund is administered by the Student Leadership Committee.

Parking Fee

All students parking on campus must register their cars with the Public Safety Department and pay a parking fee. Students pay $50 for the full academic year. Students authorized to park at IIT will receive windshield decals and gate-control cards.

Expenses

Special Fees

These are fees for special services and are charged only if incurred:

Late registration	$ 50.00
Budget payment plan fee	25.00
Deferred payment plan fee	50.00
Graduation fee	$ 50.00
Proficiency examination (per credit hour)	100.00
Returned check fee	25.00
Student insurance	442.00

Books and Supplies

Books and other supplies are available at Follett's Commons Bookstore. Costs differ widely, depending upon the field of study. Most students can expect to spend approximately $600 per year for books and supplies (exclusive of drafting equipment and similar one-time purchases). Students in the College of Architecture may spend less on books but substantially more on supplies.

Payments and Refunds

Students must pay their balance due for each semester before classes begin. Any student who is delinquent in payment of tuition or other fees, or against whom the university holds a record of indebtedness, is not given a diploma, a certificate of scholastic standing, or a copy of his or her transcript until such indebtedness has been fully paid. While indebted to the university, students are not allowed to register or attend classes for an ensuing semester. The university may effect the withdrawal of any student who, through oversight, has been allowed to register contrary to this regulation.

Students may pay using one of the IIT-approved payment plans described in the ***IIT Bulletin: Schedule of Classes,*** credit card (Visa, Master Card or Discover), check, or money order. Payment may be made in person at the IIT Cashier's Office in the Main Building or by mail to: Office of the Bursar, Illinois Institute of Technology, PO. Box 95152, Chicago, IL 60694.

Institutional Refund Policy

Withdrawal during the first week of classes- eligible for 100 percent refund of tuition

Withdrawal during the second week of classes- eligible for 50 percent refund of tuition

Withdrawal during the third week of classes- eligible for 25 percent refund of tuition

Withdrawal after the third week of classes- no refund

Refunds of Tuition

No tuition will be charged and a full refund will be made on any amounts paid upon application supported by proof as necessary, under the following circumstances:

- if a course for which the student is registered is canceled by the university; or
- if a student's serious injury causes incapacity or a student's death occurs.

Under other exceptional circumstances, such as withdrawal for involuntary military service, serious illness, or action by the university, consideration may be given for a refund or credit for unused tuition upon written request to the bursar

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 or in fraternity houses. Exceptions to this policy may be granted by the associate vice president for student affairs. Residence hall contracts are made for the full academic year, from the beginning of orientation in August until commencement in May. The charges for room and board for new students in 1998-99 range from $5,005 to $5,090 for an academic year. When a student applies for housing accommodations, an itemized list of available housing facilities and rates will be furnished.

Meals

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

Housing Deposit Fee

A $50 security deposit is required at the time a room application is submitted. An initial $150 nonrefundable payment, which applies in full to charges for room and board, must be submitted to the director of housing by July 1 for fall semester applicants or December 1 for spring semester applicants. One-half of the room and board charge for the academic year is payable each semester.

Commuting Students

A student living at home and commuting will spend an estimated annual average of $1,200 on living costs at home and for meals on campus, and approximately $500 for travel.

Miscellaneous Expenses

Miscellaneous personal and recreational expenses are estimated at $650 for the academic year. These figures are used in computing the official financial aid budget.

Married Students

There are 356 living units in four high-rise apartment buildings on campus. These units range from efficiency to three-bedroom apartments. Leases typically are signed by married students and single full-time graduate students if space is available. Rentals for unfurnished apartments, including all utilities except telephone, range from approximately $445 to $900 per month. Furnished apartments also are available. Applications for campus housing should be submitted to the director of housing well in advance. A $35 application fee is required when applying for an apartment.

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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 and liberal arts. This section lists the general education requirements of the university. Specific degree requirements are described in the departmental listings. Minors are listed on page 104.

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 requited general education courses in science, mathematics, computer science, humanities and social science. These courses provide the foundation for neatly all of IIT's major programs. Because general education courses apply to all majors, students may wait as late as the sophomore year to declare their major and can still graduate on ***time.***

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.*** General education requirements may not be waived, not will substitutions be permitted, without the approval of the dean of the Undergraduate College. Approval will be granted only to individual students, and then only under extraordinary circumstances. Most departments of major study requite additional courses in these areas, which are stated under the individual major degree requirements.

A. 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 an English composition course at IIT. This requirement applies to all students enrolling for an undergraduate degree.

B. Mathematics: Five credit hours
The five credit hours must be above MATH 115.

C. Computer Science: Two credit hours
All students must take CS 105, ARCH 125 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) Humanities 100-level course.
   (b) At least two courses marked with an (H) at the 300-level or above. Some students may use foreign language courses at the 200-level to fulfill 300-level requirements. Students wishing to use foreign language courses must confirm their eligibility with the dean of the Undergraduate College.
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 two courses on the 300 level or above.
   (b) Courses must be chosen 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 marked with an (N) in psychology. These courses must be distributed as follows:
(a) Two sequential natural science or engineering courses in a single field. (CHEM 124 with MS 201 satisfies this requirement.)
(b) At least one natural science or engineering course in a second area.

F. interprofessional Projects: 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.

Special Academic Requirements

There are special requirements that go beyond or modify the basic general education requirements.

1. Policy on 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:

(a) Students must satisfy the Basic Writing Proficiency Requirement as listed in the general education requirements.

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

- 15 hours in major courses and
- 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.

(c) Students must seek help from one of the IIT Writing Centers when referred by a course instructot or an academic adviser. The Writing Center provides support for all writing instruction within the curriculum, tutoring for students referred to the center by course instructors or advisers, and individual help on demand to students who wish to improve their writing.

2. Engineering and Computer Science Majors

The Bachelor of Science degree programs in engineering and computer science requite the following courses, which may be applied to the general education requirements:

(a) Mathematics: MATH 151, MATH 152 and at least one course numbered 200 or above.

(b) Physics: PHYS 123 and PHYS 221.

3. Non-Applicable Courses

Some courses are marked as not applying to graduation. These courses do affect grade point average and academic status.

4. Introduction to the Profession: 4 credit hours

All engineering and computer science students must complete these seminars in their first year. (Students entering with 30 hours or more of transfer credit are excused.)

Applied Mathematics

Applied Mathematics

The field of applied mathematics explores those branches of mathematics that form the foundation of science and engineering-probability and statistics, numerical analysis, and mathematical modeling. Collectively, these branches define an emerging field of study called computational science, which uses techniques drawn from applied mathematics and computer science to solve problems arising in the sciences, engineering and business.

The department offers a Bachelor of Science with specialization in applied mathematics. Students in this program combine a foundation in mathematics and computer science with a professional concentration in another discipline in which they apply their computational mathematics skills to the modeling and the solution of real world problems.

The requirements for the bachelor's degree are summarized below.

Faculty

Interim Chair
Edwin F. Stueben
235D Stuart Building
Ext. 78984

Professors
B. Bernstein (jointly with Chemical Engineering), Delyannis, Edelstein, Erber (jointly with Physics), Frank

Associate Professors
Adler, Heller, Lubin, Stueben

Assistant Professor
Fasshauer

Senior Lecturers
Langdon, Maslanka, Sitton

Faculty Emeriti
Byrne, Darsow, DeCicco, Pearson, Reingold, Sklar, Wilcox

Bachelor of Science with specialization in applied mathematics

Required Courses	Credit Hours
Specialization Courses MATH 100, 101, 151, 152, 251, 252, 332, 400, 402, 461, 471, 475, 476 CS 200, 330, 331, 430	55
Specialization Electives	6
Computer Science Electives	6
Professional Concentration Electives	15
Science/Engineering Requirements CHEM 124, BIOL 107 or 115, PHYS 123	11
Science Elective	3

Required Courses	Credit Hours
Humanities Requirement Humanities 100-level course	3
Humanities Electives	9
Psychology Requirements PSYCH 221,301	6
Social Science Requirement PS 200	3
Social Science Electives	6
Interprofessional Projects	6
Total credit hours	129

A sample program of study is given on the next page. Note that the time sequence shown is only a guideline. Each student works closely with an adviser to formulate a program of study that not only meets the student's goals in terms of content, but that also allows for experiences outside of the classroom-for instance, internships, co-ops and ROTC programs.

Applied Mathematics Curriculum

Semester 1	Lect.	Lab. Hrs.	Cr. Hrs.
MATH 100 Introduction to the Profession I	1	2	2
MATH 151 Calculus I	4	1	5
CS 200 Introduction to C++ Programming	2	2	3
Humanities 100-level course	3	0	3
PSYCH 221 Introduction to Psychology	3	0	3
Totals	13	5	16

Semester 2	Lect.	Lab. Hrs.	Cr. Hrs.
MATH 101 Introduction to the Profession II	0	4	2
MATH 152 Calculus II	4	1	5
CS 330 Discrete Structures	3	0	3
PHYS 123 Mechanics	3	3	4
Humanities elective	3	0	3
Totals	13	8	17

Semester 3			
MATH 251 Multivariate and Vector Calculus	4	0	4
MATH 332 Matrices	3	0	3
CS 331 Data Structures and Algorithms	2	2	3
CHEM 124 Principles of Chemistry I	3	3	4
PS 200 American Government	3	0	3
Totals	1.5	5	17

Semester 4			
MATH 252 Introduction to Differential Equations	4	0	4
MATH 471 Numerical Methods I	3	0	3
Computer science elective	3	0	3
BIOL 115 Human Biology	3	0	3
Computer science elective	3	0	3
Totals	16	0	16

Semester 5			
MATH 400 Analysis I	3	0	3
CS 430 Introduction to Algorithms	3	0	3
Science elective	3	0	3
Social science elective	3	0	3
Professional concentration elective	3	0	3
Totals	15	0	15

Semester 6			
MATH 461 Fourier Series and Boundary-Value Problems	3	0	3
Specialization elective	3	0	3
PSYCH 301 Industrial Psychology	3	0	3
Humanities elective	3	0	3
Professional concentration elective	3	0	3
IPRO I Interprofessional Project I	1	6	3
Totals	16	6	18

Semester 7			
MATH 402 Complex Analysis	3	0	3
MATH 475 Probability	3	0	3
Social science elective	3	0	3
Professional concentration elective	3	0	3
Professional concentration elective	3	0	3
Totals	15	0	15

Semester 8			
MATH 476 Statistics	3	0	3
Specialization elective	3	0	3
Humanities elective	3	0	3
Professional concentration elective	3	0	3
IPRO II Interprofessional Project II	1	6	3
Totals	13	6	15

Total Credit Hours 129

Applied Sciences Program

As technology becomes a pervasive force, no professional can afford to enter the workplace without an understanding of technology and its scientific foundations. For example, a corporate attorney may draw on a background in biology to defend a pharmaceutical patent. A physician may be called upon to make a cost-benefit analysis of a sophisticated medical device. A person trained in psychology may find a rewarding career in such specialties as human resources or rehabilitation counseling, Each of these professionals requires education in more than one discipline.

IIT's Applied Sciences Degree Program offers students this multidisciplinary crosstraining. Undergraduates may specialize in one of eight focused professional disciplines: psychology, political science, biology, chemistry, physics, computer information systems, applied mathematics or molecular biochemistry and biophysics-linked with an interdisciplinary core of math, sciences, computing, communication, organizational behavior and humanities, which will be the basis for every professional career in the future. Undergraduates from engineering and architecture who plan to pursue graduate or professional study also are invited to participate in the Applied Sciences program.

The flexibility and broad base of the Applied Sciences Degree Program make it an ideal preparation for students planning careers in medicine, dentistry and other graduate health professions: the physical and social sciences; law; psychology; environmental studies; and graduate business. Because graduates of these programs have excellent analytic and communication skills, they are prepared to begin careers in a variety of fields after earning their undergraduate degrees.

Each student's program is highly individualized-integrating courses, projects, research and field work relevant to the student's professional goals, as well as to his or her undergraduate specialization.

Program Advisers
Timothy I. Morrison
Interim Chair of Biological, Chemical and Physical Sciences
182 Life Sciences
Ext. 73381

Bogden Korel
Interim Chair of Computer Science
237 Stuart Building
Ext. 75150

M. Ellen Mitchell
Director of Institute of Psychology
252 Life Sciences
Ext. 73500

William J. Grimshaw
Chair of Social Sciences
214 Wishnick Hall
Ext. 75129

Edwin Stueben
Interim Chair of Applied Mathematics
235D Stuart Building
Ext. 78984

Legal studies Adviser
Scott Peters
Assistant Professor of Political Science
221 Wishnick Hall
Ext. 75130

Premedical Advisers

Biology, Chemistry, Molecular Biochemistry and Biophysics, and Physics for the Professions
Dean Chapman
Associate Professor of Physics
174 Life Sciences
Ext. 73575

Psychology for the Professions
Tamara Sher
Assistant Professor of Psychology
248D Life Sciences
Ext. 73506

College of Architecture

On this threshold before the next century, architecture must fill an ever more demanding role in asserting human values in a rapidly changing, technology-driven and increasingly complex global society. The integration of new construction, along with the conservation of the old, brings together current issues of urban housing, commercial development, infrastructure and transportation, along with critical concerns for energy and sustainable environment. The resulting cultural values of community development must be adaptable to both domestic and international contexts, and thoughtful to the consequences of what we build.

The College of Architecture at IIT is uniquely positioned to provide the academic challenge of preparing students for this professional responsibility.

The college's roots are firmly embedded in Chicago's architectural history. Creative pioneers like Sullivan, Jenney, Root, Burnham and Wright produced a body of work that established the principles of modern architecture. These architects were energized by exciting new engineering possibilities, yet they never wavered from the unifying belief in a rich cultural expression of architecture for their time. They also believed in education and, in 1895, combined a course of study in drawing and construction at the Art Institute of Chicago, with the support courses of history, mathematics and engineering from the then Armour Institute of Technology. The catalog for this new program was called the Chicago School of Architecture.

Out of these beginnings, the College of Architecture continues this tradition of responding to the leading issues of architectural education and practice. Located in one of the world's greatest cities for the study of architecture, the most outstanding architectural and engineering resources of Chicago provide both faculty and reinforcement of the educational mission. Moreover, S.R. Crown Hall, designed by Mies van der Rohe, is the ultimate space to study architecture. Set within the Mies-designed campus, it has become recognized as one of the most significant buildings of the 20th Century.

Faculty

Dean
Donna V. Robertson
S. R. Crown Hall
Ext. 73230

Assistant Dean for Academic Affairs
Lee W. Waldrep
S. R. Crown Hall
Ext. 78835

Professors
Elnimeiri. Land

Associate Professors
Beltemacchi, Hovey, Robertson, Schipporeit, Sharpe, Takeuchi, Thomas

Studio Professors
Brown, Conger-Austin, Denison, Horn, Karidis, Krueck, Nicholson, Roesch, Veikos, Wetzel

Lecturers
Krawczyk

Adjunct Professors
Abdelrazaq, Baker, Bihler, Bowman, Clark, Fujikawa, Gang, Gentry, Hamill, A. Harrray, J. Hartray, Hillary, Kriegshauser, McAnulty, Moreno, Nagle, Nelson, Piotrowski, Ronan, Rubio, Shaver, Sobel, Stein, Waldrep, Yeo

Visiting Assistant Professors
Mical, Mitchell, Roy

Faculty Emeriti
Danforth, Hannaford, Utsunomiya

Instructors
Felsen, Grimes, Miller

Visiting Critics
Battle, Graham, Macfarlane

Professional Degrees

The undergraduate professional degree program at IIT has always been a comprehensive five-year fully accredited Bachelor of Architecture degree. The educational format is based on providing the fundamental body of knowledge required by the profession within a fully coordinated three-year core studio sequence. Each of the three years is team taught to horizontally integrate all courses within each year and vertically sequence learning experiences from year to year. This professional background within the three-year core becomes the preparation for the last two years of electives in design studios focused on topic areas such as 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 next 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, environmental and international context of their profession. Faculty are encouraged to broaden the upper-level studios to become real-world interdisciplinary projects. This new 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 higher education.

To clarify the difference in architectural degree programs, it should be noted that most states require an individual intending to become an architect to hold an accredited degree. Two types of degrees are accredited by the National Architectural Accrediting Board: (1) The Bachelor of Architecture, which requires a minimum of five years of study, and (2) The Master of Architecture, which requires a minimum of three years of study following an unrelated bachelor's degree or two years following a related pre-professional bachelor's degree. These professional degrees are structured to educate those students who aspire to registration and license to practice as architects. The college offers both of these degrees.

The four-year preprofessional degree, where offered, is not accredited by NAAB. The preprofessional 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 degree.)

Bachelor of Architecture

Required Courses	Credit Hours
Architecture Requirements ARCH 100, 109, 110, 113, 114, 125, 200, 201, 202, 225, 305, 306, 309, 310, 313, 417, 418, 419, 420, 423	83
City and Regional Planning Requirements CRP 201, 465	6
Mathematics Requirements MATH 119, 122	6
Physics Requirements PHYS 211, 212	6
Civil and Architectural Engineering Requirements CAE 286, 287, 351, 352, 425	16
Art and Architectural History Requirements AAH 119, 120	6
Architecture History Elective	3
Humanities and Social Science Requirements See general education requirements on page 30.	21
Interprofessional Projects	6
Architecture Electives or Specialized Minor	15
Total Credit Hours	**168**

Architecture Curriculum

Semester 1	Lect.	Lab. Hrs.	Cr. Hrs.
ARCH 100 Introduction to Architecture	1	0	1
ARCH 113 Architecture Studio I	0	12	6
ARCH 109 Freehand Drawing I	0	4	2
MATH 119 Geometry for Architects	3	0	3
ARCH 125 Introduction to Architectural Computing	2	2	3
Humanities 100-level elective	3	0	3
Totals	9	18	18

Semester 2	Lect.	Lab. Hrs.	Cr. Hrs.
ARCH 200 Introduction to Architecture	0	2	1
ARCH 114 Architecture Studio II	0	12	6
ARCH 110 Freehand Drawing II	0	4	2
MATH 122 Introduction to Mathematics II	3	0	3
PHYS 211 Basic Physics I	3	0	3
Humanities/social science elective	3	0	3
Totals	9	18	18

Semester 3			
ARCH 201 Architecture III: Structures, Building Systems and Assembly	0	10	5
AAH 119 History of World Architecture I	3	0	3
CAE 286 Theory and Concept of Structural Mechanics	4	0	4
PHYS 212 Basic Physics II	3	0	3
ARCH 225 Computer-Aided Design in Practice	1	2	3
Totals	12	12	18

Semester 4			
ARCH 202 Architecture IV: Structures, Building Systems and Assembly	0	12	6
AAH 120 History of World Architecture II	3	0	3
CAE 287 Structures I, Analysis and Behavior	3	0	3
CRP 201 The Dwelling	3	0	3
Social science elective	3	0	3
Totals	12	12	18

Semester 5			
ARCH 305 Architecture V	0	12	6
ARCH 309 Mechanical and Electrical Building Systems for Architects I	3	0	3
CRP 465 The Ecological Basis of Planning	3	0	3
CAE 351 Structures II: Steel and Timber Design	3	0	3
Architecture elective/minor	3	0	3
Totals	12	12	18

Semester 6			
ARCH 306 Architecture VI	0	12	6
ARCH 310 Mechanical and Electrical Building Systems for Architects II	3	0	3
CAE 352 Structures III: Reinforced Concrete and Masonry Design	3	0	3
ARCH 423 Architectural Programming	3	0	3
Architecture elective/minor	3	0	3
Totals	12	12	18

Semester 7			
ARCH 417 Architecture VII	0	12	6
Architectural history elective	3	0	3
Architecture elective/minor	3	0	3
Social science elective	3	0	3
Totals	9	12	15

Semester 6			
ARCH 418 Architecture VIII	0	12	6
CAE 425 Fire Protection and Life Safety in Building Design	3	0	3
IPRO elective	1	6	3
Humanities elective	3	0	3
Totals	7	18	15

Semester 9			
ARCH 419 Architecture IX	0	12	6
ARCH 313 Architectural Practice	3	0	3
Architecture elective/minor	3	0	3
Social science elective	3	0	3
Totals	9	12	15

Semester 10			
ARCH 420 Architecture X	0	12	6
Architecture elective/minor	3	0	3
IPRO elective	1	6	3
Humanities elective	3	0	3
Totals	7	18	15

Total Credit Hours **168**

Optional Programs

Architecture students are encouraged to select electives that provide a sequence of 15 credit hours of learning experiences related to a specific interest that will reinforce the curriculum.

Such topical fields of study should be chosen early in the student's program in consulcation with an academic adviser.

Bachelor of Architecture/Master of Business Administration Double-Degree Option

Qualified students may earn both the Bachelor of Architecture and Master of Business Administration (M.B.A.) degrees in six, rather than the normal seven, years. Students who are completing their eighth semester, or an equivalent of 124 credit hours, in architecture at IIT may apply for entry into the joint program. They should take preparatory courses for the M.B.A. prior to entry and the Graduate Management Admission Test during the eighth semester. Students who anticipate entering into the program should seek advising in the Stuart School of Business and the College of Architecture early in their studies at IIT.

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

Qualified students regularly 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, CAE 303, CAE, 304, CAE 307, CAE 310, CAE 431, and CAE 432 in place of MATH 119, MATH 122, CAE 287, CAE 351, CAE 352 and as technical electives. Students who anticipate entry into the combined program and who intend to specialize in construction engineering and management must successfully complete the following courses as part of the technical electives in their undergraduate program in architecture: CAE 323, CAE 431, CAE 432 and CAE 457.

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.

Biological, Chemical and Physical Sciences

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

The Department of Biological, Chemical and Physical Sciences offers traditional Bachelor of Science (B.S.) degrees in each area of biology, chemistry and physics, as well as an interdisciplinary Bachelor of Science in Molecular Biochemistry and Biophysics (M.B.B.), which combines elements of all three disciplines. Traditional programs serve as a solid foundation for entry into graduate and medical school and for jobs in both the government and the private sector. This is also true of the M.B.B. major, which is part of the honors medical programs with Rush University and the Chicago Medical School.

The department also provides specialized bachelor's degree programs that integrate the sciences with law and business; these include honors programs, similar to the M.B.B. honors medical program, which guarantee admission into IIT's Chicago Kent College of Law or Stuart School of Business. In addition, the department offers bachelor's degrees in each discipline of biology, chemistry and physics within the Applied Sciences for the Professions Program (see page 34); while still rigorous, these curricula allow students to study a somewhat wider variety of subjects than is possible in the traditional programs. Finally, research honors programs are offered in biology, chemistry and physics.

Details of the four traditional programs, as well as the specialized degree programs, can be found on the following pages.

Faculty

Chair
Timothy I. Morrison
182 Life Science
Ext. **73480**

Department Home Page
http://www.iit.edu/~bcps

Biology Faculty

Professors
D. Cork, Roth, B. Stark, Webster

Adjunct Professors
Gendel, Kilbane, McCormick, Ratajczak, Rubenstein, Sedita

Associate Professors
Erwin, Howard

Assistant Professors
Garfinkel, T.C. Irving

Faculty Emeriti
Bretz, W.F. Danforth, Grecz, Hayashi, Hoskin, Jasper, Koblick, Roush

Chemistry Faculty

Professors
Eisenberg, P.Y. Johnson, Lykos, Schug

Associate Professors
Mandal, Stetter

Assistant Professors
Khan, Stagliano

Adjunct Associate Professor
Smotkin

Faculty Emeriti
Fanta, Filler, Miller, Wood

Physics Faculty

Pritzker Professor of Science
Lederman

Professors
R. Burnstein, Erber*, P.W. Johnson, Kallend**, Rubin, Spector, Zasadzinski

Associate Professors
Bunker, Chapman, Coffey, Kaplan, Longworth, Morrison, Segre

Research Associate Professors
Port, Zhang

Adjunct Associate Professor
Gluskin

Research Assistant Professor
White

Visiting Assistant Professor
Karagiannes

Faculty Emeriti
Colvert, Grossweiner, Hauser, Mahliot, Markham, Zwicker

*Jointly with Department of Applied Mathematics
**Jointly with Department of Mechanical, Materials and Aerospace Engineering

Biology

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

A semester-by-semester outline of the biology degree program (including credit hours) is presented below. Complete course descriptions are also available.

Bachelor of Science in Biology

Required Courses	Credit Hours
Biology Requirements BIOL 100, 107, 109, 115, 117, 210, 214, 225, 320, 403, 404, 430, 445, 446, 495	40
Biology Electives	12
Interprofessional Projects Any two of the following: IPRO 297, 397, 497	6
Mathematics Requirements MATH 151, 152	**10**
Chemistry Requirements CHEM 124, 125, 237, 239, 247	18
Physics Requirements PHYS 123, 221, 223	12
Computer Science Requirement CS 105	2
Humanities/Social Science Electives	21
Free Electives	**6**
Total Credit Hours	127

Biology Curriculum

Semester 1	Cr. Hrs.
BIOL 107 General Biology-Lecture	3
BIOL 109 General Biology-Lab	2
CHEM 124 General Chemistry I	4
BIOL 100 Introduction to the Profession	2
MATH 151 Calculus I	5
Totals	**16**

Semester 2	Cr. Hrs.
BIOL 115 Human Biology-Lecture	3
BIOL 117 Experimental Biology-Lab	2
CHEM 125 General Chemistry II	4
Humanities 100-level course*	3
MATH 152 Calculus II	5
Totals	**17**

Semester 3	
BIOL 214 Genetics	3
CHEM 237 Organic Chemistry I	4
PHYS 123 General Physics I	4
Humanities/social science elective*	3
Humanities/social science elective*	3
Totals	**17**

Semester 4	
BIOL 210 Microbiology Lectures	3
CHEM 239 Organic Chemistry II	3
PHYS 221 General Physics II	4
BIOL 225 Microbiology Laboratory	2
Humanities/social science elective*	3
Totals	**15**

Semester 5	
BIOL 430 Animal Physiology	3
CHEM 247 Analytical Chemistry	3
PHYS 223 General Physics III	4
CS 105 Computer Science	2
Humanities/social science elective*	3
Totals	**15**

Semester 6	
BIOL 403 Biochemistry Lectures	4
BIOL 404 Biochemistry Laboratory	3
IPRO 397 Interprofessional Project I	3
Humanities/social science elective*	3
Free elective	3
Totals	**16**

Semester 7	
BIOL 445 Cell Biology Lectures	3
BIOL 446 Cell Biology Laboratory	3
Biology elective	3
BIOL 495 Biology Colloquium	1
BIOL 320 Literature in Biology	2
Biology elective	3
Totals	**15**

Semester 8	
Biology elective	3
Biology elective	3
Free *elective*	3
BIOL 495 Biology Colloquium	1
IPRO 497 Interprofessional Project II	3
Humanities/social science elective*	3
Totals	**16**

Total Credit Hours **127**

*Humanities and social sciences components of the general education requirement.

Chemistry

The undergraduate chemistry program at IIT provides excellent preparation for a number of professions, including chemical research, law (patent, forensic and intellectual property), medicine, business and environment. The rigorous interdisciplinary nature of the program prepares students with a greater breadth of understanding of how chemistry interrelates with other sciences and with the professions mentioned above. Graduates are also prepared for immediate entry into positions in industrial, medical or other research laboratories and for graduate studies in analytical, inorganic, organic or physical chemistry.

A semester-by-semester outline of the chemistry degree program is presented below. Complete course descriptions are also available.

Bachelor of Science in Chemistry

Required Courses	Credit Hours
Chemistry Requirements CHEM 100, 124, 125, 237, 239, 240, 247, 321, 334, 335, 343, 344, 415, 416, 451, 485	47
Interprofessional Projects IPRO 297 and 497 or 397 and 497	6
Chemistry Electives	9
Mathematics Requirements MATH 151, 152, 251, 252	18
Physics Requirements PHYS 123, 221, 223	12
Computer Science Requirement CS 105	2
Humanities/Social Science Electives	21
Free Electives	12
Total Credit Hours	**127**

Chemistry Curriculum

Semester 1	Cr. Hrs.
CHEM 124 General Chemistry I	4
CHEM 100 Introduction to the Profession	2
MATH 151 Calculus I	5
CS 105 Computer Science	2
Humanities 100-level course*	3
Totals	**16**

Semester 2	Cr. Hrs.
CHEM 125 General Chemistry II	4
PHYS 123 General Physics I	4
MATH 152 Calculus II	5
Humanities/social science elective*	3
Totals	**16**

Semester 3	
CHEM 237 Organic Chemistry I	4
CHEM 247 Analytical Chemistry	3
PHYS 221 General Physics II	4
MATH 251 Calculus III	4
Totals	**15**

Semester 4	
CHEM 239 Organic Chemistry II	3
CHEM 240 Organic Chemistry Laboratory	2
PHYS 223 General Physics III	4
MATH 252 Differential Equations	4
Humanities/social science elective*	3
Totals	**16**

Semester 5	
CHEM 343 Physical Chemistry I	3
CHEM 321 Instrumental Analysis	4
IPRO 397 Interprofessional Project I	3
Free elective	3
Humanities/social science elective*	3
Totals	**16**

Semester 6	
CHEM 344 Physical Chemistry II	4
CHEM 334 Spectroscopic Methods	2
CHEM 335 Spectroscopic and Separation Techniques	2
CHEM 415 Inorganic Chemistry	3
Free elective	3
Humanities/social science elective*	3
Totals	**17**

Semester 7	
CHEM 416 Advanced Chemistry Laboratory	3
CHEM 451 Techniques in Chemical Literature	2
CHEM 485 Chemistry Colloquium	1
Chemistry elective?	3
Free elective	3
Humanities/social science elective*	3
Totals	**15**

Semester 8	
Chemistry elective†	3
Chemistry elective†	3
CHEM 485 Chemistry Colloquium	1
Free elective	3
IPRO 497 Interprofessional Project II	3
Humanities/social science elective*	3
Totals	**16**

Total Credit Hours **127**

*Humanities and social sciences components of general education requirement.
†Any 400- or 500-level chemistry course or interdisciplinary courses with departmental consent.

Molecular Biochemistry and Biophysics

Why should a biologist know about physics and chemistry? Or physicists and chemists about biology? Just ask some of our faculty who are using x-ray synchrotron radiation science to study proteins, their molecular structures, and the drugs that interact with them. This research may lead to the development of more successful, potent drugs.

Molecular biochemistry and biophysics (M.B.B.) is an interdisciplinary major, combining biology, chemistry and physics with innovative experimental techniques.

Through this study, students will discover the essential building blocks of life, how they fit together, how they work, and the physical methods for exploring these building blocks. With its quantitative emphasis and research focus, 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 and the Chicago Medical School. In addition, M.B.B. majors may be eligible to apply for the Applied Sciences Scholarship (ranging from half to full tuition) and the Research Honors Program.

A semester-by-semester outline of the molecular biochemistry and biophysics program is presented below.

Bachelor of Science in Molecular Biochemistry and Biophysics

Required Courses	Credit Hours
Biology Requirements BIOL 100, 107, 109, 115, 117, 210, 214, 320, 403, 404, 430, 445, 446, 495	**38**
Chemistry Requirements CHEM 124, 125, 237, 239, 247 (or PHYS 300)	18
Physics Requirements PHYS 123, 221, 223, 348, 410	18
Interprofessional Projects IPRO 297, 497	6
Mathematics Requirements MATH 151, 152, 251, 252 (or PHYS 240), 476	20/21
Computer Science Requirement CS 105	2
Biology Elective	3
Humanities/Social Science Electives	21
Free Elective	3
Total Credit Hours	**129/130**

Molecular Biochemistry and Biophysics Curriculum

Semester 1	Cr. Hrs.
CHEM 124 General Chemistry I	4
BIOL 107 General Biology I-Lecture	3
BIOL 109 General Biology I-Lab	2
BIOL 100 Introduction to the Profession	2
MATH 151 Calculus I	5
Totals	**16**

Semester 2	Cr. Hrs.
CHEM 125 General Chemistry II	4
BIOL 115 Human Biology Lecture	3
BIOL 117 Experimental Biology Laboratory	2
Humanities 100-level course*	3
MATH 152 Calculus II	5
Totals	**17**

Semester 3	
PHYS 123 General Physics I	3
CHEM 237 Organic Chemistry I	4
BIOL 214 Genetics	3
MATH 251 Calculus III	4
CS 105 Computer Science	2
Totals	**16**

Semester 4	
PHYS 221 General Physics II	4
CHEM 239 Organic Chemistry II	3
BIOL 210 Microbiology Lectures	3
Humanities/social science elective*	3
IPRO 297 Interprofessional Project I	3
Totals	**16**

Semester 5	
PHYS 223 General Physics III	4
BIOL 430 Animal Physiology	3
CHEM 247 Analytical Chemistry or	
PHYS 300 Instrumentation Lab	3
BIOL 320 Literature in Biology	2
Humanities/social science elective*	3
Totals	15

Semester 6	
BIOL 403 Biochemistry Lectures	4
BIOL 404 Biochemistry Laboratory	3
PHYS 240 Computational Science or	
MATH 252 Differential Equations	3/4
Humanities/social science elective*	3
Humanities/social science elective*	3
Totals	16/17

Semester 7	
BIOL 445 Cell Biology Lectures	3
BIOL 446 Cell Biology Laboratory	3
PHYS 348 Modern Physics	3
BIOL 495 Biology Colloquium	1
IPRO 497 Interprofessional Project II	3
Humanities/social science elective*	3
Totals	**16**

Semester 8	
PHYS 410 Molecular Biophysics	3
Biology elective	3
MATH 476 Statistics	3
BIOL 495 Biology Colloquium	1
Free elective	3
Humanities/social science elective*	3
Totals	16

Total Credit Hours **129/130**

* Humanities and social sciences components of general education requirements.

Physics

The undergraduate physics program at IIT provides 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 other research laboratories and for graduate study in biophysics, solid-state physics or high energy physics.

A semester-by-semester outline of the physics degree program (including credit hours) is presented below. Complete course descriptions are also available.

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, 428, 440, 485	55
Interprofessional Projects IPRO 397, 497	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/Social Science Electives	21
Free Elective-s	12
Total Credit Hours	**128**

Physics Curriculum

Semester 1	Cr. Hrs.
PHYS 123 General Physics I	4
CHEM 124 General Chemistry I	4
PHYS 100 Introduction to the Profession	2
MATH 151 calculus I	5
Humanities 100-level course	3
Totals	18

Semester 2	Cr. Hrs.
PHYS 221 General Physics II	4
CHEM 125 General Chemistry II	4
MATH 152 Calculus II	5
Humanities/social science elective*	3
Totals	16

Semester 3	
PHYS 223 General Physics III	4
CS 105 Computer Science	2
MATH 251 Calculus III	4
Humanities/social science elective*	3
Humanities/social science elective*	3
Totals	**16**

Semester 4	
PHYS 348 Modern Physics	3
PHYS 240 Computational Science	3
MATH 252 Differential Equations	4
Humanities/social science elective*	3
Humanities/social science elective*	3
Totals	**16**

Semester 5	
PHYS 308 Classical Mechanics I	3
PHYS 300 Instrumentation Laboratory	3
IPRO 397 Interprofessional Project I	3
Mathematics elective	3
Humanities/social science elective*	3
Totals	**15**

Semester 6	
PHYS 309 Classical Mechanics II	3
PHYS 304 Kinetic Theory and Thermodynamics	3
PHYS 427 Advanced Physics Laboratory I	3
Free elective†	3
Free elective†	3
Totals	15

Semester 7	
PHYS 405 Quantum Theory I	3
PHYS 428 Advanced Physics Laboratory II	3
PHYS 413 Electricity and Magnetism I	3
PHYS 485 Physics Colloquium	1
IPRO 497 Interprofessional Project II	3
Free elective†	3
Totals	**16**

Semester 8	
PHYS 406 Quantum Theory II	3
PHYS 440 Computational Physics	3
PHYS 414 Electricity and Magnetism II	3
PHYS 485 Physics Colloquium	1
Mathematics elective	3
Free elective†	3
Totals	**16**

Total Credit Hours	**128**

* Humanities and social science components of general education requirements.

† Any advanced undergraduate or graduate physics course selected in consultation with the academic adviser.

Other Bachelor's Degree Programs in Biological, Chemical and Physical 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 summer 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. Programs

Students enrolled in the M.B.B. degree program are eligible for one of these programs. For detailed information, see page 110.

Honors Law Programs

Students in any of the BCPS Applied Sciences programs (see page 34) are eligible for this program (see page 109). For students in biology, chemistry and physics, this is a seven-year program, which can be accelerated under special conditions approved by the student's advisor.

Five-Year Financial Markets & Trading Program

This program combines an undergraduate science degree with the Stuart School of Business innovative Master of Science in Financial Markets &Trading. The five-year combined B.S./M.S. program guarantees admission to the master's program, provided the student maintains an undergraduate GPA of 3.0 and performs satisfactorily on the GMAT Students enrolled in any of the BCPS Applied Sciences programs (see page 34) are eligible for this program.

Stuart School of Business

The Stuart School of Business offers graduate degrees and teaches undergraduate courses. Because employment in many professions often leads to management responsibility, undergraduate students should consider taking a minor in management to help develop their competence as managers. A minor in management would also help those students who seek an M.B.A. after the conclusion of their undergraduate program.

Faculty

Dean
M. Zia Hassan
430C Downtown Campus
Ext. 66515

Adviser, Undergraduate Programs
John R. Twombly
446 Downtown Campus
Ext. 66538

Professors
Goldhar, Hassan, Knowles, Thomopoulos

Associate Professors
Bariff (Coleman-Fannie Mae Candies Foundation Associate Professor), Bilson, Hall, Kraft, Prabhaker, Tourk

Clinical Assistant Professors
Hamilton, Twombly

Assistant Professors
Barlow, Caudill (visiting), Imam, Quinn

Lecturers
Jabbari, Modica, Rausch

Chemical and Environmental Engineering

The IIT Department of Chemical and Environmental Engineering offers leading edge research and education programs that prepare engineers for the technological challenges of the 21st century. The department, capitalizing on its unique interdisciplinary focus, provides students with a knowledge of chemical and environmental engineering fundamentals; the capability to design processes that incorporate principles of pollution prevention; and an understanding of economic, environmental and societal issues that influence intelligent technology choices.

B.S., MS., Professional Master's and Ph.D. degree programs are offered in both chemical and environmental engineering. M.S. and Professional Master's degree programs are also offered in food process engineering. Among the innovative programs available are a 4.5-year double B.S. degree in chemical and environmental engineering and a five-year Bachelor of Science in Chemical Engineering/Master of Environmental Engineering combination. The department also offers B.S./M.D. programs in engineering and medicine (see page 110) and a combined undergraduate/graduate law program (see pages 109).

Faculty

Chair
Hamid Arastoopour
Room 127 Perlstein Hall
Ext. **73040**

Professors
Arastoopour, Beissinger, B. Bernstein, Cinar (Associate Chair, Chemical Engineering), Cooper (Vice President and Chief Academic Officer of the Main Campus), Gidaspow, Linden (Max McGraw Professor), Moschandreas (Associate Chair, Environmental Engineering), Noll, Parulekar, Selman, Wasan

Associate Professors
Anderson, Schieber, Smotkin, Teymour (S.C. Johnson Polymer Associate Professor), Venerus

Assistant Professors
Chang, Khalili, Pagilla

Adjunct Professors
Aderangi, Balasubramaniam, Caracotsios, Fields, Franek, Knowlton, Lindahl, Peters, Wang

Research Professors
Nikolov, Tulis

Part-Time Faculty
Abrevaya, Basila, Berry, Butler, Kelley, Myers, Negiz, Nykiel, Oskouie, Vamos

Faculty Emeritus
Swanson

Special Program Note for the Chemical and Environmental Engineering Programs

The Interprofessional Project Experience

Students in the chemical and environmental engineering programs must be enrolled in six credits of Interprofessional Projects according to the following format:

IPRO 296 Introduction to IPROs (1 credit)
IPRO 397 Interprofessional Project (3 credits)
IPRO 496 Design IPRO (2 credits)

IPRO 397 provides the opportunity to enroll in an IPRO offered by any academic unit. IPRO 296 and 496 create a package to accomplish interdisciplinary teamwork for process design. All project groups will have students from chemical and environmental engineering programs. IPRO 496 students attend one lecture weekly on process design and a two-hour meeting with the expanded IPRO group and their project adviser. The expanded IPRO group consists of the IPRO 496 students, IPRO 296 students and students from other academic units who have registered for the relevant IPRO 297/397/497 sections (3 credit hours). IPRO 296 students provide support to the specific design activity through literature survey, data generation and use of design software as appropriate. IPRO 496 students are responsible for developing and designing the process. IPRO 297/397/497 students enrich the project by extending the work into their areas of specialization.

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, and is integrated in environmental, economic and societal issues. Equipment design is emphasized in courses such as Fluid Mechanics and Heat-Transfer Operations, Mass-Transfer Operations, and Chemical Reaction Engineering. Control-system design is practiced in the Process 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 and Process Design IPRO) 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 equally 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 the student who wants 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 (E^3);
- Environmental Engineering;
- Polymer Science and Engineering;
- Bioengineering; and
- Process Design and Operation.

These programs are described on the following pages.

Students may also choose the following minors (see page 104):

- Air Force Aerospace Studies;
- Applied Mathematics;
- Fire Protection and Safety Engineering;
- Management;
- Military Science; and
- Naval Science.

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.

Chemical and Environmental Engineering

Bachelor of Science in Chemical Engineering

Required Courses	Credit Hours
Major Courses	
Chemical Engineering Requirements CHE 100, 101, 202, 301, 302, 317, 351, 406, 418, 423, 433, 435, 439, 451, 494	40
Mathematics Requirements MATH 151, 152, 251, 252	18
Physics Requirements PHYS 123, 221	8
Chemistry Requirements CHEM 125, 237, 239, 247, 343, 344	21
Computer Science Requirement CS 105	2
Electrical and Computer Engineering Requirement ECE 383	3
Humanities and Social Sciences Requirements See the general education requirements, page 30.	21
Technical Electives	12
Interprofessional Projects IPRO 296, 397, 496	6
Total Credit Hours	**131**

Chemical Engineering Curriculum

Semester 1	Lect.	Lab. Hrs.	Cr. Hrs.
MATH 151 Calculus I	4	2	5
CHEM 125 Principles of Chemistry II*	3	3	4
CS 105 Introduction to Computer Programming I	2	1	2
CHE 100 Introduction to the Profession I	1	2	2
Social sciences elective	3	0	3
Totals	13	8	16

Semester 2	Lect.	Lab. Hrs.	Cr. Hrs.
MATH 152 Calculus II	4	2	5
PHYS 123 Mechanics	3	3	4
Humanities elective	3	0	3
CHE 101 Introduction to the Profession II	0	4	2
Totals	10	9	14

Semester 3			
MATH 252 Introduction to Differential Equations	4	0	4
CHE 202 Material and Energy Balances	2	2	3
CHEM 237 Organic Chemistry I	3	4	4
PHYS 221 Electromagnetism and Optics	3	3	4
Humanities elective	3	0	3
Totals	15	9	18

Semester 4			
MATH 251 Multivariate and Vector Calculus	4	0	4
IPRO 296 Introduction to IPRO†	0	2	1
CHEM 239 Organic Chemistry II	3	0	3
CHEM 343 Physical Chemistry I	3	0	3
CHE 301 Fluid Mechanics and Heat-Transfer Operations	3	0	3
Humanities or social science elective	3	0	3
Totals	16	2	17

Semester 5			
CHE 302 Mass-Transfer Operations	2	2	3
CHE 351 Chemical Engineering Thermodynamics	3	0	3
CHEM 344 Physical Chemistry	3	4	4
CHEM 247 Analytical Chemistry	2	4	3
Humanities elective	3	0	3
Totals	13	10	16

Semester 6			
CHE 317 Chemical Engineering Laboratory	1	3	2
CHE 439 Numerical and Data Analysis	3	0	3
ECE 383 Electric and Electronic Circuits	3	0	3
IPRO 397 Interprofessional Project	3	0	3
CHE 433 Process Modeling and System Theory	2	2	3
Technical elective	3	0	3
Totals	15	5	17

Semester 7			
CHE 4 18 Chemical Engineering Laboratory II	1	3	2
CHE 423 Chemical Reaction Engineering	2	2	3
CHE 435 Process Control	2	2	3
CHE 494 Chemical Process Design	2	2	3
Technical elective	3	0	3
Social science elective	3	0	3
Totals	13	9	17

Semester 8			
CHE 406 Transport Phenomena	3	0	3
CHE 451 Chemical Process Thermodynamics	2	0	2
IPRO 496 Process Design IPRO†	1	2	2
Technical elective	3	0	3
Technical elective	3	0	3
Social science elective	3	0	3
Totals	15	2	16

Total Credit Hours **131**

* Initial placement in CHEM 125 requires consent of the BCPS department.

† Satisfies part of the General Education Requirement for Interprofessional Projects. Only CHE and ENVE majors may register for IPRO 296 and IPRO 496.

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

Chemical and Environmental Engineering

Professional Specializations

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

1. Energy/Environment/Economics (E^3)

Program Adviser: H. Arastoopour

Students must take a three-credit-hour course in special problems or research in energy from the following:

CHE 492 Senior Problems
MMAE 491 Undergraduate Research
MMAE 494 Undergraduate Design Project
MMAE 497 Undergraduate Special Topics
ECE 491 Undergraduate Research
ECE 497 Undergraduate Special Problems

In addition, they should choose three or four courses - at least one course from each of the following three areas:

Energy Sources and Conversion

CHE 465 Electrochemical Energy Conversion
CHE 481 Flow Through Porous Media and Fundamentals of Reservoir Engineering
CHE 483 Synthetic Energy
CHE 582 Interfacial and Colloidal Phenomena
ECE 319 Fundamentals of Power Engineering
MMAE 425 Direct Energy Conversion
CHE 565 Electrochemical Engineering

Energy and Power Distribution and Utilization/Environment

CHE 430 Petrochemical Process Operations and Design
CHE 482 LNG Fundamentals
CHE 489 Fluidization
MMAE 423 Air Conditioning and Refrigeration
MMAE 424 Internal Combustion Engines
ENVE 404 Water and Wastewater Engineering
ENVE 463 Introduction to Air Pollution Control
ENVE 476 Engineering Control of Industrial Hazards
ENVE 480 Solid Waste Engineering
ENVE 485 Pollution Prevention
ECE 411 Power Electronics
ECE 419 Power Systems Analysis
ECE 420 Analytical Methods in Power Systems
ECE 434 Control Systems with Laboratory
ECE 435 Electrical, Magnetic and Optical Properties of Materials
ECE 436 Analysis and Processing of Discrete Signals
ECE 437 Digital Signal Processing I
ECE 438 Control Systems

Energy Analysis, Economics and Policy

CHE 426 Statistical Tools for Engineers
CHE 541 The Role of Energy in Industrial Economies
CHE 543 Energy, Environment and Economics
ECON 423 Economic Analysis of Capital Investments
PS 338 Energy and Environmental Policy

Appropriate substitutions may be made with the approval of E^3 program advisers.

2. Environmental Engineering

Program adviser: D. Moschandreas

Students must take the following three courses:

ENVE 404 Water and Wastewater Engineering
ENVE 463 Introduction to Air Pollution Control
ENVE 48 1 Hazardous Waste Engineering

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

CHE 426 Statistical Tools for Engineers
ENVE 401 Introduction to Water Resources Engineering
ENVE 450 Analysis of Environmental Systems
ENVE 476 Engineering Control of Industrial Hazards
ENVE 480 Solid Waste Engineering
ENVE 485 Pollution Prevention

Appropriate substitutions may be made with the approval of the program adviser.

3. Polymer Science and Engineering

Program adviser: 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. Four courses (12 credit hours) should be taken as follows:

Students must take one of the following two courses:

CHE 450 Principles of Polymer Science and Engineering
CHEM 435 Introduction to Polymers

In addition, they should choose two courses (six credit hours) from the following

CHE 455 Polymer Processing
CHE 492 Senior Problems
CHE 538 Polymerization Reaction Engineering
CHE 555 Polymer Processing
CHE 575 Polymer Rheology
CHE 581 Processing and Applications of Polymer Composite Materials
CHEM 535 Advanced Polymer Chemistry
CHEM 537 Polymer Chemistry Laboratory
CHEM 542 Characterization of Polymers
MMAE 467 Fundamental Principles of Polymer Materials
MMAE 483 Structure/Property Relationship in Polymers
MMAE 487 Fiber-Reinforced Polymer Composite Materials
MMAE 579 Characterization of Polymers
MMAE 580 Structure and Property of Polymers
MMAE 58 1 Theory of Mechanical Behavior of Polymers

Students should take up to one course (three credit hours) from the following:

CHE 426 Statistical Tools for Engineers
CHE 489 Fluidization
CHE 582 Interfacial and Colloid Phenomena
FPE 541 Principles of Food Packaging
MMAE 451 Finite Element Methods in Engineering
MMAE 485 Manufacturing Processes

Appropriate substitutions may be made with the approval of the program adviser.

4. Bioengineering

Program adviser: S. Parulekar

Bioengineering has two career specializations:

Biomedical Engineering
Four courses (12 credit hours) most be taken and are allocated as follows:

BIOL 107 General Biology Lectures
BIOL 115 Human Biology
CHE 411 Introduction to Bioengineering

One elective is chosen from the following:

BIOL 214 Genetics and Genetics Technology
BIOL 403 Biochemistry Lectures
BIOL 414 Genetics for Engineering Scientists
BIOL 430 Animal Physiology: Lecture
BIOL 445 Cell Biology
CHE 426 Statistical Tools for Engineers
CHE 492 Senior Problems
CHE 510 Transport Phenomena in Living Systems

Biotechnology
Students must take the following course:

CHE 411 Introduction to Bioengineering

Three electives are chosen from the following:

BIOL 107 General Biology Lectures
BIOL 214 Genetics and Genetic Technology
BIOL 403 Biochemistry Lectures
BIOL 414 Genetics for Engineering Scientists
BIOL 423 Microbial Genetics Laboratory
BIOL 445 Cell Biology
CHE 426 Statistical Tools for Engineers
CHE 577 Biochemical Engineering
CHE 578 Biochemical Engineering II
CHE 579 Enzyme Reactor Engineering

5. Process Design and Operation

Program adviser: A. Cinar

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

At least two courses (six credit hours) must be taken from the following:

CHE 426 Statistical Tools for Engineers
CHE 431 Artificial Intelligence Applications in Engineering
CHE 437 Discrete Time Systems and Computer Control
CHE 507 Computer-Aided Design
CHE 508 Process-Design Optimization
CHE 528 Analysis and Simulation of Chemical Processing;
CHE 530 Advanced Process Control
CHE 532 Process Modeling
CHE 560 Statistical Quality and Process Control

Up to two courses may be selected from the following (only one may be an ENVE course):

CHE 402 Introduction to Microelectronics Fabrication Technology
CHE 430 Petrochemical Process Operations and Design
CHE 455/555 Polymer Processing
CHE 465 Electrochemical Energy Conversion
CHE 475 Food Engineering I
CHE 476 Food Engineering II
CHE 489 Fluidization
CHE 492 Senior Problems
CHE 571 Food Process Engineering
CHE 572 Advanced Food Process Engineering
ENVE 450 Analysis of Environmental Systems
ENVE 476 Engineering Control of Industrial Hazards
ENVE 485 Pollution Prevention
FPE 521 Food Process Engineering
FPE 522 Advanced Food Process Engineering

Environmental Engineering

Environmental engineering is a dynamic multidisciplinary profession that draws on fundamentals from the biological, physical, mathematical and social sciences, as well as the various engineering disciplines. Environmental engineering can be defined as the science and art of planning, designing, constructing and managing solutions to environmental problems. These problems are often multimedia, involving contaminant transport through air, water and solid phases in the environment. Furthermore, the scale of the systems involved is enormous, ranging from global warming to marine pollution, to treatment systems for emissions from a specific industry, to microbial degradation processes. Environmental engineers are involved in resource development, allocation and management to achieve and maintain sustainable development.

Environmental engineers must be able to analyze existing and potential environmental problems to develop comprehensive solutions. To meet these requirements, the environmental engineering baccalaureate curriculum begins with the mathematical and physical sciences common to all fields of engineering. It also includes courses in the natural and life sciences, which are critical to understanding the impact of development on natural systems. Advanced courses in the program include laboratory classes in sample collection and analysis as well as classes in environmental control systems design.

Bachelor of Science in Environmental Engineering

Required Courses	Credit Hours
Environmental Engineering Requirements ENVE 100, 101, 302, 305, 404, 407, 426, 463, 481, 490, 494	29
Mathematics Requirements MATH 151, 152, 251, 251	18
Physics Requirements PHYS 123, 221	8
Chemistry Requirements CHEM 125, 237, 247, 343, 344	18
Computer Science Requirement CS 105	2
Biology Requirements BIOL 107,210	6
Engineering Course Requirements CHE 202, 301, 302, 351, 423, 433	18
Humanities and Social Science Requirements See general education requirements, page 30.	21
Technical Electives	6
Interprofessional Projects IPRO 296, 397, 496	6
Total Credit Hours	132

Environmental Engineering Curriculum

Semester 1		Lect.	Lab. Hrs.	Cr. Hrs.
ENVE 100	Introduction to the Profession I	0	2	2
MATH 151	Calculus I	4	2	5
CHEM 125	Principles of Chemistry II*	3	3	4
CS 105	Introduction to Computer Programming I	2	1	2
BIOL 107	General Biology Lectures	3	0	3
Totals		12	8	16

Semester 2		Lect.	Lab, Hrs.	Cr. Hrs.
ENVE 101	Introduction to the Profession II	0	4	2
MATH 152	Calculus II	4	2	5
PHYS 123	Mechanics	3	3	4
Humanities elective		3	0	3
Totals		10	9	14

Semester 3				
MATH 252	Introduction to Differential Equations	4	0	4
CHE 202	Material and Energy Balances	2	2	3
PHYS 221	Electricity and Magnetism	3	3	4
CHEM 237	Organic Chemistry I	3	4	4
BIO 210	Microbiology Lectures	3	0	3
Totals		15	9	18

Semester 4				
MATH 251	Multivariate and Vector Calculus	4	0	4
CHE 301	Fluid Mechanics and Heat-Transfer Operations	3	0	3
CHEM 343	Physical Chemistry I	3	0	3
Social science elective		3	0	3
Humanities elective		3	0	3
IPRO 296	Introduction to IPRO**	0	2	1
Totals		16	2	17

Semester 5				
ENVE 302	Environmental Chemistry	2	3	3
CHE 302	Mass Transfer Operations	2	2	3
CHE 351	Chemical Process Thermodynamics	3	0	3
CHEM 247	Analytical Chemistry	2	4	3
CHEM 344	Physical Chemistry II	3	4	4
Totals		12	13	16

Semester 6				
ENVE 305	Geochemical Cycles	3	0	3
ENVE 463	Introduction to Air Pollution Control	3	0	3
ENVE 404	Water and Wastewater Engineering	3	0	3
IPRO 397	Interprofessional Project	3	0	3
CHE 433	Process Modeling and System Theory	3	0	3
Humanities or social science elective		3	0	3
Totals		18	0	18

Semester 7				
CHE 423	Chemical Reaction Engineering	2	2	3
ENVE 426	Statistical Tools for Engineers	3	0	3
ENVE 494	Environmental Engineering Design	2	2	3
ENVE 407	Environmental Monitoring	1	3	2
Technical elective		3	0	3
Social science elective		3	0	3
Totals		14	7	17

Semester 8				
ENVE 490	Environmental Processes Lab	1	3	2
ENVE 481	Hazardous Waste Engineering	2	3	3
IPRO 496	Process Design IPRO**	1	2	2
Technical elective		3	0	3
Humanities elective		3	0	3
Social science elective		3	0	3
Totals		13	8	16

Total Credit Hours 132

* Initial placement in CHEM 125 requires consent of the BCPS department.

** Satisfies pan of the General Education Requirement for Interprofessional Projects. Only CHE and ENVE majors may register for IPRO 296 and IPRO 496.

ROTC students may substitute two technical electives with ROTC required course.

Double-Degree Option - Chemical and Environmental Engineering Curriculum

Semester 1	Lect.	Lab. Hrs.	Cr. Hrs.
CHE/ENVE 100 Introduction to the Profession I	1	2	2
MATH 151 Calculus I	4	2	5
CHEM 125 Principles of Chemistry II	3	3	4
BIOL 107 General Biology Lectures	3	0	3
CS 105 Intro to Computer Programming	2	1	2
Totals	**13**	**8**	**16**

Semester 2	Lect	Lab. Hrs.	Cr. Hrs.
CHE/ENVE 101 Introduction to the Profession II	0	4	2
MATH 152 Calculus II	4	2	5
PHYS 123 Mechanics	3	3	4
Humanities elective	3	0	3
Totals	**10**	**9**	**14**

Semester 3			
MATH 252 Introduction to Differential Equations	4	0	4
CHE 202 Material and Energy Balances	2	2	3
PHYS 221 Electromagnetism and Optics	3	3	4
CHEM 237 Organic Chemistry I	3	4	4
BIO 210 Microbiology Lectures	3	0	3
Totals	**15**	**9**	**18**

Semester 4			
IPRO 296 Introduction to IPRO*	0	2	1
MATH 251 Multivariate and Vector Calculus	4	0	4
CHE 301 Fluid Mechanics and Heat-Transfer Operations	3	0	3
CHEM 343 Physical Chemistry I	3	0	3
CHEM 239 Organic Chemistry II	3	0	3
Humanities elective	3	0	3
Totals	**16**	**2**	**17**

Semester 5			
ENVE 302 Environmental Chemistry	2	3	3
CHE 302 Mass Transfer Operations	2	2	3
CHE 351 Chemical Transfer Thermodynamics	3	0	3
CHEM 344 Physical Chemistry II	3	4	4
Social science elective	3	0	3
Totals	**13**	**9**	**16**

Semester 6			
ENVE 305 Geochemical Cycles	3	0	3
CHE 433 Process Modeling and System Theory	2	2	3
IPRO 397 Interprofessional Project	3	0	3
ENVE 404 Water and Wastewater Engineering	3	0	3
CHE 317 Chemical Engineering Laboratory I	1	3	2
CHE 439 Numerical and Data Analysis	3	0	3
Totals	**1.5**	**5**	**17**

Semester 7			
CHE 418 Chemical Engineering Laboratory II	1	3	2
CHE 423 Chemical Reaction Engineering	2	2	3
CHE/ENVE 494 Chemical Process Design/ Environmental Engineering Design	2	2	3
CHE 435 Process Control	2	2	3
CHEM 247 Analytical Chemistry	2	4	3
Social science elective	3	0	3
Totals	**12**	**13**	**17**

Semester 8			
ENVE 490 Environmental Processes Laboratory	1	3	2
ENVE 481 Hazardous Waste Engineering	2	3	3
ENVE 463 Introduction to Air Pollution Control	3	0	3
IPRO 496 Process Design IPRO	1	2	2
CHE 406 Transport Phenomena	3	0	3
CHE 451 Chemical Process Thermodynamics	2	0	2
Totals	**12**	**8**	**15**

Semester 9			
ENVE 407 Environmental Monitoring	1	3	2
CHE 426 Statistical Tools for Engineers	3	0	3
ECE 383 Electric and Electronic Circuits	3	0	3
Social science elective	3	0	3
Humanities elective	3	0	3
Humanities or social science elective	3	0	3
Totals	**16**	**3**	**17**

Total Credit Hours **147**

ROTC students require five years to complete the double-degree program.

* CHE/ENVE 296 and 496 satisfy part of the General Education Requirement for Interprofessional Projects. Only CHE and ENVE majors may register for these courses.

Civil Engineering

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 degree 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, concrete, 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,

The Department of Civil and Architectural Engineering provides introductory undergraduate education in these six subdisciplines of civil engineering and provides professional specializations in the areas of structural, geotechnical, transportation, civil-environmental, construction engineering and architectural engineering. The department also offers graduate degree programs and conducts research in the areas of structural engineering, geotechnical engineering, transportation engineering, and construction engineering and management. In addition, the department provides undergraduate service courses to the College of Architecture in the area of structural engineering and through minors in construction management and fire protection and safety engineering.

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 Fire Protection and Safety Engineering (see page 104).

Architecture students who plan to pursue a master's degree in structural engineering should take CAE 303, 304, 307, 310, 431 and 432 in place of CAE 287, 351 and 352. Consult the ***IIT Bulletin: Graduate Programs*** for additional details.

All civil engineering students are expected 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. Please contact the Department of Civil and Architectural Engineering for information concerning this examination,

Faculty

Chair
Jamshid Mohammadi
228 Alumni Memorial
Ext. 73540

Professors
Arditi, Guralnick (Perlstein Distinguished Professor), Khisty, Mohammadi

Adjunct Professors
Carreira, Gill

Associate Professors
Budiman, O'Leary

Adjunct Associate Professors
Domel, Paintal

Assistant Professors
DeSantiago, Novak (visiting), Shen

Adjunct Assistant Professors
Fazio, Frano, Lemming, Jahedi

Faculty Emerti
Chu, Dygdon, Fiesenheiser, Hrachovsky, Loving, Milbradt

Civil and Architectural Engineering

Bachelor of Science in Civil Engineering

Required Courses	Credit Hours
Civil Engineering Requirements CAE 100, 101, 105, 221, 301, 302, 303, 304, 307, 310, 312, 315, 323, 419, 431, 432, 457, 470 and three CAE electives*	61
Technical Electives*	9
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
Engineering Course Requirements **MMAE 201, 202, 305**	9
Humanities and Social Sciences Requirements See general education requirements, page 30.	21
Total Credit Hours	135

* Of the total of six technical electives, one must be a junior-year IPRO, another must be a senior-year IPRO, and three must be CAE courses.

Civil Engineering Curriculum

Semester 1	Lect.	Lab. Hrs.	Cr. Hrs.
MATH 151 Calculus I	4	2	5
CHEM 124 Principles of Chemistry	3	3	4
CAE 100 Introduction to the Profession I	1	2	2
CAE 105 Geodetic Science	2	3	3
Humanities or social science elective	3	0	3
Totals	**13**	**10**	**17**

Semester 2	Lect.	Lab, Hrs.	Cr. Hrs.
MATH 152 Calculus II	4	2	5
CS 105 Introduction to Computing	2	1	2
CAE 101 Introduction to the Profession II	0	4	2
PHYS 123 Mechanics	3	3	4
Humanities or social science elective	3	0	3
Totals	**12**	**10**	**16**

Semester 3			
MATH 251 Calculus III	4	0	4
MMAE 201 Mechanics of Solids I	3	0	3
CAE 221 Engineering Geology	2	2	3
PHYS 221 Electromagnetism and Optics	3	3	4
Humanities or social science elective	3	0	3
Totals	**15**	**5**	**17**

Semester 4			
MATH 252 Introduction to Differential Equations	4	0	4
MMAE 305 Dynamics	3	0	3
MMAE 202 Mechanics of Solids II	3	0	3
PHYS 224 General Physics III	3	0	3
Humanities or social science elective	3	0	3
Totals	**16**	**0**	**16**

Semester 5			
CAE 301 Hydraulics and Hydrology	2	3	3
CAE 303 Structural Design I	2	3	3
CAE 304 Structural Analysis I	3	0	3
CAE 312 Engineering Systems Analysis	3	0	3
CAE 315 Materials of Construction	2	3	3
Technical elective*	3	0	3
Totals	**17**	**9**	**18**

Semester 6			
CAE 302 Fluid Mechanics and Hydraulics	3	0	3
CAE 307 Structural Design II	2	3	3
CAE 310 Structural Analysis II	3	0	3
CAE 323 Soil Mechanics	2	3	3
Technical elective*	3	0	3
Humanities or social science elective	3	0	3
Totals	**16**	**6**	**18**

Semester 7			
CAE 419 Transportation Engineering and Design	3	0	3
CAE 431 Steel and Timber Design	3	0	3
CAE 457 Geotechnical Foundation Design	3	0	3
CAE 470 Construction Methods and Cost Estimating	2	3	3
Technical elective*	3	0	3
Humanities or social science elective	3	0	3
Totals	**16**	**3**	**18**

Semester 6			
CAE 432 Concrete and Foundation Design	3	0	3
Technical electives*	9	0	9
Humanities or social science elective	3	0	3
Totals	**15**	**0**	**15**

Total Credit Hours **135**

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

* Of the total of six technical electives, one must be a junior-year IPRO, another must be a senior-year IPRO, and three must be CAE courses.

Civil and Architectural Engineering

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 adviser and chair.

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

Construction Engineering and Management: CAE 471, Construction Planning and Scheduling; CAE 472, Construction Site Operation; and CAE 473, Construction Project Administration.

Geotechnical Engineering: CAE 415, Pavement Design, Construction and Maintenance; CAE 442, Finite Element Methods in Framed Structures; and 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; and CAE 430, Probability Concepts in Civil Engineering.

Civil-Environmental Engineering: ENVE 401, Introduction to Water Resources Engineering; ENVE 480, Solid Waste Engineering; and CAE 482, Hydraulic Design of Open Channel Systems.

Architectural Engineering: Consult the department for advice on appropriate courses.

Architectural Engineering

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 performance of mechanical, acoustic, electrical and sanitation systems; lighting; systems and energy conservation; 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.

Bachelor of Science in Architectural Engineering

Required Courses	Credit Hours
Architectural Engineering Requirements CAE 100, 101, 105, 303, 304, 307, 310, 312, 315, 323, 401, 402, 457, 470, 471	61
Architecture Requirements ARCH 226, 309, 310	9
Technical Electives*	12
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
Engineering Course Requirements ECE 383; MMAE 201, 202, 305, 313, 320	18
Humanities Requirement AAH 119	3
Humanities and Social Science Electives	18
Total Credit Hours	**135**

* Of the total of four technical electives, one must be a junior-year IPRO, another must be a senior-year IPRO, and one must be a CAE course.

Architectural Engineering Curriculum

Semester 1	Lect.	Lab. Hrs.	Cr. Hrs.
MATH 151 Calculus I	4	2	5
CHEM 124 Principles of Chemistry	3	3	4
CAE 100 Introduction to the Profession I	1	2	2
CAE 105 Geodetic Science	2	3	3
Humanities or social science elective	3	0	3
Totals	13	10	17

Semester 2	Lect.	Lab. Hrs.	Cr. Hrs.
MATH 152 Calculus II	4	2	5
CS 105 Introduction to Computing	2	1	2
CAE 101 Introduction to the Profession II	0	4	2
PHYS 123 Mechanics	3	3	4
Humanities or social science elective	3	0	3
Totals	12	10	16

Semester 3			
MATH 251 Multivariate and Vector Calculus	4	0	4
AAH 119 History of World Architecture I	3	0	3
PHYS 221 Electromagnetism and Optics	3	3	4
MMAE 201 Mechanics of Solids I	3	0	3
Humanities or social science elective	3	0	3
Totals	16	3	17

Semester 4			
MATH 252 Introduction to Differential Equations	4	0	4
MMAE 305 Dynamics	2	3	3
MMAE 202 Mechanics of Solids II	3	0	3
ARCH 225 Computer-Aided Design in Practice	2	2	3
PHYS 224 Thermal and Modern Physics	3	0	3
Totals	14	5	16

Semester 5			
MMAE 320 Thermodynamics	3	0	3
CAE 303 Structural Design I	2	3	3
CAE 304 Structural Analysis I	3	0	3
CAE 315 Materials of Construction	2	3	3
ARCH 309 Mechanical and Electrical Building Systems for Architecture I	3	0	3
Humanities or social science elective	3	0	3
Totals	16	6	18

Semester 6			
CAE 307 Structural Design II	2	3	3
MMAE 313 Fluid Mechanics	3	0	3
CAE 310 Structural Analysis II	3	0	3
CAE 323 Soil Mechanics	2	3	3
ARCH 310 Mechanical and Electrical Building Systems for Architecture II	3	0	3
Technical elective*	3	0	3
Totals	16	6	18

Semester 7			
CAE 457 Geotechnical Foundation Design	3	0	3
CAE 470 Construction Methods and Cost Estimating	2	3	3
CAE 401 Building Systems Integration Studio I	1	3	2
CAE 312 Engineering Systems Analysis	3	0	3
Technical elective*	3	0	3
Humanities or social science elective	3	0	3
Totals	15	6	17

Semester 8			
CAE 471 Construction Planning and Scheduling	3	0	3
CAE 402 Building Systems Integration Studio II	0	6	2
ECE 383 Electric and Electronic Circuits	3	0	3
Technical elective*	3	0	3
Technical elective*	3	0	3
Humanities or social science elective	3	0	3
Totals	15	6	17

Total Credit Hours **136**

• Of the total of four technical electives, one must be a junior-year IPRO, another must be a senior-year IPRO, and one must be a CAE course.

Engineering Graphics

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 as used in engineering, science, business and technical work. The graphic language, 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. With the increase in technological development, 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.

Optional Programs in Engineering Graphics

Certificate Programs

Recognizing the need for drafters and designers with a strong background in special areas of graphics, the Department of Civil and Architectural Engineering offers the following engineering graphics certificate programs. These programs are 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.

Certificate in Architectural Technology Curriculum

EG 105 Engineering Graphics and Design (1-2-2)*
EG 308 Architectural Drawing I (2-2-3)
EG 309 Architectural Drawing II (2-2-3)
EG 310 Architectural Drawing III (2-2-3)
EG 312 Architectural Freehand Drawing (2-2-3)
EG 313 Architectural Detailing (2-2-3)

Certificate in Engineering Graphics and CAD Curriculum

EG 105 Engineering Graphics and Design (1-2-2)
EG 305 Advanced Engineering Graphics and Design (2-2-3)
EG 306 Engineering Descriptive Geometry (2-2-3)
EG 405 Mechanical Design Graphics (2-2-3)
EG 406 Technical and Pictorial Illustration (2-2-3)
EG 419 Computer Graphics in Engineering (2-2-3)

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 for advice on appropriate courses.

Graduate Courses

Graduate courses are available to degree-seeking undergraduate students with the approval of the course instructor and faculty adviser. See the current ***IIT Bulletin: Graduate Programs*** for course descriptions.

* Numbers in parentheses indicate lecture hours-laboratory hours-credit hours.

Computer Science

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 field of applied mathematics explores those branches of mathematics that form the foundation of science and engineering-probability and statistics, numerical analysis, and mathematical modeling. Collectively, these branches define an emerging field of study called computational science and engineering, which uses techniques drawn from applied mathematics and computer science to solve problems from various science and engineering disciplines.

Faculty

Interim Chair
Bogdan Korel
228F Stuart Building
Extension 75150

Professors
Campbell, Carbon, Evens, Frieder

Associate Professors
I. Burnstein, Christopher, Greene, Korel, Roberge

Assistant Professors
Chang, Dickens, Hood, Orlandic, Wan

Research Associate Professor
Elrad

Adjunct Associate Professors
Biernat, Chafi, Drakopoulos, Lidinsky, Soneru

Adjunct Assistant Professors
Nowicki, Trygstad, Woyna

Lecturer
Brandle

Instructors
M. Bauer, Bistriceanu, Manov

Faculty Emeriti
C. Bauer

Computer Science

The department offers two undergraduate programs in computer science: a Bachelor of Science in Computer Science and an Applied Science for the Professions Bachelor of Science 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. In addition to these programs in computer science, the Department of Computer Science and the Department of Electrical and Computer Engineering jointly offer a Bachelor of Science in Computer Engineering. This program focuses on both the digital electronics hardware used in computer systems and the software that controls this hardware, with an emphasis on the design and implementation of computer-controlled systems. This program is described in detail on page 75.

All three 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++, 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 Bachelor of Science 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 adviser 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).

Bachelor of Science in Computer Science

Required Courses	Credit Hours
Computer Science Requirements CS 100, 101, 105, 106, 330, 331, 350, 351, 430, 440, 450, 487	32
Computer Science Electives	15
Mathematics Requirements MATH 151, 152, 251, 474	17
Mathematics Electives	3
Science/Engineering Requirements PHYS 123,221	**8**
Science/Engineering Electives	6

Required Courses	Credit Hours
Humanities Requirements	
PHIL 374 or CS 485	3
Humanities 100-level course	3
Humanities Electives	**9**
Social Science Electives (including at least three hours in economics)	12
Non-Technical Elective	3
Interprofessional Projects	6
Free Electives	12
Total Credit Hours	**129**

Computer Science Curriculum

Semester 1		Lect.	Lab. Hrs.	Cr. Hrs.
CS 100	Introduction to the Profession I	1	2	2
CS 105	Introduction to Computer Programming I	2	1	2
MATH 151	Calculus I	4	1	5
Humanities	100-level course	3	0	3
Social science	elective	3	0	3
Totals		13	4	15

Semester 2		Lect.	Lab. Hrs.	Cr. Hrs.
CS 101	Introduction to the Profession II	0	4	2
CS 106	Introduction to Computer Programming II	2	1	2
MATH 152	Calculus II	4	1	5
PHYS 123	Mechanics	3	3	4
Humanities	elective	3	0	3
Totals		12	9	16

Semester 3				
CS 330	Discrete Structures	3	0	3
CS 331	Data Structures and Algorithms	2	2	3
MATH 251	Multivariate and Vector Calculus	4	0	4
PHYS 221	Electromagnetism and Optics	3	3	4
Humanities	elective	3	0	3
Totals		15	5	17

Semester 4				
CS 350	Computer Organization and Assembly Language Programming	2	2	3
CS 430	Introduction to Algorithms	3	0	3
Mathematics	elective	3	0	3
Science/engineering	elective	3	0	3
Social science	elective	3	0	3
Totals		14	2	15

Semester 5				
CS 351	Systems Programming	2	2	3
Computer science	elective	3	0	3
Science/engineering	elective	3	0	3
Humanities	elective	3	0	3
Free	elective	3	0	3
Totals		14	2	15

Semester 6				
CS 440	Programming Languages and Translators	3	0	3
Computer science	elective	3	0	3
MATH 474	Probability and Statistics	3	0	3
Social science	elective	3	0	3
IPRO I	Interprofessional Project I	1	6	3
Free	elective	3	0	3
Totals		16	6	18

Semester 7				
IPRO II	Interprofessional Project II	1	6	3
CS 450	Operating Systems I	3	0	3
CS 487	Software Engineering I	3	0	3
Computer science	elective	3	0	3
Social science	elective	3	0	3
Free	elective	3	0	3
Totals		16	6	18

Semester 8				
Computer Science	elective	3	0	3
Computer Science	elective	3	0	3
PHIL 374	Moral Issues in Computer Science or			
CS 485	Computers in Society	3	0	3
Non-technical	elective	3	0	3
Free	elective	3	0	3
Totals		15	0	15

Total Credit Hours **129**

Bachelor of Science with specialization in computer information systems

Required Courses	Credit Hours
Specialized Courses	
CS 100, 101, 105, 106, 330, 331, 350, 351	20
Computer Science Technical Electives*	15
Computer Science Electives	6
Mathematics Requirement	5
MATH 151	
Mathematics Elective	3
Science Requirements	
BIOL 107 or 115	3
CHEM 124	4
PHYS 123	4
Science Elective	3

Required Courses	Credit Hours
Humanities Requirements	3
Humanities 100-level course	
Humanities Electives	9
Psychology Requirements	
PSYCH 121, 301	6
Social Science Requirement	
PS 200	3
Social Science Electives	6
Interprofessional Projects	6
Minor Courses	15
Free Electives	18
Total Credit Hours	**129**

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

Computer Information Systems Curriculum

Semester 1		Lect.	Lab. Hrs.	Cr. Hrs.
CS 100	Introduction to the Profession I	1	2	2
CS 105	Introduction to Computer Programming	2	1	2
MATH 151	Calculus I	4	1	5
Humanities	100-level course	3	0	3
PSYCH 221	Introduction to Psychology	3	0	3
Totals		13	4	15

Semester 2		Lect.	Lab. Hrs.	Cr. Hrs.
CS 101	Introduction to the Profession II	0	4	2
CS 106	Introduction to Computer Programming II	2	1	2
Mathematics	elective	3	0	3
BIOL 115	Human Biology	3	0	3
Humanities	elective	3	0	3
Social science	elective	3	0	3
Totals		14	5	16

Semester 3				
CS 330	Discrete Structures	3	0	3
CS 331	Data Structures and Algorithms	2	2	3
CHEM 124	Principles of Chemistry I	4	0	4
PS 200	American Government	3	0	3
Humanities	elective	3	0	3
Totals		15	2	16

Semester 4				
CS 350	Computer Organization and Assembly Language Programming	2	2	3
Computer science	technical elective	3	0	3
PHYS 123	Mechanics	3	3	4
Minor course		3	0	3
Computer science	elective	3	0	3
Totals		14	5	16

Semester 5				
CS 351	Systems Programming	2	2	3
Science	elective	3	0	3
Minor course		3	0	3
Free elective		3	0	3
Free elective		3	0	3
Totals		14	2	15

Semester 6				
Computer science	technical elective	3	0	3
PSYCH 301	Industrial Psychology	3	0	3
Minor course		3	0	3
IPRO I	Interprofessional Project I	1	6	3
Humanities	elective	3	0	3
Free elective		3	0	3
Totals		16	6	18

Semester 7				
Computer science	technical elective	3	0	3
Computer science	technical elective	3	0	3
Minor course		3	0	3
Social science	elective	3	0	3
Computer science	elective	3	0	3
Free elective		3	0	3
Totals		18	0	18

Semester 8				
IPRO II	Interprofessional Project II	1	6	3
Computer science	technical elective	3	0	3
Minor course		3	0	3
Free elective		3	0	3
Free elective		3	0	3
Totals		13	6	15

Total Credit Hours **129**

Institute of Design

The Institute of Design no longer offers an undergraduate degree program but encourages students with undergraduate degrees in disciplines other than design to apply to its master's and Ph.D. programs. For further information, call 312.595.4900.

Faculty

Director
Patrick F. Whitney
350 N. LaSalle Street
312.595.4900

Professors
Fahnstrom, Heskett, Whitney

Associate Professors
Grimes, Poggenpohl, Prygrocki, Sato

Assistant Professors
Blevis, Wolke

Senior Lecturers
K. McCoy, M. McCoy

Visiting Faculty
Cain, Conley, Ichikawa, Keeley, Pycha, Sivasankaran, Thaler

Electrical and Computer Engineering

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.) in conjunction with the Department of Computer Science. Both degree programs are accredited by the Engineering Accreditation Commission of the Accreditation Board of Engineering and Technology (ABET).

The department also offers the following minors (see page 104):

- Ah Force Aerospace Studies;
- Applied Solid State Physics;
- Energy/Environment/Economics (E^3);
- Management;
- Military Science;
- Naval Science;
- Pre-Med for environmental engineering majors: and
- 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 electives. The curriculum is described in detail on page 74.

Some students may wish to combine the full breadth of the B.S.E.E. curriculum with a concentration on computer systems. For these students, the department offers a computer systems specialization of the B.S.E.E. degree. The specialization includes the full B.S.E.E. curriculum and specific courses in computer science and electrical engineering.

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. This curriculum is described in detail on page 76.

The ECE department considers the advising of students as an important obligation. Each semester, each student must meet with his/her faculty adviser during the preregistration period. Students must closely adhere to course prerequisites to maximize academic performance and satisfy requirements for ABET accreditation. Faculty advisers for all EE and CPE degree students are listed on the department's bulletin board.

Faculty

Interim Chair
Donald R. Ucci
127 Siegel Hall
Ext. **73400**

Associate Chair
John Nestor
141 Siegel Hall
Ext. **73386**

Department Home Page
ece.iit.edu
(includes faculty e-mail addresses and phone numbers)

Professors
Arzbaecher, LoCicero, Saniie, Shahidehpour, H. Stark (Carl and Paul Bodine Distinguished Professor), Wong

Adjunct Professor
Briley

Associate Professors
Atkin, Galatsanos, Nestor, Patterson, Saletta, Troyk, Ucci, Williamson

Assistant Professors
Chan (Motorola Assistant Professor), Flueck, Mills (visiting), Ramesh, Saraniti, Wang, Wernick, Wu (visiting), Yang

Lecturers
Behera, Tagliavia

Faculty Emeriti
Armington, Martin, Peach, Weber

CPE Program Faculty
Chang (CS), Galatsanos (ECE), Hood (CS), Korel (CS), Nestor (ECE), Ramesh (ECE), Roberge (CS), Saniie (ECE)

Electrical Engineering

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 day-to-day life, as evidenced by examples such as wireless communications, power distribution, computerized traffic control, noise pollution monitoring and abatement, and medical instrumentation.

Bachelor of Science in Electrical Engineering

Required Courses	Credit Hours
Electrical Engineering Requirements ECE 100, 101, 211, 212, 213, 214, 218 242, 307, 308, 309, 311, 312, 319	40
Professional Elective-s	14
Mathematics Requirements MATH 151, 152, 251, 252, 333, and MATH 475 or ECE 475	24
Physics Requirements PHYS 123, 221, 224	11
Chemistry Requirement CHEM 124	4

Required Courses	Credit Hours
Computer Science Requirement CS 105	2
Humanities and Social Sciences Requirements See general education requirements, page 30.	21
Engineering Course Requirement MMAE 320	3
Science Electives BIOL 107, MS 201 or CHEM 126	3
Technical Selection Elective	3
Interprofessional Projects	6
Total Credit Hours	131

Bachelor of Science in Electrical Engineering with specialization in computer systems

The following courses must be completed in addition to required courses for the B.S.E.E. degree.

CS 106	Introduction to Computer Programming II
CS 331*	Data Structures and Algorithms
CS 450	Operating Systems
ECE 441**	Microcomputers
ECE 429	Introduction to VLSI Design or
ECE 446**	Logic Design and Implementation
ECE 448**	Mini/Micro Computer Programming

* This course serves as a technical selection.

**These courses serve as professional ECE electives.

Electrical Engineering Curriculum

Semester 1	Lect.	Lab. Hrs.	Cr. Hrs.
MATH 151 Calculus I	4	1	5
CHEM 124 Principles of Chemistry I	3	3	4
CS 105 Introduction to Computer Programming I	2	1	2
ECE 100 Introduction to the Profession I	1	2	2
Social science elective	3	0	3
Totals	**13**	**7**	**16**

Semester 2	Lect.	Lab. Hrs.	Cr. Hrs.
MATH 152 Calculus II	4	1	5
PHYS 123 Mechanics	3	3	4
Science elective*	3	0	3
ECE 101 Introduction to the Profession II	0	4	2
Humanities 100-level course	3	0	3
Totals	**13**	**8**	**17**

Semester 3			
MATH 252 Introduction to Differential Equations	4	0	4
PHYS 221 Electromagnetism and Optics	3	3	4
ECE 211 Circuit Analysis I	3	0	3
ECE 212 Analog and Digital Laboratory I	0	3	1
ECE 218 Digital Systems	3	0	3
Social science elective	3	0	3
Totals	**16**	**6**	**18**

Semester 4			
MATH 251 Multivariate and Vector Calculus	4	0	4
PHYS 224 Thermal and Modern Physics	3	0	3
ECE 213 Circuit Analysis II	3	0	3
ECE 214 Analog and Digital Laboratory II	0	3	1
ECE 242 Digital Computers and Computing	3	0	3
Totals	**13**	**3**	**14**

Semester 5			
MATH 333 Matrix Algebra and Complex Variables	3	0	3
IPRO I** Interprofessional Project I	1	6	3
ECE 307 Electrodynamics	3	3	4
ECE 311 Engineering Electronics	3	3	4
Humanities elective	3	0	3
Totals	**13**	**12**	**17**

Semester 6			
ECE 308 Signals and Systems	3	0	3
ECE 309 Traveling Waves	3	0	3
ECE 312 Electronic Circuits	3	3	4
ECE 319 Fundamentals of Power Engineering	3	3	4
Social science elective	3	0	3
Totals	**15**	**6**	**17**

Semester 7			
Professional ECE elective †	3	0	3
Professional ECE elective †	3	3	4
ECE 475 Random Phenomena in Electrical Engineering or	3	0	3
MATH 475 Probability	3	0	3
IPRO II** Interprofessional Project II	1	6	3
Humanities elective	3	0	3
Totals	**13**	**9**	**16**

Semester 8			
Professional ECE elective †	3	0	3
Professional ECE elective †	3	3	4
Technical selection ††	3	0	3
MMAE 320 Thermodynamics	3	0	3
Humanities or social science elective	3	0	3
Totals	**15**	**3**	**16**

Total Credit Hours **131**

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

* Science elective must be BIOL 107, 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 adviser approval.)

† 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 adviser and the 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 adviser approval.

†† The technical selection may be chosen from CS 331, MMAE 200, Technical IPRO or other departmental-approved courses.

Computer Engineering

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 high-definition television (HDTV), 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.

Bachelor of Science in Computer Engineering

Required Courses	Credit Hours
Computer Engineering Requirements	
CPE 100, 101	4
CS 105, 106, 330, 331, 350, 351, 450, 470, 487	25
ECE 211, 212, 213, 214, 218, 311, 441	19
Mathematics Requirements	
MATH 151, 152, 251, 252, 474	21
Junior mathematics elective (MATH 333 or 471)	3
Physics Requirements	11
PHYS 123, 221, 224	
Chemistry Requirement CHEM 124	4
Engineering Science Requirement MMAE 200 or MMAE 320	3
Humanities and Social Sciences Requirements See general education requirements, page 30.	21
Junior Computer Engineering Elective ECE 307, 308, 309, 312 or 319	3/4
Professional Electives	9/10
Interprofessional Projects	6
Total Credit Hours	129/131

Computer Engineering Curriculum

Semester 1		Lect.	Lab. Hrs.	Cr. Hrs.
MATH 151	Calculus I	4	1	5
CPE 100	Introduction to the Profession I	1	2	2
Humanities	100-level course	3	0	3
CHEM 124	Principles of Chemistry I	3	3	4
CS 105	Introduction to Computer Programming I	2	1	2
Totals		13	7	16

Semester 2		Lect.	Lab. Hrs.	Cr. Hrs.
MATH 152	Calculus II	4	1	5
CPE 101	Introduction to the Profession II	0	4	2
Social science elective		3	0	3
PHYS 123	Mechanics	3	3	4
CS 106	Introduction to Computer Programming II	2	1	2
Totals		12	9	16

Semester 3				
MATH 252	Introduction to Differential Equations	4	0	4
PHYS 221	Electromagnetism and Optics	3	3	4
ECE 211	Circuit Analysis I	3	0	3
ECE 212	Analog and Digital Laboratory I	0	3	1
ECE 218	Digital Systems	3	0	3
CS 331	Data Structures and Algorithms	2	2	3
Totals		15	8	18

Semester 4				
MATH 251	Multivariate and Vector Calculus	4	0	4
PHYS 224	Thermal and Modern Physics	3	0	3
ECE 213	Circuit Analysis II	3	0	3
ECE 214	Analog and Digital Laboratory II	0	3	1
CS 350	Computer Organization and Assembly Language Programming	2	2	3
CS 330	Discrete Structures	3	0	3
Totals		15	5	17

Semester 5				
Engineering science elective*		3	0	3
ECE 311	Engineering Electronics	3	3	4
CS 351	Systems Programming	2	2	3
Junior mathematics elective**		3	0	3
Humanities elective		3	0	3
Totals		14	5	16

Semester 6				
Junior computer engineering elective***		3	0/3	3/4
CS 450	Operating Systems I	3	0	3
MATH 474	Probability and Statistics†	3	0	3
IPRO I	Interprofessional Project I††	1	6	3
Social science elective		3	0	3
Totals		13	6/9	15/16

Semester 7				
ECE 441	Microcomputers	3	3	4
CS 470	Computer Architecture I	2	2	3
CS 487	Software Engineering I	3	0	3
Professional elective†††		3	0	3
Social science or humanities elective		3	0	3
Totals		14	5	16

Semester 8				
Professional elective†††		3	0/3	3/4
Professional elective†††		3	0	3
IPRO II	Interprofessional Project II††	1	6	3
Humanities elective		3	0	3
Social science elective		3	0	3
Totals		13	6/9	15/16

Total Credit Hours **129/131**

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

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

**Junior mathematics elective: Choose either MATH 333 or MATH 471.

† ECE 475 may be substituted with adviser approval.

†† Interprofessional projects may be taken at any time during the sophomore,

adviser approval.)

††† Professional electives may be chosen from the 400-level ECE courses identified with a (P) in the course descriptions except ECE 448, and any 400-level

sional elective must be CS 471, ECE 429 or ECE 446. A maximum of three credits of Undergraduate Research (ECE 491 or CS 491) or Special Problems (ECE 497 or CS 495) may be used as a professional elective with adviser approval.

Lewis Department of Humanities

The Lewis Department of Humanities offers courses in writing, literature, history, foreign languages, art and architectural history, and philosophy. The department has four objectives:

1. To offer students the opportunity to pursue their 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.

2. To strengthen the ability of all IIT students to formulate and express ideas. In addition to composition courses for both native English 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 technical and business writing. Advanced courses provide further exposure to critical thinking and the communication of ideas.

3. To support the requirements of IIT's professional degree programs. Courses marked with an (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 that are of special relevance to students preparing for careers in the law in IIT's preprofessional degree programs.

4. 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.

Faculty

Chair
Paul F. Barrett
218 Siegel Hall
Ext. 73465

Professors
Davis, Feinberg, Harrington, Ladenson, Root, Schmaus

Associate Professors
Barrett, Fox-Good, Misa, Snapper (Associate Chair)

Assistant Professors
Brande, Coogan, Pulliam, Quiroz

Lecturer
Dabbert

Faculty Emeriti
Applebaum, Irving, Knepler, Sawyier, Zesmer

Manufacturing Technology

The Bachelor of Manufacturing Technology is a transfer program designed to enable community college A.A.S. graduates who are interested in manufacturing to complete their bachelor's degree while they are working.

Admission to the manufacturing technology program is competitive. It is based on a review of college transcripts, documentation of work experience, and an admission interview. The applicant must hold an A.A.S. degree from an accredited college or the equivalent.

The degree should be in an appropriate technical field. Only courses in which the student has earned a grade of "C" or better may be accepted for transfer. Students admitted must have previously completed the following requirements or make them up while working on the B.M.T. degree. The degree requires 126 hours including transfer and coursework completed at IIT.

Faculty

Program Director
Keith E. McKee
125 Engineering I
Ext. **73650**

Program Coordinator
Pamela Houser
Ext. 73584

Outreach Coordinator
Jerry Field
Ext. 73651

Department Home Page
www.iit.edu/~iitbmt/bmt.html

Chairman, Academic Overview Committee
Kalpakjian

Adjunct Professor
Levine

Part-Time Faculty
Copley, English, Feldy, Gibson, Maurer, Nemeth, Sud, Thakkar, Tomal, Vohra

Technology Transfer
Michal Safar

Admission Requirements

Mathematics
Six credit hours of mathematics 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. Up to 6 credit hours may be in graphics/drafting. Coursework should include at least one laboratory science. In some cases, certain technology courses might be applied to this requirement.

Humanities
Six credit hours. Relevant studies include literature, philosophy (except logic) and history.

Social Sciences
Three credit hours. These typically include anthropology, geography, political science, psychology, sociology and economics.

Manufacturing Technology Curriculum

A total of 66 credits (22 courses) are required for the degree for a total of 126 credit hours. This includes four senior-level humanities and social science electives. The 18 required courses focus on all facets of plant operations, including materials, marketing, planning and budgeting, as well as communications, supervisory skills and software applications.

Semester 1		Lect.	Lab. Hrs.	Cr. Hrs.
MT 301	Technical Communications	3	0	3
MT 305	Computers in Manufacturing	3	0	3
MT 315	Manufacturing Enterprises	3	0	3
Totals		9	0	9

Semester 2		Lect.	Lab. Hrs.	Cr. Hrs.
MT 311	Production and Operations	3	0	3
MT 313	Materials in Manufacturing	3	0	3
Humanities elective*		3	0	3
Totals		9	0	9

Semester 3				
MT 321	Computer Integrated Manufacturing	3	0	3
MT 323	Manufacturing Management and Planning	3	0	3
Social science elective*		3	0	3
Totals		9	0	9

Semester 4				
MT331	Product Design in Manufacturing	3	0	3
MT 333	Resource Management in Manufacturing	3	0	3
Social science elective*		3	0	3
Totals		9	0	9

Semester 5				
MT 404	Sales, Marketing, and Product Introduction in Manufacturing	3	0	3
MT 406	Quality Control in Manufacturing	3	0	3
IPRO 397	Interprofessional Project	1	6	3
Totals		7	6	9

Semester 6				
MT 412	Manufacturing Processes	3	0	3
MT 432	Vendor/Customer Relations	3	0	3
Totals		6	0	6

Semester 7				
MT 424	Management Information Systems in Manufacturing	3	0	3
MT 426	Decision-Making and Risk Analysis in Manufacturing	3	0	3
Humanities elective*		3	0	3
Totals		9	0	9

Semester 8				
MT 422	Manufacturing Technology	3	0	3
MT 414	Topics in Manufacturing	3	0	3
Totals		6	0	6

Total Credit Hours 66

* Six credit hours of 300/400-level social science and six credit hours of 300/400-level humanities electives are required.

Mechanical, Materials and Aerospace Engineering

The Department of Mechanical, Materials and Aerospace Engineering offers the Bachelor of Science degree in mechanical engineering (B.S.M.E.), metallurgical and materials engineering (B.S.M.M.E.), and aerospace engineering (B.S.A.E.). These degree programs are accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).

All three programs build upon a strong foundation in mathematics and basic sciences, the humanities and social sciences, and a balance of engineering topics in the respective disciplines; include innovative engineering activities and opportunities for undergraduate students; and are responsive to the changing needs of industry. The aim is to educate individuals for professional careers in engineering and to provide the basis for life-long learning and advanced study at the graduate level.

In recognition of the changing professional environment in which IIT's graduates will function, the MMAE department programs place substantial emphasis on the following:

- Teaching students to understand the economic, ethical, societal, environmental and international context of their professional activities.
- Improving oral and written communication skills.
- Training students to work in multidisciplinary teams.
- Preparing students for the interprofessional work force of the 21st century.
- Enhancing students' abilities to link science and engineering principles to key technologies.

Faculty

Chair
Marek Dollar
243 Engineering 1
Ext. 73175

Department Home Page
http://mmae.iit.edu
(includes faculty e-mail addresses)

Professors
Barnett, Corke, Dix, M. Dollar, Kallend, Kalpakjian, Nagib (Rettaliata Distinguished Professor), Nair, Nash, Porter, Todd (Associate Chair, Metallurgical and Materials Engineering Program and Iron and Steel Society Professor), Way (Associate Chair, Aerospace Engineering Program), Williams

Associate Professors
Aronov, Meade (Associate Chair, Mechanical Engineering Program), Mostovoy, Ruiz, Wark

Assistant Professors
A. Dollar, Cassel, Foley (Finkl Assistant Professor), Gosz, Tarabishy (visiting), Tszeng

Research Professors
Broutman, Kumar, Sciammarella

Research Assistant Professors
Hires

Lecturer
Jennings

Adjunct Professors
Copley, Morel, Natarajan, Patwardhan, Routbort, Singh

Adjunct Associate Professor
Mansy, Thakkar

Faculty Emeriti
Bonthron, Breyer, Donnell, Fejer, Gordon, Graham, Higgins, Lavan, Morkovin, Rasof, Rettaliata, Tao, Torda

Mechanical, Materials and Aerospace Engineering

Students are introduced to the scope of the engineering profession in the first-year courses Introduction to the Profession I and II, 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 MME 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 years.

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 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 capstone design courses. Mechanical engineering projects involve design of thermal and mechanical systems; metallurgical and materials engineering students develop new or optimized materials, processing routes and selection schemes; and aerospace engineering students produce conceptual designs of aircraft and spacecraft missions.

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.

Metallurgical and Materials Engineering

The metallurgical and materials 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 microscopies 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.

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 aeronautics, 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.

Mechanical, Materials and Aerospace Engineering

Advising

The MMAE department considers the advising of students an important obligation. Each student must meet with a faculty adviser during the pre-registration period each semester. Students must closely adhere to course prerequisites to maximize academic performance and satisfy requirements for ABET accreditation. Faculty advisers for all MMAE students are listed on the departmental bulletin board.

Program requirements may not be waived, nor will substitutions be permitted, without the approval of the appropriate associate chair.

Minors

Minors available to students who wish to broaden their knowledge can be found beginning on page 105. In the B.S.M.E. and B.S.A.E. programs, two of the required minor courses substitute for the two technical electives. In the B.S.M.M.E. program, these are substituted for the two MME electives. Minors other than those listed below may be undertaken with the approval of the student's faculty adviser 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, MME and AE students are:

- Aerospace Engineering (for ME students only);
- Air Force Aerospace Studies;
- Applied Solid State Physics (for MME students only);
- Construction Management;
- Electromechanical Design and Manufacturing (for ME and AE students only);
- Energy/Environment/Economics (E^3);
- Environmental Engineering;
- Fire Protection and Safety Engineering;
- Management;
- Materials Engineering (for ME or AE students only);
- Mechanical Engineering (for AE students only):
- Military Science;
- Naval Science;
- Polymer Science and Engineering;
- Premedical Studies; and
- Software Engineering.

Mechanical, Materials and Aerospace Engineering

Bachelor of Science in Mechanical Engineering, Bachelor of Science in Metallurgical and Materials Engineering, and Bachelor of Science in Aerospace Engineering

Required Courses for the first two years	Credit Hours
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
Engineering Graphics Requirement EG 105	2
Material Sciences Requirement MS 201	3
Mechanical, Materials and Aerospace Engineering Requirements MMAE 100, 101, 201, 202, 271	15
Humanities/Social Science Electives	12

Additional Courses Required for the B.S.M.E. Degree in the third and fourth years	Credit Hours
Mechanical and Aerospace Engineering Requirements MMAE 303, 305, 310, 320, 321, 322, 350, 430, 431, 432 or 433, 443, 485	40
Physics Requirement PHYS 300	3
Interprofessional Projects	6
Technical Electives	6
Humanities/Social Science Electives	9
Total Credit Hours, B.S.M.E.	131

Additional Courses Required for the B.S.M.M.E. Degree in the third and fourth years	Credit Hours
Metallurgical and Materials Engineering Requirements MMAE 361, 362, 363, 370, 464, 465, 467, 468, 474, 476, 482, 485	36
Physics Requirement PHYS 300	3
Interprofessional Projects	6
Metallurgical and Materials Engineering Electives	6
Humanities/Social Science electives	9
Total Credit Hours, B.S.M.M.E.	127

Additional Courses Required for the B.S.A.E. Degree in the third and fourth years	Credit Hours
Mechanical and Aerospace Engineering Requirements MMAE 304, 305, 310, 311, 312, 320, 322, 350, 430, 436, 441, 452	40
Physics Requirement PHYS 300	3
Interprofessional Projects	6
Technical Electives	6
Humanities/Social Science Electives	9
Total Credit Hours, B.S.A.E.	131

Mechanical. Materials and Aerospace Engineering

B.S.M.E., B.S.M.M.E. and B.S.A.E. Curricula

Curricula for B.S.M.E., B.S.M.M.E. and B.S.A.E. are the same in the first two years.

Semester 1	Lect.	Lab. Hrs.	Cr. Hrs.
MMAE 100 Introduction to the Profession I	1	4	3
EG 105 Engineering Graphics and Design	1	2	2
CHEM 124 Principles of Chemistry	3	3	4
MATH 151 Calculus I	4	2	5
Humanities or social science elective	3	0	3
Totals	**12**	**11**	**17**

Semester 2	Lect.	Lab. Hrs.	Cr. Hrs.
MMAE 101 Introduction to the Profession II	1	4	3
CS 105 Introduction to Computing	2	1	2
PHYS 123 Mechanics	3	3	4
MATH 152 Calculus II	4	2	5
Humanities or social science elective	3	0	3
Totals	**13**	**10**	**17**

Semester 3			
MMAE 201 Mechanics of Solids I	3	0	3
MS 201 Materials Science	3	0	3
PHYS 221 Electricity and Magnetism	3	3	4
MATH 251 Multivariate and Vector Calculus	4	0	4
Humanities or social science elective	3	0	3
Totals	**16**	**3**	**17**

Semester 4			
MMAE 202 Mechanics of Solids II	3	0	3
PHYS 224 Thermal and Modern Physics	3	0	3
MATH 252 Introduction to Differential Equations	4	0	4
MMAE 271 Engineering Materials and Design	2	3	3
Humanities or social science elective	3	0	3
Totals	**15**	**3**	**16**

Mechanical Engineering: Third and Fourth Years

Semester 5			
PHYS 300 Instrumentation Laboratory	2	3	3
MMAE 305 Dynamics	3	0	3
MMAE 310 Fluid Mechanics	3	3	4
MMAE 320 Thermodynamics	3	0	3
MMAE 350 Computational Mechanics	3	3	4
Totals	**14**	**9**	**17**

Semester 6			
MMAE 303 Mechanics of Solids III	3	0	3
MMAE 321 Applied Thermodynamics	3	0	3
MMAE 322 Heat and Mass Transfer	3	3	4
IPRO I Interprofessional Project I	1	6	3
Humanities or social science elective	3	0	3
Totals	**13**	**9**	**16**

Semester 7			
MMAE 430 Engineering Measurements	2	6	4
MMAE 431 Design of Machine Elements	2	3	3
MMAE 485 Manufacturing Processes	3	0	3
IPRO II Interprofessional Project II	1	6	3
Humanities or social science elective	3	0	3
Totals	**11**	**15**	**16**

Semester 8			
MMAE 432 Design of Mechanical Systems or	1	6	3
MMAE 433 Design of Thermal Systems	2	3	3
MMAE 443 System Analysis and Control	3	0	3
Technical elective*	3	0	3
Technical elective*	3	0	3
Humanities or social science elective	3	0	3
Totals	**13/14**	6/3	**15**

Total Credit Hours **131**

* 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, physics or computer science. However, not all such courses are acceptable as technical electives. See your faculty adviser for a determination of which courses are acceptable. In addition, ECE 218 and ECON 423 are permitted. Any deviations require written approval by the associate chair of the student's major.

Mechanical, Materials and Aerospace Engineering

Metallurgical and Materials Engineering: Third and Fourth Years

Semester 5			
PHYS 300 Instrumentation Laboratory	2	3	3
MMAE 362 Physics of Solids	3	0	3
MMAE 363 Metallurgical and Materials Thermodynamics	3	0	3
MMAE 370 Materials Laboratory I	1	6	3
Humanities or social science elective	3	0	3
Totals	**12**	**9**	**15**

Semester 6			
MMAE 361 Fundamentals of Crystalline Solids	3	0	3
MMAE 465 Electrical, Magnetic and Optical Properties of Materials	3	0	3
Metallurgical and materials elective	3	0	3
IPRO I Interprofessional Project I	1	6	3
Humanities or social science elective	3	0	3
Totals	**13**	**6**	**15**

Semester 7			
MMAE 464 Physical Metallurgy	3	0	3
MMAE 467 Fundamental Principles of Polymer Materials	3	0	3
MMAE 468 Introduction to Ceramic Materials	3	0	3
MMAE 482 Composites	3	0	3
Humanities or social science elective	3	0	3
Totals	**15**	**0**	**15**

Semester 8			
MMAE 474 Metals Processing	2	3	3
MMAE 476 Materials Laboratory II	2	3	3
MMAE 485 Manufacturing Processes	3	0	3
Metallurgical and Materials elective	3	0	3
IPRO II Interprofessional Project II	1	6	3
Totals	**11**	**12**	**15**

Total **Credit** Hours ***127***

Aerospace Engineering: Third and Fourth Years

Semester 5	Lect.	Lab. Hrs.	Cr. Hrs.
MMAE 305 Dynamics	3	0	3
MMAE 310 Fluid Mechanics	3	3	4
MMAE 320 Thermodynamics	3	0	3
MMAE 350 Computational Mechanics	3	3	4
Humanities or social science elective	3	0	3
Totals	**15**	**6**	**17**

Semester 6	Lect.	Lab. Hrs.	Cr. Hrs.
PHYS 300 Instrumentation Laboratory	2	3	3
MMAE 304 Mechanics of Aerostructures	3	0	3
MMAE 311 Compressible Flow	3	0	3
MMAE 312 Aerodynamics of Aerospace Vehicles	3	0	3
IPRO I Interprofessional Project I	1	6	3
Totals	**12**	**9**	**15**

Semester 7			
MMAE 322 Heat and Mass Transfer	3	3	4
MMAE 441 Aerospace Dynamics	3	0	3
MMAE 452 Aerospace Propulsion	3	0	3
IPRO II Interprofessional Project II	1	6	3
Humanities or social science elective	3	0	3
Totals	**17**	**9**	**16**

Semester 8			
MMAE 430 Engineering Measurements	2	6	4
MMAE 436 Design of Aerospace Vehicles	2	3	3
Technical elective*	3	0	3
Technical elective*	3	0	3
Humanities or social science elective	3	0	3
Totals	**13**	**9**	**16**

Total Credit Hours 131

* See footnote, page 84.

Graduate Courses

Graduate courses are available to degree-seeking undergraduate students with the approval of the course instructor and faculty adviser. See the current ***IIT Bulletin: Graduate Programs*** for course descriptions.

Institute of Psychology

Psychology has as its objective understanding the manner in which organizations, human beings and animals behave, learn and interact and the ways in which their behavior can be modified.

The Institute of Psychology offers two distinct psychology programs, as well as options for honors pre-med and law. One program is a traditional Bachelor of Science in Psychology, The other is a unique research-based, human-behavior-oriented B.S. program, blending the strengths of highly successful graduate programs in clinical, industrial/organizational, and rehabilitation psychology The program incorporates recommendations of the American Psychological Association for undergraduate education in the four basic areas of social, individual differences, physiology and learning and cognition, as well as Illinois Institute of Technology's focus on interdisciplinary, project-based learning. Designed for highly motivated, career-oriented students, this new program emphasizes the integration of applied research with faculty and practical experience in professional settings, in conjunction with traditional classroom activities. The four-year learning experience is highlighted and supported by a faculty mentorship model, individual advising, and both individual and group activities with faculty, graduate and other undergraduate students. On the following pages are a list of required courses and a sample program of study. Students should also refer to page 34 of this bulletin for additional information on this Applied Sciences Program.

Most psychologists hold advanced degrees, and this innovative program will provide students with excellent preparation for graduate school. Jobs in many fields are open to persons holding only a bachelor's degree in psychology, including new burgeoning areas of geriatrics, health and sports counseling, behavioral medicine, and managed health care, as well as traditional settings such as schools, courts, hospitals, industries and research laboratories. Many students also will find psychology highly beneficial as a pre-professional major for advanced studies in medicine, dentistry, law, business or public administration.

In summary, the institute's curriculum encompasses the major changes that have occurred in psychology over the past 25 years and prepares students for the twenty-first century, whether it be in psychology or another professional field.

Faculty

Director
M. Ellen Mitchell
252 Life Sciences
Ext. 73500

Professors
Geist, Huyck, Lam, Raju, Schleser, Wolach

Associate Professors
Ayman, Hopkins, Merbitz, Mitchell, Young

Assistant Professors
Hansen, Hilburger, Morris, Paquin (visiting), Sher, Roth, Rokicki

Faculty Emeritus
Vermillion

Bachelor of Science in Psychology, Applied Sciences Program

Required Courses	Credit Hours
Psychology Requirements PSYC 204, 221, 222, 301, 303, 406, 435 or 436, 482, 483, 487, 488	33
Introduction to the Profession 100 (2 semesters)	4
Psychology Electives	15
Mathematics Requirements MATH 122, 221	6
Computer Science Requirement CS 105	2
Interprofessional Projects	6
Natural Sciences Requirements CHEM 124, BIOL 107 and/or 115*, PHYS 211	12-13
Humanities and Social Sciences Requirements See general education requirements, page 30. (21 hrs) Social science electives (3 hrs)	24
Fourth-year capstone project	3
Free electives	21
Total Credit Hours	**126-127**

* In the absence of a lab to accompany BIOL 107 or 115, both courses must be completed.

A sample curriculum follows. Interested students should contact the institute directly to consult with a faculty adviser about the curriculum and its tailor-made opportunities.

Applied Sciences, Psychology Specialization Curriculum

Semester 1	Lect.	Lab. Hrs.	Cr. Hrs.
PSYC 100 Introduction to the Profession I	2	0	2
Humanities 100-level elective	3	0	3
CHEM 124 Principles of Chemistry I	3	3	4
PSYC 221 Human Behavior, Growth and Learning	3	0	3
MATH 122 Introduction to Mathematics II	3	0	3
Totals	**14**	**3**	**15**

Semester 2	Lect.	Lab. Hrs.	Cr. Hrs.
PSYC 101 Introduction to the Profession II	2	0	2
BIOL 115 Human Biology	3	0	3
PS 200 American Government	3	0	3
PSYC 222 Brain, Mind and Behavior	3	0	3
Humanities or social sciences elective	3	0	3
Totals	**14**	**0**	**14**

Semester 3			
PSYC 303 Abnormal Psychology	3	0	3
PSYC 482 Undergraduate Research Seminar I	1	2	3
PSYC 301 Industrial Psychology	3	0	3
BIOL 107 General Biology Lectures	3	0	3
MATH 221 Basic Probability and Statistics	3	0	3
IPRO Interprofessional project	1	6	3
Totals	**14**	**8**	**18**

Semester 4			
Free elective	3	0	3
Psychology elective	3	0	3
PSYC 483 Undergraduate Research Seminar II	1	2	3
CS 105 Introduction to Computer Programming I	2	1	2
PHYS 211 Basic Physics I	3	0	3
Humanities or social sciences elective	3	0	3
Totals	**15**	**3**	**17**

Semester 5			
PSYC 435 Early Development or PSYC 436 Adult Development	3	0	3
PSYC 204 Experimental Psychology and Research Methods	3	0	3
Free elective*	3	0	3
Free elective*	3	0	3
Humanities or social sciences elective	3	0	3
Totals	**15**	**0**	**15**

Semester 6			
Psychology electives	6	0	6
Humanities or social sciences elective	3	0	3
Humanities or social sciences elective	3	0	3
Free electives *	6	0	6
Totals	**18**	**0**	**18**

Semester 7			
Interprofessional Project	1	6	3
PSYC 487 Integrative Psychology Seminar I	3	0	3
PSYC 406 History and Systems of Psychology	3	0	3
Psychology elective	3	0	3
Free elective*	3	0	3
Totals	**13**	**6**	**15**

Semester 8			
psychology Honors Project	3	0	3
PSYC 488 Integrative Psychology Seminar II	3	0	3
Psychology elective	3	0	3
Humanities or social sciences elective	3	0	3
Free elective*	3	0	3
Totals	**15**	**0**	**15**

Total Credit Hours **127**

* Students may select a minor sequence in place of free electives.

Bachelor of Science in Psychology (Traditional)

Required Courses	Credit Hours
Psychology Requirements	**30**
PSYC 204, 221, 222, 303, 310, 406, 423, 435 or 436, 452, 487	
Psychology Electives	**6**
Mathematics Requirements	**13**
MATH 151, 152, 221	
Physics Requirements	**6**
PHYS 211, 212	
Chemistry Requirements	**7**
CHEM 124, 126	
Computer Science Requirements	**8**
CS 105, 200, 460	

Required Courses	Credit Hours
Biology Requirements	**6**
BIOL 107, 115	
Humanities and Social Sciences Requirements	**21**
See general education requirements, page 30.	
Electives	
Individualized minor courses	15
Free electives	**6**
Interprofessional Projects	**6**
Total Credit Hours	**128**

Institute of Psychology

Psychology (Traditional) Curriculum

Semester 1	Lect.	Lab. Hrs.	Cr. Hrs.
PSYC 100 Introduction to the Profession I	2	0	2
PSYC 221 Human Behavior, Growth and Learning	3	0	3
Humanities 100-level elective	3	0	3
MATH 151 *Calculus I	4	2	5
Humanities or social science elective	3	0	3
Totals	**13**	**4**	**16**

Semester 2	Lect.	Lab. Hrs.	Cr. Hrs.
PSYC 101 Introduction to the Profession II	2	0	2
PSYC 222 Brain, Mind and Behavior	2	2	3
PSYC 303 Abnormal Psychology	3	0	3
MATH 152* Calculus II	4	2	5
Humanities or social science elective	3	0	3
CS 105 Introduction to Computer Programming I	2	1	2
Totals	**16**	**5**	**18**

Semester 3			
PSYC 3 10 Social psychology	3	0	3
BIOL 107 General Biology Lectures	3	0	3
CS 200 Intro to C++ Programming	2	2	3
Social science elective	3	0	3
Humanities elective	3	0	3
Totals	**14**	**2**	**15**

Semester 4			
PSYC 204 Experimental Psychology and Research Methods	3	0	3
PHYS 211 Basic Physics I	3	0	3
BIOL 115 Human Biology	3	0	3
Interprofessional Project	1	6	3
Individualized minor**	3	0	3
Totals	**13**	**6**	**15**

Semester 5			
PHYS 212 Basic Physics II	3	0	3
MATH 221 Basic Probability and Statistics	3	0	3
CHEM 124 Principles of Chemistry I	3	3	4
CS 460 Fundamentals of Multimedia	2	2	3
Individualized minor**	3	0	3
Totals	**14**	**5**	**16**

Semester 6			
PSYC 435 Early Development or PSYC 436	3	0	3
CHEM 126 Principles of Chemistry II	3	0	3
Humanities or social science elective	3	0	3
Individualized minor**	3	0	3
Free elective	3	0	3
Interprofessional Project	1	6	3
Totals	**16**	**6**	**18**

Semester 7			
PSYC 452 Personality Theory	3	0	3
PSYC 406 History and Systems of Psychology	3	0	3
Humanities or social science elective	3	0	3
Individualized minor**	3	0	3
Psychology elective	3	0	3
Totals	**15**	**0**	**15**

Semester 8			
PSYC 487 Integrative Psychology Seminar I	3	0	3
PSYC 423 Learning Theory	3	0	3
Individualized minor**	3	0	3
Free electives	6	0	6
Totals	**15**	**0**	**15**

Total Credit Hours **128**

* Depending on their level of preparation, students may be placed in another mathematics sequence.

** Students must plan a specialized minor in consultation with their departmental adviser. The minor will be designed to complement their professional studies.

Optional Programs

Combined Degree Programs

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.) or public administration (B.S./M.P.A.) offered by IIT Students wishing to participate in the accelerated B.S./J.D. option must indicate this as early as possible. With the consent of the Institute of Psychology director, undergraduate psychology students may enroll in some graduate-level psychology courses.

Applications for admission to graduate programs at IIT (leading to the degrees of Master of Science in Psychology, Master of Science in Rehabilitation Counseling, Master of Science in Personnel and Human Resource Development, and Doctor of Philosophy in Psychology in Rehabilitation and Industrial/Organizational Psychology) are encouraged for students earning undergraduate degrees from IIT

ROTC: Air Force Aerospace Studies

Ah Force ROTC is conducted at approximately 600 colleges and universities throughout the United States to select and tram men and women to become commissioned officers in the U.S. Air Force. Most graduates who enter the Air Force through Air Force ROTC are assigned to positions consistent with their academic major. Other graduates, who wish to do so, may qualify to become pilots and navigators. Men and women who complete graduation requirements and the Professional Officer Course receive commissions and enter active duty as second lieutenants. Officers who qualify may take graduate training prior to beginning their military duties.

Faculty

Chair
Lt. Col. Greg Hayman
208 Stuart Building
Ext. **73525**

Department Home Page
http://www.iit.edu/~afrotc
(includes faculty e-mail addresses)

Professor
Hayman

Assistant Professors
Clancy, Duhon, Musselman, Larson

ROTC: Air Force Aerospace Studies

Financial Aid

Scholarships are available to qualified graduate and undergraduate students in both the four-year and two-year programs. These scholarships pay up to full tuition and fees, textbook allowance, and a monthly subsistence allowance. All members receive a subsistence allowance of $150 per month in their final two academic years. Scholarships are available for four-, three- and two-year periods depending on the student's academic major. Qualified students desiring operational, technical/scientific, nontechnical (business), nursing or health-related (medicine, optometry) options should contact the Department of Air Force Aerospace Studies.

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 and total quality management as they relate to the U.S. Air Force.

A student may take any of these courses without entering the AFROTC program.

Four-Year Program

The Air Force ROTC offers both the four-year and two-year commissioning programs for male and female IIT students. The four-year program consists of the four-semester General Military Course (GMC) and the four-semester Professional Officer Course (POC). Students normally start this program as freshmen but may begin as sophomores by enrolling in both the freshman- and sophomore-year classes. Students not on scholarship may withdraw from the GMC at any time.

Participants in the POC are selected from qualified volunteer applicants. An Air Force ROTC-paid, four-week field training encampment, held at an Air Force base, is required for POC students. This requirement is normally completed during the summer between the sophomore and junior years. The major areas of study during field training include junior officer training, aircraft and air-crew orientation, career orientation, survival training, base functions, and the Air Force environment.

Two-Year Program

The two-year program consists of a paid five-week summer field training encampment and the four-semester Professional Officer Course. Participants in this program are selected from qualified volunteer applicants. This program is designed for undergraduate and graduate students with less than three, but at least two, years remaining at IIT The five-week field training is held at an Air Force base and is a prerequisite for the POC. The major areas of study at field training are the same as in the four-year program with the addition of the GMC academic curriculum. Upon successful completion of the five-week program, which includes the GMC academic curriculum, transfer credit of three semester hours will be applied toward the completion of the AFROTC minor. Contact the Department of Aerospace Studies during the fall term of your sophomore year if interested in this option.

Minor

Students may select a minor in Air Force Aerospace Studies. See page 104 for course requirements.

ROTC Air Force Aerospace Studies Curriculum

Semester 1		Lect.	Lab. Hrs.	Cr. Hrs.
As 101	Air Force Today I	1	2	1

Semester 2		Lect.	Lab. Hrs.	Cr. Hrs.
As 102	Air Force Today II	1	2	1

Semester 3				
AS 201	The Evolution of USAF Air and Space Power I	1	2	1

Semester 4				
As 202	The Evolution of USAF Air and Space Power II	1	2	1

Semester 5				
AS301	Air Force Leadership Studies I	**3**	**2**	**3**

Semester 6				
AS 302	Air Force Leadership Studies II	3	2	3

Semester 7				
AS401	National Security Affairs	**3**	**2**	**3**

Semester 6				
AS 402	Preparation for Active Duty	**3**	**2**	**3**
	Totals	**16**	**16**	**16**

GMC courses AS 101, 102, 201, and 202 academic curricula are included in the two-year program's five-week field training.

ROTC: Military Science

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

Chair
LTC Patrick D. Flanagan
University of Illinois at Chicago
312.996.3451

IIT Program Director
CPT David Chovancek
103 SB
Ext. 77148

Professor
Flanagan

Assistant Professors
Chovancek, Gardiner, Henson

Instructors
Alton, Barstow, LaRoche

ROTC: Military Science

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.

Advanced Course

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 Advanced Course. A tax-free subsistence allowance of $150 per month is paid to each cadet in the Advanced Course except during attendance at summer camp, when pay is approximately $100 per week. Upon graduation and successful completion of the Advanced Course and the Professional Military Education Requirements (PMEs), cadets are commissioned as second lieutenants in the Active Army, the Army Reserve or the National Guard.

Summer Camp

Cadets are paid approximately $700 during both Camp Challenge (the Basic Camp) and Camp Adventure (the Advanced Camp). Travel to and from camp 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 subsistence allowance and drill pay. They may also receive additional money while attending school.

Financial Assistance

In addition to a monthly subsistence of $150, the program offers two-, three- and four-year federal Army ROTC scholarships up to $16,000 per year to qualified students. IIT offers an excellent incentive package to scholarship winners. For further information, call 312.567.7553 or visit the Department of Military Science.

ROTC: Military Science Curriculum

Semester 1	Lect.	Lab. Hrs.	Cr. Hrs.
MILS 010 Freshman Recitation	1	0	1
MILS 101 U.S. Defense Establishment	1	2	1
MILS 147* Aerobic Conditioning	0	3	2
Totals	2	5	4

Semester 2	Lect.	Lab. Hrs.	Cr. Hrs.
MILS 102 Customs and Traditions of the Military	1	2	1
MILS 148' Aerobic Conditioning	0	3	2
Totals	1	5	3

Semester 3			
MILS 201 Fundamentals of Leadership, Organization and Planning	2	2	2
MILS 247* Aerobic Conditioning	0	3	2
Totals	2	5	4

Semester 4			
MILS 202 Leadership Dynamics	2	2	2
MILS 248* Aerobic Conditioning	0	3	2
Totals	2	5	4

Semester 5			
MILS 301 Military Operations and Tactics	3	2	3
MILS 347** Aerobic Conditioning	0	3	2
Totals	3	5	5

Semester 6			
MILS 302 Organizational Leaders	3	2	3
MILS 348** Aerobic Conditioning	0	3	2
Totals	3	5	5

Semester 7			
MILS 401 Training and Resource Management	3	2	3
MILS 447** Aerobic Conditioning	0	3	2
Totals	3	5	5

Semester 8			
MILS 402 Military Law	3	2	3
MILS 448** Aerobic Conditioning	0	3	2
Totals	3	5	5

* MILS 147, 148, 247, 248 (Aerobic Conditioning) are required for all scholarship cadets in the Basic Program.

** MILS 347, 348, 447, 448 (Aerobic Conditioning) are required for all Advanced Course cadets.

ROTC: Naval Science

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 unit 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

Chair
Capt. Michael D. Besancon
217 Stuart Bldg.
Ext. 73530

Professor
Besancon

Associate Professor
Hall

Assistant Professors
Buch, McRae, Crawford, Mahaley

ROTC: Naval Science Undergraduate Study

The objective of the program in naval science is to supplement the student's academic study with specialized education in naval subjects and practical training and experience so that, upon commissioning, the future officer can become a productive member of the naval community. Active duty naval officers are assigned as instructors in the NROTC unit. It is their responsibility to assist the students in translating the theoretical knowledge they receive into the practical skills and knowledge they will require after commissioning and to provide both professional and personal counseling.

Classroom experience is principally directed toward providing education in those technical areas that are peculiar to the naval environment, such as navigation. Knowledge of customs and traditions of the service is provided through seminars and contact with Navy personnel. During the summer, students are assigned to naval ships and stations where their education as future naval officers is enhanced by on-the-job training. Scholarship NROTC students receive about four weeks of summer training each year; 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, Virginia.

Scholarship Program

NROTC scholarship students are selected by nationwide competition. The NROTC Scholarship pays for tuition, books and fees, as well as provides a tax-free stipend each month for four years. Graduates are commissioned as naval officers and incur an obligation of four years of active duty.

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 science 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 an 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 in the summer before 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. Naval science courses are not offered on a pass-fail basis.

Optional Program

Students may select a minor in naval science. See page 105 for course requirements.

ROTC: Naval Science Curriculum

Semester 1		Lect.	Lab. Hrs.	Cr. Hrs.
NS 101	Introduction to Naval Science	2	2	2

Semester 2		Lect.	Lab. Hrs.	Cr. Hrs.
NS 202	Seapower and Maritime Affairs	3	2	3

Semester 3				
NS 102	Naval Ships Systems	3	2	3

Semester 4				
NS 401	Leadership and Management	2	2	2

Semester 5				
NS 301	Navigation & Naval Operations I	3	2	3

Semester 6				
NS 302	Navigation & Naval Operations II	3	2	3

Semester 7				
NS 201	Naval Weapons Systems	3	2	3

Semester 8				
NS 402	Naval Leadership and Ethics	3	2	3

Marine Option

Semester 4/6				
NS 401	Leadership and Management	2	2	2

Semester 5/7				
NS 310	Evolution of Warfare or	3	2	3
NS 410	Amphibious Warfare	3	2	3

Semester 8				
NS 402	Naval Leadership and Ethics	3	2	3
NS 410	Evolution of Warfare	3	2	3

Social Sciences

The Department of Social Sciences, which encompasses the disciplines of political science, sociology and public administration, offers coursework and awards degrees at both the undergraduate and graduate levels. The faculty has special strengths in the fields of urban government and politics, organization and management, policy analysis, and science and technology studies, and concentrates many of its courses in these fields of specialization.

An undergraduate program is offered leading to a Bachelor of Science with a concentration in political science, as are minors in political science, sociology and public administration. The department participates with other IIT departments in offering interdisciplinary minors in legal studies, law and society, technology and human affairs, and urban studies.

At the graduate level, the department offers the master's degree in public administration (M.P.A.). Combined undergraduate B.S./M.P.A. degrees are offered combining several different undergraduate degrees with a master's degree in public administration. These combined degrees can usually be completed in five years. The department cooperates with the university's law school (Chicago-Kent College of Law) in offering a program leading to a bachelor's degree and law degree in six years instead of the usual seven years.

Faculty

Chair
William J. Grimshaw
214 Wishnick Hall
Ext. 75129

Professor
Grimshaw

Associate Professors
Beam, DeForest, Segerstrale

Assistant Professors
Nippert-Eng, Peters, Price

Adjunct Professors
Cohen, Gillio, Kuner, Maloney, Marcus, Markle, Pounian, Risley, Stafford

Faculty Emeriti
Goldman, Stover

Social Sciences

Political Science

Political science emphasizes making connections between the theory and practice of politics. Concerns range from perennial philosophical issues regarding justice, equality and freedom to practical political matters such as conflict resolution, collective decision making, and public policy. Opportunities are provided to consider how theoretical understandings of politics can inform political action and how participation in politics offers the basis for understanding it.

Since the ancient Greeks, knowledge of the affairs of state has always been deemed essential for all educated citizens. A knowledge of political science is central to any occupation or profession that needs an understanding of human behavior and the relations between people and governments or the analysis and communication of information about public problems. A background in political science is virtually indispensable to people in politics and government, whether at the state, local or national level. A political science undergraduate degree is common for the following types of professionals: lawyers, journalists, policy analysts, planners, scientists, business managers, politicians or medical people. Such professionals are in constant need for information on and understanding of the political, legal, governmental and public implications of their fields.

At IIT, most political science students emphasize American government, urban affairs, or public administration, A number of faculty also teach courses involving political and social issues relating to science and technology and to the workplace.

Students seeking a major in political science are required to complete 33 credits in political science. With department approval, up to 18 hours of coursework in related fields may be applied toward this requirement. Majors are also required to complete an approved course in statistics and a course in research methods. Students seeking a minor in political science are required to complete 15 credits in political science. Additional courses may be required to prepare students for professional training and for entrance in their chosen professional field, such as law or medicine.

Sociology

Sociology may be defined as the study of societies, communities, organizations and groups. It examines the structure and process of society and of the social groups that compose it. The focus is often on how people coordinate their activities to reach individual and collective goals in a wide range of settings including work, educational, religious, familial and political settings.

Sociological analysis explores social situations from the standpoint of the roles, meanings and norms that make behavior predictable and organized. It investigates how such patterns of interdependent activity arise and what sustains them; why they take one shape instead of another; how some change more rapidly than others; how they are related to each other, and how people justify and explain their organizations and activities. Thus, the field provides an understanding of the crucial problems facing our rapidly changing society.

Sociology provides intellectual and research skills, as well as a body of concepts and information useful to those entering numerous professions, including architecture, engineering, design, government, planning, social work, law and medicine. Students completing a minor in sociology are required to take five three-hour courses offered in the discipline.

Public Administration

Public administration emphasizes public management, policy analysis and financial management of governmental organizations. Public administration courses are generally offered only at the graduate level, but are generally open to qualified undergraduate students. A joint degree program leading to a combined B.S./M.P.A. degree program is offered for students interested in government careers.

Political Science Curriculum

The political science curriculum consists of 126 semester hours, which are distributed as follows: at least 33 hours in political science (including I'S 200 and PS 309); a minor of at least 15 hours; up to 29 hours of free electives; and completion of the general education program (four hours of Introduction to the Profession; six hours of Interprofessional Projects; five hours of mathematics, including MATH 221; two hours of computer science: 21 hours of humanities and social science; and 11 hours of natural science or engineering). The sequence for completing these hours over the course of four years is quite flexible. A typical program might be as follows.

Semester 1	**Hrs.**
Introduction to the Profession I	2
English Composition or Humanities 100-level course	3
Mathematics course above MATH 110	3-5
Natural science or engineering course	3-5
PS 200 American Government	3
Totals	14-18

Semester 2	**Hrs.**
Introduction to the Profession II	2
Humanities elective or Humanities 100-level course	3
Social science elective	3
CS 105 or CS 130	2
Natural science or engineering course	3-5
Political science elective	3
Totals	**16-18**

Semester 3	
Humanities elective	3
Social science elective	3
MATH 221 or equivalent statistics course	3
Political science electives	6
Totals	15

Semester 4	
Interprofessional Project	3
Minor course	3
Natural science or engineering course	3-5
Political science electives	6
Totals	**15-17**

Semester 5	
Social science elective	3
Minor course	3
Free electives	6
Political science electives	6
Totals	**18**

Semester 6	
Social science or humanities elective	3
Minor course	3
Free electives	6
PS 309 Research Methods in Social and Political Science	3
Totals	**15**

Semester 7	
Interprofessional project	3
Minor course	3
Free electives	6
Political science elective	3
Totals	**15**

Semester 6	
Minor course	3
Free electives	9
Political science elective	3
Totals	**15**

Minors

Minors generally consist of five courses and are optional and frequently cross-disciplinary. Because 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 advisers in their major departments.

NOTE: Not all specialized minors are applicable to all majors. Some may require more than a normal course load to satisfy requirements.

Following are some sample minors:

Aerospace Engineering (ME majors only): MMAE 311, MMAE 312, MMAE 436, MMAE 441, MMAE 443, MMAE 452.

Air Force Aerospace Studies: AS 101, AS 102, AS 201, AS 202, AS 301, AS 302, AS 401, AS 402. Attendance at a five-week field training camp may be substituted for AS 101, AS 102, AS 201 and AS 202.

Applied Solid State Physics: PHYS 348, PHYS 412, PHYS 415, and at least two of the following courses: PHYS 300, PHYS 405, PHYS 418, PHYS 427, PHYS 428 and PHYS 437.

Architectural Technology: EG 105, EG 308, EG 309, EG 310, EG 312, EG 313.

Architecture (non-architecture majors only): ARCH 100, ARCH 109, either ARCH 113 or ARCH 400, either AAH 119 or AAH 120, and one of the following courses: ARCH 114, ARCH 200, ARCH 225, ARCH 309, ARCH 313 and ARCH 319. Those students preparing for competitive application to graduate programs in architecture are encouraged to select ARCH 114.

Artificial Intelligence: CS 200, CS 330, CS 33 1, CS 430, CS 480.

Biochemistry: BIOL 210, BIOL 225, BIOL 403, BIOL 404, BIOL 445, and either BIOL 515 or CHEM 538.

Bioengineering:

- **Biochemical specialization:** BIOL 107, CHE 411, and at least three of the following courses: BIOL 210, BIOL 214, BIOL 403, BIOL 414, BIOL 445, CHE 492, CHE 577 and CHE 579.
- **Biomedical specialization:** BIOL 107, CHE 411, and at least three of the following courses: BIOL 210, BIOL 214, BIOL 403, BIOL 414, BIOL 430, BIOL 445, CHE 492 and CHE 5 10.

Biology: BIOL 107, BIOL 109, BIOL 115, BIOL 117, BIOL 210 and BIOL 214.

Chemistry: At least 15 credit hours must be completed from the following courses: CHEM 247; one of the sequences: CHEM 237, 239 or CHEM 343, 344; and electives chosen from: CHEM 321, CHEM 334, CHEM 335, CHEM 455.

Circuits and Systems (non-EE, non-CPE majors only): ECE 211, ECE 213, ECE 218 and one of the following sequences: ECE 308 and ECE 403, ECE 308 and ECE 438, or ECE 309 and ECE 420.

Computational Structures: CS 200, CS 330, CS 331, CS 430, MATH 471.

Computer Architecture: At least 15 hours must be completed from the following courses: CS 200, ECE 218, cs 331, cs 350, cs 470, cs 471.

Computer Networking: CS 200, CS 331, CS 350, CS 450, cs 455.

Construction Management: CAE 470, CAE 471, CAE 472, CAE 473, ECON 423.

Database Management: CS 200, CS 331, CS 425, CS 445.

Electromechanical Design and Manufacturing (AE and ME majors only):

- **AE majors:** MMAE 445, MMAE 485, MSC 312, ECE 218, ECE 242, ECE 441 (replaces PHYS 300).
- **ME majors:** MMAE 444, MMAE 485, MSC 312, ECE 218, ECE 242, ECE 441 (replaces PHYS 300).

Energy/Environmental/Economics (E^3): Three or six credit hours in Special Problems, Projects, or Research in Energy, In addition, at least one course from each of the following three areas:

- **Energy Sources and Conversion:** CHE 465, CHE 481, CHE 483, CHE 565, CHE 566, CHE 582, MMAE 425 and ECE 319.
- **Energy and Power Distribution and Utilization/ Environment:** CHE 430, CHE 482, CHE 489, MMAE 424, ENVE 404, ENVE 463, ENVE 476, ENVE 480, ENVE 485, ECE 411, ECE 419, ECE 420, ECE 434, ECE 435, ECE 436, ECE 437, ECE 438.
- **Energy Analysis, Economics and Policy:** CHE 426, CHE 541, CHE 543, ECON 423, LAW 330, PS 338, CS 480. Appropriate course substitutions may be made with the approval of the energy technology program advisers.

Minors

Engineering Analysis: MATH 332, MATH 402, MATH 461, MATH 471, MATH 488.

Engineering Graphics and CAD: EG 105, EG 305, EG 306, EG 405, EG 406, EG 419.

Environmental Engineering: ENVE 404, ENVE 463, ENVE 481 and two courses from the following: ENVE 401, ENVE 426 or CHE 426, ENVE 450, ENVE 476, ENVE 480, ENVE 485, ENVE 501 and ENVE 506.

Fire Protection and Safety Engineering: **CAE 421, CAE 422,** CAE 424, CAE 425, CAE 426.

Graphics and CAD for Non-Engineers: EG 225, EG 325, EG 329, EG 425, EG 429.

Health Care and American Society: **SOC** 201, SOC 348, PS 351, PS 332 or SOC 301.

History: At least 15 credit hours must be completed, including at least six hours in European and six hours in American history at the 300 level or above.

Law **and** Society: At least 15 credit hours must be completed, including the following: PS 256, PS 318, SOC 348, PHIL 362.

Literature: At least 15 credit hours in 300-level English courses must be completed, including ENGL 337 or ENGL 338.

Logic and Philosophy of Science: At least 15 credit hours must be completed, including PHIL 340, PHIL 341, and at least three of the following courses: PHIL 326, PHIL 335, PHIL 342, PHIL 343, PHIL 345, PHIL 350.

Management: ACCT 151, ECON 211, MGT 351 and two of the following three courses: ECON 423, MKT 371 and OM 312. Chemical engineering majors should also take CHE 426 or another engineering science course.

Materials Engineering:

- ME majors only: MMAE 361, MMAE 464, MMAE 474, MMAE 476 and one of the following courses: MMAE 467, MMAE 468, MMAE 482, MMAE 483, MMAE 486, or an approved IPRO.
- **AE majors only**: MMAE 361, MMAE 464, MMAE 474, MMAE 485 and one of the following courses: MMAE 467, MMAE 468, MMAE 482, MMAE 483, MMAE 486, or an approved IPRO.

Mechanical Engineering (AE majors only): MMAE 406, MMAE 431, MMAE 432, MMAE 433, MMAE 443, MMAE 485.

Military Science: MILS 101, MILS 102, MILS 201, MILS 107 or MILS 202 (these courses will at times be interchanged) or attendance at military training; MILS 301, MILS 302, MILS 401, MILS 402.

Naval Science: NS 101, NS 102, NS 201, NS 202 (attendance at the Naval Science Institute may be substituted for these courses), NS 301, NS 302, NS 401, NS 402.

Marine Option: MGT 351, NS 101, NS 202, NS 310, NS 402, NS 410.

Music: 15 credits in music theory or practice taken at VanderCook College of Music. Students should contact Educational Services concerning applicability of course toward graduation.

Operating Systems: **CS 200, CS 331, CS 350, CS 351,** CS 450.

Organizational Psychology: PSYC 221, PSYC 301, PSYC 303, PSYC 310 or SOC 201, PSYC 409.

Philosophy: At least 15 credit hours of philosophy courses numbered 300 or above.

Political Science: At least 15 credit hours in political science must be completed, including at least nine hours above the 200 level.

Polymer Science and Engineering: CHE 450 or CHEM 435 and at least three courses from the following: CHE 492, CHE 538, CHE 555, CHE 575, CHE 581, CHEM 535, CHEM 537, CHEM 542, MMAE 467, MMAE 483, MMAE 487, MMAE 580; and at least one course from the following: CHE 426, CHE 489, CHEM 582, MMAE 451, MMAE 485, FPE 541.

Premedical Studies (engineering and computer science majors): This specialized minor is intended for those students who plan to apply to a medical school, and must be approved by the Premedical Advisory Committee.

- **Chemical Engineering**: BIOL 107, BIOL 109, BIOL 115, BIOL 117
- **Environmental Engineering**: BIOL 109, BIOL 115, BIOL 117, CHEM 239
- **Electrical Engineering**: BIOL 107, BIOL 109, BIOL 115, BIOL 117, CHEM 125, CHEM 237, CHEM 239
- **Materials Engineering**: BIOL 107, BIOL 109, BIOL 115, BIOL 117, CHEM 237, CHEM 239
- **Mechanical Engineering**: BIOL 107, BIOL 109, BIOL 115, BIOL 117, CHEM 125, CHEM 237, CHEM 239
- **Computer Science**: BIOL 107, BIOL 109, BIOL 115, BIOL 117, CHEM 124, CHEM 125, CHEM 237, CHEM 239.

Minors

Process Design and Operation: At least three courses from the following: CHE 426, CHE 431, CHE 437, CHE 507, CHE 508, CHE 528, CHE 530, CHE 532, CHE 560; and at least two courses from the following (only one of the ENVE offerings): CHE 402, CHE 430, CHE 455 or CHE 555, CHE 465, CHE 475, CHE 476, CHE 489, CHE 492, CHE 571, CHE 572, CHE 577, ENVE 404, ENVE 450, ENVE 476, ENVE 485.

Programming Languages: CS 200, CS 331, CS 350, CS 351, CS 440.

Psychology: At least 15 credit hours must be completed, including the following two required courses: MATH 221, PSYC 221.

Public Administration: PS 200 or PS 201, and PS 351, PS 452, PS 462, SOC 311.

Rehabilitation Services: PSYC 410, PSYC 411, PSYC 412, PSYC 583, PSYC 584.

Sociology: SOC 200 or SOC 201, plus an additional 12 credits chosen in consultation with the sociology faculty.

Software Engineering: CS 200, CS 331, CS 350, CS 351, CS 487.

Statistics: MATH 332, MATH 475, MATH 474, MATH 483, and either MATH 482 or MATH 487.

Technical and Professional Communications: ENGL 421, ENGL 423 and nine more credits of communication course-work in consultation with the director of the Program in Technical Communication and Information Design.

Technology and Human Affairs: At least 15 credit hours must be completed from the following: HIST 383, PHIL 370, PHIL 374, PS 332, PS 338, PS 339, SOC 303, SOC 362.

Telecommunications: CS 106 or 200; ECE 403, 406, 407 and 436; and two telecommunications electives chosen from CS 331, CS 450, ECE 448, or ECE 449.

Urban Studies: Four of the following courses: HIST 350, HIST 352, PS 315, PS 317, SOC 350 or SOC 411.

Special Programs

Double Undergraduate Degree Options

Depending upon their interest, capabilities, and goals, and with the permission of their advisers and department chairs, students may design their own double undergraduate degree programs or select one of the options listed below.

Bachelor of Science in Chemical Engineering/Bachelor of Science in Environmental Engineering

This 4.5-year program is designed to train students to be knowledgeable in the fundamental principles of chemical engineering science and design and to have a clear understanding of environmental issues and their assessment. For a full description of the program, see page 58 in the departmental curricula section of this bulletin.

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

Students interested in obtaining two undergraduate degrees in four years should consult an Department of Electrical and Computer Engineering adviser. This program is particularly applicable for freshman entering IIT with advanced placement credits.

Bachelor of Science in Mechanical Engineering/Bachelor of Science in Aerospace Engineering

Students interested in this program should consult an adviser from the Department of Mechanical, Materials and Aerospace Engineering.

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 advisers and department chairs, students may design their own combined degree programs or select one of the following options.

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 management courses may earn both the bachelor's degree and the M.B.A. degree in about five years, rather than the usual six years. An exception exists in the case of architecture, where qualified students may earn a bachelor's degree and the M.B.A. degree in about six years, rather than the usual seven years. The undergraduate courses listed below, 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.

Taken as undergraduate:	Advanced standing in graduate school for:
ACCT 151	MBA 510
MGT 351	MBA 520
OM 312	MBA 570
MKT 371	MBA 560

Students who are considering the bachelor's/M.B.A. program should consult with the Stuart School of Business undergraduate programs adviser 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 Architecture/Master of Business Administration

Qualified students may earn both the Bachelor of Architecture and Master of Business Administration degrees in about six years, rather than the usual seven years. Students who are completing their eighth semester, or an equivalent of 124 credit hours, in architecture at IIT may apply for entry into the joint program. They should take preparatory courses for the M.B.A. prior to entry and the GMAT during the eighth semester. Students who anticipate entering the program should seek advising in the Stuart School of Business and the College of Architecture early in their studies at IIT

Bachelor of Architecture/Master of Civil Engineering

Qualified students regularly enrolled at IIT may earn both the Bachelor of Architecture and Master of Civil Engineering (M.C.E.). 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, CAE 303, CAE 304, CAE 307, CAE 310, CAE 437, and CAE 438 in place of MATH 119, MATH 122, CAE 287, CAE 351, CAE 352, and as technical electives. Students who anticipate entry into the combined program and who intend to specialize in construction engineering and management must successfully complete the following courses as part of the technical electives in their undergraduate program in architecture: CAE 323, CAE 437, CAE 438 and CAE 457.

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

Bachelor of Science in Political Science/Master of Public Administration

The requirements for the Bachelor of Science in Political Science and Master of Public Administration (M.P.A.) degree may be completed in five years. Qualified students interested in careers in the public sector are encouraged to begin their preparation at the undergraduate level and follow a course of study that will allow them to move directly into the M.P.A. program. Students would enroll as political science majors and would obtain the bachelor's degree at the end of the fourth year. Any time after the fourth semester, students can request admission to the M.P.A. program. Students granted provisionsal admission are then allowed to take one graduate public administration course each semester counted as part of their undergraduate program and also as part of their M.P.A. degree. A final decision on M.P.A. admission is made during the eighth semester, at the end of which the Bachelor of Science in Political Science is awarded. If a student is admitted to the M.P.A. program, the remaining course requirements are completed during the fifth academic year.

Combined Undergraduate/Graduate Law Programs (Leading to B.S./J.D. degrees)

Students in these programs do 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. Several combined undergraduate and graduate law degree programs are available. Political science and psychology majors in these programs can complete an undergraduate degree and law degree in six years, rather than the usual seven years. Students with other majors who enter with substantial college credit, or who place out of a substantial number of courses, may also complete both degrees in six years.

Pre-law undergraduate students also have access to seminars, pre-law advising, assistance preparing for the LSAT pre-law internships, and the mentoring program.

Honors Law Program

Students apply to both the undergraduate program and the law school prior to the beginning of their freshman year and may receive admission to both the undergraduate program and the J.D. program at the time of their matriculation. Admission to the J.D. program is conditioned upon the following criteria prior to beginning law school coursework:

a) maintaining a record that the law school director of admissions determines to be consistent with the character and fitness requirements of the bar examining authorities
b) taking the LSAT exam
c) completing a law school application
d) fulfilling the undergraduate general education requirements and other requirements specified by their home department for students in the Honors Law Program.
e) completing required undergraduate courses.

Students who major in political science or psychology normally complete both their B.S. and J.D. degrees in six years instead of the usual seven years. Students in other majors who enter with sufficient college credit, or who place out of a substantial number of courses, may also accelerate the completion of both degrees, finishing in six years instead of the usual seven years.

Bachelor of Science/Juris Doctor

This program is available to qualified students who are already enrolled at IIT. Students may apply to this program after their sophomore or junior year. Generally students with a GPA of 3.25 and an LSAT equal to the median score at the law school are admitted to the program. Students who can complete their general education and major course requirements prior to the beginning of the fall semester of their senior year can complete their undergraduate and law degrees in six years instead of the usual seven. Engineering majors usually take seven years to complete the program.

Admission to the law school during a student's sophomore year is contingent on the student maintaining a record which the law school director of admissions determines is consistent with the character and fitness requirements of the bar examining authorities. Students interested in this program should notify the pre-law adviser as soon as possible in order to obtain assistance in planning course schedules to meet both law school and undergraduate course requirements in the minimum amount of time.

Special Programs

B.S./M.D. Programs

In addition to premedical studies, IIT offers two dual-degree programs in which high-ability applicants simultaneously go through a joint admissions procedure at IIT and a participating medical school. Students earn a bachelor's degree from IIT and a medical degree from the medical school. The MCAT will not be required for admission but may be required for tracking purposes. These innovative programs are designed to meet the urgent and intensifying need for technologically proficient physicians and researchers. For more information, contact the Office of Undergraduate Admission, 312.567.3025.

IIT/Chicago Medical School Honors Program in Engineering and Medicine

The IIT/CMS Honors Program in Engineering and Medicine is an eight-year program open to freshman applicants in which students complete their undergraduate degree at IIT in chemical engineering, mechanical engineering, electrical engineering, computer science or molecular biochemistry and biophysics during the first four years of the program. The final four years are spent at the Finch University of Health Sciences/The Chicago Medical School, during which the student earns the M.D. degree.

IIT/Rush Medical College Combined Honors Program in Engineering and Medicine

(Junior-year transfer program)

The IIT/Rush Medical College Program is a six-year program that begins in the student's junior year. It is open to IIT sophomores and to students attending other colleges or universities who transfer to IIT at the end of their sophomore year. Students admitted to this program will complete their undergraduate degree at IIT in chemical engineering, mechanical engineering, electrical engineering, computer science or molecular biochemistry and biophysics during the first two years of the program. 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 M.D. degree. This program is designed for students who intend to become research-oriented physicians.

International Education

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 or cultural environment and often enriches the academic program by providing special research facilities or by giving breadth to the major discipline.

Exchange Programs

IIT has undergraduate exchange programs with the following universities: Robert Gordon University, Scotland, architecture; Institute National des Sciences Appliques (INSA), Lyon, France, engineering; and Ecole Speckle Traveaux du Publics (ESTP), Paris, engineering. Students interested in exchange programs should first contact the associate dean of the Undergraduate College and then the director of the International Cultural Center during their second year of study.

Study Abroad Opportunities

IIT requires students to submit academically sound plans prior to participating in a study abroad program. The application process begins the year before study abroad is anticipated. Contact the International Center (IC) for information on universities that have study abroad relationships with IIT.

Application forms, as well as a set of procedural guidelines for study abroad, may be obtained from the IC or from the Undergraduate College.

Students wishing to study abroad must verify their eligibility with both the associate dean of the Undergraduate College and the director of the IC.

Post-Baccalaureate Certificate and Certificate Programs

Certificate Programs

The Department of Civil and Architectural Engineering offers two certificate programs: one in architectural technology and one in engineering graphics and CAD. These programs are 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. Consult the civil and architectural engineering section in this bulletin for further information.

Post-Baccalaureate Certificate Programs

IIT offers a number of certificate programs at the graduate level including bioengineering, computer networking and telecommunications, computer science, construction management, earthquake and wind engineering design, electrical and computer engineering, energy/environment/economics, environmental studies, food process engineering, geoenvironmental engineering, infrastructure engineering, and management, intelligent information systems, process operations management, psychology, software engineering, technical communication, transportation systems planning, and wireless communications engineering. For information on post-baccalaureate certificate programs, please consult the Graduate College.

Special Programs

Premedical Programs

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 B.S. degree and, at the same time, fulfill the prerequisites for medical school:

- Applied Sciences for the Professions, with a concentration in biology, chemistry, molecular biochemistry and biophysics, physics or psychology (see p. 34, 39, 86).
- Engineering (chemical, environmental, electrical, metallurgical and materials, mechanical) with a minor in premedical studies (see p. 50, 72, 80, 105).
- Computer Science with a minor in premedical studies (see p. 66, 105).

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 adviser 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, CHEM 125, CHEM 237, CHEM 239, PHYS 123, PHYS 221, BIOL 107, BIOL 109, BIOL 115, BIOL 117. To improve MCAT scores, BIOL 403 and BIOL 404 are recommended instead of BIOL 117. To improve performance during the first year in medical school, BIOL 430 and BIOL 445 are recommended.

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:
Anna Dollar (Chair) (MMAE)
Dean Chapman (BCPS)
Martha Evens (CS)
Krishna Pagilla (CHEE)
Hamid Arastoopaur (CHEE)
Robert Roth (BCPS)
Tamara Sher (PSYC)
Miles Wernick (ECE)

Premedical Office:
116 Engineering 1
312.567.8852

Premedical Programs Home Page:
http://www.iit.edu/~premed/

Post-Baccalaureate Premedical Program

IIT prepares college graduates for application and admission to medical school. In many cases, post-baccalaureate students were not pre-med in college and took few, if any, premedical science courses. In other cases, post-baccalaureate students are not recent graduates and wish to refresh their knowledge, improve their grade point averages, or prepare for the Medical College Admission Test (MCAT). Post-baccalaureate students enroll on a full-time or a part-time basis in regular courses along with other IIT students and are advised by the IIT Premedical Advisory Committee. Students in the program have complete access to courses, faculty advising, student services, and campus facilities.

For more information, contact the Premedical Office.

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 IIT Admission Office or any of IIT's ROTC departments for scholarship/program information.

VanderCook College of Music

Full-time IIT students in good standing may take courses offered at VanderCook College of Music without additional tuition payment. Some non-performance VanderCook courses may be used to satisfy part of the general education requirement for an IIT degree. Performance courses may be used as free electives.

Admission to VanderCook courses is on a space-available basis, and students may be asked to audition or satisfy other requirements prior to acceptance into a VanderCook course.

IIT students wishing to take courses at VanderCook College of Music should contact the Office of Educational Services or the Undergraduate College for further information.

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Political Science 161
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Numbers in parentheses indicate (lecture hours-laboratory hours-credit hours).

Letters in parentheses

(C) Identifies courses that fulfill the communications general educational requirements
(D) CAE design courses
(H) Identifies courses that fulfill humanities general educational requirements
(N) Identifies courses that fulfill natural science or engineering general educational requirements
(P) ECE, CPE professional elective
(S) Identifies courses that fulfill social sciences general education requirements
(T) CS technical elective.

Art and Architectural History

AAH 119, 120
History of World Architecture I, II
Comprehensive background as well as concentration on individual cultures and their architects from ancient to modern times. Discussion of architectures from around the world. Specific details and expressions of more generalized theories and strategies will be explored. (3-0-3); (3-0-3) (C) (H)

AAH 301
Thinking About Art
A course designed for those who find art pleasing, meaningful or significant and who want to extend the range of their sensibilities. Theories of art will be studied for insight, as well as for historical interest and continuity Works of art will be studied for their intrinsic value, for their relation to ideas and events, and as cultural artifacts. Regular visits to area museums and galleries will be required. Prerequisite: a 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H) (C)

AAH 491
Independent Reading and Research
For advanced students. Prerequisite: Consent of the department. (Credit: Variable) (H) (C)

AAH 494
Senior Seminar: Theories of Architecture in Historical Perspective
An investigation of the development of formal architectural theory. Writings by architects from Awtquiry to the present will be studied, analyzed, and criticized. The relation between theory and practice will be emphasized. The implications of particular theories for such other questions as environment, tradition, change, innovation, revolution and meaning will be considered. Prerequisites: AAH 119, AAH 120 or consent of instructor. (3-0-3) (C)

Accounting

ACCT 151
Financial and Managerial Accounting
Basic financial and managerial accounting topics: GAAP, the major financial statements, accrual accounting, financial reporting alternatives, financial statement analysis, cost behavior, cost systems, short- and long-term decision-making, and product costing. (3-0-3) Offered in fall and spring.

Architecture

ARCH 100, 200
Introduction to Architecture
The fundamental objectives and philosophy underlining the architectural curriculum at IIT; the role of the architect as a professional related to the heritage of Chicago architecture; orientation to the local cultural, institutional and architectural resources. (1-0-1); (1-0-1) (C)

ARCH 109, 110
Freehand Drawing I, II
Drawing from still life, human figure and architecture, both out-of-doors and in the studio; drawing from life in various mediums. ARCH 109 is prerequisite for ARCH 110. (0-4-2); (0-4-2)

ARCH 113,114
Architecture Studio I, 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 shills and model shop ability. ARCH 113 is prerequisite for ARCH 114. (0-12-6); (0-12-6)

ARCH 125
Introduction to Architectural Computing
Introduction to PC computing in architecture; covering basic concepts in word processing, spreadsheet, database and business graphics and their use in architectural and engineering design; history and overview of computer use in a design office; introduction to computer programming using the BASIC language covering basic graphic concepts; and the use of the library and telecommunication facilities available on campus, including e-mail, CD-ROM, and Internet access. (1-2-3)

ARCH 201, 202
Architecture III, IV, Structures, Building Systems, and 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. Prerequisites: ARCH 113, 114. ARCH 201 is prerequisite for 202. (0-10-5); (0-12-6)

ARCH 225
Computer-Aided Design in Practice
Review of drafting, modeling and rendering computer hardware and software used in the practice of architectural design. Design and management issues are explored with the extensive use of PC CAD systems, including AutoCAD. Prerequisite: ARCH 125. (2-2-3)

ARCH 305, 306
Architecture V, VI
Continued development of architectural principles of ARCH 20 1 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. Prerequisites: ARCH 201, ARCH 202. ARCH 305 is prerequisite for ARCH 306. (0-12-6); (0-12-6)

ARCH 309, 310
Mechanical & Electrical Building Systems for Architects I, 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. ARCH 309 is prerequisite for ARCH 310. (3-0-3); (3-0-3)

ARCH 313
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 314
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 319
History of Modern Architecture
These courses will offer specialized and advanced studies in the history and critical interpretation of architecture in the modern era. (3-0-3) (C)

ARCH 320
History of Chicago Architecture
This *course* focuses on the Chicago School and offers specialized and advanced studies in the history and critical interpretation of various aspects of the related art, architecture and technology. (3-0-3) (C)

ARCH 321
History of Modern Thought in Architecture: 20th Century
Mies, Gropius, Le Corbusier and others constructed modernist canon as much with their manifestos - provocative, assertive, entirely subjective texts packaged in the rhetoric of objectivity-as with their buildings. This course studies the major texts and concepts that have produced architecture in the twentieth century Study will be made of the modernist legacy and its basis in a canon that has experienced transformations across the course of decades, while retaining essential principles and mythic status today. (3-0-3) (C)

ARCH 331,332
Visual Training I, 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. ARCH 331 is prerequisite for ARCH 332. (3-0-3); (3-0-3)

ARCH 395
Technology as Design
Since the development of cast iron as a viable construction material in the mid 1800's, there has been a path of architecture that 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 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. (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. Prerequisites: ARCH 110, ARCH 408 or permission of the instructor. (0-3-3)

ARCH 417, 418
Architecture VII, 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. Prerequisites: ARCH 305, ARCH 306. ARCH 417 is prerequisite for ARCH 418. (0-12-6); (0-12-6)

ARCH 419,420
Architecture IX, 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. (0-12-6); (0-12-6)

ARCH 421, 422
Energy Conscious Design I, 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. ARCH 421 is a prerequisite for ARCH 422. (3-0-3); (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 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 425
Computer-Aided Design in Practice
Review of drafting, modeling and rendering computer hardware and software used in the practice of architectural design. Design and management issues are explored with the extensive use of PC CAD systems, including AutoCAD. Prerequisite: ARCH 125 or graduate standing. (2-2-3)

ARCH 426
3-D Modeling in CAD
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. Prerequisites: ARCH 425 and AutoCAD. (3-0-3)

ARCH 427
Image Processing in CAD
Review of advanced methods in creating 2-D and 3-D images and their manipulation/transformation to produce architectural presentations, including scanning, image composition and texture cloning. Prerequisites: ARCH 425 and 426 or consent of instructor. (3-0-3)

ARCH 428
3-D 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. Prerequisites: ARCH 425 and 426 or consent of instructor. (1-4-3)

ARCH 429
CAD Programming
Review programming in CAD systems; programming basics in Autocad, extensive creation of 2-D and 3-D objects, data interrogation, manipulation, and extraction, and 2-D and 3-D parametric and rule-based design. Investigation of form creation, based on mathematical relationships and random generation. Prerequisites: ARCH 425 and ARCH 426 or consent of instructor. (1-3-3)

ARCH 441,442
Landscape Architecture I, II
The natural landscape as a basis of landscape work. Ecotones and their relation to vital habitats including plant materials, their selection and installation. The focus will be on housing with its associated planting including various gardens both formal and informal. ARCH 441 is a prerequisite for ARCH 442. (2-2-3); (2-2-3)

ARCH 460
Chicago Architecture Practicum
This course synthesizes the subject of architecture through a series of presentations and field trips. Students lead the ARCH 200 class in exercises on observation and documentation of the urban environment. Prerequisite: Consent of instructor. (1-4-3)

ARCH 467
Advanced Materials Workshop
This course is designed to involve the students with the architectural craft of materials that can be applied to model and prototype construction. Included will be industrial tours and a product of the student's own choosing. (1-4-3)

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. (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. (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 past 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
Architecture and the City
Students will investigate in a seminar format the development and design of cities through the analysis of urban culture, society economics, government, economy and architectural theory. (3-0-3)

ARCH 473
Conflict and 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 485.466
Structural Design in Architecture I, II
This course reviews fundamental concepts in statics and strength of materials, calculations of the stresses, and deflections in statically determinate systems, including beams, trusses, frames and arches. The design of steel compression, tension and flexural members, and the behavior of reinforced concrete, will all be explored. Computer programs will be used to analyze stati-

cally indeterminate systems. ARCH 485 is the prerequisite for ARCH 486. (3-0-3); (3-0-3)

ARCH 480
Long-Span and 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 and 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 494
Senior Theory Seminar
An investigation of the development of formal architectural theory in the West. Writings by architects from Vitruvius to the present will be studied, analyzed, and criticized. The relation between theory and practice will be emphasized, as well as the implications of particular theories for such other questions as tradition, change, innovation and revolution. (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)

Air Force Aerospace

AS 101
Air Force Today 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
Air Force Today II
Introduction to the 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 147, 148, 247, 248, 347, 348, 447, 448
Air Force Physical Training
This course is offered to increase cadet's levels of physical fitness and to emphasize the importance of a healthy lifestyle. (0-3-2)

AS 201
The Evolution of USAF Air and 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. Communication skills are also refined. Leadership Laboratory continued. (1-2-1) (C)

AS 202
The Evolution of USAF Air and Space Power II
Continuing study of topics covered in AS 201. Covers the period from the Vietnam War through today. Also, communication skills are refined. 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. Advanced Leadership Laboratory compliments 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, quality management, Air Force personnel and evaluation systems, leadership ethics, and oral and written presentation shills required of an Air Force junior officer. Continuation of Advanced Leadership Laboratory. (3-2-3) (C)

AS 401
National Security Affairs
This course is designed for college seniors and 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 Advanced Leadership Laboratory. (3-2-3) (C)

AS 402
Preparation for Active Duty
Designed for college seniors and 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 the different services and programs available on a military installation. Emphasis is also given on refining oral and written communication skills. Continuation of Advanced Leadership Laboratory. (3-2-3) (C)

Leadership Laboratory
A study of Air Force customs and courtesies, drills and ceremonies, issuing military commands, instructing, directing and evaluating the preceding skills, studying the environment of an Air Force officer, and learning about the areas of opportunity as available to commissioned officers. Planning and controlling of military activities of the cadet corps, preparation and presentation of briefings and other oral and written communications. Providing interviews, guidance and information which will increase the understanding, motivation and performance of other cadets.

Course Descriptions

Biology

BIOL 100
Introduction to the Profession
Introduction to the biological sciences, scientific method, computing tools, and interrelations of biological sciences with chemistry, physics and other professions. (2-0-2) (C)

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, their diversity and ecological relations. BIOL 107 and 109 plus BIOL 115 and BIOL 117 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. Prerequisite: Concurrent or previous enrollment in BIOL 107. (0-4-2) (C)

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; and microbial human diseases. BIOL 115 plus BIOL 107 (General Biology) constitutes a two-semester sequence in science. (3-0-3)

BIOL 117
Experimental Biology
A biology laboratory course to accompany 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 relationships between cell function and structure. (0-4-2) (C)

BIOL 210
Microbiology Lectures
A study of microorganisms and their relation to water, sanitation, soil, disease, biotechnology, bioremediation, bioinformatics and genetic engineering. Prerequisite: BIOL 107 or BIOL 115 or equivalent. (3-0-3)

BIOL 214
Genetics and Genetic Technology
An introduction to genetic engineering and genetics designed for both biology and other science majors. The course will focus on how the study of genetics has been adapted, from contemporary recombinant DNA research to the solution of various practical problems in biotechnology, agriculture, the environment and the diagnosis and treatment of disease. Basic aspects of transmission, molecular and population genetics will serve as the background. Prerequisite: One semester of college-level biology, e.g., BIOL 107 or 115, or consent of the instructor. (3-0-3)

BIOL 225
Microbiology Laboratory
Isolation and identification of microorganisms, microbial growth, design of culture media, microorganisms as biocatalysts, environmental microbiology, quantitative microbiology, introduction to microbial genetics, and genetic engineering. Prerequisites: Concurrent or previous enrollment in BIOL 210 or consent of instructor. (0-4-2) (C)

BIOL 301
Literature Survey/MCAT Preparation
A course to familiarize pre-med students with the biology literature and prepare them for MCAT examinations. (1-0-1)

BIOL 320
Biological Literature
Library research on an advanced topic in biology, directed by a faculty member. (0-4-2) (C)

BIOL 403
Biochemistry Lectures
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. Prerequisite: BIOL 107 or BIOL 115 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: Previous or concurrent enrollment in BIOL 403. (0-6-3) (C)

BIOL 414
Genetics for Engineering Scientists
A course in genetics and genetic engineering designed for advanced students in engineering and related disciplines. The course will cover genetics at the molecular, cellular, organismal, and population levels as a basis for discussions of practical applications of recombinant DNA technology in industry and the fields of medicine, agriculture, etc. A term paper will be required in addition to in-class examinations. Prerequisite: Consent of the instructor. (3-0-3) (C)

BIOL 423
Microbial Genetics Laboratory
Quantitative techniques in microbial genetics including mutagenesis, isolation and characterization of mutants, hybridization, random spore analysis and gene complementation. Basic techniques used in recombinant DNA technology (genetic engineering) will include restriction enzyme analysis and mapping, cloning of DNA fragments into plasmid vectors, transformation of cells with recombinant DNA, isolation and analysis of recombinant plasmids, Southern blotting and PCR. Prerequisites: BIOL 210, BIOL 225, BIOL 403. (1-6-3) (C)

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: BIOL 107 or BIOL 115. (3-0-3)

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. Prerequisites: BIOL 107 or BIOL 115 and CHEM 237 or consent of the instructor. (3-0-3)

BIOL 446
Cell Biology Laboratory
A laboratory course in cell biology to be taken concurrently with BIOL 445. (0-6-3) **(C)**

BIOL 490
Individual Study
Prerequisite: Consent of instructor. (Credit: Variable; maximum three credit hours) (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. Prerequisite: Consent of instructor. (Credit: Variable) (C)

BIOL 495
Colloquium
Lectures by prominent scientists. Prerequisites: BIOL 107 and 115, or permission of instructor. This course may not be used to satisfy the natural science general education requirement. (1-0-1)

Graduate Courses
Graduate courses are available to degree-seeking undergraduate students with the approval of the course instructor and faculty adviser. See the current *IIT Bulletin: Graduate Programs* for full descriptions.

BIOL 513
Advanced Biochemistry

BIOL 514
Toxicology

BIOL 515
Molecular Biology

BIOL 519
Biochemistry Laboratory

BIOL 523
Methods in Microbial Genetics and Genetic Engineering

BIOL 526
The Gene and Cell Development

BIOL 527
Immunology and Immunochemistry

BIOL 529
Applied Immunology

BIOL 533
Laboratory in Cell and Molecular Biology

BIOL 542
Advanced Microbiology Lectures

BIOL 550
Industrial and Computational Biology

BIOL 560
Microbial Physiology and Metabolism

BIOL 561
Microbial Genetics and Genetic Engineering

Civil and Architectural Engineering

* May only be taken by architecture students; not for civil and architectural engineering majors.

CAE 100
Introduction to Engineering I
Introduction to the profession; an introduction to engineering graphics as a problem-solving tool. Basic traditional techniques of orthographic projection, multiview sketching, isometric and oblique pictorials, sectioning, auxiliary views, dimensioning, detail drawing, use of ANSI standards; and applications in civil and architectural engineering. (1-2-2)

CAE 101
Introduction to Engineering II
A continuation of CAE 100. Application of PC-based CAD (computer-aided drawing and design) software to presentation and problem solving in civil and architectural engineering applications. Introduction to basic principles of design. Prerequisite: CAE 100. (0-4-2)

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, transits, total stations and photogrammetric equipment. Corequisite: CAE 100. (2-2-3)

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: airphoto interpretation, soil and rock mechanics in relation to engineering geology; subsurface exploration; dams, reservoirs, tunnels; case-history illustrations. (3-0-3)

CAE 286*
Theory and Concept of Structural Mechanics
Vectors, forces, free-body diagrams. Statics of particles and rigid bodies. Moments of forces, couples. Equations of equilibrium. Centroids, moment of inertia. Simple truss analysis. Cables. Strength of materials, stress and strains, stress-strain relations. Beam theory, shear and bending moment diagrams. Flexure and shear stresses, deflections. Prerequisite: MATH 122. (4-0-4)

CAE 287*
Structures I: Analysis and Behavior
Structural analysis; behavior of beams and frames. Buckling of columns. Stress calculations in trusses, cables, beams and frames. Deflection of trusses and beams. Indeterminate systems; three-moment equations; computer application of structural analysis. Loads on structures; concept of design; definition of ASD and LRFD. Prerequisite: CAE 286. (3-0-3)

Course Descriptions

CAE 301
Hydraulics and 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. Corequisite: MATH 252. (2-3-3)

CAE 302
Fluid Mechanics and 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; turbomachinery; measurement in fluid mechanics and hydraulics. Prerequisite: MATH 252. (3-0-3)

CAE 303
Structural Design I
Design loads: factors of safety; load and resistance factors for steel and timber structures. Experimental and analytical study of steel and timber 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 and timber. Prerequisite: MMAE 202. (2-3-3) (D) (C)

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. Prerequisites: MMAE 202, MATH 252. (3-0-3)

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. Prerequisites: MMAE 202, CAE 304. (2-3-3) (D) (C)

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. Prerequisite: CAE 304. (3-0-3)

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. Prerequisite: 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 aggregates, concrete, masonry, wood, bituminous material, 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: MMAE 202. (2-3-3) (C)

CAE 323
Soil Mechanics
Physical and mechanical properties of soils; elementary principles of soil identification and testing. Principles of soil permeability and seepage, consolidation, failure theories, earth pressures, and bearing capacity. Laboratory included. Prerequisites: MMAE 202, CAE 301. (2-3-3) (C)

CAE 351*
Structures II:
Steel and limber Design
Strength and behavior of structural steel. Design of steel tension, compression and bending members. Steel truss and frame-connection design and details. Beam-column design, base-plate design, and details. Strength and behavior of timber. Design of timber tension, bending and compression members. Timber connections and details. Prerequisite: CAE 287. (3-0-3)

CAE 352*
Structures III: Reinforced Concrete and Masonry Design
Concrete as a material, behavior of reinforced concrete. Design of concrete beams, columns, one-way slabs and simple footings. Detail of reinforcement. Deflection and cracking of concrete. Masonry structures, design of masonry load-bearing walls, reinforced and unreinforced masonry members. Prerequisite: CAE 287. (3-0-3)

CAE 401
Building Systems Integration Studio I
Principles and elements of design; synthesis of structural, mechanical, electrical, sanitary and construction, considering interrelationship in performance and economics. Emphasis will be given to system identification, typical usage and manner or means of integration. Prerequisites: CAE 111, 112, and senior standing. (1-3-2) (D)

CAE 402
Building Systems Integration Studio II
Continuation of CAE 401. An in-depth review of interference design. Design and detailed development of a major architectural project integrating all aspects of architecture and related disciplines in a professional manner and milieu. Prerequisite: CAE 401. (0-6-2) (D)

CAE 408
Bridge and Structural Design
Design of modern bridges and other structures of steel and reinforced concrete. Prerequisite: CAE 437. (2-3-3) (D)

CAE 410
Introduction to Wind and Earthquake Engineering
Kinematics of Particles, Newtons 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. Prerequisite: CAE 310. (3-0-3)

CAE 412
Traffic Engineering Studies and 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. Prerequisite: Senior standing or consent of the instructor. (3-0-3) (D)

CAE 415
Pavement Design, Construction and Maintenance
Pavement types, stresses in flexible and rigid pavements, vehicle pavement interaction. Mathematical models for pavement systems, subgrade support, design of flexible and rigid pavements. Construction procedure, drainage considerations, environmental effects. Rehabilitation and maintenance of pavements. Prerequisite: 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: guideways, terminals, and other elements for railroads, airports and harbors. Prerequisite: Senior standing or consent of the instructor. (3-0-3) (D)

CAE 417
Railroad Engineering and 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. Prerequisite: Senior standing or consent of the instructor. (3-0-3) (D) (C)

CAE 419
Transportation Engineering and 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. (3-0-3) (D)

CAE 420
Introduction to 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. Prerequisite: CAE 310. (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, etc. (3-0-3)

CAE 422
Sprinklers, Standpipes, Fire Pumps, Special Suppression and 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: MMAE 310. (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: MMAE 310, MMAE 322 or consent of the instructor. (3-0-3)

CAE 425
Fire Protection and 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. For architects and engineers not majoring in fire protection and safety engineering. (3-0-3)

CAE 426
Computer Fire Modeling Theory and Applications
Introduction to fire heat-transfer processes and fire testing materials: application of a set of quantitative engineering tools (fire models) to construct a description of conditions that occur or might occur during the course of a fire; life and structural impacts from hostile fires in buildings. Prerequisite: CAE 424 or consent of instructor. (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: MATH 252. (3-0-3) (D)

CAE 431
Steel and Timber Design
Design of steel beams, plate girders, and beam columns. Bolted and welded connections. Design of typical frame systems. Prerequisites: CAE 307, 310. (3-0-3) (D)

CAE 432
Concrete and Foundation Design
Design of reinforced concrete building frames and continuous structures. Design of girders, slabs, columns, foundations and retaining walls. Prerequisites: CAE 307, CAE 310. (3-0-3) (D)

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. Prerequisites: CAE 304, CAE 310; or CAE 351, 352. (2-2-3)

CAE 436
Design of Masonry and Timber Structures
Design of unreinforced and reinforced masonry structural elements and structures. Serviceablility and ultimate capacity design. Seismic response, resistance and design. Design of wood columns and bending members. Mechanical Fasteners and Connectors. Prerequisites: CAE 310, 307 or 352 or consent of the instructor. (3-0-3) (D)

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. Prerequisite: CAE 310. (3-0-3)

CAE 467
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. Prerequisites: CAE 301, CAE 323. (3-0-3) (D)

CAE 470
Construction Methods and 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. Prerequisite: senior standing. (2-3-3) (D)

CAE 471
Construction Planning and 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. Prerequisites: CAE 470 and senior standing. (3-0-3) (D,C)

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, Prerequisite: Senior standing. (3-0-3)

CAE 473
Construction Project 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. Prerequisite: Senior standing. (3-0-3)

CAE 462
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: CAE 301 or consent of instructor. (3-0-3) (D)

CAE 463, 464
Environmental Systems for Buildings I, II
Introduction of the operation and design of building systems for climate control, water and drainage, fire safety, electrical supply, illumination, transportation, and noise control. (3-0-3); (3-0-3)

CAE 466
Soil and 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. Prerequisites: CAE 323 or consent of instructor. (3-0-3)

CAE 491
Undergraduate Research
Special research problems in civil engineering under individual supervision of instructor. Seminar presentation is required. Prerequisite: Senior standing, minimum GPA of 3.0, and consent of instructor. (Credit: Variable; maximum 4 credit hours)

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; maximum 4 credit hours)

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 flowsheeting. Team project research and project management skills. Internet publishing. Prerequisite: CHE 100. (0-4-2) (C)

CHE 202
Material and Energy Balances
Material and energy balances for engineering systems subjected to chemical and physical transformations. Calculations on industrial processes. Prerequisites: CS 105, MATH 152, and one semester of chemistry. (2-2-3) (C)

IPRO 296
introduction to IPRO
Introduction to process design. Principles and techniques in effective team work. Performance of selected design tasks in project groups integrated with IPRO 496. Practice with process design software. First part of the IPRO 296-IPRO 496 project package. *Only CHE students should register for this course.* Prerequisite: CHE 101, CHE 202, or consent of instructor. (0-2-1) (C)

CHE 301
Fluid Mechanics and Heat-Transfer Operations
Flow of fluids and heat transfer. Fundamentals of fluid flow and heat transfer design equations as applied to selected unit operations. Prerequisites: CHE 202, MATH 252. Corequisites: CHEM 343, MATH 251. (3-0-3)

CHE 302
Mass-Transfer Operations
Mass transfer in stagewise and continuous contacting equipment. Mass-transfer design equations as applied to selected unit operations. Unsteady state operations in mass-transfer equipment. Prerequisite: CHE 301. (2-2-3)

CHE 317
Chemical Engineering Laboratory I
Laboratory work in the unit operations of chemical engineering, fluid flow, heat transfer and other selected topics. Prerequisite: CHE 301. (1-3-2) (C)

CHE 351
Chemical Engineering Thermodynamics
Laws of thermodynamics and their application to chemical engineering operations. Prerequisite: CHEM 343. (3-0-3)

CHE 402
Introduction to Microelectronics Fabrication Technology
Fundamentals of integrated circuit technology. Epitaxy and doping of epitaxial layers. Film deposition techniques. Bipolar and MOS integrated circuit devices. Integrated and hybrid circuit fabrication. (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. Prerequisites: CHE 301, CHE 302, MATH 252. (3-0-3)

CHE 411
Introduction to Bioengineering
Transport phenomenon and reaction kinetics. Application of engineering principles to biochemical and biomedical systems. Biochemical topics include: microbial pathways, biological systems, evergetics and control systems, enzyme and macrobial kinetics, and the design and analysis of biological reactors. Biomedical topics include: flow properties of blood, transport in the human cardiovascular system, and the analysis and design of organ functions including the kidney and lung, Prerequisites: CHE 301, CHE 302. Corequisite: CHE 423. (3-0-3)

CHE 418
Chemical Engineering Laboratory II
Laboratory work in distillation, humidification, drying, gas absorption, filtration and other areas. Prerequisites: CHE 302, CHE 317. Corequisite: CHEM 247. (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. Prerequisites: CHE 302, CHE 351, CHE 433. (2-2-3)

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. Prerequisite: Junior standing. (3-0-3)

CHE 430
Petrochemical Process Operations and Design
Chemical and engineering aspects of current petrochemical and petroleum refining processes will be emphasized, including chemical conversions (catalytic and thermal), physical separations, and evaluation of alternatives. Design and simulation of refinery separation systems with emphasis on distillation columns. Prerequisite: CHE 494. (3-0-3)

CHE 431
Artificial Intelligence Applications in Engineering
Knowledge-based system (KBS) architecture, knowledge representation, inferencing strategies. Real-time KBS. Commercial KBS shells. Neural networks, backpropagation, radial basis functions, recurrent neural networks. Applications in product design, process modeling, diagnosis, and control. Prerequisite: Consent of the instructor. (3-0-3)

CHE 433
Process Modeling and 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: CHE 301. Corequisites: CHE 302, CHE 351. (2-2-3)

CHE 435
Process Control
Dynamic process models, stability assessment, feedback and feedforward 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: CHE 302, CHE 433. (2-2-3)

CHE 497
Discrete Time Systems and Computer Control
Sampling of continuous-time signals, Z-transforms, modeling, digital controller design using state-space and pole-placement design methods, adaptive control and self-tuning regulators. Emphasis on chemical process systems and applications. Prerequisite: CHE 433. (3-0-3)

CHE 499
Numerical and 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. Prerequisites: CHE 301, CHE 302, MATH 252. (3-0-3)

CHE 450
Principles of Polymer Science and Engineering
This introductory course deals with the physics, chemistry and engineering of polymer systems. Classical concepts and theories as well as recent developments are addressed. Topics to be discussed include: characterization, structure and properties, thermodynamics, polymerization reaction engineering, mechanical behavior, rheology, and processing. (3-0-3)

CHE 451
Chemical Process Thermodynamics
Second-law analysis of cooling, separation, combustion and other chemical processes. Chemical reaction equilibrium and processing applications. Prerequisite: CHE 351. (2-0-2)

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, calendering, fiber spinning, injection molding, mixing and polymerization reaction. Prerequisites: CHE 301, 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. Prerequisites: CHEM 244, CHE 303; or comparable mass-transfer course. (3-0-3)

CHE 475
Food Engineering I
Fundamentals of food engineering. Theory and practice in food processing operations including material and energy balances, flow of fluid foods, heat transfer, thermal process evaluation, and evaporation. Problem-solving and calculation sessions. (3-0-3)

CHE 476
Food Engineering II
Companion course to CHE 475 and normally follows it. Covers freezing and thawing, dehydration (including freeze-drying), distillation and extraction. (3-0-3)

CHE 461
Flow-Through Porous Media and Fundamentals of Reservoir Engineering
Introduction to petroleum geology and formation of oil and gas. Reservoir and fluid properties. Single- and two-phase flow of gases and liquids through porous media. Darcy's Law and its application in oil and gas reservoirs. Fundamentals of enhanced oil and gas recovery, (3-0-3)

CHE 462
LNG Fundamentals
Properties of liquid and gas mixtures at low temperatures. Vapor liquid equilibria. Thermodynamic analysis of natural gas liquefaction processes. Storage and transportation of LNG. Prerequisite: CHE 351 or MAE 205. (3-0-3)

CHE 463
Synthetic Energy
Introduction to synthetic energy processes. Analysis, design, and operation features of synthetic energy conversion processes. Fluidized beds, packed beds and dilute gas solids systems. The principles of low, medium and high-BTU coal gasification and waste-to-energy conversion processes. Prerequisite: CHE 351 or MAE 205. (3-0-3)

CHE 466
Applied Particulate Technology
Applications of particulate technology to industrial processes: sampling, collection, characterization, segregation, flow handling, storage, agglomeration, mixing, pulverization, attrition and transport of particles. Application of powder technology to material processing and environmental engineering. (3-0-3)

CHE 469
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 bed. Design aspects of fluidized bed and pneumatic conveying. Industrial applications of fluidized beds (catalytic reactors, drying, coal conversion, waste treatment). Prerequisite: CHE 302. (3-0-3)

CHE 492
Senior Problems
A senior research course that allows the student to pursue a largely independent study and research program in areas of current staff interest. Prerequisites: Senior standing and a GPA in major courses of 3.0 or better. (Credit: Variable; maximum 3 credit hours)

CHE 494
Chemical Process Design
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: CHE 302, CHE 351, CHE 433. (2-2-3) (C)

Course Descriptions

IPRO 496
Design IPRO
Group project in process design. Integration of technical, safety, environmental, economic and societal issues in process development and design. Final part of the IPRO project package. Project teams consist of chemical and environmental engineering students and students from other disciplines and professions. Students from other academic units should register for designated section of IPRO 297/397/497 (3 credits) and their contribution to the project tasks will be defined accordingly. *Only CHE students should register for this course.* Prerequisites: CHE 494, IPRO 296. Co-requisites: CHE 423, CHE 435. (1-2-2) (C)

Graduate Courses
Graduate courses are available to degree-seeking undergraduate students with the approval of the course instructor and faculty adviser. See the current *IIT Bulletin: Graduate Programs* for course descriptions.

CHE 501
Transport Phenomena

CHE 503
Chemical Engineering Thermodynamics

CHE 507
Computer-Aided Design

CHE 508
Process Design Optimization

CHE 510
Transport Phenomena in Living Systems

CHE 512
Heat Transfer

CHE 518
Principles of Diffusional Operations

CHE 524
Industrial Catalysts

CHE 525
Chemical Reaction Engineering

CHE 528
Analysis and Simulation of Chemical Processes

CHE 530
Advanced Process Control

CHE 532
Process Modeling

CHE 533
Statistical Analysis

CHE 535
Applications of Mathematics to Chemical Engineering

CHE 536
Computational Techniques in Engineering

CHE 538
Polymerization Reaction Engineering

CHE 542
Fluidization and Gas-Solids Flow Systems

CHE 543
Energy, Environment and Economics

CHE 555
Polymer Processing

CHE 560
Statistical Quality and Process Control

CHE 565
Electrochemical Engineering

CHE 566
Fundamentals of Electro-chemistry

CHE 571
Food Process Engineering

CHE 572
Advanced Food Process Engineering

CHE 573
Bioseparations

CHE 575
Polymer Rheology

CHE 576
Industrial Chemistry

CHE 577
Biochemical Engineering

CHE 579
Enzyme Reactor Engineering

CHE 581
Processing and Applications of Polymer Composite Materials

CHE 582
Interfacial and Colloidal Phenomena

CHE 583
Pharmaceutical Engineering

CHE 585
Drug Delivery

CHE 586
Particulate Technology

CHE 587
Particle Processing and Characterization

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 124
Principles of Chemistry I
Foundations of chemistry, atoms and molecules, stoichiometry of chemical reactions, thermochemistry, properties of gases, states of matter, chemical solutions, and kinetics. Molecular basis for chemical reactivity; atomic structure, periodicity, chemical bonding. (3-3-4) (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: CHEM 124. (3-3-4) (C)

CHEM 126
Principles of Chemistry II
Same as CHEM 125 except without the laboratory. Prerequisite: CHEM 124. (3-0-3)

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: CHEM 125 or consent of instructor. (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: 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 or corequisite: CHEM 239. (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: CHEM 125 or consent of instructor. (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. Prerequisites: CHEM 247, CHEM 344. Prerequisite or corequisite: PHYS 223. (2-6-4) (C)

CHEM 334
Spectroscopic Methods in Identification and 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. Prerequisites: CHEM 239, CHEM 247. (2-0-2)

CHEM 335
Spectroscopic and Separation Techniques
Characterization of prepared or separated organic compounds by chromatographic, chemical, and spectroscopic methods. Prerequisites: CHEM 240, CHEM 247. Corequisite: CHEM 334. (0-6-2) (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. Prerequisites: CHEM 247, PHYS 223, MATH 251. (3-0-3)

CHEM 344
Physical Chemistry II
Quantum theory, molecular structure and spectroscopy, chemical equilibrium constants from statistical mechanics, phenomemological 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: CHEM 343. (CHEM 247, Analytical Chemistry is recommended.) (3-4-4) (C)

CHEM 415
Inorganic Chemistry
In-depth introduction to the vast subfield of the discipline dealing with all 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: CHEM 344. (3-0-3)

CHEM 416
Advanced Chemistry Laboratory
An advanced laboratory with emphasis on synthesis and characterization of inorganic and organometallic compounds. Prerequisites: CHEM 240, CHEM 321. (1-7-3) (C)

CHEM 435
Introduction to Polymers
An introduction to polymer science with major emphasis on background, nomenclature and synthesis. Selected processing and characterization techniques and applications to day-to-day encounters with modern intelligent polymeric materials are introduced. Prerequisites: CHEM 239, CHEM 344 or consent of instructor. (3-0-3)

CHEM 450
Introduction to Research
Required for chemistry majors. Designed to give research experience in a faculty research laboratory. Prerequisites: CHEM 334, CHEM 335. (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. Prerequisites: CHEM 239, CHEM 343. (2-0-2)

CHEM 454
Computer Applications in Chemistry
A numerical methods and computer applications course for chemists; emphasis on software rather than hardware; results of numerical analysis and linear algebra presented and applied to solution of chemical problems. Prerequisites: CS 105, MATH 152, CHEM 344. (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. Prerequisites: CHEM 239, CHEM 344. (3-0-3)

CHEM 467
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. (0-12-4) (C)

CHEM 497
Special Projects
For juniors and seniors. (Credit: Variable) (C)

Graduate Courses
Graduate courses are available to degree-seeking undergraduate students with the approval of the course instructor and faculty adviser. See the current *IIT Bulletin: Graduate Program* for full descriptions.

CHEM 500
Advanced Analytical Chemistry

CHEM 501
Liquid Chromatography

CHEM 502
Gas Chromatography, Gas Chromatography-Mass Spectrometry

CHEM 503
Chromatography Techniques

CHEM 504
Chemometrics

CHEM 505
Spectroscopic Methods

CHEM 506
Sampling and Sample Preparation

CHEM 506
Analytical Methods Development

CHEM 509
Spectral and Physical Methods

CHEM 510
Electronics and Interfacing

CHEM 516
Electrochemical Methods

CHEM 520
Advanced Inorganic Chemistry

CHEM 521
Structural Inorganic and Solid State Chemistry

CHEM 522
Efficient Chemical and Materials Synthesis

CHEM 524
Intellectual Property Management

CHEM 530
Organic Reaction Mechanisms

CHEM 531
Organic Synthesis

CHEM 535
Advanced Polymer Chemistry

CHEM 537
Polymer Chemistry Laboratory

CHEM 536
Physical Biochemistry

CHEM 539
Introduction to Pharmaceutical Chemistry

CHEM 542
Polymer Characterization and Analysis

CHEM 550
Chemical Bonding

CHEM 552
Chemical Kinetics

CHEM 553
Advanced Chemical Thermodynamics

Computer Engineering

CPE 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 computer engineering through a series of hands-on projects and computer exercises. Develops professional communication and teamwork skills. (1-2-2) (C)

CPE 101
Introduction to the Profession II
Continuation of CPE 100, primarily through short projects. Prerequisite: CPE 100. (0-4-2) (C)

City and Regional Planning

CRP 201
The Dwelling
Programming and planning for human habitation in dwellings and neighborhoods. Housing as a response to human needs. Environmental impacts and their amelioration. Building types and their impacts on programmatic needs. Examples of various housing schemes in and around Chicago. (1-4-3)

CRP 203
Housing and Housing Types
The planning of rooms, houses, and groups of houses. Analysis of climatological, physical, psychological and social needs and their influence **on** the planning of housing. Government regulations, costs and financing, and their impact on housing. Includes single-family detached, row housing, walk ups, and low-rise construction. Limited work in other buildings. Lectures, seminars and drawing problems. Prerequisite: Drawing ability. (1-4-3)

CRP 204
Housing and Community Developments
Neighborhood and community theory and application. Housing, parks, shopping, work places and their rela-

tionships in size and location. Related infrastructure, including traffic, potable water, storm drainage, sewerage, natural gas, and electric. Prerequisite: CRP 203. (0-6-3)

CRP 307
Elements of City Planning
Theory of city planning and its application to new construction and to reconstruction of existing cities. The disposition of the various functions and activities of a city into a mutually supportive system. The acquisition and analysis of physical, social and economic information. City prototypes and their application to specific locations. Government codes and regulations and their use and effect on cities. Prerequisite: CRP 203, CRP 204, or consent of instructor. (1-4-3)

CRP 306
City Planning and Replanning
The application of city planning theory to a specific area. Planning for the reuse of existing cities and for new construction, A project that applies various planning principles to an actual situation is the primary effort. Prerequisite: CRP 307. (1-4-3)

CRP 407
Infrastructure Planning
Planning for and the application of various utility systems. Current practice and recent developments in methods and materials. Political and social issues involved in planning. Finance and operating costs and procedures. Focus on water supply, sewerage, storm drainage and transportation systems. (3-0-3)

CRP 408
City Planning Practice
Program and procedure. City planning techniques and methods as developed in planning commissions. Technical experience as a procedural guide. General background knowledge of the scope and types of office techniques and tools used in the preparation of a city plan. (3-0-3)

CRP 425,426
History and Architecture of Cities I, II
Selected topics in the history and development of human settlements. Examination of the forces affecting city development in history. These courses are taught as seminars and meet for one three-hour period per week. (3-0-3); (3-0-3)

CRP 441
The Airport: An Introduction
Review of aircraft types and their evolution and use; airport development and planning. General aviation, regional, metropolitan and major hub airport requirements; anatomy of the airport and requirements. Readings, written assignments, airport visits, and reports. Future airport/space port needs are analyzed. (3-0-3)

CRP 465
The Ecological Basis of Planning
The role of natural systems in meeting human needs. Natural systems. Climate, geology, land forms, soils, vegetation, and animal populations as the bases of agricultural and industrial technologies. Competing demands on air, water and land. Limiting factors. (3-0-3)

CRP 470
Urban Form in History: Pre-20th Century
This course studies historical and modern urban form in relation to contemporary urban problems. In the first semester, historical examples of high-density urban form and housing are selected and analyzed. Many examples of innovative urbanism and housing have features that are relevant to modern problems. They can be found in the different historical periods of major world regions, cultures and climates. Each student will take two or more examples and will prepare a report with text, diagrams and data. Prerequisite: Graduate or upper-level undergraduate standing. (2-2-3) (C)

CRP 471
Urban Form in History: 20th Century Low-Rise Urbanism
The second semester of this course examines modern innovative examples of high-density, low-rise urban form, housing and neighborhood design. The redevelopment of urban residential areas and the rapid expansion of suburbs, low-density areas with the problems of environment, traffic, pollution, land-use, etc., logically call for an improved urbanism criteria. Modern low-rise, high-density examples, both built and theoretical, will be selected and analyzed. Each student will take two or more projects and prepare a report with diagrams, data and descriptive text. Prerequisite: CRP 470. (2-2-3) (C)

CRP 472
Low-Rise Urbanism: House Components, Form/Cluster Design
As low-density suburbs expand, so do the problems of environmental quality, land use, traffic, pollution, etc. The alternative model of high-density, low-rise, energy-efficient urbanism is the subject of this course. The first semester deals with the components of the house and their assembly into unit form, the guiding principles of unit aggregation, solar orientation, gardens, access and garaging. Each student will prepare designs for unit types and diagrammatic clustering. Prerequisite: Graduate or upper level undergraduate standing. (2-8-6)

CRP 473
Low-Rise Urbanism: Residential High-Density Design
The second semester of this course focuses on the preparation of detailed designs for houses and neighborhood clustering based on the high-density low-rise concept. Basic determinants are passive solar design, type variety, minimum infrastructure and access, gardens, privacy, integrated garaging. Each student will develop and present one design project within an overall program of types. Prerequisite: CRP 472. (2-8-6)

CRP 490
Directed Reading
Prerequisite: Consent of the instructor and approval of the dean. (Credit: Variable; maximum three credit hours)

CRP 497
Special Problems
Independent study of projects and problems. Prerequisites: Students must be advised and have consent of the instructor and approval of the dean. (Credits: Variable)

Course Descriptions

Computer Science

CS 100
Introduction to the Profession I
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 101
Introduction to the Profession II
An introduction to contemporary areas of research and practice in computer science. Examines the context in which projects evolve, the problems confronted, how theory becomes practice in their solution, and the role of computer scientists in research and industry. Prerequisite: CS 100 or equivalent. (0-4-2) (C)

CS 105
Introduction to Computer Programming I
Introduces the use of a high-level programming language (C/C++) 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 **106**
Introduction to Computer Programming II
Continuation of CS 105. Introduces more advanced elements of C++ programming, including pointers, recursion, classes and object-oriented programming techniques. Pre-requisite: CS 105 or consent of instructor. (2-1-2)

CS 200
Introduction to C++ Programming
Problem-solving and program design using C++. Introduces a variety of programming techniques, algorithms and basic data structures, including an introduction to object-oriented programming. Prerequisite: Experience using another programming language (Pascal, BASIC, etc.). (2-2-3)

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. Prerequisite: CS 106 or CS 200. (3-0-3)

CS 331
Data Structures and 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: CS 106 or CS 200. (2-2-3)

CS 350
Computer Organization and 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. Prerequisite: CS 106 or CS 200. (2-2-3) (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. Prerequisites: CS 331, CS 350. (2-2-3)

CS 397
Special Projects
Prerequisite: Written consent of instructor. (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. Prerequisites: CS 331, CS 350. (3-0-3) (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: CS 106 or CS 200 or CS 325. (3-0-3) (T) (C)

CS 426
Introduction to Databases II
Investigation of architectural strategies for deploying database applications. Continuation of topic covered in CS 425, including a review of the relational database architecture and the SQL query language. Emphasis will be placed on active, object/relational and object-oriented database architectures. Develop familiarity with modeling, design and implementation techniques used in the construction of database applications. Prerequisite: CS 425 or database experience.

CS 430
Introduction to Algorithms
Introduction to the design, behavior and analysis of computer algorithms. Searching, sorting and combinatorial algorithms are emphasized. Worst case and average bounds on time and space usage. Prerequisites: CS 330, CS 331. (3-0-3) (T)

CS 440
Programming Languages and 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: CS 351. (3-0-3) (T)

CS 441
Current Topics in Programming Languages
New topics in programming language design such as concepts of concurrent and distributed programming, communicating sequential processes, and functional programming. System development tools and language features for programming. Introduction to programming language semantics. Prerequisite: CS 440. (3-0-3) (T)

CS 445
Object-Oriented Design and 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: CS 331. (3-0-3) (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. Prerequisites: CS 331, CS 350 or ECE 242. (3-0-3) (T)

CS 451
UNIX Systems Programming
Introduction to systems programming using the UNIX operating system. Includes shells and shell script programming, use of systems calls in C/C++ programs, process control, interprocess communication, and basic system administration. Prerequisites: CS 351, CS 450. (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: CS 450. (3-0-3) (T)

CS 460
Fundamentals of Multimedia
Introduction to computer-based multimedia, including desktop publishing, hypermedia, presentation media, graphics, animation, sound, video, and integrated authoring techniques. Prerequisite: CS 105 or consent of instructor. (2-2-3) (C)

CS 451
Practicum in Teaching and Training Using Multimedia
Study and practical experience in teaching and training using computer-based multimedia. Introduction to the pedagogy and application of instructional methodologies. Prerequisite: CS 460. (3-0-3)

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. Prerequisites: CS 350, ECE 218. (2-2-3) (C) (T)

CS 471
Design of Computer Processors
Further study of the internal design and organization of computer architectures. Methods of interconnecting devices: bus structures, independent channels, interrupt-driven controllers, synchronous and asynchronous devices. Survey of current microprocessors and microcomputer systems, including hardware/software interfacing and application of these systems. Hands-on experience in the construction of a microcomputer system. Prerequisites: CS 350, ECE 218. (2-2-3) (C) (T)

CS 480
Artificial Intelligence
Styles of programming and software engineering with applications to artificial intelligence and to the creation of good programming environments through the use of key ingredients of these styles. These include techniques of search, data-driven programming, demons, frames, object-oriented programming, production-rule systems, logic programming, and code that constructs code-including language-extension through macros. Prerequisite: CS 331. (3-0-3) (T)

CS 485
Computers and Society
Discussion of the impact of computer technology on present and future society. Historical development of the computer. Social issues raised by cybernetics. Prerequisites: CS 105 and at least junior standing. (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: CS 351. (3-0-3) (C) (T)

CS **488**
Software Engineering II
Study of advanced principles and practices in software engineering-including evolutionary software development, software prototyping, object-oriented analysis and design, software system architectures, software project management, software testing, software metrics and measurement, software quality assurance, software reuse, software maintenance, reverse engineering, and computer-aided software engineering. Prerequisite: CS 487. (3-0-3) (T)

CS 491
Undergraduate Research
Prerequisite: Written consent of instructor. (Credit: Variable)

CS 493
Senior Design Project I
First part of a two-semester practicum in the design of software products. Emphasizes the relationship between users and designers, especially the need for effective communications between these groups during the design process. Offered fall semester only. Prerequisite: CS 351. (0-2-1) (C)

CS 494
Senior Design Project II
Continuation of CS 493. Students work in design teams that translate a loose set of constraints into a set of product objectives. They then develop product designs using contemporary software engineering techniques and tools. Emphasizes need for innovation, experimentation and communication in the design process. Offered spring semester only. Prerequisite: CS 493. (0-4-2) (C)

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. Prerequisite: Consent of instructor. (Credit: Variable)

Graduate Courses

The following graduate courses are available to degree-seeking undergraduate students with the approval of the course instructor and faculty adviser. See the current *IIT Bulletin: Graduate Program* for course descriptions.

CS 511
Topics in Computer Graphics

CS 521
Object-Oriented Analysis and Design

CS 524
Object-Oriented Information Systems

CS 525
Advanced Database Organization

CS 527
Client/Server Applications Development I

CS 528
Client/Server Applications Development II

CS 530
Formal Theory of Computation

CS 531
Topics in Automata Theory

CS 532
Formal Languages

CS 535
Analysis of Algorithms

CS 536
Science of Programming

CS 537
Software Metrics

CS 540
Syntactic Analysis of Programming Languages

CS 541
Compiler Construction

CS 542
Computer Networks I: Fundamentals

CS 543
Advanced Topics in Computer Networks

CS 544
Computer Networks II: Network Services

CS 545
Concurrent Programming

CS 546
Parallel Processing

CS 548
Seminar in Broadband Integrated Services Networks

CS 550
Comparative Operating Systems

CS 551
Operating System Design and Implementation

CS 555
Analytic Models and Simulation of Computer Systems

CS 560
Computer Science in the Classroom

CS 561
The Computer and Curriculum Content

CS 565
Computer-Assisted Instruction

CS 566
Practicum in the Application of Computers to Education

CS 570
Comparative Computer Architecture

CS 572
Advanced Computer Architecture

CS 580
Medical Informatics

CS 581
Advanced Artificial Intelligence

CS 582
Robotics

CS 583
Expert Systems

CS 584
Neural Networks

CS 585
Natural Language Processing

CS 586
Software Systems Architectures

CS 587
Programming Project Management

CS 588
Advanced Software Engineering Development

CS 589
Software Testing and Quality Assurance

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. (1-2-2) (C)

ECE 101
Introduction to the Profession II
Continuation of ECE 100, primarily through short projects. Prerequisite: ECE 100. (0-4-2) (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. Corequisite: MATH 252. Concurrent registration in ECE 212 and ECE 218 is strongly encouraged. (3-0-3)

ECE 212
Analog and Digital Laboratory I
Basic experiments with analog and digital circuits. Familiarization with test and measurement equipment: combinational digital circuits; familiarization with latches, flip-flops and shift registers; operational amplifiers; and transient effects in first-order and second-order analog circuits; PSpice software applications. Corequisites: ECE 211, ECE 218. Concurrent registration in ECE 211 and ECE 218 is strongly encouraged. (0-3-1) (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. Prerequisite: ECE 211. Concurrent registration in ECE 214 is strongly encouraged. (3-0-3)

ECE 214
Analog and Digital Laboratory II
Design-oriented experiments including 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. Prerequisite: ECE 212. Corequisite: ECE 213. Concurrent registration in ECE 213 is strongly encouraged. (0-3-1) (C)

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. Prerequisite: Sophomore standing. Concurrent registration in ECE 2 11 and ECE 2 12 is strongly encouraged. (3-0-3)

ECE 242
Digital Computers and 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. Prerequisites: CS 105, ECE 218. (3-0-3)

ECE 307
Electrodynamics
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. Prerequisites: PHYS 221, MATH 251. (3-3-4)

ECE 308
Signals and 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. Prerequisites: ECE 213, MATH 333. (3-0-3)

ECE 309
Traveling Waves
Analysis and design of circuits using distributed network elements. Response of transmission lines with linear and nonlinear loads to digital and transient signals. AC steady-state of lossless and lossy lines. The Smith Chart as an analysis and design tool. Impedance matching methods; transmission line transformers. Prerequisites: ECE 213, PHYS 221. (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. Prerequisites: ECE 213, ECE 214. (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: ECE 311. (3-3-4) (C)

ECE 319
Fundamentals of Power Engineering
Principles of electromechanical energy conversion. Fundamentals of the operation 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. Prerequisites: ECE 213, ECE 214, PHYS 221. (3-3-4) (C)

ECE 383
Electric and Electronic Circuits
Circuit concepts, Ohm's Law. Kirchhoff's Laws, network theorems. Circuit elements, DC and AC network analysis. Diodes, transistors and electronic amplifiers. Digital electronics circuits and instrumentation. Credit for this course not applicable to a B.S.E.E. or a B.S.CP.E. degree and will not count in the EE or CPE major GPA. Prerequisite: PHYS 221. (3-0-3)

ECE 403
Communication Systems I
Power spectral density. Analysis and design of amplitude and frequency modulation systems. Signal-to-noise ratio analysis. Frequency division multiplexing: spectral design considerations. The sampling theorem. Analog and digital pulse modulation systems. Time division multiplexing. Design for spectral efficiency and crosstalk control. Introduction to information theory. Prerequisite: ECE 308. (3-0-3) (P)

ECE 404
Communication Systems II
Lecture portion of ECE 406. Credit will be given for either ECE 404 or ECE 406, but not for both. Prerequisites: ECE 403 and ECE 475; or MATH 475. (3-0-3) (P)

ECE 406
Digital and Data Communications
Channel capacity, entropy, digital source encoding considering bit rate reduction, quantization, waveshaping, and intersymbol interference. Analysis and design of digital modulators and detectors. Matched filters. Probability of error analysis. Laboratory covers modulation, detection, sampling, analog-to-digital conversion, error detection, and an open-ended project. Credit will be given for either ECE 404 or ECE 406, but not for both. Prerequisites: ECE 403 and ECE 475 or MATH 475. (3-3-4) (P) (C)

ECE 497
Computer Communications Systems
The ISO-OSI layered architecture, packet switching and circuit switching, error detection and recovery (ARQ) protocols, bridges and routers, basic queueing theory, telephone switches, Erlang-B and Erlang-C blocking formulae, TCP/IP, X.25, signaling (Signaling System 7), Personal Communication Services (PCS) networks, Broadband Networks. Prerequisite: ECE 475 or MATH 475. (3-0-3) (P) (C)

ECE 409
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 specifications. Laboratory experiments reinforce concepts and include an open-ended design problem. Prerequisites: ECE 309, ECE 312. Corequisite: ECE 403. (3-3-4) (P) (C)

ECE 410
Consumer Electronics
Information acquisition and signal processing techniques utilized in communication systems with emphasis on implementation in television. Topics covered include synchronization, surface acoustic wave filters, ultrasonic transducers, frequency-band utilization, calorimetry, color encoding and decoding. Prerequisites: ECE 308, ECE 312. (3-0-3) (P)

ECE 411
Power Electronics
Analysis, design and application of electronic devices to power and control systems. Control of AC-DC, DC-AC, DC-DC, AC-AC converters, motor speed, and switched-mode power supplies using devices such as power transistors, power MOSFETs, FETs, thyristors (SCRs), GTOs, IGBTs and UJTs. Project laboratory emphasizes power electronic circuit analysis, design of converters, and design and control of devices and their cost/performance tradeoffs. Prerequisites: ECE 312, ECE 319. (3-3-4) (P) (C)

ECE 413
Modern Optics and 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. Same as PHYS 412. Prerequisite: PHYS 348. (3-0-3)

ECE 414
Audio and Electroacoustics
Analysis and design of audio preamplifiers, power amplifiers, passive and active filters. Acoustic principles. Basics of magnetic recording. Project laboratory: the design, construction, troubleshooting and testing of components of an audio system. Prerequisite: ECE 312. (3-3-4) (P) (C)

ECE 415
Solid State Electronics
Energy-bands and carrier transport in semiconductors and metals. Physical principles of p-n junction devices, bipolar junction transistors, FETs, Gunn diodes, IMPATT devices, light-emitting diodes, semiconductor lasers. Same as PHYS 415. Prerequisite: PHYS 348. (3-0-3) (P)

ECE 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. Same as PHYS 418. Prerequisite: PHYS 348. (3-0-3)

ECE 419
Power Systems Analysis
Transmission systems analysis and design. Large scale network analysis using Newton-Raphson load flow. Economic operation of power systems with consideration of transmission losses. Unsymmetrical short-circuit studies. Detailed consideration of the swing equation and the equal-area criterion for power system stability studies. Design of electric utility power systems using interactive graphical software. Prerequisite: ECE 3 19. (3-0-3) (P)

ECE 420
Analytical Methods in Power Systems
Fundamentals of power systems operation and planning, power system dynamics and control. Design of reliable power systems, power systems security analysis, optimal scheduling of power

generation, estimation of power system state. Prerequisite: ECE 309. (3-0-3) (P)

ECE 421
Microwaves
Lecture portion of ECE 423. Credit will be given for either ECE 421 or ECE 423, but not for both. Prerequisites: ECE 307, ECE 309. (3-0-3) (P)

ECE 423
Microwave Circuits and 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. Prerequisites: ECE 307, ECE 309. (3-0-4) (P) (C)

ECE 426
Linear Integrated Circuits
Analysis and design of linear analog integrated circuits. Contemporary semiconductors (Si, GaAs, InP), fabrication techniques (CVD, MOCVD), MOS and Bipolar devices and their models. Circuits (operational amplifiers, multipliers) and their subcircuit elements (differential amplifier, current source). Simulation of integrated circuits. Prerequisite: ECE 312. (3-0-3) (P)

ECE 427
Digital Integrated Circuits
Analysis and design of input and output circuits for various logic families and their relation to specifications and interfacing techniques. Speed, fanout, noise immunity and temperature dependence. The study of semiconductor memories, MSI, LSI circuits and applications. Prerequisites: ECE 218, 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. Credit for ECE 429 will not be given if ECE 530 is taken. Prerequisites: ECE 218, ECE 311, and senior standing. (3-3-4) (P) (C)

ECE 493
Real-Time Data Acquisition and Processing
A design-oriented course stressing real-time applications of signal and system theory, computers and instrumentation. Analog and digital signals, transducers, signal conditioning, analog-to-digital and digital-to-analog conversion, real-time signal processing. The laboratory considers design problems from various fields. Prerequisites: ECE 308, ECE 312. (3-3-4) (P) (C)

ECE 434
Control Systems with Laboratory
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. The laboratory consists of the complete design of a control system, with major tasks being modeling, controller design, and performance testing. Credit will be given for either ECE 434 or ECE 438, but not for both. Prerequisite: ECE 308. (3-3-4) (P) (C)

ECE 435
Electrical, Magnetic and 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 MMAE 465. Prerequisite: ECE 311 or MMAE 362. (3-0-3) (P)

ECE 496
Analysis and Processing of Discrete Signals
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: ECE 308. (3-3-4) (P) (C)

ECE 497
Digital Signal Processing I
Lecture portion of ECE 436. Credit will be given for either ECE 436 or ECE 437, but not for both. Prerequisite: ECE 308. (3-0-3) (P)

ECE 438
Control Systems
Lecture portion of ECE 434. Credit will be given for either ECE 438 or ECE 434, but not for both. Prerequisite: 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. Prerequisites: ECE 218 or CS 470, ECE 242 or CS 350, and senior standing. **(3-3-4) (P) (C)**

ECE 446
Logic Design and Implementation
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, programmable logic, and application-specific integrated circuits (ASICs). Design-oriented laboratory stressing the use of programmable logic devices. Prerequisites: ECE 218, ECE 311, senior standing. (3-3-4) (P) (C)

ECE 448
Mini/Micro Computer Programming
Engineering applications programming using the C language in a UNIX environment. Use of UNIX tools including filters and shell scripts. Overview of UNIX software design practices using

tools such as Make and SCCS. The UNIX system interface. Software design projects. Prerequisites: CS 106, ECE 242 or CS 350, and senior standing. (3-0-3) (P)

ECE 449
Object-Oriented Programming and 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 class libraries. Event-driven simulation techniques in an object-oriented environment. Programming projects will include the development of a simulator for an engineering application. Prerequisites: ECE 448, senior standing. (3-0-3) (P)

ECE 470
Photonics
Lecture portion of ECE 471. Credit will be given for either ECE 470 or ECE 471, but not for both. Prerequisites: ECE 307, ECE 309. (3-0-3) (P)

ECE 471
Photonics with Laboratory
An engineering-oriented treatment of optics and photonics, concentrating on optical design for communications and sensor systems. Electromagnetic theory of optics and its application to free-space and guided-wave optical systems: polarization states; optical components; fiber and integrated-optic waveguides; semiconductor sources and detectors; electro-optic and acousto-optic modulation techniques. Laboratory section introduces optical measurement techniques. Characterization of passive optical components and dielectric waveguides. Design of interferometric sensors. Design and testing of optical transmitters and receivers for communication systems. Credit will be given for either ECE 470 or ECE 471, but not for both. Prerequisites: ECE 307, ECE 309, ECE 312. (3-3-4) (P) (C)

ECE 475
Random Phenomena in Electrical Engineering
Basic axioms of probability. Signals as random variables. Distribution and density functions. Functions of random variables. Applications to the binary symmetric communication channel, square-law and other nonlinear devices. The Gaussian, Poisson and other distributions. Application to photon counting. The signal-plus-noise problem. The DC and AC value of signals: mean and variances. The meaning of signal-to-noise ratio. Higher moments. Estimation of the mean and variance. Confidence intervals. Credit will be given for either ECE 475 or MATH 475, but not for both. Prerequisite: ECE 308. (3-0-3)

ECE 461
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: ECE 437. Corequisite: ECE 475 or MATH 475. (3-0-3) (P)

ECE 463
Switching Circuit Theory
Design, synthesis and analysis of synchronous and asynchronous sequential circuits. Foundations of discrete logic, including set theory, graphs algebraic structures. Descriptions and capabilities of sequential circuits. Properties of sequential circuits applicable to the design process. Minimization, decomposition and machine structure. Fault detection and hazards. Prerequisites: ECE 218 or CS 330, and senior standing. (3-0-3) (P)

ECE 491
Undergraduate Research
Independent work on a research project supervised by a faculty member of the department. Prerequisites: Written consents of academic adviser and instructor. (Credit: 1-3 credit hours) (P)

ECE 497
Special Problems
Design, development, analysis of advanced systems, circuits or problems as defined by a faculty member of the department. Prerequisites: Written consents of academic adviser and instructor. (Credit: 1-3 credit hours) (P)

Graduate Courses

The following graduate courses are available to qualified degree-seeking undergraduate students with the written approval of the course instructor, faculty adviser and department chair. Generally a 3.0/4.0 GPA is required for departmental approval. See the current *IIT Bulletin: Graduate Programs* for course descriptions.

ECE 502
Basic Network Theory

ECE 604
Communication System Design

ECE 509
Electromagnetic Field Theory

ECE 510
Passive Network Synthesis

ECE 511
Analysis of Random Signals

ECE 513
Communication Engineering Fundamentals

ECE 523
Electronic Circuit Theory

ECE 524
Electronic Circuit Design

ECE 526
Active Filter Design

ECE 530
VLSI Design

ECE 531
Linear System Theory

ECE 535
Discrete Time Systems

ECE 540
Reliability Theory and System Implementation

ECE 541
Performance Evaluation of Computer and Communication Networks

ECE 545
Computer Communication Networks

ECE 556
Modern Power System Analysis

ECE 557
Fault Tolerant Power Systems

ECE 558
Power System Reliability

ECE 564
Control and Operation of Electric Power Systems

ECE 569
Digital Signal Processing II

ECE 575
Electron Devices

ECE 578
Microwave Theory

ECE 581
Computer and Robotic Vision

ECE 585
Digital Computer Design

ECE 586
Fault Detection in Digital Circuits

ECE 588
CAD Techniques for VLSI Design

Economics

ECON 211
Principles of Macroeconomics
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. (3-0-3) (S)

ECON 423
Economic Analysis of Capital Investments
The evaluation of proposed capital investments in the public and private sectors. Equivalent worth, rate of return, and benefit/cost methods. Treatment of the time value of money, taxes, inflation, risk, interrelated investments and capital budgeting. Prerequisite: Junior standing. (3-0-3) (S)

Engineering Graphics

EG 100
Basic Technical Drawing
Designed for students who are not prepared to take EG 105 because they have had little or no high school technical drawing or who need a slower approach to the subject. Special emphasis is placed upon the use of instruments, lettering, line technique, and introductory multiview projection. (0-4-1)

EG 105
Engineering Graphics and Design
Basic traditional and computer-based techniques and applications, multiview sketching, orthographic projection, isometric and oblique pictorials, sectioning, auxiliary views, principles of descriptive geometry, dimensioning, detail drawings, introduction to design and computer-aided drafting and design (CAD). Prerequisites: Trigonometry. (1-2-2)

EG 131
Architectural Engineering Graphics
Basic techniques of engineering graphics, emphasizing application in architectural engineering. Lettering, multiview sketching, and orthographic projection, principles of dimensioning. Plan, elevation and sectional views of structures. Isometric and perspective sketching and drawing. Introduction to building systems and materials. Introduction to computer-aided drafting and design (CAD). Prerequisite: Trigonometry. (1-2-2)

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, first-angle drawing, R.H. and L.H. drawings, 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 and 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 drafting and design. Engineering design project. Prerequisite: EG 105. (2-2-3)

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 problems. Shades and shadows, conics, map projection and spherical triangles. Emphasis on those applications that promote visualization and introduce new engineering experience. Applications of computers to problem solving. Prerequisite: 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. Prerequisite: EG 105 or consent of instructor. (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: 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: 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. Prerequisite: EG 105 or consent of instructor. (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: EG 309 or consent of instructor. (2-2-3)

EG 325
Advanced Engineering Graphics for Non-Engineers
Continuation of EG 225. 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: EG 225. (2-1-3)

EG 329
Graphic Representation for Non-Engineers
Basic techniques of graphics applied to communications and report writing. Use of Harvard Graphics to generate charts and graphs including two- and three-dimensional line 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: EG 225. (2-2-3)

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 data processing systems and procedures, application of computers to design, and CAD/CAM. Prerequisite: EG 305. (2-2-3)

EG 406
Technical and 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. Prerequisite: EG 105. (2-2-3)

EG 409
Computer-Generated Pictorial Projections
Study of computer-generated representations of three dimensional objects. Projections include multiview, perspective, axonometric and oblique. Prerequisites: EG 406. (2-2-3)

EG 419
Computer Graphics in Engineering
Techniques of computer-aided design and computer-aided manufacturing. Study of various computer graphic hardware and software systems through demonstrations and use. Prerequisites: EG 105 and junior standing or consent of instructor. (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. Prerequisite: EG 325. (2-1-3)

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. Prerequisite: EG 329. (2-2-3)

Graduate Courses

Graduate courses are available to degree-seeking undergraduate students with the approval of the course instructor and faculty adviser. See the current *IIT Bulletin: Graduate Programs* for course descriptions.

English

ENGL 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. (3-0-3) (C)
This course satisfies IIT's Basic Writing Proficiency Requirement (page 30). It does not satisfy a general education requirement in the humanities and social or behavioral sciences.

ENGL 110
English Structure in Academic Prose
ENGL 110 and ENGL 111 comprise a one-year sequence for students whose native language is not English. ENGL 110 helps students with the complex structure and vocabulary of academic writing, with an emphasis on short compositions. (3-0-3) (C)

ENGL 111
Writing in the University for Non-Native Students
Equivalent to ENGL 101. Designed to deal with the special writing problems

of those students whose native language is not English. (3-0-3) (C) This course satisfies IIT's Basic Writing Proficiency Requirement (page 30). It does not satisfy a general education requirement in the humanities and social or behavioral sciences.

ENGL 301
Introduction to Linguistics
The objective analysis of language structure and structural hierarchies; a survey of the basic concepts of linguistics; the phoneme, the morpheme, language change over time and space. Prerequisite: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement.
(3-0-3) (H) (C)

ENGL 305
Aspects of the
American English Language
Beginning with a survey of the development of the English language and its place in the world's languages, the course examines the structure of contemporary standard American English from a linguistic perspective and develops the concepts and vocabulary briefly to examine existing geographic and socio-economic variation. Prerequisite: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement.
(3-0-3) (H) (C)

ENGL 307
The Self in Language
Explores the constructed nature of "the self" in literature and non-fiction prose. Special focus on the role of language in determining one's identity. Prerequisite: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H) (C)

ENGL 334
Literature of Modern Science
A study of the literature of science from the Renaissance to modern times. Prerequisite: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H) (C)

ENGL 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 modem cultute. 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: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H) (C)

ENGL 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 ENGL 337. Prerequisite: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H) (C)

ENGL 339
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: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H) (C)

ENGL 340
World Drama
A study of major world dramatists. The syllabus varies, but may include works by Sophocles, Lope de Vega, Marlowe, Shakespeare, Moliere, Goethe, Ibsen, Soyinka and others. Prerequisite: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H) (C)

ENGL 341
Modern Drama
Study of major dramatists and movements in the theater since Ibsen and Strindberg, with special emphasis on such writers as Chekhov, Shaw, Brecht, O'Neill, Ionesco and Pinter. Prerequisite: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement.
(3-0-3) (H) (C)

ENGL 343
Theater in Chicago
Designed to introduce students to the variety of professional theater performances in and around Chicago. Main emphasis is on seeing plays, ancient to contemporary; essays and oral reports; study of dramatic genres and theater history. Prerequisite: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H) (C)

ENGL 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: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H) (C)

ENGL 345
The Novel
Analysis of the novel as a literary form with attention to its place in ongoing cultural and political discourse. Prerequisite: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H) (C)

ENGL 347
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, Gabriel Marquez, Nadine Gordimer, Toni Morrison and Salman Rushdie. Prerequisite: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H) (C)

ENGL 346
Poetry
Study of poetry and imaginative prose, including an analysis of the theoretical, literary, and sociocultural contexts of these works. The course may include creative writing by students. Prerequisite: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H) (C)

ENGL 351
Nineteenth-Century American Literature
Study of representative works of such writers as Franklin, Poe, Emerson, Hawthorne, Melville, Whitman, Twain, Chopin and Dickinson, Prerequisite: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H) (C)

ENGL 353
Writing in Black
An examination of works by Toni Morrison, Paule Marshall, W.E.B. DuBois, Richard Wright and other black writers. The course includes formal and ideological analysis, emphasizing both nationalism and transnationalism in black culture. Prerequisite: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H) (C)

ENGL 356
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 perspectives of globalism and nationalism. Prerequisite: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H) (C)

ENGL 360
Chicago in Literature
A survey of great American novelists, poets and dramatists who have lived and worked in Chicago from the time of the Great Fire to the present day, and who have made Chicago one of the great world literary centers. Writers discussed include such figures as Theodore Dreiser, Carl Sandburg and Richard Wright. Prerequisite: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H) (C)

ENGL 362
Work, Worker and the Workplace: Changing Images in Literature and the Arts
An investigation of the changing images of work, workers, and the workplace from the 1890s to the 1990s. The course addresses the representation of both technological and social change in fiction, poetry, and art. Prerequisite: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H) (C)

ENGL 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: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H) (C)

ENGL 371
Middle English and Renaissance Literature
Study of English literature from its beginnings-both oral and written-through the early 17th Century, in times of linguistic change, political revolutions, nation-building and burgeoning empire. Reading list varies but is likely to include Arthurian romance, the Gawain poet, Chaucer, Margery Kempe, Medieval Drama, Spenser, Marlowe, Shakespeare, Elizabeth Carey, John Webster (and other Elizabethan and Jacobean poets and playwrights), John Donne and John Milton. Prerequisite: A 100-level-humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H) (C)

ENGL 372
Restoration and Eighteenth-Century Literature
Study of English Literature in the Age of Enlightenment, from the late 17th to the late 18th century. Reading list varies but may include Donne, Milton, Bunyan, Behn, Dryden, Swift, Pope, Johnson, Boswell, Burke, Reynolds and Sterne. Prerequisite: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H) (C)

ENGL 373
The Romantic Rebellion and Its Aftermath
The foundations of modernism growing out of the upheaval that brought forth the poetry of Wordsworth, Keats and Shelley, and a new vision of an industrialized world in the works of Dickens, Carlyle, Ruskin, and Tennyson. Prerequisite: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H) (C)

ENGL 374
Twentieth-Century British Literature
Study of such writers as Shaw, Yeats, Woolf, Joyce, Huxley, Auden, Spender and Thomas. Prerequisite: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H) (C)

ENGL 376
Science Fiction: I
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: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H) (C)

ENGL 377
Science Fiction: II
An investigation of science fiction novels and what they tell us about our conceptions of nature and technology, and about the possible outcomes for our cultural and technological processes. We will ask how these novels connect environmental or ecological themes with political and economic ones. Prerequisite: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H) (C)

ENGL 401
Advanced Composition and Prose Analysis
Critical analysis of various types of prose, with stress on the art as well as the craft of writing. The student is required to write several critical papers. Prerequisite: A 100-level humanities course and junior standing. (3-0-3) (C)

ENGL 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: A 100-level humanities course and junior standing. (3-0-3) (H) (C)

ENGL 421
Technical Writing
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: A 100-level humanities course and junior standing. Credit not granted for both ENGL 421 and MT 301. (3-0-3) (C)

ENGL 423
Writing in the Workplace
A study of communications relating to entrepreneurial and corporate structures. This course will help students develop business communication skills, including the ability to analyze situations, determine appropriate communications forms, write and revise business-related documents, and give oral presentations. Prerequisite: A 100-level humanities course and junior standing. (3-0-3) (C)

ENGL 428
Verbal and 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: A 100-level humanities course and junior standing. (3-0-3) (C)

ENGL 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: A 100-level humanities course and junior standing. (3-0-3) (H) (C)

ENGL 480
Special Topics in Shakespeare
An independent research project or small-group seminar addressing a particular Shakespearean work or theme, to be arranged in advance with the instructor. Enrollment limited. Prerequisite: ENGL 337 or 338, a 100-level humanities course, and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H) (C)

ENGL 491
Independent Reading and Research
For advanced students. Prerequisite: Consent of department. (Credit: Variable) (H) (C)

ENGL 497
Special Project
(Credit: Variable)

Environmental Engineering

ENVE 100
Introduction to the Profession I
Introduction to environmental engi*neering* and engineering productivity software. Communication skills development, technical reporting and presentation, engineering ethics, and a variety of topics are discussed. (1-2-2) (C)

ENVE 101
Introduction to the Profession II
A continuation of ENVE 100. Advanced engineering applications of productivity software. Engineering graphics and technical flow-sheeting. Team project research and project management skills. Internet publishing. Prerequisite: ENVE 100. (0-4-2) (C)

IPRO 296
Introduction to IPRO
Introduction to process design. Principles and techniques in effective team work. Performance of selected design tasks in project groups integrated with CHE/ENVE 496. Practice with process design software. First part of the IPRO project package. Only *ENVE students should register for this course.* Prerequisite: ENVE 101, CHE 202 or consent of instructor. (0-2-1) (C)

ENVE 302
Environmental Chemistry
Chemical principles of environmental systems, including an introduction to acid-base reactions, gas transfer, chemical speciation, precipitation and oxidation-reduction reactions. Corequisite: CHEM 344. (2-3-3) (C)

ENVE 305
Geochemical Cycles
The movement and fate of chemicals within the three phases of the environment: Air, water and terrestrial solids. Emphasis is placed on models and mechanisms that determine the rates, lifetime, routes and reservoirs of chemicals moving through the environment. Prerequisites: MATH 252, CHE 202, ENVE 302. (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. Prerequisite: CHE 301. (3-0-3)

ENVE 404
Water and 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. Prerequisite: ENVE 302. (3-0-3)

ENVE 405
Environmental Impact Assessment
Modeling methods for the prediction and assessment of environmental impacts due to changes in the physical, chemical or biological environment.

Comparative studies of methodologies to assess immediate and extended effects, including trends in space and time due to changes in anthropogenic systems. Includes an overview of environmental regulations. Prerequisite: ENVE 305. (3-0-3)

ENVE 407
Environmental Monitoring
Sampling and analytical methods used in the assessment of environmental impacts due to changes in the physical, chemical or biological environment. There is an emphasis on sample planning, data evaluation and interpretation. Corequisite: ENVE 426. (1-3-2) (C)

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. Prerequisite: 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. Prerequisite: CHE 301. **(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. Prerequisites: ENVE 305, ENVE 426. (3-0-3)

ENVE 480
Solid Waste Engineering
Quantities and characteristics of solid, hazardous and municipal waste; collection methods, equipment, and costs; and refuse disposal practices, regional planning, and management. Prerequisite: ENVE 305. (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 processes. Corequisites: ENVE 404, ENVE 463. (2-3-3) (C)

ENVE 485
Pollution Prevention
An interdisciplinary course that draws upon material from chemical, electrical, environmental and mechanical engineering disciplines. This course reviews regulations and explores the tools used to set up and maintain pollution prevention programs. Topics include process assessments; defining and ranking pollution prevention options; feasibility analyses including technical, environmental, and economic aspects; and life cycle analysis. (3-0-3)

ENVE 480
Environmental Processes Laboratory
Laboratory work in environmental processes including filtration, gas transfer, adsorption, biological systems and other selected topics. Prerequisites: ENVE 404, ENVE 463. (1-3-2) (C)

ENVE 494
Environmental Engineering Design
Application of technical and economic principles to the design of environmental equipment, processes and systems. Material from previous courses is integrated into practical design problems. Offered jointly with CHE 495. Prerequisite: CHE 302. (2-2-3)

IPRO 486
Process Design IPRO
Group project in process design. Integration of technical, safety, environmental, economic and societal issues in process development and design. Final part of the IPRO project package. Project teams consist of chemical and environmental engineering students and students from other disciplines and professions. Students from other academic units should register for designated section of IPRO 297/397/497 (3 credits) and their contribution to the project tasks will be defined accordingly. Only *ENVE students should register for this course*. Prerequisites: ENVE 494, IPRO 296. Co-requisites: ENVE 404, ENVE 463. (1-2-2) (C)

Graduate Courses

The following graduate courses are available to degree-seeking undergraduate students with the approval of the course instructor and faculty adviser. See the current *IIT Bulletin: Graduate Programs* for course descriptions.

ENVE 501
Environmental Chemistry

ENVE 503
Water and Wastewater Analysis

ENVE 506
Chemodynamics

ENVE 513
Biological Processes in Wastewater Treatment

ENVE 542
Physical and Chemical Processes of Water and Waste Treatment

ENVE 545
Environmental Regulations and Risk Assessment

ENVE 570
Air Pollution Meterology

ENVE 572
Ambient Air Monitoring

ENVE 576
Indoor Air Pollution

ENVE 585
Groundwater Contamination and Pollutant Transport

French

Most students may take 200-level foreign language courses for a general education requirement in the humanities, but students seeking engineering degrees must receive the permission of the dean of the Undergraduate College to assure that they satisfy accreditation requirements. A student with prior acquaintance of a language is placed in a course at the proper level by the instructor. Most students with two years of high school French are prepared for FREN 201.

FREN 101
Elementary French I
An introduction to modern French, with exercises in translation, grammar, conversation and comprehension. (3-0-3)

FREN 102
Elementary French II
A study of modern French emphasizing structural analysis and developing comprehension, translation and conversation skills. Reading of selected French texts and exercises in composition. Prerequisite: FREN 101. (3-0-3)

FREN 201
intermediate French I
Continuation of training in written and oral expression. Study of French literary works and composition of reports. Prerequisite: FREN 102. (3-0-3) (H)

FREN 202
Intermediate French II
Training towards fluency in modern French. Classroom analysis of French literature, with collateral readings and an emphasis on written reports. Prerequisite: FREN 201. (3-0-3) (H)

German

Most students may take 200-level foreign language courses for a general education requirement in the humanities, but students seeking engineering degrees must receive the permission of the dean of the Undergraduate College to assure that they satisfy accreditation requirements. A student with prior acquaintance of a language is placed in a course at the proper level by the instructor. Most students with two years of high school German are prepared for GER 201.

GER 101
Elementary German I
An introduction to modem German, with exercises in translation, grammar, conversation and comprehension. (3-0-3)

GER 102
Elementary German II
A study of modern German emphasizing structural analysis and developing comprehension, translation and conversation skills. Reading of selected German texts and exercises in composition. Prerequisite: GER 101. (3-0-3)

GER 201
Intermediate German I
Continuation of training in written and oral expression. Study of German literary works and composition of reports. Prerequisite: GER 102. (3-0-3) (H)

GER 202
Intermediate German II
Training towards fluency in modern German. Classroom analysis of German literature, with collateral readings and an emphasis on written reports. Prerequisite: GER 201. (3-0-3) (H)

History

HIST 300
History of Western Civilization to the Renaissance
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. Prerequisites: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H) (C)

HIST 301
History of Western Civilization from the Renaissance
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. Prerequisites: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H) (C)

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. Prerequisites: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H) (C)

HIST 310
Nineteenth-Century Europe: 1789-1900
Survey and analysis of nineteenth-century European history. The French Revolution and Napoleon; conservatism, liberalism, and romanticism; Industrial Revolution; nationalism and the unification of nation states; revolutions of 1848; imperialism; and major intellectual movements. Prerequisites: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H) (C)

HIST 311
Twentieth-Century Europe: 1890-1949
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: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H) (C)

HIST 312
Contemporary Europe, 1949-Present
Settlement of World War II; political and economic reconstruction; Cold War; Third World nationalism and the end of colonialism; the United States and Europe; Soviet Union and Eastern Europe from Stalin to Yeltsin; the end of communism in Eastern Europe and the disintegration of the Soviet Union. Prerequisites: A 100-level

humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H) (C)

HIST 320
Nineteenth-Century European Intellectual and Cultural History
Survey of major developments in political, literary, scientific, religious, philosophical, and social thought. Topics vary and may include Romanticism, Positivism, Liberalism, Socialism, Darwinism, Religion and Science Controversy, and movements in art and literature. Prerequisites: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H) (C)

HIST 333
Ethnicity in American History and 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. Prerequisites: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H) (C)

HIST 334
The Creation of America: The New World to 1789
Examines how the U.S., its values and its institutions came to be. Colonization, "Indian" relations, slavery, the American Revolution and the *Constitution* are studied in the context of the colonial world, including Latin America. Controversial issues and the challenge of discovery are stressed. Prerequisites: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H) (C)

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. Prerequisites: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H) (C)

HIST 337
The American Century: 1898-1976
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 1960s. Prerequisites: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-6-3) (H) (C)

HIST 338
Contemporary America: 1960 and 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. Prerequisites: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H) (C)

HIST 340
Rise of Global Economy
A historical analysis of contemporary globalization in trade, technology, labor and culture. The course includes a comparative analysis of the world's leading economies (e.g. Great Britain, Germany, United States and Japan) and considers their varied responses to industrial revolutions in the past two centuries. Prerequisites: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-6-3) (H) (C)

HIST 341
Modern East Asia
A survey of East Asian history since 1800, with special emphasis on the political and cultural history of China, Japan and the Koreas. Prerequisites: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H) (C)

HIST 346
America and Vietnam
Utilizing video materials, this course covers the history of Vietnam under French domination, independence, civil war and the eventual participation of the United States in its longest and most divisive war. (3-1-3) (H) (C)

HIST 349
African-American Experience
A study of the African-American experience since 1800, including African roots, formal and informal institutions of oppression, change in continuity in folk culture, and history of social institutions. Prerequisites: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H) (C)

HIST 350
U.S. 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. Prerequisites: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H) (C)

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. Prerequisites: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-9-3) (H) (C)

HIST 372
History of Engineering
Examines the birth and evolution of professional engineering. Topics include engineering education, professional standards, industrial and government contexts, distinctive modes of thinking and engineering in popular culture. Prerequisites: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-9-3) (H) (C)

HIST 380
The Origins of Modern Science
An examination of the profound change in our conception of the natural world from Copernicus (1500 A.D.) to Newton (1700 A.D.); how the adoption of experimentation, quantification and new instruments created a new conception of scientific method; and the goals and nature of scientific knowledge. Prerequisites: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H) (C)

HIST 381
Science in Industrial Society: 1750-1900
The transformation of the physical and biological sciences from the Enlightenment to the 20th Century and its effects on culture, politics and belief; the creation of science-based technologies and the creation of the profession of scientist. Prerequisites: ENGL 101, HUM 102 or equivalents; a 100-level humanities course; and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H) (C)

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. Prerequisites: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H) (C)

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 modem nation-state. Prerequisites: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H) (C)

HIST 384
Science in the Twentieth Century
Development of quantum theory, relativity and molecular biology; the growth of science to its present important position in government, economic life and technological development. Prerequisites A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H) (C)

HIST 491
Independent Reading and Research
For advanced students. Prerequisite: Consent of department. (Credit: Variable) (H) (C)

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. (3-0-3) (H)(C)

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. (3-0-3) (H) (C)

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 and 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. (3-0-3) (H) (C)

HUM 315
Creativity in Art, Science and Technology
An exploration of processes of creative thinking and action across the fields of art, science and technology. The course examines creative cognitive styles, creativity in individuals, and the dynamics of creative groups. It aims to discover patterns of thought or techniques that can enhance creativity. Emphasis is on student projects. Prerequisites: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H) (C)

Interprofessional Projects

IPRO 297, 397, 497
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 six to 10 students from sophomore through graduate level and from all disciplines, who can broadly contribute to a project effort. While every effort will be made to accommodate students' first choices, 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 requirements. Specific rules about selection of IPRO projects may apply in certain degree programs. Some projects may carry humanities or social sciences credit. Students must consult the lead faculty member for the project and their faculty adviser before registering for a project. (1-6-3) (C)

Mathematics

* This course does not count for graduation in any engineering, mathematics, natural science or computer science degree program

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 and quadratic surfaces. Applications. **(3-0-3)**

MATH 122*
Introduction to Mathematics II
Basic concepts of calculus of a single variable; limits, derivatives and integrals. Applications. (3-0-3)

MATH 123*
Applied Mathematics
Basic concepts of calculus of single variable: limits, derivatives, integrals. Applications. Systems of linear equations and matrices. Linear programming. (4-0-4)

MATH 146*
Calculus/Precalculus I
Review of algebra and analytic geometry. Functions, limits and derivatives. Trigonometry, trigonometric functions and their derivatives. Chain rule, implicit and inverse functions, and inverse trigonometric functions. (4-0-4)

MATH 146
Calculus/Precalculus II
Applications of derivatives: related rates, maxima and minima, monotonicity, concavity, graphing, and optimization. Antiderivatives, first-order differential equations. Definite integral and applications. (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: Placement. (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: Grade of "C" or better in MATH 151 or MATH 149; or Advanced Placement. (4-1-5) (C)

MATH 161
Honors Calculus I
Functions, limits and continuity Derivatives of algebraic, trigonometric and inverse trigonometric functions. Implicit functions. Applications of the derivative: rates, graphing and optimization. Introduction to integration. Applications of the integral: area, volume and work Prerequisite: Placement. (4-1-5) (C)

MATH 162
Honors Calculus II
Calculus of logarithmic exponential and hyperbolic functions. Integration techniques. Indeterminate forms and improper integrals. Parametric equations. Polar coordinates. Numerical series. Power series expansions. Prerequisite: Grade of "C" or better in MATH 161; advanced placement for MATH 151; or consent of the department. (4-1-5) (C)

MATH 221*
Basic Probability and Statistics
Introduction to probability and statistics for students in the natural and social sciences or humanities. No calculus background required. Same as MSC 221. (3-0-3)

MATH 251
Multivariate and Vector Calculus
Analytic geometry in three-dimensional space. Partial derivatives. Multiple integrals. Vector analysis. Applications. Prerequisite: MATH 152 or MATH 162. (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. Prerequisites: MATH 152 or MATH 162. (4-0-4)

MATH 300
Calculus Investigations
Short projects chosen from a variety of mathematical areas and applications including analytic geometry, fractals, probability, mechanics, number theory and topology. Each project explores some part of calculus with emphasis on its utility and its extensions. Corequisite: MATH 152 or MATH 162; permission of instructor. (3-2-3)

MATH 331
Mathematical Methods
Matrices: matrix operations, transpose, rank, inverse. Determinants. Solutions of linear equations. Eigenvalues and eigenvectors. Fourier series; half-range series. Applications of solution to potential, wave and heat equations. Prerequisites: MATH 251 and MATH 252. Credit not granted for both MATH 331 and MATH 333. (3-0-3)

MATH 332
Matrices
Matrix algebra, rank, inverses; systems of linear equations, determinants; eigenvalues and eigenvectors. Corequisite: MATH 251. (3-0-3)

MATH 333
Matrix Algebra and 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. Prerequisite: MATH 251. Credit not granted for both MATH 331 and MATH 333. (3-0-3)

MATH 400
Analysis I
Real numbers, continuous functions; differentiation and Riemann integration. Functions defined by series. Prerequisite: MATH 251 or consent of instructor. **(3-0-3)**

MATH 401
Analysis II
Functions of several variables, partial differentiation, and multiple integrals. Prerequisite: MATH 400. (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: MATH 251. (3-0-3)

MATH 405
Introduction to Iteration and 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. Prerequisites: MATH 251; MATH 252; one of the following: MATH 331, MATH 332, or MATH 333, or consent of the instructor. (3-0-3)

MATH 430
Algebra
Introduction to groups, rings, fields, vector spaces and polynomials. Prerequisite: MATH 332. (3-0-3)

MATH 445
Mathematical Logic
Models of languages; propositional, Aristotelian, and predicate logic; and formal theories. Prerequisite: CS 330 or consent of instructor. (3-0-3)

MATH 451
Differential Geometry
Theory of curves, the Frenet formulas; theory of surfaces, fundamental forms, and curvature; and further selected topics. Prerequisite: MATH 252. (3-0-3)

MATH 452
Topology
Fundamentals of point-set topology; metric and topological spaces; study of continuous mappings; and further selected topics. Prerequisite: MATH 400. **(3-0-3)**

MATH 461
Fourier Series and 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. Prerequisites: MATH 251, MATH 252. (3-0-3)

MATH 471
Numerical Methods I
Taylor polynomials, computer representation of numbers; error; and numerical linear algebra. Prerequisite: Familiarity with Fortran. Corequisite: MATH 331, MATH 332 or MATH 333. Credit will not be given for both MATH 370 and MATH 471. (3-0-3)

MATH 472
Numerical Methods II
Interpolation, approximation of functions, numerical integration and differentiation, and numerical solution of differential equations. Prerequisites: MATH 252, MATH 471. (3-0-3)

MATH 474
Probability and Statistics
Elementary probability theory including discrete and continuous distributions, sampling, estimation, confidence intervals, hypothesis testing and linear regression. Prerequisite: MATH 251. Credit not granted for both MATH 474 and MATH 475. **(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. Prerequisite: MATH 251. Credit not granted for both MATH 474 and MATH 475. (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: MATH 475. (3-0-3)

MATH 462
Introduction to Markov Processes
Random walks, discrete time Markov chains: Poisson processes, continuous time Markov chains; renewal theory. Prerequisite: MATH 475. (3-0-3)

MATH 463
Design and Analysis of Experiments
Principles of estimation; hypothesis tests, confidence intervals. Contingency tables; goodness-of-fit. Analysis of variance; linear regression. Hierarchical and split-plot designs; analysis of covariance. Multiple regression. Prerequisite: MATH 221 or MATH 476. (3-0-3)

MATH 466
Mathematical Modeling I
A general introduction to optimization problems. Linear programming: the simplex method. Elements of graphs and networks. Introduction to game theory. Applications. Prerequisite: MATH 475 or consent of the instructor. **(3-0-3)**

MATH 467
Mathematical Modeling II
The formulation of mathematical models, solution of mathematical equations, and interpretation of results. Selected topics from queueing theory and financial derivatives. Prerequisite: MATH 252. (3-0-3)

MATH 469
Ordinary Differential Equations
Boundary-value problems: Green's functions, Strum-Liouville theory, eigenfunction expansions. Linear and nonlinear systems: existence and uniqueness, Floquet theory, stability concepts. Phase-plane analysis: critical points, limit cycles. Prerequisite: MATH 252. (3-0-3)

MATH 469
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: MATH 46 1. (3-0-3)

MATH 490
History of Mathematics
A history of mathematics from ancient times to the twentieth century Prerequisite: MATH 152. Course does not count for graduation in any ECE degree program. (3-0-3)

MATH 491
Reading and Research
(Credit: Variable)

Management

MGT 351
Theory of Organization and Management
Introduction to the theory and practice of management; includes the basic managerial functions: planning, organizing, leading and controlling. Communication, motivation and decision-making techniques are stressed.

Also covered are organization structure and design, the dynamics of individual and group interaction, organization climate, managerial styles, the implications of increasing work force diversity, coping with conflict, and methods for achieving organizational improvement. Issues in international business are dealt with at relevant points. Prerequisite: Junior standing. (3-0-3)

Military Science

MILS 010
Freshman Recitation
A structured tutorial and learning environment for first-year army ROTC students; development of improved academic abilities; and a better understanding of the military discipline. Students must be enrolled in their initial year of ROTC. (1-0- 1)

MILS 101
U.S. Defense Establishment
Discussion and practical application of fundamentals, principals and traits of leadership. An introduction to the history and practical application of the U.S. Army customs and traditions. A practical laboratory is required for Army ROTC cadets. (1-2-1) (C)

MILS 102
Customs and Traditions of the Military
An examination of the nation's defense establishment. Emphasis is placed on the structural aspects and the authority relationships of the Department of Defense and the Department of the Army; constitutional provisions for the common defense; and the concept of civilian control of the military. A practical laboratory is requited for Army ROTC cadets. (1-2-1) (C)

MILS 107
American Military History
In-depth study of American military history through examination of evolvement of the Army and warfare. (3-2-3)

MILS 147, 149, 247, 249, 347, 349, 447, 448
Aerobic Conditioning
Participation in aerobic exercise program; evaluation of the level of cardiovascular fitness. (0-3-2)

MILS 201
Fundamentals of Leadership, Organization and Planning
Study and practical application of basic leadership techniques to include motivating and counseling. Emphasis on communication skills to include oral presentations and the Army writing style. A practical laboratory is required for Army cadets. (2-2-2)

MILS 202
Leadership Dynamics
Analytical study of American military history from its origin through the present. Emphasis on leadership, strategy, the principles of war, and growth of the military in the United States. A practical laboratory is required for Army ROTC cadets. (3-2-3)

MILS 301
Military Operations and Tactics
Introduction to the principles of war; practical exercises in small unit leadership and combined arms operations. Study of land navigation techniques and field communications equipment operating procedures with actual field application. A practical laboratory is required for Army ROTC cadets. Prerequisites: MILS 101; MILS 102; MILS 201 or the equivalent; and department approval. (3-2-3) (C)

MILS 302
Organizational Leaders
Detailed study of Army tactical combat doctrine to include organization, patrolling, offensive and defensive tactics at the small unit level. Advanced techniques of planning, organization, delegation and control with practical application. A practical laboratory is required for Army ROTC cadets. Prerequisites: MILS 101; MILS 102; MILS 201 or the equivalent; and department approval. (3-2-3)

MILS 401
Training and Resource Management
Nature of command and staff relationships; theory and application of U.S. Army training management doctrine; operations and intelligence functions; professional ethics. A practical laboratory is required for Army ROTC cadets. Prerequisites: MILS 101, MILS 102; MILS 201 or the equivalent; and department approval. (3-2-3) (C)

MILS 402
Military Law
Study of the nature, structure, powers and procedures of the military justice system; reserve components of the Army; senior and subordinate relationships; obligations and responsibilities of an officer on active duty. A practical laboratory required for Army ROTC cadets. Prerequisites: MILS 101; MILS 102; and MILS 201 or the equivalent; and department approval. (3-2-3) (C)

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. Prerequisite: Department approval. (Credit: 1-4 hours)

Marketing

MKT 371
Marketing
Introduction to the activities and decisions faced by marketing managers in modern organizations. Topics include: consumer and organizational buying behavior, marketing research, market segmentation, new product development, product line decisions, pricing channels, distribution, promotion, international marketing, and introduction to marketing strategic planning. (3-0-3) Offered in fall and spring.

Mechanical, Materials and Aerospace Engineering

MMAE 100
Introduction to the Profession I
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)

Course Descriptions

MMAE 101
Introduction to the Profession II
Continuation of MMAE 100, primarily through short projects. Prerequisite: MMAE 100. (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. Credit for this course is not applicable to BSME, BSMME and BSAE programs. Prerequisites: PHYS 123, MATH 152, CS 105. Corequisites: MATH 252. (3-0-3)

MMAE 201
Mechanics of Solids I
Free body diagrams. Equilibrium of a particle, a system of particles, and a rigid body. Distributed forces, centroids, centers of gravity, and moments of inertia. Analysis of structures. Friction. Internal loads in bars, shafts and beams. Stress and strain in axially loaded members. Prerequisites: CS 105, MMAE 101, PHYS 123. Corequisite: MATH 152. (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: MMAE 201. (3-0-3)

MMAE 271
Engineering Materials and Design
Mechanical behavior of metals, polymers, ceramics and composites, laboratory testing methods including tension, torsion, hardness, impact, toughness, fatigue and creep. Evaluation of structural performance in terms of material processing, service conditions and design. Prerequisites: MS 201, MMAE 201. Corequisite: MMAE 202. (2-3-3) (C)

MMAE 303
Mechanics of Solids III
Analysis of stress and strain. Design of torsional and bending structural elements. Energy methods. Curved beams. Thick-walled cylinders, spinning disks. Stability of columns. Stress concentration, stress intensity factors, fractures toughness. Fatigue. Theories of failure and yield. Design applications. Prerequisites: MMAE 202, MMAE 271, MATH 251, MATH 252. (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. Bending of multi-cell tubes. Energy methods. Castigliano's theorems. Structural instability. Prerequisites: MMAE 202, MATH 251, MATH 252. (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: MMAE 201. Corequisite: MATH 252. (3-0-3)

MMAE 310
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. Lab Component: Introduction to measurements of fluid properties and basic features of fluid flows; flow through pipes and channels, flow-induced forces on bodies; First Law of Thermodynamics: six laboratory experiments in small groups supplemented by demonstrations and films. Prerequisites: MATH 251, MATH 252. Corequisites: MMAE 305, MMAE 320. (3-3-4) (C)

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. Prerequisites: MMAE 310, 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. Prerequisites: MMAE 310, MMAE 320, MMAE 350. (3-0-3)

MMAE 313
Fluid Mechanics
Same as MMAE 310 without the laboratory component. Prerequisites: MMAE 305, MATH 251, MATH 252. Corequisite: MMAE 320. (3-0-3)

MMAE 320
Thermodynamics
Introduction to thermodynamics. Thermodynamic concepts: properties; the first and second laws, energy analysis of thermodynamic systems, flowing and nonflowing, including power and refrigeration systems. Second-law limitations. Prerequisites: CHEM 124, PHYS 224, CS 105, MATH 251. Corequisite: MATH 252. (3-0-3)

MMAE 321
Applied Thermodynamics
Second-law analysis of engineering systems. Chemical Equilibrium. Thermodynamics of non-reacting systems. Water-air mixtures. Phase diagrams. Thermodynamics of reacting systems. Combustion. Fuel cells. Analysis and design of refrigeration and power generation systems. Prerequisites: MMAE 320, MATH 251. Corequisite: MMAE 310. (3-0-3)

MMAE 322
Heat and Mass Transfer
Basic laws of transport phenomena. Similarity relations and analogies. Steady-state heat conduction; heat generation and extended surfaces. Multi-dimensional and transient heat conduction. Numerical and graphical analysis. Fundamentals and empirical relations of forced and natural convection. Radiation concepts, networks, solar energy. Combined effects, Lab component: Introduction to thermal science measurements; combustion, thermodynamics cycles, conduction, convection and radiation heat transfer. Six laboratory experiments in small groups. Prerequisites: MMAE 320, MMAE 310, MMAE 350. (3-3-4) (C)

MMAE 350
Computational Mechanics
Special emphasis will be given to engineering problems in solid mechanics, fluid mechanics and heat transfer. Topics will include solution of nonlinear equations of one variable, numerical differentiation and integration, solution of systems of linear algebraic equations, linear discrete systems, approximate methods for solving ordinary differential equations, and design of numerical experiments. Lab component: Numerical solutions to practical engineering problems and interpretation of results using commercially available software. Prerequisites: MATH 251, MATH 252, MMAE 202. (3-3-4)

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. Prerequisites: MS 201, MMAE 271. (3-0-3)

MMAE 362
Physics of Solids
Introduction to 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. Prerequisite: MS 201. (3-0-3) (C)

MMAE 363
Metallurgical and Materials Thermodynamics
The three laws of thermodynamics. Extensive problem solving in metallurgical and materials applications of heat and mass balances, free-energy criteria, and equilibrium relations. Prerequisite: MS 201. (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 and analyses. Corequisite: MMAE 27 1. **(1-6-3) (C)**

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. Prerequisites: MMAE 305, 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. Exo- and endo-prosthetics. Implants and biomechanical compatibility. Prerequisites: MMAE 303, consent of instructor. Corequisite: MMAE 430. (3-0-3) (C)

MMAE 423
Air Conditioning and Refrigeration
Environmental control for winter and summer; elements of psychrometrics, load calculations. Space heating and cooling methods; extended surface coils; absorption refrigeration; system analysis and planning. Prerequisites: MMAE 321, MMAE 322. (3-0-3)

MMAE 424
Internal Combustion Engines
Fundamentals of spark ignition and diesel engines. Combustion knock and engine variables: exhaust gas analysis and air pollution; carburetion; fuel injection; lubrication; engine performance; vehicle performance. Engine balance and vibrations. Electronic control. Prerequisites: MMAE 321, MMAE 322. (3-0-3)

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. Prerequisites: MMAE 321, PHYS 208. (3-0-3)

MMAE 430
Engineering Measurements
Introduction to applications of measurement instrumentation and design of engineering experiments. Generalized characteristics of sensors and measurements systems. Signal conditioning and computer-based data acquisition and analysis. Measurement of motion, force, strain, torque, shaft power, pressure, sound, flow, temperature and heat flux. Design of experiments proposals. Team-based projects addressing application of engineering measurements to a variety engineering problems. Effective communication of experimental results. Prerequisite: PHYS 300. (2-6-4) (C)

MMAE 431
Design of Machine Elements
Design factors and fatigue. Application of principles of mechanics to the design of various machine elements such as gears, bearings, clutches, brakes and springs. Prerequisite: MMAE 303. (2-3-3)

MMAE 432
Design of Mechanical Systems
Small-group design projects drawn from industry. Prerequisite: MMAE 431. (1-6-3) (C)

MMAE 433
Design of Thermal System
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. Prerequisites: MMAE 321, MMAE 322. (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: MMAE 431. (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. Prerequisite: Senior standing. (3-0-3)

MMAE 436
Design of Aerospace Vehicles
Aircraft design including aerodynamic, structural and powerplant characteristics to achieve performance goals. Focus on applications ranging from commercial to military and from man-powered 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. Prerequisites: MMAE 304, MMAE 311, MMAE 312. (2-3-3) (C)

MMAE 446
Introduction to Robotics
Classification of robots; kinematics and inverse kinematics of manipulators; trajectory planning: robot dynamics and equations of motion; position control. Prerequisite: MMAE 305, PHYS 300. (3-0-3)

MMAE 441
Spacecraft and Aircraft Dynamics
Two-body central force motion, orbital dynamics and orbital maneuvers. Rigid body kinematics, Euler angles, dynamics, and attitude reorientation of spacecraft. Aircraft equations of motion; longitudinal and lateral stability. Design of aircraft components for stability. Prerequisite: MMAE 312. (3-0-3)

MMAE 442
Aircraft and Spacecraft Response and Control
Aircraft lateral modes of motion and approximations; the yaw damper. Aircraft response to control and external inputs; introduction to automatic control. Spacecraft attitude control devices, gyroscopic instruments, momentum exchange and mass movement techniques, gravity gradient stabilization. Introduction to spacecraft automatic attitude control systems. Prerequisite: MMAE 441. (3-0-3)

MMAE 443
Systems Analysis and Control
Mathematical modeling of lumped-parameter dynamical systems. Linearization techniques. Laplace transformation and transfer functions. Transient and frequent response. Stability theory. Control of single-input, single-output systems. Types of controllers and their design employing root locus. Design of state feedback controllers. Pole placement and state observer design, Prerequisites: MMAE 305, PHYS 300. (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: MMAE 485 or equivalent. (3-0-3)

MMAE 445
CAD/CAM with Numerical Control
Computer graphics in engineering design and CAD software and hardware. Numerical control of machine tools by various methods. Prerequisite: CS 105, MATH 252. (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, isoparametric elements, and problems of stress concentration. General finite element codes: data generation and checks, ill-conditioned problems, and node numbering. Prerequisite: MMAE 304 or MMAE 303. (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. Prerequisites: MMAE 311, MMAE 312.(3-0-3)

MMAE 464
Physical Metallurgy
Principles of solid state phase transformations in metals and alloys with extensive reference to the significance of the principles in the context of commercial alloy systems. Strengthening mechanisms in metals and alloys and their relationship to phase structure. Creep mechanisms and resistance. High temperature structural materials. Oxidation and corrosion resistance. Prerequisites: MMAE 271, MMAE 361. (3-0-3)

MMAE 465
Electrical, Magnetic and Optical Properties of Materials
Electronic structure of solids, semiconductor devices and their fabrication. Ferroelectric and piezoelectric materials. Magnetic properties, magnetocrystalline anistotropy, magnetic materials and devices. Optical properties and their applications, generation and use of polarized light. Same as ECE 435. Prerequisite: ECE 311 or MMAE 362. (3-0-3)

MMAE 466
Microstructural Characterization of Materials
Advanced optical microscopy. Scanning and transmission electron microscopes. X-ray microanalysis. Surface characterization. Quantitative microscopy. Prerequisite: MMAE 370. (2-3-3) (C)

MMAE 467
Fundamental Principles of Polymeric Materials
An overview of the basic principles of polymeric materials. Topics discussed include types of polymers; methods of polymers synthesis, structure, and morphology and their relationship to properties: and basic polymer processing methods. (3-0-3)

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: MS 201. (3-0-3)

MMAE 472
Ferrous Technology
Production of ferrous materials in the integrated steel mill, including treatment of the iron blast furnace and steelmaking in the basic oxygen furnace. Processing of the materials in the plant and thermodynamic reaction considerations. Other ferrous processes discussed include gas-metal reactions and surface treatments. Prerequisite: MMAE 361. (3-0-3)

MMAE 473
Corrosion
Theory and prevention of corrosion of metals, including oxidation, sulphidation, other atmospheric attacks, aqueous corrosion, and other topics. Prerequisite: MMAE 361. (3-0-3)

MMAE 474
Metals Processing
The principles and practice of (a) melting and casting processes; sand, die, investment, evaporative mold, and permanent mold casting processes; and (b) the heat treatment of carbon and low alloy steels, stainless steels, tool steels, cast irons, and selected nonferrous alloys including titanium, aluminum and nickel base alloys. Prerequisite: MMAE 464. (2-3-3) (C)

MMAE 475
Powder Metallurgy
Production, pressing and sintering of metal powders. Effects of particle size, friction and die design on pressed densities. Theories of sintering. Relation of sintering practice to physical properties. Homogenization of alloys. Industrial equipment. Applications. Laboratory simulation of a series of P/M manufacturing cycles from powder to finished product are used to reinforce the classwork. Prerequisite: MMAE 361. (2-3-3) (C)

MMAE 476
Materials Laboratory II
Advanced synthesis, processing and characterization of metallic, non-metallic and composite materials. Investigation of the relationships among materials structures, processing routes and physical properties. (2-3-3) (C)

MMAE 477
Commercial Alloys
Classification of the commercially significant groups of ferrous and nonferrous alloys. Mechanical, chemical and physical behavior; the relationship to basic structure-property principles. The significance of the various alloy groups in engineering practice. Prerequisite: MMAE 464. Corequisite: MMAE 474. (3-0-3)

MMAE 478
Service Failure Analysis
Theory and analyses of materials failures. Prerequisite: Consent of instructor. (2-3-3)

MMAE 460
Forging and Forming
Mechanical and metallurgical basis for successful production of forgings and stampings. Prerequisite: MMAE 271 or consent of instructor. (3-0-3)

MMAE 461
Welding and Fabrication
Principles and processes for metal joining by welding, brazing and soldering. Metallurgy of joining steels, aluminum, and other metals. Industrial applications of welding technology including quality control and specification development. Prerequisite: MMAE 361. (2-3-3)

MMAE 462
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. (3-0-3)

MMAE 463
Structure/Property Relationship in Polymers
Detailed study of the relationship between polymer structure, morphology and properties. Topics include theories of rubber elasticity, the glassy state, semi-crystalline structure, and polymers melts. Effects of molecular weight and different types of intermolecular interactions are presented. (3-0-3)

MMAE 464
Materials and Process Selection
Context of selection. Decision analysis. Demand, materials and processing profiles. Design criteria. Selection schemes. Value and performance oriented selection. Case studies. (3-0-3) (C)

MMAE 465
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: MMAE 271. (3-0-3)

MMAE 466
Properties of Ceramics
Thermal, optical, mechanical, electrical and magnetic properties of ceramics and their applications. Includes a review of defect equilibria and ceramic microstructures. Prerequisites: MS 201, MMAE 361. (3-0-3)

MMAE 467
Fiber Reinforced Polymeric Composite Materials
The materials, structure and fabrication methods for fiber reinforced polymeric composites will be discussed. Prediction of mechanical properties such as stiffness and strength. Prediction methods for laminates. Thermal and diffusion properties. Prerequisite: MMAE 202. **(3-0-3)**

MMAE 489
Ferrous Products: Metallurgy & Manufacture
Relationships between the engineering properties of steels and the fundamental aspects of steelmaking and shaping technologies. Topics will include: the behavior of high purity iron; effects of interstitial and substitutional alloying additions; metallurgical principles of strength ductility, and toughness: steelmaking and solidification; post-solidification processing; and micostructure and crystallographic anisotropy. (3-0-3)

MMAE 491
Undergraduate Research
Student undertakes an independent research project under the guidance of an MMAE faculty member. Requires approval of the MMAE Department Undergraduate Studies Committee. (Credit: Variable; three hours maximum.)

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; three hours maximum.)

MMAE 497
Undergraduate Special Topics
(Credit: Variable)

Graduate Courses
Graduate courses are available to degree-seeking undergraduate students with the approval of the course instructor and faculty adviser. See the current *IIT Bulletin:* Graduate *Programs* for course descriptions.

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: CHEM 124. (3-0-3)

Manufacturing Technology

MT 301
Technical Communications
Communication formats found in manufacturing environments. Identify, analyze and practice verbal and written communications exercises, which include technical writing, word processing, discussion leadership and audio-visual and related graphic communications enhancement. Credit not granted for both MT 301 and ENGL 421. (3-0-3) (C)

MT 305
Computers in Manufacturing
Review and summary of various computer applications in the manufacturing environment. Hands-on proficiency development with current software packages supporting the manufacturing enterprise. Networking, database management, spreadsheet applications and computer graphics. Classroom demonstration and student homework occur in place of scheduled lab time. (3-0-3)

MT311
Production and Operations
Introduces industrial engineering concepts and prepares the learner to perform fundamental engineering tasks. These include design of work stands, human factors, work groups, plant layout and equipment selection. (3-0-3)

MT 313
Materials in Manufacturing
Introduction to solid materials, including metals, plastics and natural materials. Mechanical, physical and electrical properties of metals will be considered as they relate to engineering applications and manufacturing. Product integrity and environmental aspects, such as disposal, human acceptance and economic considerations. (3-0-3)

MT 315
Manufacturing Enterprises
This course provides an introduction to the world of manufacturing. The world-wide evolution of manufacturing will be considered, leading to today's competitive world. The range of manufacturing activities will be reviewed. The students will be introduced to the organization and purpose of manufacturing. (3-0-3)

MT 321
Computer-Integrated Manufacturing
Explores application of computer systems. to manufacturing processes, such as production planning and control, product design, and quality control. Prerequisite: MT 305. (3-0-3)

MT 323
Manufacturing Management and Planning
This course introduces students to various concepts of management, specifically as applicable to manufacturing companies. Management of people and organization will be considered, as well as concepts of forecasting and strategic planning. Prerequisites: MT 301, MT 305, MT 315. (3-0-3) (C)

MT 331
Product Design in Manufacturing
The array of products resulting from manufacturing mandates close attention to the relationship between product design and other plant operations. This course will introduce product design and principles, such as value, structure, and image, as well as such areas as design planning and computer applications in design. Prerequisite: MT 305. (3-0-3) (C)

Course Descriptions

MT 333
Resource Management in Manufacturing
Resources to be managed in manufacturing include materials, labor, capital and time. Coverage will include financial analysis, cost accounting, program management, investments and scheduling. Cost is primary but not only basis for managing manufacturing operations. Prerequisite: MT 305. (3-0-3) (C)

MT 404
Sales, Marketing and Product Introduction in Manufacturing
Techniques of marketing research; strategies for new product introduction: and sales management and planning. Prerequisite: MT 323. (3-0-3) (C)

MT 406
Quality Control in Manufacturing
Topics include quality control based on metrology and overall quality control systems. Metrological techniques covered include mechanical, electrical, materials and chemical perspectives. Such QC issues as SPC, ISO 9000, MilSpec and TQM are examined. Emphasis is on exploring options and consequences of selecting appropriate methodologies. (3-0-3)

MT 412
Manufacturing Processes
Process areas studied include metals, plastics and electronics manufacturing. Key processes in each of these industries are explored, with particular consideration given to interactions between materials and processes, as well as related design issues. Prerequisites: MT 313, MT 315. (3-0-3)

MT 414
Topics in Manufacturing
Students will use this course to capitalize on previous studies to select and complete a "job specific" project. Topics are selected with the approval of the student's employer and MT staff, and presentation of the project report is made to both. Prerequisite: Completion of all 300-level MT courses. (3-0-3) (C)

MT 422
Manufacturing Technology
This course reviews current technologies applied to manufacturing operations. Emphasis is on technologies not included in other courses, such as automated manufacturing, group technology, flexible manufacturing systems, numerical control, robotics and artificial intelligence. Prerequisites: MT 321, MT 412. (3-0-3)

MT 424
Management Information Systems in Manufacturing
Integration of all elements of manufacturing enterprise into a common database is critical to efficiency and profitability. This course details how Management Information Systems (MIS) ties together such operational aspects as order entry, production scheduling, quality control, shipping and collections. Prerequisite: MT 321. (3-0-3)

MT 426
Decision Making and Risk Analysis in Manufacturing
Course presents the range of decision-making and risk analysis theories and procedures, including software systems and management group techniques for determining and prioritizing company decisions related to such areas as products and work force distribution. Prerequisites: MT 323, MT 333, MT 404, MT 406. (3-0-3) (C)

MT 432
Vendor/Customer Relations in Manufacturing
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. Prerequisite: MT 404. (3-0-3)

MT 434
Manufacturing Futures
This course allows a futuristic view of manufacturing of interest to the student and MT staff, who must work to develop individual or group projects. Prerequisite: Completion of all 300-level MT courses. (3-0-3) (C)

Naval Science

NS 101
Introduction to Naval Science
A general introduction to seapower and the naval service. The instruction places particular emphasis on the mission, organization, regulations and broad warfare components of the Navy. Included is an overview of officer and enlisted rank and rating structures, procurement and recruitment, training and education, promotion and advancement, and retirement policies. The course also covers the basic tenets of naval courtesy and customs, discipline, naval leadership and ship's nomenclature. The student is made cognizant of the major challenges facing today's naval officer, especially in the areas of human resource management. Prerequisite: Consent of instructor. (2-2-2)

NS 102
Naval Ships Systems
Designed to familiarize midshipmen with the types, structure, and purpose of naval ships. The design of naval ships is examined with respect to safety of operations and ship stability characteristics. Included are nuclear and conventional propulsion systems, auxiliary power systems, interior communications, and basic damage control. Prerequisite: Consent of instructor. (3-2-3) Offered fall semester.

NS 201
Naval Weapons Systems
This course provides an introduction to the theory and principles of operation of naval weapons systems. It includes coverage of types of weapons and fire control systems, capabilities and limitations, theory of target acquisition, identification and tracking, trajectory principles, and basics of naval ordnance. Prerequisite: Consent of instructor. (3-2-3) Offered spring semester.

NS 202
Seapower and Maritime Affairs
A course based on the premise that the student must develop knowledge and interest in seapower and maritime affairs. The course is oriented toward the general concept of seapower (including the merchant marine), the role of various warfare components of a navy in supporting the Navy's mission, the implementation

of seapower as an instrument of national policy, and a comparative study of U.S. and Soviet naval strategies. Prerequisite: Consent of instructor. (3-2-3) Offered spring semester. (C)

NS 301,302
Navigation and Naval Operations I, II
A comprehensive study of the theory, principles, and procedures of ship navigation, movement and employment. Competency is achieved in the areas of piloting and celestial and electronic means of shipboard navigation. Operations topics include communications, sonar-radar search and screening theory. Tactical formations and dispositions, relative motion, maneuvering board and tactical plots are analyzed for force effectiveness and unity Rules of the road, lights, signals and navigational aids are also covered. Prerequisite: Consent of instructor. (3-2-3); (3-2-3)

NS 310
Evolution of Warfare
A survey of all military history designed to provide the student with a basic knowledge of the art and concepts of warfare and its evolution from the beginning of recorded history to the present. Included within this study is a consideration of the influence that leadership, political, economic, sociological and technological factors have had on warfare and the influence they will continue to exert in the age of limited warfare. Prerequisite: Consent of instructor. (3-2-3) (C)

NS 401
Leadership and Management
This course is a comprehensive advanced-level study of organizational behavior and management. Topics include a survey of principal management functions. Major behavioral theories as well as practical applications are explored by the use of experiential exercises, case studies and laboratory discussions. Other topics include decision-making, communication, responsibility, authority, accountability and total quality leadership (TQL). (2-2-2) (C)

NS 402
Naval Leadership and Ethics
This course discusses ethical considerations in military leadership including the development of common core values among a diverse population and application of those values in the problematic context of the use of military force in support of national policy. A capstone course integrating professional competencies of prior course and training. (3-2-3) (C)

NS **410**
Amphibious Warfare
The course is designed to provide the student with a historical survey of the evolution of amphibious warfare. An in-depth survey of amphibious landings is concluded with a study of the development of modern amphibious doctrine. Emphasis is placed on case studies of WW II: Pacific landing operations and Allied landings in North Africa, Northern Europe and Italy. Prerequisite: Consent of instructor. (3-2-3) (C)

Operations Management

OM 312
Introduction to Operations Management
Operational problems studied from a systems viewpoint. Development and application of policies, techniques and models for making decisions in the areas of product and service design, design of operating systems, production and control of the product or service. Prerequisite: Junior standing. (3-0-3) Offered in fall and spring.

Public Administration

Undergraduates may enroll in the following courses with department permission.

PA 501
Introduction to Public Management

PA 502
Complex Organizations

PA 503
Administrative Law

PA 513
Public Policy Analysis and Evaluation

PA 514
Government Management and Information Systems

PA 522
Public Personnel Administration

PA 531
Governmental Accounting and Budgeting

PA 532
Public Finance

PA 542
Planning for Governments and Agencies

PA 551
Public Works Management

PA 552
Health and Human Services Policy and Administration

PA 553
Police Administration

PA 554
Administration of Science and Technology

PA 561
Political Process and Administration

PA 562
Urban and Metropolitan Government

PA 563
Intergovernmental Relations

PA 564
Comparative Administration and Policy

PA 577
Topics in Public Management

PA 590
Internship in Public Administration

Philosophy

PHIL 301
Ancient Philosophy
A study of major works by Plato, Aristotle and other important ancient philosophers. Prerequisites: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H)(C)

PHIL 302
Origins of Modern Philosophy
A study of major 17th and 18th century philosophers, such as Descartes, Hobbes, Spinoza, Locke, Leibniz, Berkeley, Hume and Kant. Prerequisites: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H)(C)

PHIL 304
19th-Century Philosophy
A study of major 19th century philosophers, such as Hegel, Comte, Mill, Peirce, James and Nietzsche. Prerequisites: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H) (C)

PHIL 305
20th-Century Philosophy
A study of recent philosophical trends (or movements), including logical positivism, existentialism, ordinary language philosophy, etc. Prerequisites: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H) (C)

PHIL 310
American Philosophy
A survey of the most important thinkers and movements in American philosophy. Prerequisites: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H)(C)

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. Prerequisites: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H)(C)

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. Prerequisites: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H) (C)

PHIL 335
Theory of Knowledge
An inquiry into how knowledge in general is possible, whether we can achieve certainty, and the role of reason and experience in the acquisition of knowledge. Prerequisites: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H)(C)

PHIL 340
Symbolic Logic
An introduction to propositional and predicate calculus, with applications to the theory of language, the concept of argumentation, and the foundations of mathematics. Prerequisites: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (C)

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. Prerequisites: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H) (C)

PHIL 342
Philosophy of Mind
An examination of the conception of "mind" as opposed to body, and its implications for psychology, artificial intelligence and neuroscience. Prerequisites: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H) (C)

PHIL 343
Philosophy of Social Inquiry
An examination of the methods and theories of the social sciences, especially sociology, anthropology and their relationships to the natural sciences. Prerequisites: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H) (C)

PHIL 345
Space and Time
An investigation into philosophical problems of space and time raised by modern physics and geometry. Issues include problems raised by studies of relativity, the topology of space and time, the direction of time, etc. Prerequisites: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H) (C)

PHIL 350
Science and Method
A history of the 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. Prerequisites: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H) (C)

PHIL 360
Ethics
A study of the fundamental issues of moral philosophy. Prerequisites: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H)(C)

PHIL 361
Political and Social Philosophy
An analysis of the concepts of legitimate political authority, social justice, natural rights, sovereignty, etc. Prerequisites: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H) (C)

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. Prerequisites: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H)(C)

PHIL 363
Aesthetics
The philosophy of the fine arts, including an analysis of the concepts of beauty, representation, expression and the purpose of art. Prerequisites: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H)(C)

PHIL 365
Philosophy of Free Speech
Analysis of the philosophical foundations of the right of free speech within the American *Constitution's* framework. Topics include: the philosophical underpinnings *of* the right of free speech, judicial review under the *Constitution,* selected free speech issues such as libel, defamation, speech in the workplace, pornography, flag-burning, and others. Prerequisites: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H)(C)

PHIL 370
Moral Issues in Engineering
A study of the problems of moral and social responsibility for the engineering profession, including such topics as safety, confidentiality and government regulation. Prerequisite: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H)(C)

PHIL 371
Moral Issues in Architecture
Examination of moral problems faced by architects and planners and the concept of professional behavior. Prerequisites: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H) (C)

PHIL 373
Moral Issues in Business
Ethical issues relating to individual and corporate responsibility, self- and governmental regulation, investment, advertising, urban problems, the environment, and preferential hiring. Prerequisites: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H) (C)

PHIL 374
Moral Issues 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. Prerequisites: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H) (C)

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. Prerequisites: A 100-level humanities course and satisfaction of IIT's Basic Writing Proficiency Requirement. (3-0-3) (H) (C)

PHIL 490, 491
Independent Study
Supervised individual research for advanced students. Prerequisite: Consent of the department. (Credit: Variable.) (H)(C)

Physics

PHYS 100
Introduction 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 and 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. Simple harmonic motion, gravitation and fluid mechanics. Oscillations and waves. Corequisites: MATH 149, MATH 151 or MATH 161. (3-3-4) (C)

PHYS 211, 212
Basic Physics I, II
Intended to give students in the liberal arts, architecture and design an understanding of the basic principles of physics and an appreciation of how the results of physics influence contemporary society. Prerequisite: MATH 122. This course does not count for graduation in any engineering or physical science program. (3-0-3); (3-0-3)

PHYS 213
Basic Physics Lab: Mechanics
Corequisite: PHYS 211. (0-3-1) (C)

PHYS 214
Basic Physics Lab:
Electromagnetism and Optics
Corequisite: PHYS 212. (0-3-1) (C)

PHYS 221
General Physics II:
Electromagnetism and Optics
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. Maxwell's equations, electromagnetic waves and light. Reflection and refraction, lenses, interference and diffraction. Prerequisite: PHYS 123. Corequisite: MATH 152 or MATH 162. (3-3-4) (C)

PHYS 223
General Physics III:
Thermal and Modern Physics
Temperature, first and second laws of thermodynamics, kinetic theory and entropy. Gratings and spectra, polarization. Light and quantum physics, wave nature of matter, structure of the hydrogen atom. Atomic physics, electrical conduction in solids, nuclear physics and particle physics. Prerequisite: PHYS 221. Corequisite: MATH 251 or MATH 252. (3-3-4) (C)

PHYS 224
General Physics III Lecture:
Thermal and Modern Physics
Temperature, first and second laws of thermodynamics, kinetic theory and entropy. Gratings and spectra, polariza-

tion. Light and quantum physics, wave nature of matter, structure of the hydrogen atom. Atomic physics, electrical conduction in solids, nuclear physics and particle physics. Prerequisite: PHYS 221. Corequisite: MATH 251 or MATH 252. (3-0-3)

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: PHYS 223 or permission of the department. (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: PHYS 223. (2-3-3) (C)

PHYS 304
Kinetic Theory and Thermodynamics
The notion of phenomenological characterization: pressure, volume, temperature, etc. The first and second laws of thermodynamics. Transport phenomena; thermodynamic functions and their applications. Introduction to Maxwell-Boltzmann statistics. Prerequisite: PHYS 223. (3-0-3)

PHYS 308,309
Classical Mechanics I, 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 techniques; Lagrangian and Hamiltonian formulations of classical mechanics; small oscillations. Prerequisites: PHYS 223, MATH 252. (3-0-3); (3-0-3)

PHYS 348
Modern Physics for Scientists and Engineers
An introduction to modern physics with emphasis on the basic concepts that can be treated with elementary mathematics. Subjects covered include Einstein's special theory of relativity, black body radiation, the Bohr atom, elementary wave mechanics, and atomic and molecular spectra. Prerequisite: PHYS 223. (3-0-3)

PHYS 401
Statistical Physics
Statistical basis of thermodynamics. Kinetic theory. Fundamentals of statistical mechanics. Quantum statistics. Fluctuations and noise. Transport phenomena. Boltzmann equation. Prerequisites: PHYS 223, PHYS 304, PHYS 309. (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. Prerequisites: PHYS 309, MATH 251 or consent of instructor. (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: PHYS 223. (3-0-3)

PHYS 405
Fundamentals of Quantum Theory I
A review of modern physics including topics such as blackbody 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. Prerequisites: PHYS 308, PHYS 348, MATH 252 or permission of department. (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: PHYS 405. (3-0-3)

PHYS 410
Molecular Biophysics
Thermodynamic properties of biological molecules. Irreversible and open systems, information theory. Biophysical measurements. Structure and properties of proteins. Enzyme action, Structure and properties of nucleic acids. Genetics at the molecular level. Molecular aspects of important biological systems. Prerequisite: Consent of instructor. (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:

PHYS 223 or consent of instructor. (3-0-3)

PHYS 412
Modern Optics and 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. Same as ECE 413. Prerequisites: PHYS 348 or consent of instructor; CS 105. (3-0-3)

PHYS 413
Electromagnetism I
Differentiation and integration of vector fields; electrostatics and magnetostatics. Calculation of capacitance, resistance, and inductance in various geometries. Prerequisites: PHYS 308, MATH 252. (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: 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. Same as ECE 415. Prerequisite: PHYS 348 or consent of instructor. (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, and solid-state lasers. Laser applications. Same as ECE 418. Prerequisite: PHYS 348 or consent of instructor. (3-0-3)

PHYS 427,428
Advanced Physics Laboratory I, 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: PHYS 300 or consent of instructor. (2-3-3); (2-3-3) (C)

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: PHYS 348 or consent of instructor. (3-0-3)

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. Prerequisites: PHYS 240, PHYS 308, PHYS 348, PHYS 405 or permission of department. (2-3-3) (C)

PHYS 491
Undergraduate Research
Student participation in undergraduate research, usually during the junior or senior year. Prerequisites: Recommendation of adviser and approval of the department chair. (Credit: Variable) (C)

PHYS 497
Special Topics in Physics
(Credit: Variable) (C)

Graduate Courses

Graduate courses are available to degree-seeking undergraduate students with the approval of the course instructor and faculty adviser. See the current *IIT Bulletin: Graduate Program* for full descriptions.

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 521
Quantum Electronics

PHYS 537
Physics of the Solid State I

PHYS 538
Physics of the Solid State II

PHYS 553
Quantum Field Theory

PHYS 561
Radiation Biophysics

PHYS 570
Introduction to Synchrotron Radiation Research

PHYS 571
Health Physics I

PHYS 572
Health Physics II

PHYS 573
Standards, Statistics and Regulations

PHYS 574
Dosimetry

PHYS 575
Case Studies in Health Physics

Political Science

PS 200
American Government
Surveys American politics and government. The informal political institutions, such as parties and interest groups, are analyzed and related to the 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) (S) (C)

PS 201
Politics and Public Policy
Analyzes how social problems become public problems and how the government develops public policies and with what effect. Emphasizes the characteristics of the American policy-making process. Case studies are used to clarify the process. (3-0-3) (S) (C)

PS 256
Law in American Society
Examines the nature of law and the legal system in American society. Special attention will be paid to the institutions of the legal system, how they are supposed to function, and how they actually function. Topics for study may include the police, prosecutors, lawyers, judges, juries, grand juries and public defenders. The courts, ranging from the U.S. Supreme Court to local trial courts, are studied. The impact of U.S. Supreme Court decisions on the system of justice in America is explored. (3-0-3) (S) (C)

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) (S) (C)

NOTE: All political science courses numbered above 300 require as prerequisites successful completion of at least one other course marked with an (S) and satisfaction of IIT's Basic Writing Proficiency Requirement.

PS 300
Introduction to the Social Sciences
The course introduces the foundations of the social science disciplines, notably economics, history, political science, psychology and sociology. Primary emphasis will be placed on how the disciplines employ distinctive assumptions and perspectives, which are used to generate understanding, form explanations, and construct theories. (3-0-3) (S)

PS 303
Politics and the Media
Analyzes the media's role in contemporary American politics and government. Emphasis is placed on how the media, both newspapers and television, manufacture the news and how the news influences political and government agenda, decision making and public policies. (3-0-3) (S)

PS 309
Research Methods in Social and Political Science
Introduces students to explanation in the social sciences and both qualitative and quantitative research methods. Topics covered include formulation of research questions, measurement, data collection, survey research, significance tests, experimental and quasi-experimental design, sampling, and various techniques of qualitative research. Prerequisite: A statistics course approved by the department. Same as SOC 309. (3-0-3) (S) (C)

PS 310
Social and 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 310. (3-0-3) (S) (C)

PS 315
Urban Politics
Examines city and metropolitan politics and government. Emphasizes how economic and demographic changes influence local politics, how local politics work, and how state and national policies influence local politics. Special attention is devoted to Chicago politics. (3-0-3) (S)

PS 317
Chicago Politics
The study of 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 opposition. (3-0-3) (S)

PS 318
Contemporary Constitutional Issues
The course examines how decisions about some of our basic rights are made. Emphasizes U.S. Supreme Court decisions in the areas of criminal law, desegregation, education, welfare, housing and consumer law. Related topics of special interest to students in the class can be added to the syllabus. Supreme Court decisions are read and supplemented by textual material. (3-0-3) (S) (C)

PS 330
International Relations
Examines the relations among nations from the perspective of both the international system and the nation state. Emphasizes the transformation in the international system caused by weapons, production and communications technologies. Compares the nature, function and purpose of modern warfare and other forms of conflict with the prospects for international order through law, organization, communications and arms control. Gives special attention to the international policies of the United States toward various regions and its role in international organizations. (3-0-3) (S) (C)

PS 332
Politics of Science and Technology
Explores the complex interrelationships among science, technology and politics, with emphasis on the political issues created by contemporary scientific advances. Gives roughly equal attention to the politics of scientific discovery; the development of government organi-

zation for science and 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. Same as SOC 304. (3-0-3) (S) (C)

PS 333
National Defense Policy
Examines the formulation and implementation of national security and military policy in the United States. Surveys the emergence and growth of military strategy and the defense establishment, with primary emphasis on contemporary issues, institutions and policies, and prospects for the future. Emphasizes the impact of nuclear weapons on military strategy and security and the post Cold *war* struggle over forces and missions. (3-0-3) (S) (C)

PS 338
Energy and Environmental Policy
Places energy and environmental policy in domestic and global contexts. Traces the economic and political implications of dependence on fossil fuels and the attempt to develop alternate energy sources and promote conservation. Assesses the environmental effects of resource consumption and the effort to control these effects by increased efficiency and regulation of pollution. Explores such problems as nuclear waste, acid rain, global warming and deforestation. Examines national and international attempts at economic, political and technological solutions. (3-0-3) (S) (C)

PS 339
Nuclear Energy and Society
Explores the relationship between nuclear energy-science, technology, and products, and society--national, local, and global. Gives detailed attention to the discovery of nuclear fission and its exploitation during World War II and after, culminating in the global nuclear arms race. Examines the emergence and growth of nuclear power and the rise of the controversy over its safety, security, and economy. Considers the risks of continued proliferation, the prospects for arms control and the "peaceful atom," and the chances for survival in a nuclear world. Uses films, case studies, guest lectures, and simulations where appropriate. (3-0-3) (S) (C)

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. Studies the relationships of presidents with political parties, Congress, the bureaucracy, media, and the public, emphasizing both domestic and foreign policy, Gives major attention to changes in the presidential selection process and their implications for those who run and win the office. Examines the alleged crisis of the contemporary presidency and the proposals for overcoming it. (3-0-3) (S) (C)

PS 351
Public Administration
Examines the nature of administrative organization, decision making in organization, and organization structure and processes: division of work, authority communications and planning. Considers the role of the government executive. Analyzes relation of fiscal procedures and personnel management to organization. (3-0-3) (S) (C)

PS 355
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 structure, and political socialization. (3-0-3) (S)

PS 408
Methods of Policy Analysis
Introduces students to the field of Policy Analysis and acquaints students with basic methods policy analysis and urban planning. Course covers methods of analyzing and resolving policy issues relating to a broad range of public sector problems. Emphasis is on methods of analysis and problem solving rather than on politics or political process. Topics include decision theory, benefit/cost analysis, problem simulation, population projection, problem formulation and definition. Course will be taught using the case method. The course is of particular interest to students interested in applications of quantitative models to solve public sector problems. (3-0-3) (S) (C)

PS 452
Bureaucracy
Analyzes bureaucracy in its social context. The evolution of the theory and practice of bureaucracy as a form of control, coordination, and social order are considered. Emphasizes government bureaucracies, with selected examples from other organizations. (3-0-3) (S) (C)

PS 453
Regulatory Policy and Politics
Examines the changing role of government regulation of private and public activities from a political and administrative perspective. Explores reasons for the growth of government regulation from the Progressive era through the New Deal to the social regulation of the 1970s and for the subsequent controversy over economic and social deregulation. Investigates the regulatory process, including administrative law, standards for rule-making, and the involvement of organized groups and the courts. Studies specific cases from such areas as transportation, environment, energy, public health and research and development. (3-0-3) (S) (C)

PS 452
American Governmental Institutions
An advanced course in American government intended to develop knowledge and analytical skills to assess how well our government works and how it might work better. The course focuses on the operation of federal executive, legislative and judicial institutions, the policy-making process (including the role of administrators), and the power exercised by organized groups, experts and the media. (3-0-3) (S) (C)

PS *477*
Topics in the Study of Politics
Provides students a reading and seminar course on a selected topic of politics. Subject matter will change in successive offerings of the course. (3-0-3) (S) (C)

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. Prerequisite: Consent of instructor. (Credit: Variable; maximum 4 credit hours) (S) (C)

Psychology

PSYC 100
Introduction to Professions
Introduction to psychology and social science professions. Topics include problem formulation and career opportunities, spreadsheets and relevant computer applications, as well as data search tools. (2-0-2) (C)

PSYC 204
Experimental Psychology and Research Methods
Introduction to experimental methodology in learning, motivation and psychophysics. Design, performance and analysis of basic experiments. Prerequisites: PSYC 221 or PSYC 222. Note: Offered every other year. (2-2-3) (N,C)

PSYC 221
Human Behavior, Growth and Learning
Survey of personality, developmental, assessment, learning and social psychological aspects of human behavior. (3-0-3) (S) (C)

PSYC 222
Brain, Mind and Behavior
Survey of sensation, perception, motivation, physiological and neuropsychological bases of behavior. (3-0-3) (S) (C)

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, job placement, morale, safety, turnover, absenteeism and training. (3-0-3) (S) (C)

PSYC 303
Abnormal Psychology
Survey of the dynamics underlying behavior deviations. Considers therapeutic procedures and psychopathology. (3-0-3) (S,C)

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 406
History and Systems of Psychology
Historical development of influential psychological systems: structuralism, functionalism, behaviorism, psychoanalysis and Gestalt psychology. Prerequisite: 12 credit hours of psychology. (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. Prerequisites: PSYC 221, PSYC 222, MATH 221. (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: PSYC 221. (3-0-3) (S) (C)

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. Prerequisites: PSYC 221, PSYC 222. (3-0-3) (N)

PSYC 412
Psychosocial Aspects of Disabling Conditions
Personal adaptation and coping processes following disability; psychological and social consequences of disabling conditions; sexuality and disability; attitudes toward persons with disabilities; stigma management. One of a two-course sequence. Prerequisite: PSYC 221, PSYC 222. (3-0-3) (S) (C)

PSYC 414
Physiological Psychology
An introduction to the biological bases of behavior with an emphasis on the neuroanatomy and neurophysiology of sensory and central nervous systems. Prerequisites: PSYC 221, PSYC 222. (3-0-3) (N)

PSYC 420
Single-Subject Design and 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
Survey of contributions of major learning theorists and pertinent studies. Prerequisite: 12 hours of psychology. Note: Offered every other year. (3-0-3) (S) (C)

PSYC 426
Cognitive Processes
Survey of research in cognitive psychology; affirmative, conjunctive and disjunctive rules; transfer paradigms; distinctiveness of cues; shift paradigms. Prerequisite: PSYC 204. (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: MATH 221. (3-0-3)

PSYC 435
Early Development
Processes and theories of mental, social, emotional and physical development of infants, children and adolescents. Prerequisite: Nine credit hours of psychology or consent of instructor. (3-0-3) (S)

PSYC 436
Adult Development
Explores processes and changes in cognitive, social, physical and emotional functioning across adult life. Prerequisite: Nine credit hours of psychology or consent of instructor. (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. Prerequisites: SOC 480; PSYC 410; PSYC 411; and PSYC 412 or concurrent registration. **(3-0-3)**

PSYC 452
Personality Theory
Survey of personality theories and their application to everyday life. Prerequisites: PSYC 221, PSYC 222. (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. Prerequisites: PSYC 221, PSYC 222. (3-0-3) (S)

PSYC 482.483
Undergraduate Research Seminar I, 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. Prerequisites: PSYC 221, PSYC 222 and PSYC 204; or consent of instructor. (1-2-3)

PSYC 487
Integrative Psychology Seminar I
A synthesis of issues and areas in psychology. Prerequisites: Junior standing, 21 credit hours in psychology, and MATH 221. (3-0-3)

PSYC 468
Integrative Psychology Seminar II
Seminar integrating seminal and cutting edge psychological writings both empirical and conceptual to address key issues in contemporary psychology. Prerequisite: Third-year standing, 24 credit hours in psychology. (3-0-3)

PSYC 469
Undergraduate Psychology Seminar
Reports and discussion of current problems and issues in psychology. Prerequisites: PSYC 221, PSYC 222 and PSYC 204; or consent of instructor. (3-0-3) (S)

PSYC 497
Special Problems
Independent study involving compilation and analysis of data bearing on a significant problem. Prerequisites: Junior standing and consent of instructor. (Credit: Variable)

Graduate Courses

The following graduate courses are available to degree-seeking undergraduate students with the approval of the course instructor and faculty adviser. See the current *IIT Bulletin: Graduate Programs* for course descriptions.

PSYC 501
Psychological Foundation of Behavior

PSYC 502
Social Bases of Behavior

PSYC 503
Learning, Cognition and Motivation

PSYC 504
Individual Differences and Personality Development

PSYC 513
Vocational Evaluation I

PSYC 523
Introduction to Theories of Psychology

PSYC 545
Graduate Statistics

PSYC 556
Organizational Psychology

PSYC 561
Applied Counseling Techniques

PSYC 563
Vocational Counseling

PSYC *574*
Administration in Social Service Delivery

PSYC 583
Rehabilitation Engineering Technology

Sociology

SOC 200
Introduction to Sociology
Introduces students to the structure and operation of society. Analyzes individual behavior. Emphasizes the structure and problems of American society. **(3-0-3) (S) (C)**

SOC 201
Social Psychology
Examines how contemporary society molds individuals to its image. Topics include: human instinct, values and needs, attitudes, the process of socialization, suggestion and propaganda, rumor, prejudice, social conflict, conformity, social values, and interaction. (3-0-3) (S) (C)

SOC 210
Society, Environment and Ecology
An introductory survey course with no prerequisites. Aims at providing environmental literacy and understanding of the changing arguments in the environmental debate. Traces the relationship between man and nature from early industrial optimism to the 1960s rise of concerns about pollution, the 1970s limits to growth debate, and today's concerns with global climate change and the fate of earth itself Explores the possibility of a new paradigm of clean, innovative technology, and its social, economical and political implications. (3-0-3) (S) (C)

SOC 249
Social Problems
Analyzes selected problems affecting American society, including: poverty among and discrimination against minorities; crime and delinquency: urban problems; United States and world population problems; foreign policy and militarism. (3-0-3) (S) (C)

SOC 242
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 world political economy; the impact of changing technology on work and employment; the shift to a service economy; the Japanese challenge to American business and industry: responses of both the public and private sectors to these issues. (3-0-3) (S) (C)

SOC 249
Sociology of the Family
This course examines the family in its cultural, social, and economic contexts: how the family forms, function, and ideology are related to other aspects of society; and how the family serves as the environment for interpersonal behavior. Among the topics to be considered are feminine and masculine roles, alternative lifestyles, parenthood and the changes in family related to the human life cycle. (3-0-3) (S) (C)

SOC 259
Race and Ethnic Relations
The course examines the social, psychological, and cultural dimensions of race and ethnic relations in the context of modem society. Major theories regarding the origins and impact of interracial and interethnic conflict are analyzed, with special emphasis placed on the consequences of such conflict for the wider society. Governmental responses to prejudice and discrimination also are examined. (3-0-3) (S) (C)

NOTE: All sociology courses numbered above 300 require as prerequisites successful completion of at least one sociology course at the 200 level, at least one other course marked with an (S), and satisfaction of IIT's Basic Writing Proficiency Requirement.

SOC 301
The Social Dimension of Science
Examines how social and psychological factors influence the reasoning and behavior of scientists. Through contrasting traditional views of science with actual scientific practice, the course aims at understanding such phenomena as "hype," resistance to scientific discovery, controversy, vicious competition, error, self-deception and fraud. (3-0-3) (S) (C)

SOC 302
Science and Belief
Explores the relationship between science and belief through comparing Western science with other belief systems, science with religion, and science with pseudoscience. The course also *examines* cultural and ideological influences on scientific knowledge and public faith in science. (3-0-3) (S) (C)

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. The course addresses broader theoretical issues such as boundaries of science, autonomy, control of science, and science and power. (3-0-3) (S) (C)

SOC 304
Politics of Science and Technology
Explores the interrelationships among science, technology and politics, with emphasis on the political issues created by contemporary scientific advances and molecular biology. Investigates the politics of scientific discovery, as well as procedures for scientific advice to government, the impact of industrial technology on the economy and society, and the social implications of science and technology and how they can be predicted, measured and controlled. Same as PS 332. (3-0-3) (S) (C)

SOC 305
Social Communication
This course 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. Group and individual exercises develop skills in social analysis, problem finding, problem solving, and oral and written presentation. (3-0-3) (S) (C)

SOC 309
Research Methods in Social and Political Science
Introduces students to explanation in the social sciences and both qualitative and quantitative research methods. Topics covered include formulation of research questions, measurement, data collection, survey research, significance tests, experimental and quasi-experimental design, sampling, and various techniques of qualitative research. Prerequisite: A statistics course approved by the department. Same as PS 309. (3-0-3) (S) (C)

SOC 310
Social and 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 310. (3-0-3) (S) (C)

SOC 311
Comparative Social Structure
Examines theories of social organization with particular focus on complex bureaucratic organizations, social stratification and social change; also considers basic social institutions (e.g., family and government) in light of relevant theories. (3-0-3) (S) (C)

SOC 321
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 the United States. (3-0-3) (S) (C)

SOC 330
Sports and Society
Exploration of sports as a multi-billion dollar "microcosm" of society. How do structure and cultural expectations constrain various participants and viewers of the sports worlds? Through a combination of academic readings, popular commentary, documentaries and movies, the course will explore American business, values, preferences, gender and ethnic expectations, and education as reflected in and affected by sports. (3-0-3) (S) (C)

SOC 346
Deviant Behavior and Conformity
Analyzes the definition, development, and control of deviant behavior in relation to social processes. Societal reaction to and the amount, distribution, and behavior systems of various forms of deviance (drug addiction, suicide, crime, alcoholism, illegitimacy, etc.) are examined. (3-0-3) (S) (C)

SOC 350
Urban Sociology
This three-part course investigates the role cities have played in the development of industrial societies: analyzes the historical development of American cities and the problems they face today, including poverty and racial tensions, fiscal strain, and population and industrial decline (with an emphasis on Chicago); and examines urban patterns and problems in the third world. (3-0-3) (S) (C)

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 proposals recommended for their solution; and how the U.S. educational system compares with those of other societies. (3-0-3) (S) (C)

SOC 354
Gender and Work
What are the effects of gendered expectations about "work"? The historical roots and nature of gendered work in and outside the home, especially focusing on wage work within blue collar, service and professional occupations.
(3-0-3) (S) (C)

SOC 355
Political Sociology
Surveys major issues and problems in political sociology, including the forms of political power structures, elitist approaches to politics, community and national power structure, voting behavior, nation building and modernization, and civil-military relations.
(3-0-3) (S) (C)

SOC 362
Technology and Social Change
Examines major changes in social institutions and the role that technical innovations have played. Introduces the student to various approaches to assessment and forecasting. (3-0-3) (S) (C)

SOC 371
Occupations and Professions
This course 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 force policies; and the work environment in a comparative perspective. (3-0-3) (S) (C)

SOC 411
The Social Use of Space
Explores the interaction of spatial and social dimensions of the city, including such topics as territoriality, neighboring, perceptions of community, effects of physical design and scale on human behavior, and urbanism and suburbanism as ways of life. Emphasizes case studies and direct observation of actual communities, with special attention to Chicago. (3-0-3) (S) (C)

SOC 415
The New Workplace
In a few years, many workers will no longer commute to downtown offices for a nine-to-five workday. Instead they will join the ranks of telecommuters and other homeworkers who design, write, and talk with each other from their homes. This course will examine the assumptions about time and space and home and work currently operating within the workplace. (3-0-3) (S) (C)

SOC 420
Managers and Management
Managers possess unique positions within the workplace. This course examines the structural constraints and cultural expectations associated with the role of "manager." We will draw from works within the sociology of business, organizations, work and occupations to explore the historical development and place of managers in society, and the current expectations, reward structure, and dilemmas of managers in a variety of work settings. Some of the dynamics we will address are distinctions between managers, their employers and their subordinates, the infiltration of managerial ideology throughout the broader society; constraints on managers' decision-making processes; currently popular policies and attitudes among managers in business; and experimental employer/management/employee configurations. This is a readings and discussion seminar. Prerequisite: SOC 200 or, with approval of instructor, significant life experience relevant to course subject matter. (3-0-3) (S) (C)

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. Analyzes major figures, schools of thought, conceptual themes and controversies. (3-0-3) (S) (C)

SOC 490
Sociology of Disability and Rehabilitation
Examines the institutions and groups that interact with disabled individuals. Topics include the service professions and rehabilitation; labeling and disability; sheltered care versus mainstreaming; disability and the family; the role of support groups; employment of individuals; and a cross-cultural survey of rehabilitation. (3-0-3) (S) (C)

SOC 491
Undergraduate Research in Sociology
Students engage in supervised readings or research in order to obtain more intensive training in special interest areas of sociology. Prerequisite: Consent of instructor. (Credit: Variable) (C)

SOC 497
Directed Readings
Students read selected literature on a particular topic. Prerequisite: Consent of instructor. (Credit: Variable) (S) (C)

Spanish

Most students may take 200-level foreign language courses for General Education in the Humanities, but students seeking engineering degrees must receive the permission of the Dean of the Undergraduate College in order to assure that they satisfy accreditation requirements. A student with prior acquaintance of a language is placed in a course at the proper level by the instructor. Most students with two years of high school Spanish are prepared for SPAN 201.

SPAN 101
Elementary Spanish I
An introduction to modern Spanish, with exercises in translation, grammar, conversation and comprehension. (3-0-3)

SPAN 102
Elementary Spanish II
A study of modern Spanish emphasizing structural analysis and developing comprehension, translation and conversation skills. Reading of selected Spanish texts and exercises in composition. Prerequisite: SPAN 101. (3-0-3)

SPAN 201
Intermediate Spanish I
Continuation of training in written and oral expression. Study of Spanish literary works and composition of reports. Prerequisite: SPAN 102. (3-0-3) (H)

SPAN 202
Intermediate Spanish II
Training towards fluency in modern Spanish. Classroom analysis of Spanish literature, with collateral readings and written reports. Prerequisite: SPAN 201. (3-0-3) (H)

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Academic Policies and Procedures

Academic Loads

The average full-time academic load during the fall or spring semester is 15-18 credit hours. The minimum registration required for full-time status for those semesters is 12 credit hours. During the summer session, six credit hours is regarded as full-time enrollment for financial aid consideration. Students who wish to enroll for more than 18 credit hours during the fall or spring semester must obtain permission from the dean of the Undergraduate College. Students who wish to enroll for more than two courses during the summer must obtain permission from the dean of the Undergraduate college. Part-time degree-seeking students who wish to enroll for nine to 11 credit hours must have permission from the dean of the Undergraduate College. Non-degree students requesting a course overload must obtain permission from the Office of Educational Services. Students who wish to change their class schedule must do so at the Student Services Center. Changes can only be made according to the deadlines stated in the *IIT Bulletin: Schedule of* Classes.

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. Most undergraduate students who have completed at least 70 semester hours (including applicable transfer credit) will receive an audit from the Office of Educational Services. Some students will be required to submit an approved program of study and should consult their departmental adviser regarding this requirement. After receiving their first audit, students may request periodic updates.

Academic Progress, Probation and Dismissal

All students who are degree candidates are expected to maintain satisfactory academic progress. This includes maintaining satisfactory grade point averages and a satisfactory rate of progress toward the completion of their degree programs.

Students who do not maintain at least 2.00 cumulative and 1.85 current GPA and a 2.00 cumulative GPA in their major field are placed on academic probation. Their eligibility for financial aid will also be reviewed.

Degree-seeking students also are expected to maintain a satisfactory rate of progress. For full-time students, this means a minimum of 12 credit hours per semester applicable to their degrees. For part-time students, a satisfactory rate of progress 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 are placed on probation the following semester. Their eligibility for financial aid will also be reviewed.

Students on probation are not permitted to:

1. Register for more than 15 credit hours per semester.
2. Hold office in any student organization.
3. Represent the university on any athletic team, student organization or committee.

Students who are on academic probation for two consecutive semesters are subject to dismissal from IIT.

The progress of non-degree students also is reviewed and any such student failing to maintain an acceptable record is subject to being placed on probation or being dismissed.

A student dismissed by the university can petition the Academic Standing Committee to review his or her case. The student must present substantial academic or other relevant new evidence not available at the time of dismissal 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 to a faculty adviser who is available to discuss opportunities and career plans in the student's chosen field and to plan and approve coursework to meet department and university requirements. Students are urged to consult their advisers often. The associate and assistant deans are the initial contact for the dean of the Undergraduate College. They, too, can offer information on the university requirements and are responsible for most student academic records.

Academic Policies and Procedures

Change or Declaration of Major

A student who wishes to change or declare a major must obtain *a Change of Major Form from* the Office of Educational Services. After completing the form, the student must have the signature from the department chair of the intended major and the dean of the Undergraduate College before returning the form to the Office of Educational Services.

Change of Status

Students who wish to change their classification and/or registration status must complete the applicable procedures listed below no later than two weeks prior to registration (or preregistration).

- 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 adviser'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 part-time non-degree status to full-time or part-time degree-seeking status must contact the Office of Educational Services. 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 Ml-time or part-time status must apply for reinstatement as an undergraduate student in the Office of Educational Services.

Class Attendance

Students may not attend any class unless they are properly registered for that class. (See Payments and Refunds, page 25). All students are expected to attend their classes regularly. Excessive absences may be grounds for a failing grade. In case of illness or hospitalization that will require a student to be absent for more than two days of classes, the Office of Student Affairs (312.567.3080) should be notified at the earliest possible date.

Credit by Examination

Credit may be earned through one or more of the following examination procedures. Total credit from proficiency examinations and CLEP may not exceed 18 semester hours. There is no limit for advanced placement credit.

Advanced Placement Program

Refer to the section on admission, page 14.

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:

1. The CLEP examination and the score achieved meet the standards of the IIT department that offers courses in the area of the examination.
2. The CLEP examination is taken before the student enters IIT.
3. 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 dean of the undergraduate college, 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* can be obtained in the Student Services Center and a fee of $100 per credit hour is charged for each examination.

Dean's List

The names of all undergraduate students who have completed at least 12 graded hours without any "D" or "E" grades and who have a semester grade point average of 3.50 or better appear on the Dean's List.

Grade Point Average

To determine a grade point average (GPA), divide the total number of grade points earned by the total number of graded semester hours. Note that graded semester hours do not include courses graded "I," "W" or "AU." All courses taken at IIT apply to the cumulative GPA, including those that do not apply toward graduation.

Grades

The following grades are used to report the quality of an undergraduate student's work:

A Excellent, 4 grade points for each semester hour.

B Good, 3 grade points for each semester hour.

C Satisfactory, 2 grade points for each semester hour.

D Minimal Passing, 1 grade point for each semester hour.

E Failure, 0 grade point for each semester hour.

W Withdraw. To withdraw from a course with a grade of "W," a student must submit a *Drop/Add Form* to the Student Services Center before the end of the tenth week of the semester (the sixth week of an eight-week summer session and the fourth week of a six-week summer session). Withdrawal without submission of this form is unofficial and will result in a grade of "E."

NOTE: Withdrawal with a grade of "W" is not possible for a student who has been assigned a failing grade because of academic dishonesty.

NOTE: Grades will only be awarded for classes in which a student is properly registered at the time the class is taken. Retroactive registration is not permitted.

AU Audit. A student may register to audit a course. 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 Incomplete Work. The "I" grade indicates that the student's work to date is of passing quality but is incomplete for reasons acceptable to the instructor. A grade of "I" will be assigned only in the 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. The student also should have a substantial equity in the course, with no more than four weeks of classroom work remaining to be completed. Prior to assignment of the "I" grade, a written agreement will be reached with the instructor concerning the work still outstanding.

A grade of "I" will be removed with the approval of the department chair and the dean of the Undergraduate College after all remaining work is completed and the instructor assigns a regular grade. The work must be completed by no later than the end of the sixth week of class of the next regular (fall or spring) semester. If no regular grade has been received in the Office of Student Records and Registration by that date, the "I" grade will revert to a grade of "E."

Academic Policies and Procedures

Retaking Courses for a Grade Change

Undergraduate students may repeat a course for a change of grade. A *Course Repeat Form* must be submitted with the registration form during the registration period. Both grades will be recorded on all transcripts issued. However, only the second grade will be used to compute the cumulative GPA, even if the second grade is lower, except when the second grade is "W" or "AU." The course repeat policy is as follows:

1. 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).

2. The same course may be repeated only once for a grade change.

3. No more than three courses may be repeated for a grade change.

4. Re-registration for courses in which a student received a passing grade requires the approval of the student's academic adviser and the dean of the undergraduate college.

5. 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

An undergraduate degree-seeking student who wishes to enroll in a graduate 500-level course must first obtain written approval from the course instructor and faculty adviser stating that the student is qualified. This approval must be presented at the time of registration. An undergraduate non-degree student may be allowed to enroll in a graduate 500-level course in certain instances, but will require the permission of the Office of Educational Services. All undergraduate students who enroll in graduate courses are governed by the undergraduate grading system for those courses.

Graduation Requirements

The 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.

In the event that 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 the relevant department chair.

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 the relevant department chair.

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 Educational Services at the beginning of the semester in which they plan to graduate. Failure to do so will result in the postponement of the student's graduation. Please refer to the IIT calendar for specific deadlines.

To graduate, students in all undergraduate curricula must complete:

1. Departmental curriculum as listed under various departmental headings or an approved program of study.

2. Credit hour requirements as appropriate to the various curricula (a minimum of 126 hours).

3. General education requirements as outlined on page 30.

4. Residence requirements as outlined on page 175.

5. A minimum cumulative grade point average of 2.00 and a minimum grade point average 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 the dean of the Undergraduate College, take additional courses to raise the grade point average.

6. Completion of all the above within a period of eight calendar years from the semester of initial admission for full-time students or twelve calendar years for part-time students after achieving degree-seeking status. A student may petition the major department and the dean of the Undergraduate College to have this period extended. If the petition is approved, this extension may involve additional compensating academic requirements.

7. 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 term. A new application for graduation must then be submitted.

Graduation with Honors or High Honors

The award of "Honors" or "High Honors" is made at each commencement to a graduating senior who has taken a minimum of 60 graded semester hours required for a particular degree at IIT

A student who has a grade point average of 3.50 or higher for work completed at IIT will graduate with "High Honors." A student who has a grade point average of at least 3.00 but less than 3.50 for work completed at IIT will graduate with "Honors."

Placement Testing

Prior to first enrollment, all first-year and transfer students are required to take the English Proficiency Examination administered by the undergraduate dean's office. For those entering students who do not have college credit for a course in calculus, a mathematics placement test also is required. Other placement tests also may be required depending on the entering student's intended major.

For students entering in the fall semester, placement tests are scheduled in the summer preceding matriculation and must be completed prior to matriculation. In the case of students entering in the spring semester (January), special arrangements will be made by the Office of Admission with the individual candidate.

Residence Requirements

All undergraduate degree-seeking students must observe the following residence requirements:

1. 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 Educational Services for approval prior to registration at another institution.

2. 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

3. 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.

Registration

Students are required to be registered during any semester that they attend classes or make use of university facilities. Registration is also required of students who are in exchange programs, the cooperative education program or study abroad.

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 "Honors" or "High Honors" for the second degree includes all IIT coursework.

Academic Policies and Procedures

Standards of Conduct

IIT believes that acquiring self-discipline is part of the educational process. As in any society, students are responsible for their own conduct. They are therefore responsible for any damage they may do to university property and should maintain satisfactory standards of conduct on and off campus. Students also must adhere to the Code of Academic Honesty, which is found in the *IIT Student Handbook*.

Complaints of student misconduct are handled by the Campus Judicial Officer, the Campus Judicial Board, or, in case of less serious incidents concerning fraternity or sorority regulations, by the Greek Council.

Students are expected to inform themselves of all university regulations and requirements that are published in the *Student Handbook.*

Student Academic Petitions

A student may request a review of decisions concerning academic status or regulations by submitting a student petition. Students must contact the Office of Educational *Services* to receive a petition as well as instructions regarding the petition process.

Students who wish to take a course at another institution during the summer must submit a student petition to the Office of Educational Services in order *to* receive *university* approval.

Transcripts

Transcripts can be requested from the Student Services Center. Requests must have the signature of the student to comply with the Family Educational Rights and Privacy Act of 1974 as amended. Requests for transcripts should be made at least 10 days prior to the date the transcript is needed; during registration week, please allow additional time for processing transcripts. Transcripts will be released only after the student has fulfilled all financial obligations to the university. Official copies of transcripts are not issued directly to students. A fee of $5 is charged for each transcript issued.

Withdrawal from the University and Leave of Absence

A full-rime degree-seeking student who withdraws from all of his or her courses is in effect withdrawing from the university. A student who withdraws from the university is required to complete the *Official Withdrawal Form* in the Office of Educational Services. Failure to complete this form may create difficulties in the student's eligibility to receive a tuition credit, if any is appropriate; in clearing his or her financial record; and in having academic records reflect an official withdrawal.

Full-time students who withdraw the intention of returning to complete their degree program may be granted a leave of absence. Students must complete the *Official Withdrawal Form* in the Office of Educational Services and ask for the leave of absence designation in their exit interview. This designation may be granted only to those students who are in good academic standing. A leave of absence cannot exceed one academic year.

A part-time degree-seeking student who withdraws from all of his or her courses is not required to submit a official withdrawal form.

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Academic Resources

Career Development Center

The Career Development Center (CDC) helps match students with cooperative education opportunities and provides a variety of career services to students and alumni.

Cooperative education is a learning approach that integrates college studies with professional working experiences in industry, business, or government. Students alternate semesters between full-time work and full-time study. Salaries among IIT co-op students are competitive and help defray educational expenses. Frequently the co-op experience improves employment opportunities upon graduation. Full-time IIT students who are in their second through fifth semesters at IIT and who have and maintain at least a 2.0 GPA are eligible to apply for the co-op program.

The cooperative education program uses three established schedules. These schedules are:

- Alternating: Students alternate terms of full-time work with full-time school. A full-time work schedule must involve the same number of work hours each week as other full-time employees. A minimum of three full-time work terms with the same employer is required.

- Sandwich: Students work three consecutive full-time work terms in twelve months.

- Parallel: Students work part-time during academic terms. Part-time employment must involve an average of 20 hours of work per week. A minimum of six consecutive part-time work terms with the same employer is required. Summer work may be full-time, and the student may register for full-time co-op for the summer, fulfilling the requirement of two part-time work terms.

Students on an alternating or sandwich schedule may take up to six hours of coursework during a work term. Students on a parallel schedule may take up to twelve hours of coursework. Coursework over these limits during a work term constitute an overload and require the approval of the dean of the Undergraduate College.

Additional services provided by CDC include on-campus interviewing; individualized job search and career development assistance; resume writing/interviewing techniques workshops; resume critiques and mock employment interviews; employer library and videotape collection; labor market and salary data; summer internship assistance; and job listings.

Computer Facilities

The Main Campus operates DEC minicomputers, a Silicon Graphics “Challenge” Unix multiprocessor, and local Unix servers. Terminals and microcomputers are located in most academic buildings across campus, in residence halls, and in the Galvin Library. There are microcomputer classrooms where seminars, tutorials and computer lab work are conducted.

At the Rice Campus, a Sun CAD facility is available with a network of eleven SPARC 1 and 2 workstations. Personal computer facilities include both PCs and Macintoshes. Laboratory equipment is available to support courses in engineering and computer science. The Rice Campus computers are networked with Main Campus computers.

Educational Services

The Office of Educational Services maintains the official academic files for all undergraduate students. This office provides a variety of academic support services for an undergraduate student from the time of admission to graduation. These services include evaluation of transfer credits from both United States and international schools; academic program audits; student petitions; change of major; monitoring of academic progress; certification of student’s eligibility for graduation; and official withdrawl from the university. In addition, this office admits part-time undergraduate students and reinstates former undergraduate students to the university.

International Center

The International Center’s focus is on international student recruitment and retention. The center provides services to all international students on matters related to orientation, personal, visa and immigration concerns. The center also is a resource for information about job availability, study abroad programs, social, personal and cultural matters. The office coordinates campus activities designed to encourage cross-cultural awareness and understanding among the members of the IIT community.

Campus Resources

Libraries

As the central library, the Paul V. Galvin Library provides a broad range of services including information on engineering, business, science, mathematics, the humanities, architecture and design via the Internet; numerous electronic and paper-based databases; a document delivery service; interlibrary loan; and special collections. Students can access holdings through the ILLINET Online Cataloging System, which provides information about the collections of 800 libraries throughout Illinois, and through corporate memberships at The John Crerar Library at the University of Chicago. Patrons of the Galvin Library can use a World Wide Web-based network providing access to Engineering Village and ProQuest, two comprehensive, full-text databases in engineering and business, as well as many other CD-ROM indexes, abstracts and full text databases.

The Graham Resource Center on the lower level of S.R. Crown Hall houses architectural and city and regional planning materials.

The Center for the Study of Ethics in the Professions Library at the Downtown Campus contains a variety of material dealing with topics in practical and professional ethics.

The Louis Biegler Library on the Rice Campus contains a collection of electrical engineering materials. The focus is on electronic access to information.

The Chicago-Kent College of Law Library at the Downtown Campus is a technologically advanced library with outstanding collections in law, business and the social sciences. Chicago-Kent also houses one of the largest collections of international law and commerce materials in the Midwest.

The library at the Moffett Campus supports research on food technology and safety.

Multicultural Programs

The Center for Multicultural Programs (CMP) assists minority students with transition from high school. One aspect of IIT's success in retaining and graduating minority students is the Academic Challenge for Excellence program, a collection of personal and professional development activities. These include a weekly fall semester orientation class; academic and personal counseling; academic monitoring: and assistance in obtaining pre-professional employment and scholarships. CMP offers opportunities for collaborative study and peer mentoring. CMP maintains a computer lab, interactive learning software and learning aids, and a video library of historical, cultural and social topics.

Women's Center

IIT's Women's Educational Development Center assists women students in their academic programs. Social, cultural and educational events are planned for women students, faculty and staff through the Women's Network, a support group of women on campus.

Writing Center

The Writing Center coordinates all aspects of instruction in written, oral, electronic and interpersonal communications at IIT. The program is based in the Lewis Department of Humanities, where students can go for tutoring on writing assignments and questions about the communications intensive "C-Courses." Assistance is also available for non-native speakers of English (ESL). In addition, the program directs IIT's Communication Across the Curriculum initiative, which provides intensive, in-class communications training in lab, lecture, design, ITP and IPRO classes. For many of these classes, students will have one-on-one contact with a communications instructor and the opportunity to complement their acquisition of technical knowledge with professional help in communication. Students may also benefit from the Writing Center's peer tutors, who assist in ITP classes, offer one-on-one tutoring five evenings per week throughout the semester and conduct special evening programs on such things as Power Point presentation skills and HTML.

Student Affairs

The Office of Student Affairs oversees many areas of student life and serves as the primary advocate and ombudsperson for students. 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*.

Athletics and Recreation

The Department of Athletics and Recreation offers a comprehensive program of varsity sports, intramural competition, instruction and informal recreational activities for both men and women. The Scarlet Hawks men's varsity teams compete in intercollegiate baseball, basketball, cross-country and swimming; women's varsity teams compete in cross-country, swimming, basketball and volleyball. The university is an active member of the National Association of Intercollegiate Athletics (NAIA).

For nonvarsity athletes, intramural teams provide spirited competition in basketball, handball/squash, racquetball, softball, tennis, touch football, swimming, cross-country and volleyball. Recreational activities, open swimming and open free-play activities are all available.

Campus Ministry

The Campus Ministry works with student religious organizations on campus. These organizations sponsor activities for faith development, worship, socializing and service. The campus minister is available to discuss personal or spiritual issues in a confidential setting and to help students look for opportunities for volunteering or community services.

Counseling and Health Services

This office provides help with educational, personal and medical problems. Educational counseling can help a student study more efficiently by teaching a variety of study skills. Personal counseling can help students get through crises or deal with a variety of problems, big and small. Medical problems are treated on-site by a physician and a nurse practitioner or referred to local clinics and hospitals. All counseling and health services are strictly confidential. This office also oversees the student health insurance program as well as the university's immunization policy.

Disability Resources

Services for persons with disabilities are coordinated by the Center for Disability Resources and Educational Development. Persons with disabilities who are interested in applying for admission to any of IIT's educational programs are invited to call the center prior to their arrival on campus to discuss their individual needs. Enrolled students with disabilities are encouraged to consult the office regarding access to IIT facilities.

Residence and Greek Life

More than half of IIT's full-time undergraduates live on campus. The Residence Life Office offers a wide range of programs and services designed to enhance campus life. The office coordinates resident advisers, student security, and the Residence Hall Association.

In addition to seven residence halls, there are seven fraternity houses. The seven fraternities and two sororities have very active programs, and membership is open to commuting as well as resident students. Housing for married students is available in four campus apartment buildings.

Student Activities

Co-curricular activities and events provide opportunities for students to expand their intellectual, social and recreational interests. The Hermann Union Building (HUB) is the site for feature films, theatrical productions and concerts. The HUB has lounges, study areas, meeting rooms, student organization offices, an auditorium, a ballroom, a cafeteria, a pub, a bowling alley and a game room. The HUB Office oversees many student groups and acts as liaison between the administration and the various organizations.

The campus is home to numerous student organizations including the Student Leadership Committee, IIT's student government; the Residence Halls Association (RHA), which governs the hall councils; Greek Council, the governing organization for social fraternities and sororities; the Organization of African-American Students Impacting Society (OASIS); Latinos Involved in Further Education (LIFE); Union Board, which plans much of the social and cultural activities on campus; Technology News, the student newspaper; WOUI-FM, the student radio station; and TechMate, the commuter student organization.

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B.A., M.A.
Associate Director of Housing for Residence Life and Campus Judicial Officer

Stacy R. Newton
Student Affairs Coordinator

Eric Schwister
B.A.
Catholic Campus Minister

Terry H. Shapiro
B.S., Ph.D.
Director of Counseling and Health Services

Richard Thomas
B.A., M.S.A.
Director of Campus Union and Student Activities

Graduate College

Mohammad Shahidehpour
B.S., M.S., Ph.D.
Dean

Bess Grossweiner
B.A.
Thesis Examiner

Anthony Halford
B.S., M.S.
Assistant Director of Office of Sponsored Research

Jennifer Halverson
B.A.
Admissions Coordinator

Judy Masilun
A.S.
Director of Graduate Admissions

Anne Penway
B.A., J.D.
Assistant Dean

Mamie Phillips
B.S.Ed., M.P.A.
Assistant Dean

Geoffrey Williamson
B.S., M.S., Ph.D.
Associate Dean

Undergraduate College

John Kallend
B.A., M.A., Ph.D.
Dean

Irma Dobbins
B.S.
Director of Multicultural Programs

Helen Oloroso
B.S., M.S.
Director of Career Development

Carole A. Orze
B.S.
Director, Educational Services

Sharon Quiroz
B.A., M.A., Ph.D.
Director of Writing Programs

Susan Sitton
B.A., M.S., Ph.D.
Associate Dean and Director of Merit Scholarships

Normandie Zagorski
B.S., M.S.
Director of Women's Educational Development Center

Administration

Armour College

Hamid Arastoopour
B.S., M.S., Ph.D.
Chair of Chemical and Environmental Engineering

Robert Arzbaecher
B.S., M.S., Ph.D.
Director of Pritzker Institute of Medical Engineering

Paul Barrett
B.A., M.A., Ph.D.
Chair of Lewis Department of Humanities

Kathleen Chappell
A.B., M.B.A.
Assistant Dean of Development

Marek Dollar
M.Sc., Ph.D., D.Sc.
Chair of Mechanical, Materials and Aerospace Engineering

William J. Grimshaw
B.A., M.A., Ph.D.
Chair of Social Sciences

Bogden Korel
B.A., M.S., Ph.D.
Interim Chair of Computer Science

Jamshid Mohammadi
B.S., MS., Ph.D.
Chair of Civil and Architectural Engineering

Timothy I. Morrison
B.A., Ph.D.
Chair of Biological, Chemical and Physical Sciences

Robert W. Porter
B.S., MS., Ph.D.
Director of American Power Conference

Edwin Stueben
B.S., M.S., Ph.D.
Interim Chair of Applied Mathematics

Donald Ucci
B.E., M.E., Ph.D.
Interim Chair of Electrical and Computer Engineering

Vivian Weil
A.B., M.A., Ph.D.
Director of Center for the Study of Ethics in the Professions

College of Architecture

Donna V. Robertson
B.A., M.Arch.
Dean

Anita Anderson
B.S., M.A.
Director of Graham Resource Center

Marilyn Birden
B.A.
Assistant Dean for Administration and Finance

John Kriegshauser
B.A.
Shop Director

Eric Thompson
B.F.A., M.F.A., M.B.A.
Director of Development

Lee W. Waldrep
B.S., M.Arch, Ph.D.
Assistant Dean
for Academic Affairs

Institute of Design

Patrick P. Whitney
B.F.A., MEA.
Director

John Grimes
B.A., M.S.
Associate Director

Elizabeth Hughes
B.A.
Associate Director

Nora Kyger
B.F.A., M.A.
Director of External Relations

Institute of Psychology

M. Ellen Mitchell
B.A., M.A., Ph.D.
Director

Olivia K. Anderson
B.S.
Director of Development

Nambury Raju
B.A., MS., Ph.D
Director of the Center for Research and Service

Administration

Office of the Vice President for Business and Finance

John Collins
B.S., M.S., Ph.D., P.E.
Vice President for Business and Finance

Tim Bauhs
B.A., M.S.
Bursar

Jean Bingham
Director of Housing

Daryn Frank
Director of Public Safety

Nancy Hamill
B.A., M. Arch.
Director of Facilities

Kevin Doharty
B.S., C.P.A., M.S.T.
Associate Vice President for Finance and Controller

Robert Paschen
Manager of Office Services

Beverly Perret
B.S.
Director of Human Resources

Office of the Vice President for External Affairs

David E. Baker
B.A., M.A.
Vice President for External Affairs

Leroy E. Kennedy
B.A.
Associate Vice President for Community Relations

Office of the Vice President for Institutional Advancement

Thomas Garrow
B.A., M.B.A., Ph.D.
Vice President for Institutional Advancement

Kathleen M. Hurley
Associate Vice President for Institutional Advancement

Kathleen M. Monteleone
B.S.
Director of Alumni Relations

Office of the General Counsel

Mary Anne Smith
B.A., M.S., J.D.
Vice President for General Counsel, and Secretary to the Board of Trustees

Jose D. Padilla
B.Ed., J.D.
Associate General Counsel

Office of the Vice President for International Affairs

Darsh T. Wasan
B.S., Ph.D.
Vice President

Mary Dawson
B.S.J.
Associate Vice President for International Affairs

Irwin B. Fieldhouse
B.S., M.S.
Senior Adviser to Joint IIT/IITRI Research Collaboration

Louise Hewitt
B.A., M.S.T.
Director of Distance Learning Technologies

Charles E. Sizer
B.S., M.S., Ph.D.
Director of Moffett Campus

Office of the Vice President for the Downtown Campus

Henry H. Perritt, Jr.
S.B., S.M., J.D.
Dean of Chicago-Kent College of Law and Vice President for Downtown campus

Administration

Chicago-Kent College of Law

Henry H. Perritt, Jr.
S.B., S.M., J.D.
Dean of Chicago-Kent College of Law and Vice President for Downtown campus

Gerald Brown
B.S.C., J.D.
Co-Director of Graduate Program in Taxation

Michael Burns
B.A., J.D.
Assistant Dean for Admissions

Stuart L. Deutsch
B.A., J.D., L.L.M.
Professor of Law; Co-Director of Program in Environmental and Energy Law

Suzanne Ehrenberg
A.B., J.D.
Associate Director of Legal Research and Writing

Sanford Greenberg
A.B., M.A., Ph.D., J.D.
Acting Director of Ilana Diamond Rovner Program in Appellate Advocacy

Harold J. Krent
A.B., J.D.
Associate Dean of Faculty and Interprofessional Activities

Gary S. Laser
B.B.A., J.D.
Director of Clinical Education

Molly Warner Lien
B.Mus., J.D.
Director of Legal Research and Writing Program

Susan O'Brien
B.A., J.D.
Assistant Dean of Public Affairs

Richard Poggendorf
B.A., M.S.
Assistant Dean of Development, Alumnae/i and Student Affairs

Charles Rudnick
B.A., J.D.
Assistant Dean of International Law and Policy Development

Dawn Rupcich
B.S.
Assistant Dean of Administration, Finance, CLE and Financial Aid

Will Sadler
B.A., M.M., M.A., Ph.D.
Executive Director of Center for Law and Computers

Jeffrey Sherman
A.B., J.D.
Co-Director of the Graduate Program in Taxation

Stephen D. Sowle
B.A., J.D.
Assistant Dean of Academic Administration

A. Dan Tarlock
A.B., L.L.B.
Co-Director of the Program in Environmental and Energy Law

Mickie Voges
B.A., J.D., M.L.S.
Director of Legal Information Center

Stuart School of Business

M. Zia Hassan
B.S., M.S., Ph.D.
Dean

John F. O. Bilson
B.Ec., M.Ec., Ph.D.
Director of Financial Markets & Trading Program

Vicki E. DuFour
B.A., M.A.
Director of Administration for Financial Markets & Trading Program

Kenneth Gibson
B.S., B.A., M.B.A.
Director of Information Technology

Carol Ginise
Manager of Admission

Joel D. Goldhar
B.Ch.E., M.B.A., D.B.A.
Director of Operations and Technology Management Program

Lynn Miller
B.S., M.A., Ph.D.
Assistant Dean of Admission and M.B.A. Program

Bernard Rausch
B.Ch.E., M.S.
Interim Director of Career Planning and Continuing Education

Ann Shillinglaw
B.A., M.A.
Director of Development

John R. Twombly
B.S., M.B.A., Ph.D., C.P.A.
Adviser to Undergraduate Programs

Shirlyn Wright
B.S., MS.
Associate Director of Employer Relations

Faculty

Year shown indicates date of initial appointment.

Frederick M. Abbott
B.A., University of California (Berkeley); J.D., Yale Law School
Professor of Law, 1989

Susan Johanne Adams
B.A., M.A., University of Wisconsin; J.D., Valparaiso University School of Law
Associate Professor of Legal Research and Writing, 1993

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

Stephanie Altman
B.A., Grinnell College; J.D., Loyola University
Assistant Professor of Clinical Practice, 1995

Paul R. Anderson
B.S., Purdue University; M.S., University of California (San Diego); Ph.D., University of Washington
Associate Professor of Chemical and Environmental Engineering, 1986

Lori Andrews
B.A., Yale College; J.D., Yale Law School
Professor of Law, 1994

Hamid Arastoopour
B.S., Abadan Institute of Technology (Iran); M.S., Ph.D., G.E., Illinois Institute of Technology
Professor of Chemical and Environmental Engineering and Chair of the Department, 1979

David Arditi
B.S., M.S., Middle East Technical University (Turkey); Ph.D., Loughborough University of Technology (England)
Professor of Civil and Architectural Engineering, 1981

Victor Avraham Aronov
Ph.D., Institute of Mechanization of Agriculture and Institute of Truck and Tractor Maintenance (Kiev)
Associate Professor of Mechanical and Materials Engineering, 1977

Robert Arzbaecher
B.S., Fournier Institute of Technology; M.S., Ph.D., University of Illinois (Champaign-Urbana)
Professor of Electrical and Computer Engineering and Director of the Pritzker Institute of Medical Engineering, 1981

Guillermo E. Atkin
B.S., Universidad F. Santa Maria (Chile); Ph.D., University of Waterloo (Canada)
Associate Professor of Electrical and Computer Engineering, 1986

Roya Ayman
B.A., M.A., Ph.D., University of Utah
Associate Professor of Psychology and Director of I/O Program, 1983

Katharine K. Baker
B.S., Harvard-Radcliffe College; J.D., University of Chicago Law School
Assistant Professor of Law, 1993

Martin L. Bariff
B.S., M.A.S., Ph.D., University of Illinois (Champaign-Urbana); Certified Public Accountant
Coleman Foundation Associate Professor of Information Resources Management and Director of the Center for Research on the Impacts of Information Systems, 1983

Christopher M. Barlow
B.A., University of Notre Dame; M.S., State University of New York (Buffalo); Ph.D., Case Western Reserve University
Assistant Professor of Management, 1995

Ralph Lipsey Barnett
B.S., M.S., Illinois Institute of Technology
Professor of Mechanical Engineering, 1969

Paul F. Barrett
B.S., M.A., Loyola University: Ph.D., University of Illinois (Chicago)
Associate Professor of History and Chair of the Department of Humanities, 1977

Matthew J. Bauer
B.S., M.S., Illinois Institute of Technology
Instructor in Computer Science, 1996

David R. Beam
B.A., Lawrence University; M.A., Ph.D., Northern Illinois University
Associate Professor of Political Science and Director of the Master of Public Administration Program, 1987

Anup K. Behera
B.Tech., Indian Institute of Technology; M.S., Ph.D., University of Illinois (Champaign-Urbana)
Lecturer in Electrical and Computer Engineering, 1988

Richard L. Beissinger
B.S., Carnegie Mellon; M.S., Cornell University; D.E.S., Columbia University
Professor of Chemical and Environmental Engineering, 1981

Peter Phillip Beltemacchi
B.S., MS., Illinois Institute of Technology
Associate Professor of Architecture,1967

Anita Bernstein
B.A., Queen's College; J.D., Yale Law School
Professor of Law, 1989

Barry Bernstein
B.S., City College of New York; M.A., Ph.D., Indiana University
Professor of Applied Mathematics and Chemical and Environmental Engineering, 1966

Michael D. Besancon,
Capt., U.S.N.*
B.S.C.E., Duke University; M.P.A., Auburn University,
Professor of Naval Science, 1997

John F. O. Bilson
B.Ec., M.Ec., Monash University (Australia); Ph.D., University of Chicago
Associate Professor and Director of the Financial Markets & Trading Program, 1995

*Member of the faculty of IIT by electron according to the provision of Article 1, Section 2 of the IIT Faculty Constitution.

Faculty

Vigil Bistriceanu
B.S., M.S., Polytechnic Institute of Bucharest
Instructor in Computer Science, 1994

Thomas F. Blackwell
B.S., University of Texas, Arlington; M.A., J.D., Duke University
Visiting Professor of Law, 1997

Eli Blevis
B.M., M.S., Ph.D., Queen's University (Canada)
Institute of Design
Assistant Professor, 1994

Fred P. Bosselman
B.A., University of Colorado; J.D., Harvard University
Professor of Law, 1991

David Brande
B.A., M.A., Portland State University; Ph.D., University of Washington
Assistant Professor of English, 1996

Stefan Brandle
B.A., Wheaton College: M.S., Ph.D., Illinois Institute of Technology
Lecturer of Computer Science, 1998

Ralph L. Brill
B.A., J.D., University of Illinois (Champaign-Urbana)
Professor of Law, 1961

Evelyn Brody
B.A., Yale College; J.D., Georgetown University Law Center
Assistant Professor of Law, 1992

Lawrence Jay Broutman
B.S., S.M., Sc.D., Massachusetts Institute of Technology
Research Professor of Materials Engineering, 1963

Bartram S. Brown
B.A., Harvard University; J.D., Columbia University; Ph.D., Graduate Institute of International Studies
Assistant Professor of Law, 1991

Gerald Brown
B.S.C., DePaul University; J.D., University of Chicago
Associate Clinical Professor of Law, and Co-director of Graduate Program in Taxation, 1990

Timothy Brown
B.S.Arch., Clemson University; M.A.Arch., University of Illinois (Chicago)
Studio Professor of Architecture, 1990

Jeffry 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

Charles W. Buch, Lt., U.S.N.*
B.A., Purdue University
Assistant Professor of Naval Science, 1997

Grant Byrd Bunker
B.A., Evergreen State College; Ph.D., University of Washington
Associate Professor of Physics and Director of the Biophysics Collabration Access Team, 1991

Ilene J. Burnstein
B.S., Brooklyn College; M.S., University of Maryland; Ph.D., Illinois Institute of Technology
Associate Professor of Computer Science, 1986

Ray Aaron Burnstein
B.S., University of Chicago; M.A., University of Washington; Ph.D., University of Michigan
Professor of Physics, 1965

John Cain
B.S., Illinois Institute of Technology
Visiting Assistant Professor in the Institute of Design, 1994

Graham M. Campbell
B.S., M.S., University of Manitoba; Ph.D., The Pennsylvania State University
Professor of Computer Science, 1981

C. Robert Carlson
B.A., Augustana College; M.S., Ph.D., University of Iowa
Professor of Computer Science, 1984

Kevin Cassel
B.S., Messiah College M.S., Ph.D., Lehigh University
Assistant Professor of Mechanical and Aerospace Engineering, 1996

Eve M. Caudill
B.S., DePaul University; Ph.D., University of Illinois (Champaign-Urbana)
Assistant Professor of Management, 1997

Geoffrey W. Y. Chan
B.Eng., M.Eng., Carleton University (Canada); Ph.D., University of California (Santa Barbara)
Motorola Assistant Professor of Electrical and Computer Engineering, 1994

H. Ted Chang
B.S., M.S., National Cheng Kung University; Ph.D., University of Illinois (Champaign-Urbana)
Assistant Professor of Chemical and Environmental Engineering, 1992

Morris Chang
B.S., Tatung Institute of Technology; M.S., Ph.D., North Carolina State University
Assistant Professor of Computer Science, 1995

Howard Stuart Chapman
B.S., J.D., University of Illinois (Champaign-Urbana)
Professor of Law, Chicago-Kent College of Law, 1971

Leroy Dean Chapman
B.S., Southwestern Oklahoma State University; Ph.D., Purdue University
Associate Professor of Physics and Director of the Center for Synchrotron Radiation Research and Instrumentation, 1995

David Chovancek, Capt., U.S. Army*
B.S., University of Central Texas; M.P.A., University of Oklahoma
Assistant Professor of Military Science, 1997

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Faculty

Thomas W. Christopher
B.A., University of Oklahoma; M.S., University of Chicago; Ph.D., Illinois Institute of Technology
Associate Professor of Computer Science, 1976

Ali Cinar
B.S., Robert College (Turkey); M.Eng., Ph.D., Texas A & M University
Professor of Chemical and Environmental Engineering and Associate Chair of Chemical Engineering Division, 1982

Herek L. Clack
B.S., Massachusetts Institute of Technology
Ph.D., Unversity of California, Berkeley
Assistant Professor of Mechanical and Aerospace Engineering, 1999

Carrie Clancy, Capt. USAF*
B.S., Miami University; M.A., University of Colorado
Assistant Professor of Aerospace Studies, 1997

Liam Coffey
B.A., Trinity College (Dublin); Ph.D., University of Chicago
Associate Professor of Physics, 1990

Lewis Collens
B.S., M.A., University of Illinois (Champaign-Urbana); J.D., University of Chicago
Professor of Law and President, 1970

Susan Conger-Austin
B.A., Stanford University; M.Arch., Princeton University
Studio Professor of Architecture, 1993

Richard James Conviser
B.A., J.D., University of California; Dr. Jur, University of Cologne
Professor of Law, 1973

David I. Coogan
B.A., The College of Wooster; M.A., Ph.D., State University of New York (Albany)
Assistant Professor of English, 1995

Chris Conley
B.S.M.E., M.S. Design, Illinois Institute of Technology
Visiting Lecturer, Institute of Design, 1993

Stuart Cooper
B.S. Massachusetts Institute of Technology
Ph.D. Princeton University
Phillip Danforth Armour Professor of Engineering and Vice president and Chief Academic Officer of the Main Campus, 1998

Douglas J. Cork
B.S., M.S., Ph.D., University of Arizona
Professor of Biology, 1980

Thomas C. Corke
B.S., M.S., Ph.D., Illinois Institute of Technology
Professor of Mechanical and Aerospace Engineering, 1982

Jacob I. Corre
A.B., University of Chicago; J.D., Yale University
Visiting Faculty Member, 1996

Matthew Crawford, Lt., U.S.N.*
B.A., Northwestern University
Assistant Professor of Naval Science, 1997

James R. Dabbert
B.A., M.S., Indiana University
Instructor in English, 1989

Michael Davis
B.A., Western Reserve University; M.A., Ph.D., University of Michigan
Professor of Philosophy, 1986

Paul Henry DeForest
B.S., Ph.D., Georgetown University
Associate Professor of Political Science, 1969

Platon C. Deliyannis
M.S., Ph.D., University of Chicago
Professor of Applied Mathematics, 1962

Dirk Denison
B. Arch., M.B.A., Illinois Institute of Technology; M. Arch., Harvard University
Studio Professor of Architecture, 1988

Eduardo De Santiago
B.S., Illinois Institute of Technology; M.S., Ph.D., Stanford University
Assistant Professor of Civil and Architectural Engineering, 1997

Stuart Lewis Deutsch
B.A., University of Michigan; J.D., Yale University; L.L.M., Harvard Law School
Professor of Law and Co-Director Program on Environmental and Energy Law, 1976

Phillip Dickens
B.S., St. Andrews Presbyterian College; M.S., University of Virginia; Ph.D., University of Virginia
Assistant Professor of Computer Science, 1996

Rollin Cumming Dix
B.S., M.S., Ph.D., Purdue University
Professor of Mechanical and Aerospace Engineering, 1964

Anna Dollar
M.S., Ph.D., Cracow University of Technology (Krakow, Poland)
Assistant Professor of Mechanical and Materials Engineering, 1994

Marek Dollar
M.Sc., Ph.D., D.Sc., University of Mining and Metallurgy (Krakow, Poland)
Professor of Materials Engineering and Chair of the Department of Mechanical, Materials and Aerospace Engineering, 19 88

Christopher R. Duhon, Capt., USAF*
B.S. USAFA, Regional Director of Admissions, 1997

James Dwyer
B.A., Boston College; J.D., Yale University; Ph.D., Stanford University
Visiting Assistant Professor of Law, 1996

Warren Stanley Edelstein
B.A., Lehigh University; M.A., Duke University; Ph.D., Brown University
Professor of Applied Mathematics, 1965

Howard C. Eglit
B.A., University of Michigan; J.D., University of Chicago
Professor of Law, 1975

Suzanne Ehrenberg
A.B., Williams College; J.D., University of Chicago
Professor of Legal Research and Writing 1989

*Member of the faculty of IIT by election according to the provision of Article I, Section 2 of the IIT Faculty Constitution.

Faculty

Walter C. Eisenberg
B.S., University of Toronto (Ontario); M.S., Rochester Institute of Technology; Ph.D., University of Buffalo (New York)
Professor of Chemistry, 1987

Mahjoub Elnimeiri
B.S., University of Khartoum; M.S., University of London, Imperial College: Ph.D., Northwestern University
Professor of Architecture, **1990**

Tzilla Elrad
B.S., The Hebrew University (Israel); M.S., Syracuse University; Ph.D., Technion Israel Institute of Technology (Israel) Research Associate Professor of Computer Science, 1982

Nanette Elster
B.A., University of Illinois; J.D., Loyola University; M.P.H., Boston University
Visiting Assistant Clinical Professor, 1996

Thomas Erber
B.S., Massachusetts Institute of Technology; M.S., Ph.D., University of Chicago
Professor of Physics and Applied Mathematics, 1957

Joseph A. Erwin
B.S., M.S., St. John's University; Ph.D., Syracuse University
Associate Professor of Biology, 1967

Martha Walton Evens
A.B. Bryn Mawr College; A.M., Radcliffe College; Ph.D., Northwestern University
Professor of Computer Science, 1975

Dale Edwin Fahnstrom
B.F.A., M.F.A., University of Illinois (Champaign-Urbana)
Professor in the Institute of Design, 1966

Martin Felsen
B.Arch., Virginia Polytechnic Institute; M.S., Columbia University
Instructor of Architecture, 1996

Susan G. Feinberg
B.A., University of Michigan; M.A., University of Louisville; Ph.D., Kent State University
Professor of English, 1980

Patrick D. Flanagan, LTC, U.S. Army
B.A., University of Illinois at Chicago, M.A., Political Studies, Governors State University, J.D., Illinois Institute of Technology
Professor of Military Science and Department Director, 1995

Alexander Flueck
B.S., M.E., Ph.D., Cornell University
Assistant Professor of Electrical and Computer Engineering, 1996

Robert Foley
B.S., University of Vermont; Ph.D., Northwestern University
Finkl Assistant Professor of Metallurgical and Materials Engineering and Director of the Midwest Steel Center, **1995**

Jacqueline Fox-Good
B.S., Northwestern University; M.A., University of Chicago; Ph.D., University of Virginia
Associate Professor of English, 1989

Maurice J. Frank, Jr.
S.B., University of Chicago; M.S., Ph.D., Illinois Institute of Technology
Professor of Applied Mathematics, 1976

Ophir Frieder
B.S., M.S., Ph.D., University of Michigan
IITRI Chair, Professor of Computer Science, 1998

Meton Gadelha
B.Arch., University Federal Rio de Janeiro; M.Arch., Cranbrook Academy of Art
Studio Professor of Architecture, 1990

Nikolas Galatsanos
Greece Diploma, National Technical University of Athens; M.S.E.E., Ph.D., University of Wisconsin (Madison)
Associate Professor of Electrical and Computer Engineering, 1989

Donald Gardiner, Capt., U.S. Army*
B.S., Illinois State University; M.S., Lewis University
Assistant Professor of Military Science, 1996

Mark D. Garfinkel
B.A., Wesleyan University; Ph.D., California Institute of Technology
Assistant Professor of Biology, 1993

Robert Gatter
B.S., Johns Hopkins University; M.A., Duke University; J.D., University of Pennsylvania
Visiting Assistant Professor of Law, 1997

Glen O. Geist
B.A., Allegheny College; M.S., Ph.D., State University of New York (Buffalo)
Professor of Psychology, 1971

Rafael Gely
B.A., Kansas State University; A.M., J.D., Ph.D., University of Illinois (Champaign-Urbana)
Assistant Professor of Law, 1995

David J. Gerber
B.A., Trinity College; M.A., Yale University; J.D., University of Chicago
Professor of Law, 1982

Joel C. Gibbons
B.S., Georgetown University; M.B.A., University of Chicago: Ph.D., Northwestern University; Ph.D., University of Chicago Lecturer in Financial Markets & Trading, 1996

Dimitri Gidaspow
B.ChE., The City College of New York; M.Ch.E., Polytechnic Institute of Brooklyn; Ph.D., Illinois Institute of Technology
Professor of Chemical and Environmental Engineering, **1962**

Martin E. Ginn
A.B., M.S., New York University; M.B.A., Illinois Institute of Technology; Ph.D., Northwestern University
Associate Professor of Organization and Technology Management, 1983

* Member of the faculty of IIT by election according to the provision of Article 1, Section 2 of the IIT Faculty Constitution.

Faculty

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 and Director of M.S. in Operations and Technology Management Program, 1983

Richard J. Gonzalez
B.A., Northwestern University; J.D., Ohio State University
Clinical Professor of Law, 1988

Michael Gosz
B.S., Marquette University MS., Ph.D., Northwestern University
Assistant Professor of Mechanical and Materials Engineering, 1996

Sonia Green
B.A., M.A., J.D., University of Chicago
Visiting Assistant Professor of Law, 1996

Sanford N. Greenberg
A.B., Princeton University: M.A., Ph.D., University of California (Berkeley): J.D., George Washington University
Visiting Assistant Professor of Law, 1994

Peter H. Greene
A.B., Amherst College; Ph.D., University of Chicago
Associate Professor of Computer Science, 1974

Ellen Grimes
B.A., M.B.A., University of Chicago; M.Arch., University of Illinois (Chicago)
Instructor, 1997

John Ricks Grimes
B.A., University of Illinois (Champaign-Urbana); M.S., Illinois Institute of Technology
Associate Director and Associate Professor in the Institute of Design, 1974

William J. Grimshaw
B.A., University of Chicago; M.A., Ph.D., University of Illinois (Champaign-Urbana)
Professor of Political Science and Chair of the Social Sciences Department, 1978

Vivien C. Gross
B.A., Northwestern University; M.A., University of Illinois (Champaign-Urbana); J.D., Indiana University (Bloomington) Clinical Professor of Law, 1979

Sidney Aaron Guralnick
B.S., Drexel Institute of Technology: M.S., Ph.D., Cornell University
Professor of Civil and Architectural Engineering and Perlstein Distinguished Professor of Engineering and Director of the Advanced Building Materials and Systems Center, 1958

Philip Norman Hablutzel
B.A., Louisiana State University; M.A., J.D., University of Chicago
Professor of Law, 1971

Kenneth B. Hall, CMDR, USN*
B.S., U.S. Naval Academy M.S., U.S. Naval Postgraduate School
Associate Professor of Naval Science, 1998

Warren Clayton Hall
B.S., A.M., University of Missouri; M.S., Ph.D., University of Illinois
Associate Professor of Economics, 1966

Charles Hamilton
B.S., M.A.S., Ph.D., University of Illinois (Champaign-Urbana); Certified Public Accountant
Clinical Assistant Professor of Accounting, 1991

Nancy S. Hansen
B.S., Ball State University; M.A., Ph.D., University of Notre Dame
Assistant Professor of Psychology, 1997

Sarah Harding
B.A., McGill University; L.L.B., Dalhousie University; B.Ch., Oxford University; L.L.M., Yale Law School
Assistant Professor of Law, 1995

Kevin Patrick Harrington
B.A., Colgate University; M.A., Ph.D., Cornell University
Professor of Architectural History, 1978

Cheryl Harris
B.A., Wellesley College; J.D., Northwestern University
Associate Professor of Law, 1990

Steven L. Harris
B.A., J.D., University of Chicago
Professor of Law, 1996

John F. Hartray
B.Arch., Cornell University
Adjunct Professor of Architecture, 1993

Richard L. Hasen
A.B., University of California (Berkeley); M.A., J.D., Ph.D., University of California (Los Angeles)
Assistant Professor of Law, 1994

M. Zia Hassan
B.Sc., University of Panjab (Pakistan); M.S., Ph.D., Illinois Institute of Technology
Professor of Industrial Management and Dean of the Stuart School of Business, 1960

Greg Hayman, LTC, USAF*
B.S., University of Toledo; M.A., Ball State University
Professor of Aerospace Studies, 1996

Barbara Ruth Heller
A.B., University of Chicago; B.S., Roosevelt University; M.S., Ph.D., University of Chicago
Associate Professor of Applied Mathematics, 1980

Bill Henson, Capt., U.S. Army*
B.A., Brigham Young University
Assistant Professor of Military Science, 1996

John Heskett
B.Sc. (Econ), London School of Economics
Professor in the Institute of Design, 1989

Steven J. Heyman
A.B., Harvard College; J.D., Harvard Law School
Associate Professor of Law, 1989

John Hilburger
B.A., M.Ed., University of Illinois (Champaign-Urbana); Ph.D., Illinois Institute of Technology
Assistant Professor of Psychology, 1997

Linda R. Hirshman
B.A., Cornell University; J.D., University of Chicago
Professor of Law, 1983

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Faculty

Michael Hites
B.S., University of Arizona; M.S., University of Illinois (Champaign-Urbana); Ph.D., Illinois Institute of Technology
Interim Director of Computer Network Services and Research Assistant Professor of Mechanical and Aerospace Engineering, 1996

Thomas M. Holsen
B.S., M.S., Ph.D., University of California (Berkeley)
Associate Professor of Chemical and Environmental Engineering, 1988

Cynthia Hood
B.S., Rensselaer Polytechnic Institute; M.S., Stevens Institute of Technology; Ph.D., Rensselaer Polytechnic Institute
Assistant Professor of Computer Science, 1996

Joyce Hopkins
B.A., McGill University; M.A., Tufts University; Ph.D., University of Pittsburgh
Associate Professor of Psychology, 1992

Gerald Horn
Studio Professor of Architecture, 1973

David Charles Hovey
B.Arch., M.S., Illinois Institute of Technology
Associate Professor of Architecture, 1969

Andrew Howard
B.A., Pomona College; Ph.D., University of California (San Diego)
Associate Professor of Biology and Director of the Industrial Macromolecular Crystallography Association Collaborative Access Team, 1995

James Huttenhower
A.B., Dartmouth College: J.D., Yale University
Visiting Assistant Professor of Law, 1996

Margaret Hellie Huyck
A.B., Vassar College; M.A., Ph.D., University of Chicago
Professor of Psychology, 1969

Tomoko Ichikawa
B.A., International Christian University (Tokyo); M.S., Illinois Institute of Technology
Visiting Assistant Professor in the Institute of Design, 1994

Syed A. Imam
B.S., University of Karachi (Pakistan); M.B.A., M.S.O.R., Ph.D., Illinois Institute of Technology
Visiting Assistant Professor of Operations and Technology Management, 1986

Thomas Charles Irving
B.Sc., M.Sc., Ph.D., University of Guelph (Ontario)
Assistant Professor of Biology and Associate Director of the Biophysics Collaboration Access Team, 1994

Kamyar Jabbari
B.S., Towson State University; M.B.A., University of Chicago
Lecturer in Finance, 1996

Mark Jennings
B.S., University of Illinois (Champaign-Urbana); MS., Ph.D., Illinois Institute of Technology
Lecturer, Mechanical and Aerospace Engineering, 1993

Peter Y. Johnson
B.S., University of Illinois (Champaign-Urbana); Ph.D., Massachusetts Institute of Technology
Professor of Chemistry, 1976

Porter Wear Johnson
B.S., Case Institute of Technology; M.A., Ph.D., Princeton University
Professor of Physics, 1969

Marc Kadish
B.A., J.D., Rutgers University
Clinical Professor of Law, **1979**

John Scott Kallend
B.A., M.A., Ph.D., Cambridge University
Professor of Materials Engineering and Physics and Dean of the Undergraduate College, 1978

Serope Kalpakjian
B.Sc., Robert College (Turkey); S.M., Harvard University; S.M., Massachusetts Institute of Technology
Professor of Mechanical and Materials Engineering, 1963

Daniel M. Kaplan
B.A., Haverford College; Ph.D., State University of New York (Stony Brook)
Associate Professor of Physics, 1994

James L. Karagiannes
B.S., Loyola University; Ph.D., Illinois Institute of Technology
Research Assistant Professor of Physics, 1993

Chris Karidis
B.Arch., Illinois Institute of Technology
Studio Professor of Architecture, 1974

Lawrence Keeley
B.A., University of Michigan
Visiting Assistant Professor in the Institute of Design, 1994

Pamela Kentra
B.A., University of Illinois; J.D., Chicago-Kent College of Law, Illinois Institute of Technology
Visiting Assistant Clinical Professor, 1995

Nasrin R. Khalili
B.Sc., M.S.P.H., Tehran University; Ph.D., Illinois Institute of Technology
Assistant Professor of Chemical and Environmental Engineering, 1995

M. Ishaque Khan
Ph.D., Indian Institute of Technology
Assistant Professor of Chemistry, 1994

C. Jotin Khisty
B.S., Nagpur University (India); M.S., M.C.P., University of Cincinnati; Ph.D., Ohio State University
Professor of Civil and Architectural Engineering, 1990

Richard Kling
B.A., University of Illinois (Chicago); J.D., Northwestern University School of Law
Clinical Professor of Law, 1981

Thomas William Knowles
B.S., Purdue University; M.B.A., Ph.D., University of Chicago
Associate Professor of Management Sciences and Operations Management, 1969

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Faculty

Bogdan Korel
M.S., Technical University of Kiev; Ph.D., Oakland University
Associate Professor of Computer Science and Interim Chair of Department of Computer Science, 1994

George Durham Kraft
B.Sc., Massachusetts Institute of Technology; M.Sc., Ph.D., Case Institute of Technology
Associate Professor of Information Management, 1968

Robert Krawczyk
BArch., University of Illinois (Chicago)
Studio Lecturer in Architecture, 1993

Harold J. Krent
A.B., Princeton University; J.D., New York University School of Law
Professor of Law, 1994

Ron Krueck
B.Arch., Illinois Institute of Technology
Studio Professor of Architecture, 1992

Sudhir Kumar
B.S., M.S., Agra University; M.S., Indian Institute of Science; Ph.D., The Pennsylvania State University
Research Professor of Mechanical Engineering, 1995

Robert Franklin Ladenson
B.A., University of Wisconsin; Ph.D., The Johns Hopkins University: J.D., DePaul University
Professor of Philosophy, 1969

Chow S. Lam
B.S., M.S.Ed., University of Wisconsin (Whitewater); M.S., Ph.D., University of Wisconsin (Madison)
Professor of Psychology and Director of Rehabilitation Program, 1985

Peter David Land
A.A. Dipl., M.Arch., Carnegie Institute of Technology; M.C.P., Yale University
Professor of Architecture, 1976

Steve J. Larson Capt., USAF*
B.A., B.S., North Dakota State University; M.A., Webster University
Assistant Professor of Aerospace Studies, 1997

Gary S. Laser
B.B.A., J.D., University of Miami
Associate Professor of Law and Director of Clinical Education, 1975

Jerald Lavin
B.A., University of Illinois (Champaign-Urbana); J.D. Harvard University
Visiting Assistant Professor, 1995

Leon Lederman
B.A., City College of New York; Ph.D., Columbia University
Pritzker Professor of Science, 1992

Jennifer Levi
A.B., Wellesley College; J.D., University of Chicago
Visiting Assistant Professor of Law, 1996

Molly Warner Lien
B.Mus., University of Miami; J.D., Emory University School of Law
Assistant Professor of Law and Director of Legal Research and Writing Program, 1984

Henry Robert Linden
B.S., Georgia Institute of Technology; M.Ch.E., Polytechnic Institute of Brooklyn; Ph.D., Illinois Institute of Technology
Max McGraw Professor of Energy and Power Engineering and Management in the Chemical and Environmental Engineering Department and Director of Energy & Power Center and Center of Excellence in Polymer Science and Engineering, 1954

Nancy Livingston
B.A. Wellesley College; J.D., DePaul University; L.L.M., New York University
Assistant Professor of Clinical Practice, 1995

Joseph Lawrence LoCicero
B.E.E., M.E.E., Ph.D., The City College of New York
Professor of Electrical and Computer Engineering, 1976

James W. Longworth
B.S., Ph.D., Sheffield University (England)
Associate Professor of Physics, 1983

Arthur Richard Lubin
B.S., Michigan State University: M.A., Ph.D., University of Wisconsin
Associate Professor of Applied Mathematics, 1975

Peter Lykos
B.S., Northwestern University; Ph.D., Carnegie Institute of Technology
Professor of Chemistry, 1955

Morris C. Mahaley, CAPT, USMC*
B.S., Marquette University
Assistant Professor of Naval Science, 1997

Martin H. Malin
B.A., Michigan State University; J.D., George Washington University
Professor of Law and Director of Institute for Law and the Workplace, 1980

Jeffery Malkan
A.B., Columbia College; J.D., City University of New York: J.S.M., Stanford University; M.A., Ph.D., State University of New York (Stony Brook)
Visiting Assistant Professor, 1994

Braja K. Mandal
B.Sc., University of Calcutta; M.Sc., M.Tech., Ph.D., Indian Institute of Technology
Associate Professor of Chemistry, 1991

Alexander Manov
B.A., M.S., University of Sofia
Instructor in Computer Science, 1993

David Maslanka
B.A., St. Xavier University; M.S., Ph.D., Illinois Institute of Technology
Senior Lecturer in Applied Mathematics, 1992

Katherine McCoy
B.A., Michigan State University
Senior Lecturer in the Institute of Design, 1995

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Faculty

Gregory E. McRae, LT, USN*
B.T.E., Georgia Institute of Technology
Assistant Professor of Naval Science, 1998

Michael McCoy
B.A., Michigan State University, M.A., Wayne State University
Senior Lecturer in the Institute of Design, 1995

Keith E. McKee
B.S., M.S., Ph.D., Illinois Institute of Technology
Director of Manufacturing Technology and Professor in Armour College, 1993

Kevin P. Meade
B.S., M.S., Illinois Institute of Technology; Ph.D., Northwestern University
Associate Professor of Mechanical Engineering and Associate Chair, 1982

Charles T. Merbitz
B.S., University of Illinois (Chicago); M.A., Ph.D., University of Florida
Associate Professor of Psychology, 1990

Jeffery P. Mills
B.S., Northwestern University; MS., Ph.D., Illinois Institute of Technology
Visiting Assistant Professor of Electrical and Computer Engineering, 1987

Thomas J. Misa
S.B., Massachusetts Institute of Technology; M.A., Ph.D., University of Pennsylvania
Associate Professor of History, 1987

M. Ellen Mitchell
B.A., Hamilton/Kirkland College; Ph.D., University of Tennessee
Associate Professor of Psychology and Director of the Institute of Psychology, 1987

Michael Modica
B.S., Illinois Institute of Technology; M.S., Ph.D., University of Chicago
Lecturer in Financial Markets, 1996

Jamshid Mohammadi
B.S., M.S., University of Teheran; M.S., Ph.D., University of Illinois (Champaign-Urbana)
Professor of Civil and Architectural Engineering and Chair of the Department of Civil and Architectural Engineering, 1979

Ahmed Mokhtar
Ph.D., Concordia University (Canada)
Assistant Professor of Civil and Architectural Engineering

Scott Morris
B.A., University of Northern Iowa; M.S., Ph.D., University of Akron
Assistant Professor of Psychology, 1993

Timothy Irwin Morrison
B.A., Western Michigan University; Ph.D., University of Illinois (Champaign-Urbana)
Associate Professor of Physics and Chair of the Department of Biological, Chemical and Physical Sciences, 1987

Demetrios J. Moschandreas
B.S., Stetson University; M.S., University of Kentucky; M.S., Ph.D., University of Cincinnati
Professor of Chemical and Environmental Engineering, 1991

Sheldon Mostovoy
B.S., Ph.D., Illinois Institute of Technology Associate Professor of Mechanical and Materials Engineering, 1978

Debbie Musiker
B.A., Princeton University, J.D., Boston University
Visiting Assistant Professor of Law, 1996

Charles D. Musselman, Jr., Capt USAF*
B.S. Pennsylvania State University; M.B.A. Colorado State University
Assistant Professor of Aerospace Studies, 1998

Hassan M. Nagib
B.S., M.S., Ph.D., Illinois Institute of Technology
Rettaliata Distinguished Professor of Mechanical and Aerospace Engineering 1971

Sheldon Harvey Nahmod
A.B., University of Chicago: L.L.B., L.L.M., Harvard University
Distinguished Professor of Law, 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, 1977

Dale Nance
B.A., Rice University; J.D., Stanford University; M.A., University of California
Professor of Law, 1989

Philip G. Nash
B.S., City College of London Polytechnic; Ph.D., Queen Mary College of London University
Professor of Materials Engineering, 1981

John A. Nestor
B.E.E., Georgia Institute of Technology; M.S.E.E., Ph.D., Carnegie-Mellon University
Associate Professor of Electrical and Computer Engineering and Associate Chair of Computer Engineering, 1987

Benjamin Nicholson
M. Arch., Cranbrook Academy of Art
Studio Professor of Architecture, 1990

Alexander Nikolov
B.S., University of Sofia; Ph.D., University of Sofia
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 at Stony Brook
Assistant Professor of Sociology, 1994

Kenneth Eugene Noll
B.S., Michigan Technological University; M.S., Ph.D., University of Washington
Professor of Chemical and Environmental Engineering, 1975

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Faculty

Terrence A. Norton
B.A., University of Notre Dame; J.D., DePaul University
Clinical Professor of Law, 1992

James E. Novak
B.S., M.S., Illinois Institute of Technology
Visiting Assistant Professor of Engineering Graphics, 1994

John Richard O'Leary
B.S., M.S., Illinois Institute of Technology; Ph.D., University of Texas (Austin)
Associate Professor of Civil and Architectural Engineering and Associate Chair of the Department, 1980

Ratko Orlandic
Ph.D., University of Virginia
Assistant Professor of Computer Science

Charles Lewis Owen
B.S., Purdue University; M.S., Illinois Institute of Technology
Distinguished Professor in the Institute of Design, 1965

Kimberly A. Pace
B.S.E.E., M.S., Massachusetts Institute of Technology; J.D., Georgetown University
Assistant Professor of Law, 1997

Krishna Reddy Pagilla
B.E., Osmania University (India); M.S., University of Oklahoma; Ph.D., University of California (Berkeley)
Assistant Professor of Chemical and Environmental Engineering, 1995

Anthony Paquin
B.A., Assumption College; M.S., San Diego State University; Ph.D., Texas A & M
Visiting Assistant Professor of Psychology, 1997

Satish J. Parulekar
B.Ch.E., University of Bombay (India); M.S., University of Pittsburgh; Ph.D., Purdue University
Professor of Chemical and Environmental Engineering, 1985

Boris Pervan
B.S., University of Notre Dame; M.S., California Institute of Technology; Ph.D., Stanford University
Assistant Professor of Mechanical and Aerospace Engineering, 1999

Scott Peters
B.A., Macalester College; J.D., Washington University; Ph.D., University of Illinois (Chicago)
Assistant Professor of Political Science and Legal Studies Adviser, 1993

Sharon Helmer Poggenpohl
B.S., M.S., Illinois Institute of Technology
Associate Professor in the Institute of Design, 1993

Robert William Porter
B.S., University of Illinois (Champaign-Urbana); M.S., Ph.D., Northwestern University
Professor of Mechanical and Aerospace Engineering and Director of the American Power Conference, 1966

Paul R. Prabhaker
B. Tech., Indian Institute of Technology: M.B.A., Indian Institute of Technology; M.S., Ph.D., University of Rochester
Associate Professor of Marketing, 1992

Bob Price
B.A., Texas Christian University; M.A., University of Texas-Arlington; Ph.D. University of Texas at Austin
Assistant Professor of Sociology, 1994

Greg Prygrocki
B.I.D., University of Manitoba (Winnipeg); M.V.A., University of Alberta (Edmonton)
Associate Professor in the Institute of Design, 1987

Gregory J. Pulliam
B.A., Memphis State University: M.A., Ph.D., University of Missouri
Assistant Professor of English, 1993

Charles Pycha
B.F.A., M.F.A., University of Illinois (Champaign-Urbana)
Visiting Assistant Professor in the Institute of Design, 1993

David M. Quinn
S.B., Massachusetts Institute of Technology; M.A., Ph.D., Yale University
Associate Professor of Management

Sharon Quiroz
B.A., University of Kansas; M.A., University of Michigan; Ph.D., Wayne State University
Assistant Professor of English and Director of Writing, 1997

Nambury Raju
B.A., Madras University; M.S. (Psyc), Purdue University; M.S. (Math), Ph.D., Illinois Institute of Technology
Professor of Psychology and Director of the Center for Psychological Services, 1996

VC Ramesh
B. Tech., Indian Institute of Technology (Madras); M.S., North Carolina State University; Ph.D., Carnegie Mellon University
Assistant Professor of Electrical and Computer Engineering, 1994

Bernard A. Rausch
B.Ch.E., University of the City of New York; M.S., Stevens Institute of Technology
Lecturer of Marketing and Interim Director of Career Planning and Continuing Education, 1986

Michele Baker Richardson
B.A., Brown University; J.D., Yale Law School
Assistant Professor of Law, 1994

James Roberge
B.S., M.S., Ph.D., Northwestern University
Associate Professor of Computer Science, 1988

Donna V. Robertson
B.A., Stanford University; M.Arch, University of Virginia
Associate Professor of Architecture and Dean of the College of Architecture, 1996

Sylvia Roch
B.A., Rice University; M.A., Texas A&M University; Ph.D., Texas A&M University
Assistant Professor of Psychology, 1996

Peter Roesch
Ingenieur fur Hochbau, Staats bauschule Coburg, (Germany); MS., Arch., Illinois Institute of Technology
Studio Professor of Architecture, 1980

Faculty

Lori Rokicki
B.A., University of Toledo
M.S., Ph.D., Ohio University
Assistant Professor of Psychology, 1996

John David Root
B.A., University of Notre Dame; M.A., Ph.D., Indiana University
Professor of History, 1969

Robert Mark Roth
B.S., Brooklyn College; Ph.D., Brandeis University
Professor of Biology, 1968

Howard Arnold Rubin
S.B., Massachusetts Institute of Technology; Ph.D., University of Maryland
Professor of Physics, 1966

David Stewart Rudstein
B.S., L.L.M., University of Illinois (Champaign-Urbana); J.D., Northwestern University
Professor of Law, 1973

Francisco Ruiz
B.S.M.E., Universidad Politecnica de Madrid; M.E., Ph.D., Carnegie Mellon University
Associate Professor of Mechanical and Aerospace Engineering, 1987

George D. Sadler
B.S., Florida State University; M.S., Brigham Young University; Ph.D., Purdue University
Research Professor, Food Packaging, 1992

Gerald Francis Saletta
B.S.E.E., M.S.E.E., University of Notre Dame; Ph.D., Illinois Institute of Technology
Associate Professor of Electrical and Computer Engineering and Associate Dean of Main Campus, 1962

Jafar Saniie
B.S., University of Maryland; M.S., Case Western Reserve University; Ph.D., Purdue University
Professor of Electrical and Computer Engineering, 1983

Marco Saraniti
M.S., University of Modena (Italy); Ph.D., Technische Universität Munchen (Germany)
Assistant Professor of Electrical and Computer Engineering, 1998

Keiichi Sato
B.S., M.S., Osaka Institute of Technology; M.S., Illinois Institute of Technology
Associate Professor of Industrial Design, 1998

Steve Sato
B.S.M.E., University of Illinois; M.E.M, Northwestern University; M.Des., Institute of Design, Illinois Institute of Technology
Visiting Lecturer, Institute of Design, 1995

George Schipporeit
Associate Professor of Architecture, 1980

Jay D. Schieber
Ph.D., University of Wisconsin (Madison)
Assistant Professor of Chemical & Environmental Engineering, 1995

Robert C. Schleser
B.A., Rutgers University, M.S., Ph.D., Memphis State University
Professor of Psychology, 1982

Warren Stanley Schmaus
A.B., Princeton University: M.A., Ph.D., University of Pittsburgh
Professor of Philosophy, 1980

Kenneth Robert Schug
B.A., Stanford University; Ph.D., University of Southern California
Professor of Chemistry, 1956

Cesar Augusto Sciammarella
Dipl. Eng. C.E., Buenos Aires University (Argentina); Ph.D., Illinois Institute of Technology
Research Professor of Mechanical and Materials Engineering, 1972

Ullica Segerstrale
Fil. and., Pol. and, University of Helsinki (Finland); M.A., University of Pennsylvania; Ph.D., Harvard University
Associate Professor of Sociology, 1988

Carlo U. Segre
B.S. (Physics), B.S. (Chemistry), University of Illinois (Champaign-Urbana); MS., Ph.D., University of California (San Diego)
Associate Professor of Physics and Chemistry and Associate Chair, Biological, Chemical and Physical Sciences, 1983

J. Robert Selman
Ingenieur in Chemical Technology, Technical University Delft (Netherlands); M.S., University of Wisconsin: Ph.D., University of California (Berkeley)
Professor of Chemical and Environmental Engineering, **1975**

Mohammad Shahidehpour
B.S., Arya-Mehr University of Technology (Iran); M.S., Ph.D., University of Missouri (Columbia)
Professor of Electrical and Computer Engineering and Dean of the Graduate College, 1983

David Carold Sharpe
B.S.Arch., Tuskegee Institute; B.S.Arch., M.S. Arch., Illinois Institute of Technology
Associate Professor of Architecture, 1962

Jay Shen
B.S., Hefei University (PRC); M.S., Chinese Academy of Sciences; Ph.D., University of California (Berkeley)
Assistant Professor of Civil and Architectural Engineering, 1993

Tamara Goldman Sher
B.A., University of Michigan; M.A., Ph.D., University of North Carolina
Assistant Professor of Psychology, 1994

Jeffrey Guy Sherman
A.B., J.D., Harvard University
Professor of Law, Co-Director of Graduate Program in Taxation, 1978

Vijay Sivasankaran
M.Des., Institute of Design, Illinois Institute of Technology
Visiting Lecturer at Institute of Design, 1994

Susan S. Sitton
B.A., Grinnell College; M.S., Northwestern University; Ph.D., Illinois Institute of Technology
Associate Dean of the Undergraduate College
Director of Merit Scholarships and Senior Lecturer in Applied Mathematics, 1987

Peggie Smith
B.A., M.A., Yale University; J.D., Harvard University
Assistant Professor of Law, 1996

Faculty

Eugene S. Smotkin
B.S., San Jose State University; M.S., San Francisco State University: Ph.D., University of Texas (Austin)
Associate Professor of Chemical Engineering, 1992

John William Snapper
B.A., Princeton University; M.A., Ph.D., University of Chicago
Associate Professor of Philosophy and Associate Chair of Humanities, 1979

Stephen D. Sowle
B.A., Williams College; J.D., Yale Law School
Assistant Professor of Law, 1994

Michael Irwin Spak
B.S., J.D., DePaul University; L.L.M., Northwestern University
Professor of Law, 1974

Harold Norman Spector
B.S., M.S., Ph.D., University of Chicago
Professor of Physics, 1966

Kenneth W. Stagliano
B.A., Ph.D., Temple University
Assistant Professor of Chemistry, 1994

Benjamin C. Stark
B.S., University of Michigan; M.Ph., Ph.D., Yale University
Professor of Biology and Associate Chair, Biological, Chemical and Physical Sciences, 1983

Henry Stark
B.E.E., City College of New York; M.S.E.E., D. Eng. Sc., Columbia University
Carl and Paul Bodine Distinguished Professor of Electrical and Computer Engineering, 1988

Joan Ellen Steinman
A.B., University of Rochester, J.D., Harvard University
Professor of Law, 1977

Joseph Stetter
B.A., Ph.D., State University of New York (Buffalo)
Associate Professor of Chemistry, 1998

Margaret G. Stewart
B.A., Kalamazoo College; J.D., Northwestern University
Professor of Law, 1979

Karen Straus
B.A., Harvard University: J.D., New York University School of Law
Visiting Assistant Professor of Law, 1993

Mary Rose Strubbe
B.A., Mundelein College; J.D., Chicago-Kent College of Law, Illinois Institute of Technology
Associate Professor of Legal Research and Writing and Assistant Director of Institute for Law and the Workplace, 1994

Edwin F. Stueben
B.S., M.S., Ph.D., Illinois Institute of Technology
Associate Professor of Applied Mathematics, 1962

Theresa Tagliavia
B.S., M.S., Illinois Institute of Technology
Lecturer in Electrical and Computer Engineering, 1985

Arthur S. Takeuchi
B.S., Arch., M.S., Illinois Institute of Technology
Associate Professor of Architecture, 1965

Mohamed N. Tarabishy
B.S., Damascus University (Syria); M.S., Ph.D., Wichita State University
Visiting Assistant Professor of Mechanical and Aerospace Engineering, 1994

A. Dan Tarlock
A.B., L.L.B., Stanford University
Distinguished Professor of Law and Co-Director of Program on Environmental and Energy Law, 1981

Fouad A. Teymour
B.Sc., M.Sc., Cairo University: Ph.D. University of Wisconsin (Madison)
S.C. Johnson Polymer Associate Professor of Chemical and Environmental Engineering, 1992

David C. Thomas
A.B., Kenyon College; J.D., University of Michigan Law School
Clinical Professor of Law, 1979

Paul Amandus Thomas
B.S. Arch., M.S. (City and Regional Planning), Illinois Institute of Technology
Associate Professor of Architecture, 1958

Nick T. Thomopoulos
B.S., M.A., University of Illinois (Champaign-Urbana); Ph.D., Illinois Institute of Technology
Professor of Management Sciences, 1966

Judith Ann Todd
B.A., M.A., Ph.D., Cambridge University (England)
Professor of Mechanical and Materials Engineering, Iron and Steel Society Professor, Associate Chair, Metallurgical and Materials Engineering and Director of Midwest Laser Center, 1990

Khairy Ahmed Tourk
B.S., University of Alexandria (Egypt); M.A., Vanderbilt University; Ph.D., University of California (Berkeley)
Associate Professor of Economics, 1972

Philip Troyk
B.S., University of Illinois (Champaign-Urbana); M.S., Ph.D., University of Illinois (Chicago)
Associate Professor of Electrical and Computer Engineering, 1983

Calvin Tszeng
B.S., M.S., National Tsinghoa University (Taiwan): Ph.D., University of California (Berkeley)
Assistant Professor of Mechanical and Materials Engineering, 1998

John R. Twombly
B.S., University of Pennsylvania; M.B.A., Ph.D., University of Chicago; Certified Public Accountant
Clinical Assistant Professor of Accounting, 1992

Donald Richard Ucci
B.E., M.E., Ph.M., City College of New York; Ph.D., City University of New York
Associate Professor of Electrical and Computer Engineering and Interim Chair of the Department, 1987

Susan Valentine
B.A., Albion College; J.D., Chicago-Kent College of Law
Visiting Assistant Professor of Law, 1997

Cathrine Veikos
B.A. Columbia University; M.Arch., Harvard University
Studio Professor of Architecture, 1996

Faculty

David Venerus
B.S., University of Rhode Island; M.S., Ph.D., Pennsylvania State University
Associate Professor of Chemical and Environmental Engineering, 1989

Mickie A. Voges
B.A., M.L.S., J.D., University of Texas (Austin)
Associate Professor of Law and Director of the Legal Information Center, 1990

Peng-Jun Wan
B.S., Tsinghua University (China); Ph.D., University of Minnesota
Associate Professor of Computer Science, 1997

Albert Z.H. Wang
B.S., Tsinghua University (China); M.S., The Chinese Academy of Sciences (China); Ph.D., State University of New York (Buffalo)
Assistant Professor of Electrical and Computer Engineering, 1998

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
Associate Professor of Law, 1990

Darsh Tilakchand Wasan
B.S., University of Illinois (Champaign-Urbana); Ph.D., University of California (Berkeley)
Professor of Chemical and Environmental Engineering, Vice President and Motorola Chair, 1964

John Lawrence Way
B.Aero.E., M.S., Ph.D., Rensselaer Polytechnic Institute
Professor of Mechanical and Aerospace Engineering and Associate Chair, Aerospace Engineering, 1970

Dale Arroy Webster
B.S., University of Michigan; Ph.D., University of California (Berkeley)
Professor of Biology, 1968

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

Miles N. Wernick
B.A., Northwestern University; Ph.D., University of Rochester
Assistant Professor of Electrical and Computer Engineering, 1994

Catherine Wetzel
B.Arch., University of Cincinnati; M.Arch., University of Pennsylvania
Studio Professor of Architecture, 1989

Patrick F. Whitney
B.F.A., University of Alberta (Canada); M.F.A., Cranbrook Academy of Art
Professor and Director of the Institute of Design, 1983

Steven Wilf
B.S., Arizona State University; J.D.. Ph.D., Yale University
Assistant Professor of Law, **1997**

David R. Williams
B.S.E., Stevens Institute of Technology; M.S.E., Ph.D., Princeton University
Professor of Mechanical and Aerospace Engineering, 1983

Geoffrey Williamson
B.S., M.S., Ph.D., Cornell University
Associate Professor of Electrical and Computer Engineering and Associate Dean of the Graduate School, 1989

Allen Harvey Wolach
B.A., University of Illinois (Champaign-Urbana); M.A., Roosevelt University; Ph.D., University of New Mexico
Professor of Psychology, 1969

Jay Wolke
B.F.A., Washington University (St. Louis); M.S., Illinois Institute of Technology
Assistant Professor in the Institute of Design, 1993

Thomas Tang Yum Wong
B.S., University of Hong Kong: M.S., Ph.D., Northwestern University
Professor of Electrical and Computer Engineering, 1981

Richard W. Wright
B.S., California Institute of Technology; J.D., Loyola University of Los Angeles; L.L.M., Harvard University
Professor of Law, 1985

Huapong Wu
B.S., M.S., University of Science and Technology (PRC); Ph.D., University of Waterloo (Canada)
Visiting Assistant Professor of Electrical and Computer Engineering, 1999.

Roy L. Yaple, CDR., USN*
B.S., Arizona State University; M.B.A., University of Nebraska (Lincoln)
Associate Professor of Naval Science, 1995

Yongyi Yang
B.S.E.E., M.S.E.B., Northern Jiatong University; M.S., Ph.D., Illinois Institute of Technology
Assistant Professor of Electrical and Computer Engineering, 1994

Michael Young
A.B., University of Chicago; M.A., Ph.D., Adelphi University
Associate Professor of Psychology and Director of Clinical Training, 1996

John F. Zasadzinski
B.S., Illinois Benedictine College; Ph.D., Iowa State University
Professor of Physics, 1982

Faculty Emeriti

William Applebaum
Associate Professor of History, 1972-1995

Ralph Elmer Armington
Professor of Electrical Engineering, 1966-1982

Charles R. Bauer
Associate Professor of Computer Science, 1985-1996

Robert John Bonthron
Professor of Mechanical and Aerospace Engineering, 1947-1991

Harold Walter Bretz
Associate Professor of Microbiology, 1957-1986

Norman Nathan Breyer
Professor of Metallurgical and Materials Engineering, 1964-1991

George D. Byrne
Professor of Applied Mathematics, 1994-1998

Thomas Manuel Calero
Associate Professor of Management, 1968-1993

Kwang-Han Chu
Professor of Civil Engineering, 1956-1984

Joseph San-Hoon Chung
Professor of Economics, 1964-1995

Martin Alvin Cohen
Associate Professor of Economics Management, 1964-1980

William White Colvert
Associate Professor of Physics and Director of the Evening Division, 1919-1964

George Edson Danforth
Professor of Architecture, 1940-1981

William Frank Danforth
Professor of Physiology, 1952-1984

William Frank Darsow
Associate Professor of Mathematics, 1961-1990

Pearce Davis
Professor of Economics, 1948-1973

John DeCicco
Professor of Mathematics, 1962-1976

Lloyd Hamilton Donnell
Research Professor of Mechanics, 1939-1962

John Drac
Associate Professor of Law, 1957-1980

John Thomas Dygdon
Professor of Engineering Graphics, 1952-1996

Paul Edward Fanta
Professor of Chemistry, 1948-1984

Andrew Akos Fejer
Professor of Mechanics and Mechanical and Aerospace Engineering, 1958-1978

Robert Filler
Professor of Chemistry, 1955-1994

Nathan Goldman
Professor of Sociology, 1968-1973

Paul Gordon
Professor of Metallurgical Engineering, 1954-1982

Lois Graham
Professor of Mechanical Engineering, 1949-1985

Nicholas Grecz
Professor of Microbiology, 1963-1982

Leonard Irwin Grossweiner
Professor of Physics, 1957-1996

R. Ogden Hannaford
Professor of Architecture, 1960-1986

Boyd A. Hartley
Associate Professor of Fire Protection and Safety Engineering, 1966-1985

Isidore Hauser
Professor of Physics, 1958-1986

Teru Hayashi
Professor of Biology, 1967-1979

Warren Heindl
Professor of Law, 1949-1994

Fred F. Herzog
Professor of Law and Dean of Chicago-Kent College of Law, 1947-1973

Geoffrey Trevor Higgins
Professor of Materials Engineering, 1969-1998

Francis Clifford George Hoskin
Professor of Biology, 1969-1994

Frank Maria Hrachovsky
Associate Professor of Engineering Graphics, 1946-1973

Robert Francis Irving
Associate Professor of English, 1967-1995

Donald Komen Jasper
Professor of Biology, 1969-1996

Henry Knepler
Professor of English, 1947-1989

Daniel Koblick
Associate Professor of Physiology, 1963-1991

Willis George Labes
Professor of Fire Protection Engineering, 1946-1979

Zalman Lavan
Professor of Mechanical and Aerospace Engineering, 1965-1991

Robert Joseph Malhiot
Professor of Physics, 1956-1987

Jordan J. Markham
Professor of Physics, 1962-1981

Thomas Lyle Martin, Jr.
Professor of Electrical Engineering and President, 1974-1987

Kenneth Phillip Milbradt
Associate Professor of Civil Engineering, 1946-1985

Sidney Israel Miller
Professor of Chemistry, 1951-1989

Mark Vladimir Morkovin
Professor of Mechanical Engineering, 1967-1982

Lester Charles Peach
Professor of Electrical and Computer Engineering, 1956-1987

H. Lennart Pearson
Associate Professor of Applied Mathematics and Dean of Graduate Studies, 1954-1994

Bernard Rasof
Professor of Mechanical Engineering, 1964-1982

Haim Reingold
Professor of Mathematics, 1943-1975

* Member of the faculty of IIT by election according to the provision of Article 1, Section 2 of the IIT Faculty Construction.

Faculty Emeriti

John Theodore Rettaliata
Professor of Mechanical Engineering and President Emeritus, 1945-1973

Allan H. Roush
Professor of Biochemistry, 1951-1982

Fay Horton Sawyier
Associate Professor of Philosophy, 1975-1988

Abe Sklar
Professor of Mathematics, 1956-1995

Spencer B. Smith
Professor of Management Sciences and Industrial Management, 1966-1996

Leon Eugene Stover
Professor of Anthropology, 1965-1995

Bernet Steven Swanson
Professor of Chemical and Environmental Engineering, 1945-1985

Liang Neng Tao
Professor of Mechanics and Mathematics, 1955-1996

T. Paul Torda
Professor of Mechanical Engineering and Director of the E^3 Program Center, 1962-1977

San Utsunomiya
Associate Professor of Architecture, 1966-1993

Mary Ella Vermillion
Associate Professor of Psychology, 1959-1985

Erwin Wilbur Weber
Associate Professor of Electrical and Computer Engineering, 1961-1998

Lee Roy Wilcox
Professor of Mathematics, 1940-1977

Scott Emerson Wood
Professor of Chemistry, **1948-1975**

William F. Zacharias
Professor of Law and Dean of the Chicago-Kent College of Law, 1933-1970

David Mordecai Zesmer
Professor of English, 1962-1992

Earl Frederick Zwicker
Professor of Physics, 1956-1991

Getting to the Main Campus

Airports

IIT and Chicago are served by O'Hare International Airport and Midway Airport. Public and private transportation is available from the airports to downtown Chicago and IIT campuses.

Train

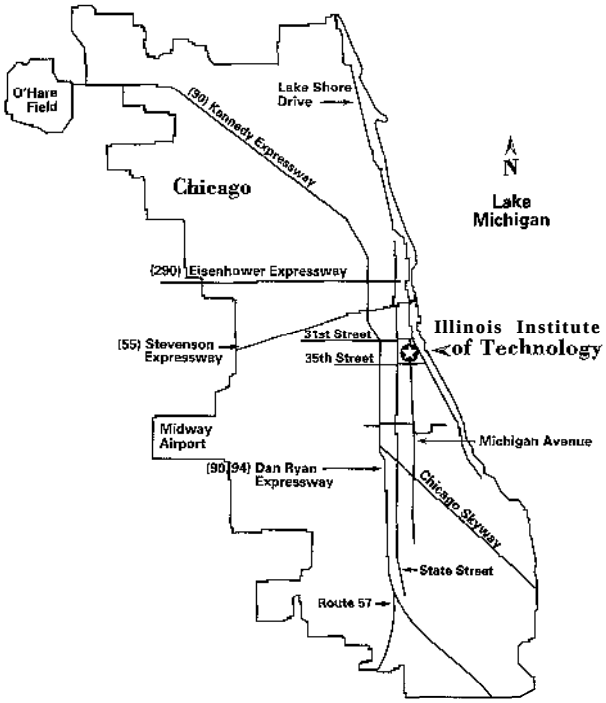
Commuter railroads to Union and Northwestern train stations (both off Canal Street), then public transportation, taxi or IIT shuttle bus from the Downtown Campus at 565 W. Adams Street to Main Campus.

Bus

To Greyhound 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) to just past State Street. Visitor parking is on the right (southeast corner). From South: Dan Ryan Expressway west to 35th Street exit, continue north to 33rd Street, turn right (east) to just past State Street. Visitor parking is on the right (southeast corner). From Lake Shore Drive: Exit at 31st Street, go inland (west) to State Street, turn left (south) to 33rd Street, turn left and visitor parking is on the right (southeast corner).

Parking

Some visitor parking is available in lots at the southeast corner of 33rd and State streets and the northeast corner of 31st and State streets. By special arrangement, events parking is usually available in the fraternity lot at 33rd and Wabash and, for evening events, in the lot west of Hermann Union Building. A few hourly spaces are available just south of the Commons Building and west of Hermann Union Building. Please call the Public Safety Department at 312.808.6300 if you need assistance in finding parking.

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Telephone Directory

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Administrative and Service

Office of Undergraduate Admission (full-time)	567.3025
Admission	567.3300
Alumni Relations	567.5040
Athletics and Recreation	567.3296
Bookstore	567.3120
Bursar's Office	567.3100
Campus Ministry	567.3160
Career Development Center	567.6800
Computing and Network Services	567.5962
Counseling and Health Service	808.7100
Disability Resources	567.5744
Educational Services Office	567.3300
Financial Aid (new students)	567.3025
Financial Aid (continuing students)	567.7219
Housing	567.5075
IITV	567.3460
International Center	808.7105
Galvin Library [Main Campus)	567.3355
Moffett Campus	708.563.1576
Multicultural Programs Center	567.5249
Public Relations	567.3104
Public Safety Department	808.6300
Residence Life Office	808.6400
Daniel F. and Ada L. Rice Campus	630.682.6000
Student Affairs	567.3080
Student and Greek Activities	567.3075
Student Services Center	567.3100
Women's Educational Development Center	567.3775

Colleges and Academic Units

Air Force Aerospace Studies	567.3525
College of Architecture	567.3230
Applied Mathematics	567.5150
Armour College	567.3009
Biological, Chemical and Physical Sciences	567.3480
Stuart School of Business	906.6500
Chemical and Environmental Engineering	567.3040
Chicago-Kent College of Law	906.5050
Civil and Architectural Engineering	567.3540
Computer Science	567.5150
Institute of Design	595.4900
Electrical and Computer Engineering	567.3400
Graduate College	567.3024
Humanities	567.3465
Manufacturing Technology	567.3650
Mechanical, Materials and Aerospace Engineering	567.3175
Military Science	567.7553
Naval Science	567.3530
Institute of Psychology	567.3500
Public Administration	906.5197
Social Sciences	567.5128
Undergraduate College	567.3163