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1995-1997 Bulletin of Undergraduate Programs

Illinois Institute of Technology

Degrees Offered at IIT

Field	Bachelor's	Master's*	Doctorate*
Aerospace Engineering	B.S., <i>p. 156</i>		
Applied Mathematics	B.S.,** <i>p. 111</i>		
Architecture	B.Arch, <i>p. 54</i>	M.Arch	D.Arch
Architectural Engineering	B.S., <i>p. 97</i>		
Biology	B.S.,** <i>p. 66</i>	M.S.	Ph.D.
Business Administration		Mas.	
Chemical Engineering	B.S., <i>p. 86</i>	Mas., M.S.	Ph.D.
Chemistry	B.S.,** <i>p. 66</i>	Mas., M.S.	Ph.D.
Civil Engineering	B.S., <i>p. 97</i>	Mas., M.S.	Ph.D.
Computer Engineering	B.S., <i>p. 125</i>		
Computer Science	B.S., <i>p. 111</i>	M.S., MST	Ph.D.
Computer Systems Engineering		M.S.	
Computing	B.S.,** <i>p. 111</i>		
Design		Mas., M.S.	Ph.D.
Electrical Engineering	B.S., <i>p. 125</i>	M.S.	Ph.D.
Electrical & Computer Engineering		Mas.	
Environmental Engineering	B.S., <i>p. 86</i>	Mas., M.S.	Ph.D.
Environmental Management		Mas.	
Financial Markets & Trading		M.S.	
Food Safety & Technology		M.S.	
Law		LL.M.	J.D.
Management			Ph.D.
Manufacturing Engineering		Mas., M.S.	
Manufacturing Technology	BMT, <i>p. 152</i>		
Mechanical Engineering	B.S., <i>p. 156</i>		
Mechanical & Aerospace Engineering		Mas., M.S.	Ph.D.
Metallurgical & Materials Engineering	B.S., <i>p. 156</i>	Mas., M.S.	Ph.D.
Operations & Technology Management		M.S.	
Personnel & Human Resources Development		M.S.	
Physics	B.S.,** <i>p. 66</i>	M.S.	Ph.D.
Political Science	B.A.,** <i>p. 192</i>		
Preprofessional Program	B.S., <i>p. 172</i>		
Psychology	B.S.,** <i>p. 176</i>	M.S.	Ph.D.
Public Administration		Mas.	
Public Works		Mas.	
Rehabilitation Counseling		M.S.	
Technical Communications & Information Design		M.S.	

Key

B.A. Bachelor of Arts
 B.Arch. Bachelor of Architecture
 BMT Bachelor of Manufacturing Technology
 B.S. Bachelor of Science
 D.Arch. Doctor of Architecture

J.D. Juris Doctor
 LL.M. Master of Laws
 Mas. Professional Master's
 M.S. Master of Science
 MST Master of Science for Teachers
 Ph.D. Doctor of Philosophy

* Graduate degrees are described in the *IIT Bulletin: Graduate Programs*

** Preprofessional Specialization/Major, see also page 172.

Illinois Institute of Technology

Bulletin

Undergraduate

Programs

1995-97

Architecture

Engineering

Psychology

Sciences

It is the intention of Illinois Institute of Technology to act in accordance with all regulations of the federal, state, and local governments in 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 Executive Assistant to the President, Room 223, 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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Letter from the President:

Dear Student:

Today, technology influences and shapes nearly every facet of life—government, industry, communication, medicine, law. In the 21st century, the ability to understand and direct technology will be critical to success in every profession. IIT provides the technology-oriented core curriculum that can help every student make a smooth transition from college to a first job or graduate school. You'll learn not just how technology works, but how technological work gets done.

IIT has structured its academic programs to put you into the real world, solving problems from the very beginning of your college career. We provide you with the advantages of an intensive, graduate-style education at the undergraduate level. As you acquire a strong base of fundamental knowledge, you will participate in interprofessional projects that help you learn how to apply that knowledge. You'll learn how to work in teams as well as independently, and how to factor social, environmental, ethical, and business concerns into your problem-solving. And you'll find that as you apply what you learn, your appetite for learning and your capacity to learn will grow.

Illinois Institute of Technology has helped thousands of engineers, architects, designers, scientists, and other professionals develop their capabilities for success. We've long been known for strong programs in engineering and architecture and have recently developed innovative preprofessional programs that give you the technological background that's increasingly important to careers in law, business, medicine, and the sciences.

We are an intellectually demanding university with a faculty that will both challenge and inspire you. Our professors are enthusiastically committed to mentoring individual students, as well as teaching in the classroom. Our setting and our commitment to preparing you for life, as well as work, enhances your experience. Beyond the classrooms and labs, you'll find a remarkable variety of opportunities to learn and have fun. On campus are clubs, competitions, lecture series, fraternities and sororities, sports, live music, and movies. And just off campus is Chicago, the Midwest's capital of culture and commerce—with its vast array of museums, restaurants, comedy and music clubs, concerts, films, and world-renowned architecture.

I invite you to take full advantage of all our university and city have to offer.

Sincerely,

A handwritten signature in black ink, reading "Lewis Collens". The signature is written in a cursive, flowing style with a large initial "L".

Lewis Collens

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The University

The Objective of Education at IIT

IIT seeks to provide a learning experience that is second to none. By bringing real-world challenges into the classrooms and laboratories and integrating the perspectives of different disciplines in project-based learning, as well as providing a solid base of fundamental knowledge, IIT prepares its graduates to become vital contributors to the 21st century, both in their careers and in society at large.

Our mission is innovation and excellence in technological education. Our strengths include a highly regarded faculty with an exceptional commitment to teaching and mentoring students, small classes, close ties with industry, and outstanding research capabilities.

Our unique first-year seminar, “Introduction to the Professions,” brings diverse lecturers from industry and academia to campus and brings students and senior faculty members together each week in small groups, to help students get to know their advisers as both teachers and mentors. Throughout the curricula, interprofessional, project-based learning experiences enable students to integrate and apply knowledge gained in classroom and laboratory work.

The Colleges of Illinois Institute of Technology

Every student and faculty member belongs to one of the colleges, schools, or institutes that form IIT. A student who changes majors will apply for admission both to the new department and to its college, school, or institute.

Students are encouraged to discuss their academic concerns with the appropriate dean, director, associate or assistant dean listed below.

College of Architecture

Interim Dean: *Mr. George Schipporeit*

Associate Deans: *Mr. Peter Beltemacchi, Mr. Dirk Denison*

Assistant Dean: *Mr. Lee Waldrep*

S.R. Crown Hall (312) 567-3230

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’s most significant buildings and a major contribution to Chicago’s rich architectural heritage.

The College emphasizes applied studio work with a faculty of practicing architects, the study of architectural theory, interdisciplinary learning and foreign study. Students working toward the degrees in architecture are members of the College of Architecture.

Armour College

Dean: *Dr. Hassan M. Nagib*

117 Engineering 1 (312) 567-3009

Armour College is named for IIT's predecessor, Armour Institute of Technology, which was established on the site of the present IIT Main Campus in 1892. The red brick buildings that stand at the west side of the Main Campus were part of the original Armour Institute.

Armour College is structured to foster connections between the various disciplines. Each program of study combines a solid grounding in the humanities, social and natural sciences, and mathematics with a strong focus on the professions and their interdependence, all within a project-based curriculum.

The following departments are in Armour College: Biological, Chemical, & Physical Sciences; Chemical & Environmental Engineering; Civil & Architectural Engineering; Computer Science & Applied Mathematics; Electrical & Computer Engineering; the Lewis Department of Humanities; Mechanical, Materials, & Aerospace Engineering; Social Sciences. The College is also home to the Pritzker Institute of Medical Engineering, the Computational Science & Engineering Institute, and the Manufacturing Institute.

Chicago-Kent College of Law

Dean: *Mr. Richard Matasar*

Associate Deans: *Mr. Howard S. Chapman, Mr. Stuart Deutsch*

Downtown Campus (565 W. Adams St.) (312) 906-5000

The Chicago-Kent College of Law is the second oldest law college in Illinois. When it joined the university in 1969, IIT became the first major institute of technology to include law among its disciplines. A shuttle bus travels between the Main Campus and the Downtown Campus.

Chicago-Kent College offers programs leading to the degrees of Juris Doctor, Master of Laws, and Master of American Law. Although the College does not offer an undergraduate degree, it participates in double degree programs and an honors program that are described on page 23. The College also offers a specialized minor in legal studies for students who are admitted into one of these programs. The Chicago-Kent Library is open to IIT undergraduates doing research in relevant fields.

Institute of Design

Director: *Mr. Patrick F. Whitney*

Associate Directors: *Ms. Betsy Hughes and Mr. Greg Prygrocki*

IITRI Research Tower (10 W. 35th St.) (312) 808-5300

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. Since its founding, the Institute of Design has attracted students and faculty from around the world who have experimented with new media, new processes, and new theories of design. ID is the first U.S. school to offer a Ph.D. in design.

The Institute of Design program includes a Doctor of Philosophy (Ph.D.), Master of Science in Design (M.S.) and a Master of Design (M.Des.). For information about the B.S. in Design, which will be offered for the last year in 1995-96, see the *1993-95 Undergraduate Bulletin* or contact 312-808-5300 for information.

Institute of Psychology

Director: *Dr. M. Ellen Mitchell*

252 Life Sciences (312) 567-3500

Established in 1995, the Institute of Psychology was elevated from a department within the old Lewis College of Liberal Arts. It is noted for its applied graduate programs in clinical, industrial/organizational, and rehabilitation psychology. The undergraduate program is uniquely oriented with a focus on human behavior, research and applied experiences, and provides a well-rounded educational preparation for admission into psychology graduate schools, entry level jobs, or pre-professional training for other fields such as law, medicine and business.

Stuart School of Business

Dean: *Dr. M. Zia Hassan*

Director of Undergraduate Business Programs: *Mr. Shawn T. Thelen*

Downtown Campus (565 W. Adams St.) (312) 906-6500

The Stuart School of Business was established in 1970 with a gift from the estate of IIT alumnus and Chicago financier Harold Leonard Stuart. The Stuart School's primary focus is to provide students with a high-quality business education. All degree programs emphasize an understanding of the individual's professional responsibility and role in the global business environment. The school houses the Center for Research on Industrial Strategy and Policy, the Center for Research on the Impacts of Information Systems and Center for Research in Financial Markets & Trading.

The Stuart School teaches undergraduate courses and offers five graduate degree programs – M.B.A.; M.S. in Financial Markets & Trading; an M.S. in Operations and Technology Management; a Master of Environmental Management; and the Ph.D. in Management.

The Graduate College

Dean: *Dr. S.M. Shahidehpour*

Assistant Dean: *Ms. Mamie Phillips*

301 Main Building (312) 567-3024

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 graduate students, represents the university in national forums for graduate education and serves as an advocate for promoting graduate education across the university. The Master of Science degree may be earned in 20 fields and doctoral degrees are offered in 14 fields. The Professional Master's degree is offered in 15 fields at IIT (see page 20).

The Undergraduate College

Interim Dean: *Dr. John Kallend*

Interim Associate Dean: *Dr. Gerald Saletta*

Interim Assistant Dean: *Dr. Susan Sitton*

Interim Assistant Dean: *Dr. James Karagiannes*

Engineering 1, Room 208 (312) 567-3163

The Undergraduate College focuses on the undergraduate curriculum—including coordinating the development of interprofessional projects and scheduling of

courses and teaching assignments, and overseeing related academic services such as career development, Educational Services, Educational Technology Center (ETC), multicultural and women's programs, Reserve Officer Training Corps for Navy and Marines, Air Force, and Army and the Writing Across the Curriculum initiative.

The Setting

IIT's Chicago location offers students a wide range of activities. On the shores of Lake Michigan, Chicago boasts miles of attractive and well-used beaches and jogging and bicycle paths. Downtown Chicago—the Loop—and other recreational and commercial centers are a short bus or train ride from campus. The Chicago Symphony Orchestra and the city's ballet and opera companies are among the world's finest, and Chicago museums, art galleries, and theaters are famous. Ethnic neighborhoods throughout the city provide an international array of cultures and cuisines. Among Chicago's professional sports teams, two are IIT neighbors: the White Sox play at Comiskey Park, just a few blocks west of the Main Campus, and the Bears are at Soldier Field two miles north.

IIT History and Campuses

IIT's traditions span more than a century of innovation and educational leadership. IIT came into being in 1940 with the merger of Armour Institute of Technology (1890) and Lewis Institute (1896). Today, IIT offers degree programs through Armour College; The College of Architecture (1938); Stuart School of Business (1969); the Graduate College; Chicago-Kent College of Law (1969); the Institute of Design (1949); and the Institute of Psychology (1995).

Midwest College of Engineering (1967) joined the university in 1986, forming the nucleus for IIT's west suburban campus.

IIT Research Institute (IITRI) is the university's contract research affiliate. Headquartered on the IIT Main Campus, IITRI also operates facilities at 16 sites throughout the country.

The 120-acre Main Campus is located in Chicago, a city rich in cultural and other resources for scholarship and research. The campus is easily accessible by public transportation, and a shuttle bus provides transportation between the Main and Downtown campuses. The master plan of the Main Campus and many of its 50 buildings were developed by Ludwig Mies van der Rohe, one of the century's most influential architects and, for 20 years, the chair of IIT's Department of Architecture.

IIT's Downtown Campus at 565 W. Adams Street in the West Loop business district, houses the Chicago-Kent College of Law, Stuart School of Business programs, and the Department of Social Sciences' Master of Public Administration program.

IIT's Daniel F. and Ada L. Rice Campus is located at 201 E. Loop Road in west suburban Wheaton. It offers graduate and upper-division undergraduate

courses and degree programs through evening and Saturday classes and through courses broadcast live over IITV (see below).

The university's fourth site is IIT Moffett Campus, location of the National Center For Food Safety and Technology (NCFST), a multidisciplinary food safety research facility in southwest suburban Bedford Park. The IIT 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 receiving classrooms to participate in class discussions. IIT has arrangements with The Chicago Medical School, Oakton College East, the IIT Rice Campus, Elgin Community College, William Rainey Harper College, South Cook Educational Service Center, and the IIT Moffett Campus so that regular students and the general public may have access to IITV. In addition, more than 20 companies offer IIT courses to their employees at their places of employment. IITV students must be admitted to IIT as undergraduate or graduate students. For information, see the *IIT Bulletin: Schedule of Classes* or call IITV at (312) 567-3460.

An M.S. in Operations and Technology Management, a weekend degree program for managers in technology-intensive organizations, is offered at Great Lakes Naval Training Center in Lake County, Ill.

Accreditation

IIT is accredited by the North Central Association of Colleges and Secondary Schools. Specific professional curricula are accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology, the American Psychological Association, the Council on Rehabilitation Education, the American Bar Association, the Association of American Law Schools, and the National Architectural Accrediting Board.

Student and Academic Affairs

Campus Life

Activities outside the classroom and laboratory are an important part of a college education. IIT encourages all students to develop their leadership abilities and teamwork skills by participating in athletics, student organizations, and professional societies. Students also are encouraged to take advantage of the many cultural, educational, and recreational resources both on campus and in the Chicago metropolitan area.

Student Center

Throughout the academic year, Hermann Union Building, is the site for feature films, theatrical productions, and concerts—classical, rock, folk, jazz, and blues. Nicknamed the HUB, Hermann Union Building houses the Campus Information Center and has lounges, study areas, meeting rooms, student organization offices, an auditorium, a ballroom, a cafeteria, a pub, a bowling alley and game room, and a ticket office that sells discounted movie and other entertainment tickets.

Student Activities

The campus is home to more than 70 student organizations—both social and academic. The HUB Office, (312) 567-3075, oversees many student groups and acts as liaison between the administration and the various organizations.

The Office of Student and Academic Affairs is directly responsible for the Student Leadership Committee (SLC), student government; Union Board, which plans and funds most of the social and cultural activities on campus; *Technology News*, student newspaper; WOUI-FM (88.9), student radio station; and TechMate, the commuter student organization.

Athletics and Recreation

The Department of Athletics and Recreation, (312) 567-3296, 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).

All athletes must be regularly enrolled, full-time undergraduates and must maintain academic eligibility. Graduates of accredited high schools or community colleges become eligible to compete in college athletics immediately upon matriculation. A four-year college transfer is ineligible to compete in an NAIA sport for one semester. A limited number of athletic scholarships are available from IIT's Student Finance Center to outstanding scholar-athletes. An athlete is permitted four full years of intercollegiate competition, which may accumulate at IIT or in a combination IIT and junior college career. Appropriate varsity awards are presented to letter winners in all sports. Seniors who have lettered for four consecutive years in a sport are given an IIT Letterman's watch.

For nonvarsity athletes, intramural teams provide spirited competition in basketball, handball, racquetball, softball, tennis, touch football, swimming, cross-country, and volleyball. Recreational activities, open swimming hours, and open free-play activities are all available during posted hours.

These activities are centered in and around Arthur S. Keating Sports Center, a modern facility that has a basketball court with seating for 2,000; an

area for four basketball games to be played at one time; and volleyball courts. Keating also has Ekco pool, a six-lane, 25-yard swimming pool with high and low diving boards; four racquetball/ handball courts; fitness room; and locker and shower rooms. Outdoors, there are fields for soccer, baseball, and football, as well as several tennis courts.

Residence and Greek Life

More than half of IIT's full-time undergraduates live on campus in seven residence halls for men and women and in four apartment buildings that house married students, single graduate students, faculty, and staff. In addition, there are two sororities and ten fraternities; eight fraternity houses make up what is known as the Fraternity Quadrangle. The fraternities and sororities have very active programs, and membership is open to commuting as well as resident students.

Student Services

Career Development

Located in Farr Hall, IIT's Career Development Center, (312) 567-7110, is staffed by professionals who provide the following services to IIT students and alumnae/i:

- On-campus interviewing (for students only)
- Candidate referral program to companies not recruiting on campus
- 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 internships development and coordination
- Job books (experienced, entry-level, summer, and part-time)
- Career counseling and testing
- Cooperative education opportunities (see below)

Commuter Student Services

TechMate Program, the commuter student organization, enables students to gain a sense of community and become active in campus life. TechMate informs the commuter student about all the available student services and provides a mechanism for students to get to know each other. The group also plans a variety of events and activities throughout the year. TechMate is located in the Student Organization Office in Hermann Union Building, (312) 567-3084.

Cooperative Education

Cooperative Education is a learning approach that integrates college studies with working experiences in industry, business, and government. Since the "cooperating" companies usually rotate students through several different work assignments during their Co-op careers, students have the opportunity to gain exposure to a wide variety of professional challenges within their major fields. All Co-op students must have and maintain at least a 2.25 G.P.A. Engineering

students who are in their second through fifth semesters at IIT enrolled as full-time students are eligible to apply to the Co-op Program. (Transfer students must have completed a minimum of 30 semester hours at their previous academic institutions.)

Engineering students alternate semesters, including summer, between full-time work and full-time study. This can allow anywhere from three to seven work periods ranging from 12 to 30 months and completion of degree requirements in 4 to 6 years. Undergraduates in disciplines other than engineering are allowed more flexibility, including length and number of work terms and initial enrollment periods.

Salaries among IIT Co-op students are competitive and help defray educational expenses. The average salaries for engineering students range from \$1,800 to \$2,200 per month. Co-oping improves employment opportunities upon graduation.

For more information contact Career Development in Farr Hall, (312) 808-7110.

Counseling and Health Service

Located on the first floor of Farr Hall, (312) 808-7100, help is provided for educational, personal, or physical problems. Educational counseling can help a student study more efficiently by teaching a variety of study skills, including time management, textbook reading, note taking, memorization and concentration, and test taking. Personal counseling can help students get through crises or deal with a variety of problems, big and small. All counseling information is strictly confidential. There is no fee for regularly enrolled IIT students.

Medical problems are treated on site by a physician and a nurse practitioner during posted office hours or referred out to local clinics and hospitals.

It is important that any illness or suspected illness be checked immediately in order to protect both the student and the university community as a whole. There is no charge for an office appointment.

For emergencies occurring after office hours, call the Public Safety Department, (312) 808-6300, to be transported to the nearest emergency facility and notify Counseling and Health Service as soon as possible.

Cultural-Religious Programs

The Religious Life Adviser, (312) 567-3160, coordinates a network of programs under the title "Life and the Spirit," a program dedicated to the development of the total person. There are forums, lectures, films, and programs integrating personal beliefs with life experiences. Spiritual, moral, religious, and personal needs also are met by organization meetings, worship in the Chapel, informal prayer groups, and weekend retreats. Students can participate in IIT's Volunteer Action Program for community service projects, including tutoring elementary and high school students, assisting hospital auxiliaries, conducting programs for the elderly, and involvement in programs such as the Blood Resource Center and Public Television membership telethons.

In January of 1995, Joseph Cardinal Bernardin, Archbishop of Chicago, dedicated the IIT Newman Center. Located in The Commons, the Newman Center, (312) 567-3160, serves Catholic students, faculty, staff, and administration.

Student & Academic Affairs Office

The Office of Student & Academic Affairs, Room 125 Engineering 1, (312) 567-3080 serves as the primary advocate and ombudsperson for students. This office oversees many areas of student life on the Main Campus, including student activities, Hermann Union Building operations, athletics and recreation, counseling and health service, and campus ministry. Students, faculty, and staff are encouraged to contact the office for help or referrals.

Disability Resources

Services for persons with disabilities are coordinated by the Center for Disability Resources and Educational Development in 218 Life Sciences Building. Persons with disabilities who are interested in applying for admission to any of IIT's educational programs, or who have been admitted but have not yet enrolled, are invited to call the Center prior to their arrival on campus to discuss their individual needs so that suitable arrangements can be made. Enrolled students with disabilities are encouraged to consult the office regarding access to IIT facilities. Office personnel may be reached at (312) 567-5744 (voice) or (312) 567-5135 for Telecommunications Device for the Deaf (TDD).

Educational Services

The Office of Educational Services, 101 Main Building, (312) 567-3300, provides a variety of academic services to undergraduate students. These include: evaluations of transfer credits; student petitions; admission of part-time undergraduate students and reinstatement of all former undergraduate students; monitoring of academic progress; processing of change of major; academic advising; academic program audits; withdrawal from the university; and certification of students' eligibility for graduation.

International Cultural Center

International Cultural Center, 402 Farr Hall, (312) 808-7105, is responsible for international undergraduate admission and provides services to the international students and scholars on matters related to orientation, personal, visa, and immigration concerns. Social, cultural, and educational events are planned by the office and open to all students, faculty, and staff. The office also coordinates campus activities designed to encourage cross-cultural awareness and understanding among the members of the IIT community.

U.S. students interested in studying abroad should contact the International Office. (See "Overseas Programs" on page 23.)

Multicultural Programs

IIT is nationally recognized for graduating minority engineers, scientists, and technical managers. Two aspects of IIT's success in retaining and graduating minority students are the six-week residential summer Bridge program, which eases the transition from high school to college, and the semester-long first-year orientation class that meets once a week during the fall semester to focus on strategies for personal and professional growth. IIT's Center for Multicultural Programs, 127 Perlstein Hall, (312) 567-5249, also helps minority students succeed through their participation in collaborative student teams and professional and peer mentoring.

Residence Life Office

Located in the residence hall complex, the Residence Life Office offers programs and services designed to enhance student life in the residence halls. The director of residence life, (312) 808-6400, coordinates student security and office staff, resident advisers, and the Residence Hall Association (RHA). The staff offers a wide range of programs, from ski trips to life issue seminars.

Women's Center

IIT's Women's Educational Development Center located in the residence hall complex, (312) 567-3775, 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. The office is located in Engineering 1, Room 226.

Academic Resources

Libraries

IIT's library system includes the Paul V. Galvin Library, The Center for the Study of Ethics in the Professions Library, and the Graham Resource Center on the Main Campus; the Louis W. Biegler Library on the Daniel F. and Ada L. Rice Campus; the Chicago-Kent College of Law Library at the Downtown Campus; and the Moffett Center Library at the Moffett Campus.

As the central library, Galvin, (312) 567-3355, provides a broad range of services, including information on engineering, business, science, mathematics, the humanities, architecture, and design via computerized online databases, a document delivery service, interlibrary loan, and special collections, including a congressionally appointed depository for U.S. government documents. Students can access holdings through the ILLINET Online Cataloging System (IO), which provides information about the collections of 800 libraries including 42 academic libraries throughout Illinois; and through corporate memberships at The John Crerar Library at the University of Chicago, and others.

Patrons of the Galvin Library, named for the founder of Motorola Inc., can also use the Galvin Research Network. Nicknamed Granny, it is a Local Area Network (LAN) providing access to Compendex Plus and ABI-Inform, two widely used engineering and business databases as well as many other CD-ROM indexes, abstracts and full text databases. Granny allows remote access through the VAX from student residence halls and VAX clusters on campus.

The Graham Resource Center (GRC), (312) 567-8892, a branch of the Galvin library, houses books, journals, indexes, slides, maps, and other architectural and city and regional planning materials. GRC is located on the lower level of S.R. Crown Hall. The Center for the Study of Ethics in the Professions (CSEP) Library, (312) 567-6913, in the Life Sciences building, contains a variety of material including codes of ethics, a referral bank of ethics centers, books, professional journals, newsletters, bibliographies, government reports and regulations, and conference proceedings dealing with topics in practical and professional ethics such as autonomy, confidentiality, loyalty, conflicts of interest, and self-regulation.

Named for IIT alumnus Louis W. Biegler, the Rice Campus library, (708) 682-6050, contains the Alva C. Todd Collection of electrical engineering materials and a small reference and journal collection. With a focus on electronic access to information, the library maintains CD-ROM titles, including Compendex Plus, ABI-Inform, and other engineering and computer science databases. Services include interlibrary loan, computer searches, research consultations, and reference services.

The Chicago-Kent College of Law Library, (312) 906-5600, is a technologically advanced library with outstanding collections of law, business, and the social sciences. Chicago-Kent also houses the Library of International Relations (LIR), (312) 906-5620, which has one of the largest collections of international law and commerce materials in the Midwest. LIR is an official depository of the United Nations.

The Moffett Center Library, (708) 563-1576, supports research on food technology and safety.

Computer Facilities

The Academic Computing Center (ACC) (312-567-5962) operates six time-shared computers with terminals located in most academic buildings, the residence halls, and Galvin Library. The computers include two parallel processing minicomputers: an Encore Multimax (BSD43) and a Harris Nighthawk (SVR4); a cluster of DEC minicomputers; a VAX model 3600 and two 3100s; a Prime 9755 system; and "Charlie," a UNIX-based machine.

ACC also has many networked personal computer classrooms with 386 and 486 PCs and Macintoshes and several SGI UNIX workstations. Most academic departments operate PC labs for their courses and research programs. External electronic mail (e-mail) uses Internet. ACC supports numerous programming languages and special software packages for a variety of disciplines and also offers seminars and tutorials on computer system use.

At the Daniel F. and Ada L. Rice Campus (708-682-6060), a Sun CAD facility is available with a network of eleven SPARC 1 and 2 workstations. Personal computer facilities include IBM PS/2s, Macintoshes, and Pentiums. Laboratory equipment is available to support courses in electrical engineering and computer science. The Rice Campus computers are networked with ACC on the Main Campus.

At the Downtown Campus, the Stuart School's First Chicago computer lab (312-906-6557) provides access to IBM 486DX-33 microcomputers linked by a Novell 4.0 network. Laser printing and color printing are available over the network. All of Borland's business software is available as well as Lotus products such as 1-2-3 for Windows. Windows-based software provides access to minicomputers at Main Campus. The lab also connects with Galvin Library's Granny Network (see "libraries" above). Real time links with major financial exchanges and databases of historical information provide users with market data that can be analyzed using software from Aspen Graphics or with spreadsheets that can be dynamically updated from the data links. Each machine is also directly connected to the Internet. Students may "surf the Net" through Mosaic, a graphical interface linked with thousands of computers around the world. Direct telenet and ftp services allow remote login and file transfer from Internet resources.

The Educational Technology Center (ETC), (312) 567-5216, is a multi-media resource center providing tutoring, testing and grading, remediation, and enrichment materials for IIT students. ETC's computerized quizzing system, developed by IIT faculty and students, serves the major undergraduate chemistry, computer science, math, and physics courses. One-on-one peer tutoring is available during all open hours. ETC maintains a comprehensive library of math, physics, chemistry, psychology, and self-help videotapes, a CD-ROM workstation, and several computers dedicated to running various educational and professional software packages.

Research Centers

Faculty and students engage in research across a range of disciplines through centers, programs, and institutes, as represented by those described below.

Advanced Building Materials and Systems Center conducts studies and analyses of new, experimental, or unusual building materials, either in the field or in the Advanced Building Materials Laboratory on the IIT Main Campus. Dr. Sidney A. Guralnick, director, (312) 567-3549.

American Power Conference represents an annual meeting, usually in April, to discuss many aspects of electric power: types of fuels, generation, transmission, distribution, and use. Dr. Robert W. Porter, director, (312) 567-3406.

Biotechnology Research Program brings together biologists, chemical engineers, and food scientists to focus on bioprocesses important to several industries; and includes collaboration with the National Center for Food Safety and Technology. Dr. Robert M. Roth, director, (312) 567-3480.

Center for Applied Psychological Service and Research conducts vocational, psychological, and neuropsychological evaluations to determine treatment needs of persons with physical or mental disabilities and offers sports and performance psychology services for athletes and other performers. Dr. Chow S. Lam, director, (312) 567-3514.

Center for Excellence in Polymer Science and Engineering, established with a grant from Amoco Foundation, concentrates research and educational efforts on processing raw polymer materials into finished products, analyzing the properties of polymers, and manufacturing and recycling polymers. Dr. Henry R. Linden, director, (312) 567-3046.

Center for Innovative Learning and Education seeks to enhance the quality of educational programs by stimulating the faculty to consider, test and implement new approaches to teaching and learning, organizing resources to support these approaches and evaluating the results. Dr. Geoffrey T. Higgins, director, (312) 567-5743.

Center for Law and Computers was established to do research and to educate law students and lawyers on the application of computers to the profession. Ms. Rosemary Shiels, director, (312) 906-5300.

Center for Research in Financial Markets & Trading offers a forum for analyzing and forecasting technology-driven trends in the financial services industry and related businesses, and offers various information services that

have broad value as well as undertaking company-specific proprietary research. John F.O. Bilson (312) 906-6523 and Jane J. Hampson (312) 906-6529.

Center for Research on the Impacts of Information Systems, a consortium of IIT faculty members and information management executives of leading Midwestern corporations, conducts research programs to help information professionals manage complex systems more effectively. Dr. Martin Bariff, director, (312) 906-6522.

Center for Research on Industrial Strategy and Policy provides a focus for faculty research on critical strategic management issues for technology-intensive organizations. Dr. M. Zia Hassan, director, (312) 906-6515.

Center for the Study of Ethics in the Professions conducts interdisciplinary research, course development, workshops, and conferences on practical moral issues in the professions. Dr. Vivian M. Weil, director, (312) 567-3017.

Center for Synchrotron Radiation Research and Instrumentation promotes application of the tools and techniques of synchrotron radiation to science and engineering research, with a particular focus on developing experimental beam line facilities to serve the needs of various collaborative access teams at the Advanced Photon Source at Argonne National Laboratory. Dr. Dean Chapman, director, (312) 567-3575.

Chicago Manufacturing Center, funded by the National Institute of Standards and Technology, the City of Chicago and industry, works with IIT to encourage faculty and students, as part of a network of national laboratories, community colleges and universities to assist small and mid-sized manufacturers to become more competitive. Ms. Virginia L. Perez (312) 567-4771.

Computational Science & Engineering Institute focuses scientific and engineering computation at IIT, fosters interdisciplinary research and education, and is a resource for the computational solution of problems in science and engineering. The members of CSEI are members of various departments in Armour College. George Byrne, interim director, (312) 567-3164

Energy+Power Center offers research and education programs that respond to the needs of the energy and power industries. The Center's activities include the Energy/Environment/Economics Program, which focuses on research in the field and sponsors the American Power Conference, the premier forum for the electric utility industry. Dr. Henry J. Linden, director, (312) 567-3095.

Energy/Environment/Economics (E³) Program includes undergraduate specialization and a graduate program of research and coursework for Master and Ph.D. students in chemical, mechanical and electrical engineering. The research program encompasses a range of energy and environmental areas of specialization that relate to industrial ecology and design for environment. Dr. Hamid Arastoopour, director, (312) 567-3095.

Fluid Dynamics Research Center conducts experiments and theoretical studies on fluid flow management and control, particularly in the area of boundary layer turbulence, applying the principles of computational fluid dynamics; and is the site of the National Diagnostic Facility, the world's largest university wind tunnel fully dedicated to basic research and supported by the Air Force Office of Scientific Research and the Office of Naval Research. Dr. Hassan M. Nagib, director, (312) 567-3175.

Fuel Cell and Battery Technology Research Hub Program, with support from the Army Research Office and other organizations, conducts a broad-based program of research to advance the military and commercial applications of advanced power supply technology. Dr. Robert J. Selman, (312) 567-3037, and Dr. Eugene S. Smotkin, (312) 567-3453, principal investigators.

IIT Research Institute (IITRI) is IIT's not-for-profit contract research affiliate where project-oriented scientists, engineers, programmers, and technicians solve problems for industry and government by applying specialized skills and capabilities in such areas as environment and health, energy, systems and software sciences, electromagnetics and electro-optics, transportation, advanced materials and manufacturing technology. Mr. John B. Scott, president, (312) 567-4000.

Institute of Design explores the application and diffusion of computing technology in the context of the future of work and across all types of education and training environments. Mr. Patrick F. Whitney, director, (312) 808-5300.

Institute of Psychology offers a unique complement of education and research programs in clinical, industrial/organizational and rehabilitation psychology. Dr. M. Ellen Mitchell, director, (312) 567-3500.

Instrumented Factory for Gears (INFAC) operates under a Department of Defense contract to advance the manufacturing and processing capabilities of the U.S. gear and precision machining and manufacturing industries. Dr. Jared Jackson, program manager, (312) 567-4952.

The Invention Center develops an artistic approach to engineering through a minor that is centered around a project-oriented creativity-driven studio concept that encompasses the elements of invention, including idea generation and development, prototype development and proof-of-concept, the patent process and commercialization. Dr. Francisco Ruiz, associate professor, (312) 567-3212.

Manufacturing Institute brings together the resources of IIT and IITRI, industry and government to offer innovative education and research programs in this field. Dr. Stephen M. Copley, director, (312) 567-3877.

Manufacturing Productivity Center addresses productivity-related issues for more than 150 client companies and government agencies. Dr. Keith E. McKee, director, (312) 567-4800.

Midwest Laser Center undertakes research involving faculty and students to support users and providers of lasers in manufacturing. Dr. Judith A. Todd, director, (312) 567-8867.

Midwest Steel Center undertakes research involving faculty and students to support the needs of the iron and steel industry. Dr. Robert P. Foley, director, (312) 567-3052.

National Center for Food Safety and Technology at the IIT Moffett Campus is a consortium comprised of IIT, IITRI, the U.S. Food and Drug Administration, the University of Illinois, and industrial sponsors to advance the safety and quality of our food supply, through research and education programs and extensive pilot plant facilities in food biotechnology, food packaging and food process control. Dr. Richard V. Lechowich, director, (708) 563-1576.

Office of Intellectual Property Management coordinates all activities associated with identifying, evaluating, protecting, marketing and licensing

inventions that arise from research conducted by faculty and staff. Mr. Thomas M. Jacobius, director, (312) 567-3035.

Office of Research Administration has responsibility for encouraging faculty participation in sponsored research, including the management of various incentive funds, identifying external sources of funding, reviewing proposals, managing grants and contracts, and assuring compliance with IIT policy and sponsor regulations. Mr. Thomas M. Jacobius, director, (312) 567-3035.

Pritzker Institute of Medical Engineering explores the application of Engineering Instrumentation and concepts to the solution of health care problems in such areas as implantable drug infusion devices, cardiac pacing, implantable microstimulators, and various assistive devices. Dr. Robert C. Arzbaecher, director, (312) 567-5324.

Research Visualization Center is a resource for obtaining advice on the application of visualization techniques and technology to the specialized needs of research investigators, for enhancing the knowledge gained from research data as well as presenting the data in a compelling fashion for students and professional audiences. Mr. John Howard, systems manager, (312) 567-3763.

Research Laboratory in Human Biomechanics integrates IIT's capabilities in computer-aided biomechanical engineering and lower extremity neuromuscular engineering, including the use of force transducer arrays and data acquisition and processing. Dr. Robert J. Jaeger, professor, Pritzker Institute of Medical Engineering (312) 567-3179 and Dr. Kevin Meade, professor, Department of Mechanical, Materials & Aerospace Engineering (312) 567-3926.

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. General education requirements are included in this section. Specific degree requirements are described in departmental listings that begin on page 54. Professional specializations, or concentrations in an area within a major, are described in the sections devoted to each curriculum. Minors, concentrations in an area outside a major, are listed on page 25.

Undeclared Majors

Students who are unsure of their career choices may enter IIT as undeclared majors. During the first year, undeclared majors take required general education courses. These courses in science, math, computer science, humanities, and social sciences provide the foundation for nearly all of IIT's major programs. Because general education requirements apply to all programs, students who change majors or wait as late as the sophomore year to declare a major 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. Most departments of major study require additional courses in these areas, which are stated under the individual major degree requirements.

A. Basic Writing Proficiency:

Students must take the English Proficiency Examination before beginning classes at IIT.

Within their first year at IIT, students must show basic writing proficiency, either by passing English composition (ENGL 101, 105 or 111) at IIT or by receiving a high pass on the English Proficiency Examination administered by IIT.

Because writing courses completed elsewhere do not satisfy this requirement, transfer students who do not receive a high pass on the Proficiency Exam must repeat ENGL 101 at IIT.

B. Mathematics: 5 credit hours.

The five credit hours must be above MATH 120.

C. Computer Science: 2 credit hours.

All students must take CS 103 or 105, or a computer science course at the 200 level or above.

D. Humanities: 12 credit hours.

Courses that satisfy this requirement are marked with an **H** in this *Bulletin*. These must be distributed as follows:

- (a) A HUM 100-level course.
- (b) At least two courses marked with an **H** at the 300-level or above. An English composition course (ENGL 101, 105, or 111) may be applied toward the requirement. Some students may use foreign language courses at the 200 level to fulfill the 300-level requirement. Engineering students wishing to use foreign language courses must confirm their eligibility with the dean of the Undergraduate College.

E. Social Sciences: 12 credit hours.

Courses that satisfy this requirement are marked with an **S** in the *Bulletin*. These must be distributed as follows:

- (a) At least two courses on the 300-level, or above.
- (b) At most nine credit hours in a single field.
- (c) At least six credits in a single field. (MGT 351 is considered to be in the same field as economics.)

F. Natural Science or Engineering: 11 credit hours.

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

- (a) Two sequential natural science or engineering courses in a single field. (CHEM 124 with METM 101 satisfies this requirement.)
- (b) At least one natural science or engineering course in a second area.

Special Academic Requirements

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

- 1. Policy on Writing.** In recognition of the importance of writing with clarity, the faculty has formally adopted a policy on writing: Faculty members in all disciplines will take note of writing deficiencies and will provide specific guidance. When necessary, students will be required to make use of university resources, such as the Writing Clinic, (312) 567-3465.
- 2. Engineering and Computer Science Majors.** The Bachelor of Science degree programs in engineering and computer science require the following courses, which may be applied to the general education requirements:
 - (a) Mathematics: MATH 151 and MATH 152, and at least one course numbered 200 or above.
 - (b) Physics: PHYS 103, PHYS 104.
- 3. Non-Applicable Courses.** Some courses are marked as not applying to graduation. These courses do affect grade point averages and academic status.
- 4. Introduction to the Profession:** 4 credit hours. All engineering and computer science students must complete this seminar in their first year. (Students entering with 30 hours or more of transfer credit are excused).

- 5. Social Science for Majors With Specializations.** The social science general education requirement is modified for students who complete a minor or professional specialization that is endorsed by their degree program. These students must complete:
- A minimum of nine credit hours marked with an **S**.
 - Students who satisfy the specialized minor in management through use of 12 hours of technical electives must take at least six credit hours from the areas of psychology, sociology, or political science.
 - At least three hours must be at the 300 level.
 - At least six hours must be in a single field.
- Engineering majors who do not complete an endorsed minor or professional specialization take 12 hours in the social sciences.
- 6. Advising Requirements.** Students are required to meet with their academic advisers before each registration. The adviser will evaluate each student's progress and goals and may ask a student to take, avoid, or repeat specific courses, even though this is not a university or departmental requirement.
- 7. Additional Academic Requirements.** To graduate, students must satisfy all university rules and all requirements set by their department of major study.

Programs

Aerospace Engineering: B.S.*
 Applied Mathematics: B.S.**
 Architectural Engineering: B.S.
 Architecture: B.Arch., M.Arch., D.Arch.
 Biology: B.S.**, M.S.*, Ph.D.
 Business Administration: M.B.A.*
 Chemical Engineering: B.S., M.S.*, Professional Master's (M.Ch.E.)*, Ph.D.
 Chemistry: B.S.**, M.S.*, Professional Master's (M.Chem.)*, Ph.D.
 Civil Engineering: B.S., M.S.*, Professional Master's (M.C.E.)*, Ph.D.
 Computer Engineering: B.S.*
 Computer Science: B.S.*, M.S.*, Master of Science for Teachers (M.S.T.)*, Ph.D.
 Computer Systems Engineering: M.S.*
 Design: Professional Master's (M.Des.)*, M.S., Ph.D.
 Computing: B.S.**
 Electrical Engineering: B.S.*, M.S.*, Ph.D.
 Electrical and Computer Engineering: Professional Master's (M.E.C.E.)*
 Environmental Engineering: B.S., M.S.*, Professional Master's (M.Env.E.)*, Ph.D.
 Environmental Management: M.S.*
 Financial Markets and Trading: M.S.*
 Food Safety and Technology: M.S.*
 Law: J.D.*, Master of Laws*
 Management: Ph.D.*
 Manufacturing Engineering: M.S.*, Professional Master's (M.M.E.)*
 Manufacturing Technology: Bachelor's*
 Mechanical Engineering: B.S.*

* May be completed on a part-time basis

** Preprofessional Specialization/Major

Mechanical and Aerospace Engineering: M.S.*, Professional Master's (M.M.A.E.)*, Ph.D.
 Metallurgical and Materials Engineering: B.S., M.S., Professional Master's (M.M.M.E.)*, Ph.D.
 Operations and Technology Management: M.S.*
 Personnel and Human Resources Development: M.S.*
 Physics: B.S.**, M.S., Ph.D.
 Political Science: B.A., B.S.**
 Preprofessional Program: B.S.
 Psychology: B.S., B.S.**, M.S.*, Ph.D.
 Public Administration: M.P.A.*
 Public Works: Professional Master's (M.P.W)*
 Rehabilitation Counseling: M.S.*
 Technical Communication and Information Design: M.S.*

Specialization Programs:

Applied Mathematics, Biology, Chemistry,
 Computing, Physics, Psychology
 within a preprofessional B.S. program
 Biotechnology within a
 B.S. in Chemical Engineering
 Computer Systems within a
 B.S. in Electrical Engineering
 Energy/Environment/Economics (E³) within an
 B.S., M.S., Professional Master's, or Ph.D. in
 chemical, mechanical, or electrical engineering

Certificate Programs in:

Architectural Technology
 Business Management for Technical Professionals
 Engineering Graphics and CAD
 Environmental Engineering
 Food Safety and Technology
 Professional Selling to Business and Industry

Post-Baccalaureate Certificate Programs in:

Computer Science
 Electrical and Computer Engineering
 Environmental Studies
 Fire Protection and Safety Engineering
 Rehabilitation Engineering Technology
 Technical and Professional Communications

Double Degree Programs include:

B.S./B.S. Architectural Engineering/Civil Engineering***
 B.S./B.S. Chemical/Environmental Engineering***
 B.S./B.S. Mechanical Engineering and Aerospace Engineering***
 Bachelor's/Juris Doctor
 Bachelor's/M.B.A.
 Bach. Arch./M.B.A.

* May be completed on a part-time basis

** Preprofessional Specialization/Major

*** Subject to faculty approval

Bach. Arch./Master of Civil Engineering

Bachelor's/M.P.A.

B.S./M.D.**

B.S./M.S. in engineering

Other programs:

Air Force, Army, and Navy ROTC

Overseas programs for junior-year students majoring in
architecture and some branches of engineering

Cooperative Education

Double Degree Options

IIT's Master's Plan double degree options allow students to earn two degrees in as few as five years. The university has created bachelor's/master's combinations in fields that are in demand in cutting-edge technologies and professions where graduate training is virtually essential.

Students may enter some 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, and faculty/employer recommendation, and other documentation.

Under 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, students may—*with the permission of their advisers and department chairs*—design their own combined-degree programs or select one of the following options:

- B.S./M.S. in Chemical Engineering with biomedical engineering specialty (undergraduate major: chemical engineering)
- B.S./M.S. in Manufacturing Engineering (undergraduate major: chemical and environmental, electrical and computer engineering, mechanical, materials and aerospace)
- B.S./M.S. in Environmental Engineering (undergraduate major: civil, chemical, or mechanical engineering; physics, chemistry, or biology)
- Bachelor's/Master of Business Administration. See page 78.
- Bachelor's/Master of Public Administration. See page 192.

B.S./M.D. Honors Program in Engineering and Medicine

In addition to pre-medical studies in our preprofessional program (see page 172), IIT offers a dual degree program in which applicants to the freshman year simultaneously go through joint admissions procedures at IIT and the Finch University of Health Sciences/The Chicago Medical School, 3333 Green Bay Road, North Chicago, Ill. The first four years are spent at the IIT campus where

** With the Finch University of Health Sciences/The Chicago Medical School in North Chicago, Illinois.

students begin working on degrees in computer science or in electrical, mechanical, or chemical engineering. In some cases, it may be possible to complete the undergraduate portion of the program in three years. The final four years of the Honors Program are spent at The Chicago Medical School. Participants in the program earn bachelor's degrees from IIT and medical degrees from The Chicago Medical School. This innovative program is 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.

B.S./J.D. Programs

Students who plan to enter law school after completing their undergraduate programs might instead consider two accelerated B.S./J.D. programs offered with Chicago-Kent College of Law at the IIT Downtown Campus.

1. The Honors Law Program permits students to receive both bachelor's and law degrees in six years, rather than the normal seven. In order to be admitted to the Honors Law Program, an incoming IIT first-year student must apply to the program and be interviewed by the admission staff at the Undergraduate College and the College of Law. Students selected for the program must take the LSAT prior to or during their junior year and receive a competitive score; they must also complete and submit the Chicago-Kent College of Law Application for Admission during the fall of their junior year.
2. The Bachelor's/J.D. ("3 + 3 Option"), is available to students in IIT liberal arts, sciences, and business programs. Since qualified students may earn both bachelor's and J.D. degrees in six years, those who are interested should inform the departmental and legal studies advisers as early as possible after their admission to IIT.

For more information, contact Dr. Scott Peters, Legal Studies Adviser, (312) 567-5130.

Interdisciplinary Architecture Programs

Two interdisciplinary six-year programs are available to undergraduate architecture students:

- Bachelor of Arch./M.B.A. – Those who qualify may earn both degrees in six rather than the normal seven years. See page 57.
- Bach. Arch./Master of Civil Engineering (Structures) Qualified students may earn both of these degrees in six rather than the normal seven years. Undergraduate architecture students at IIT who are completing their eighth semester, or an equivalent of 124 hours may apply for entry into the combined program. For more information see the Master of Civil Engineering section in the current *Bulletin: Graduate Programs*.

Overseas Programs

The International Cultural Center encourages students of all majors to consider one-way study abroad programs for a year to any country of the student's choice. For selection criteria and other information, contact the director of the

International Cultural Center in 406 Farr Hall at (312) 808-7104. Please note that these study abroad programs are not exchange programs. The College of Architecture also offers a semester abroad option in Italy for architecture students.

During 1995-96 for the first time a significant number of students were selected for one-way study abroad programs and attended top universities in Spain (Navarre), Germany (Berlin, Stuttgart), Belgium (Brussels), Mexico (Guadalajara), England (Sheffield), and Peoples Republic (Nankai).

Students who wish to participate in any of the overseas programs should verify their eligibility with the director no later than their sophomore year.

Institute National des Sciences Appliqués (INSA)

Since 1965, IIT has had an exchange program with INSA in Lyon, France. Each year, a few qualified science and engineering students take French during the spring semester of their sophomore year to prepare for spending their junior year at INSA. Before the student leaves IIT, the student must contact both a faculty adviser and the director of the International Cultural Center for selection of courses from INSA's curriculum to match the student's IIT degree program. On return, the student pursues senior-year courses according to the IIT curriculum.

Robert Gordon University

IIT is engaged in an exchange program with the Robert Gordon University in Aberdeen, Scotland. Each year, two third-year architecture students are selected to spend their junior years abroad. Interested students should apply in their sophomore years to the College of Architecture. If they are selected, students should notify the International Cultural Center prior to departure.

For more information about other overseas programs, contact the International Students and Scholars Center, 104 Farr Hall, (312)808-7105.

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, a student will often find that they enhance his or her potential for professional development. A student who wishes to pursue a minor must consult with an adviser in his or her major department. All minors are under review and are likely to be revised for the 1996 academic year. NOTE: *Not all specialized minors are applicable to all majors. Some may require more than a normal course load to satisfy requirements. The social science general education requirement is modified for students who select an endorsed minor (see Special Academic Requirement number 5 on page 20).*

Following are some sample minors.

Accounting: ACCT 130, ACCT 131, ACCT 330, ACCT 332, ACCT 337.

Actuarial Science: MATH 332, MATH 471, MATH 475, MATH 476, and one of the following: MATH 470, MATH 486, or MATH 487.

Aerospace Engineering (ME majors only): MAE 330, MAE 339, MAE 439, MAE 440, MAE 441, MAE 442.

Air Force Aerospace Studies: AS 101, AS 102, AS 201, AS 202, AS 301, AS 302, AS 401, AS 402. Students must meet all entrance requirements for the Professional Air Force Officers Course.

Applied Chemistry—at least five of the following courses: CHE 202, CHE 301, CHE 303, CHE 351, CHE 422, METM 317, METM 400, METM 479, METM 483.

Applied Mathematics: MATH 402, MATH 461, MATH 487, and MATH 471 or MATH 488. Chemical engineering students should substitute one of the above courses with CHE 426 or an equivalent engineering science course.

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, PHYS 437.

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

Artificial Intelligence: CS 200, CS 330, CS 331, CS 440, CS 480.

Biochemistry: BIOL 403*, BIOL 404, BIOL 410, BIOL 425, BIOL 445, and either BIOL 515 or CHEM 538.

Bioengineering: Biomedical specialization—BIOL 107, CHE 411, and at least three of the following courses: BIOL 403, BIOL 410, BIOL 414, BIOL 430, BIOL 445 and CHE 492.

Biological and Medical Physics: BIOL 115*, CHEM 237, CHEM 239, PHYS 300, PHYS 410. If possible, students should augment this option with BIOL 107.

Biology: BIOL 107, BIOL 109, and four additional courses in biology.

* Departmental approval required.

Chemistry—at least 15 credit hours must be completed from the following courses: CHEM 247, one of the sequences: CHEM 237, 239 or CHEM 243, 244, and electives chosen from: CHEM 321, CHEM 334, CHEM 335, CHEM 455.

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

Computer Architecture—at least 15 credit hours must be completed from the following courses: CS 200, CS 331, CS 350, CS 450, CS 470, CS 471, CS 472.

Computer-Supported Design: ID 331, ID 415, ID 447, ID 467, ID 468.

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

Database Management: CS 200, CS 325, CS 331, CS 425, CS 430.

Electromechanical Design and Manufacturing (AE and ME majors only)

AE majors: MAE 479, MAE 481, MSC 312, ECE 218, ECE 242, ECE 441 (replaces ECE 386).

ME majors: MAE 480, MAE 481, MSC 312, ECE 218, ECE 242, ECE 441 (replaces ECE 386).

Energy and Power/Environmental/Economics (E³)—three or six credit hours in Special Problems or Research in Energy (CHE 492 or MAE 491/497 or ECE 491/497). In addition, at least one course from each of the following three areas:

- **Energy Sources and Conversion:** CHE 430, CHE 460, CHE 465, CHE 481, CHE 482, CHE 483, MAE 450, and ECE 331.
- **Energy and Power Distribution and Utilization/Environment:** CHE 488, CHE 489, MAE 452, MAE 454, ENVE 450, ENVE 463, ENVE 476, ENVE 480, ECE 411, ECE 419, ECE 420, ECE 434/438.
- **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.

Engineering Analysis: MATH 332, MATH 402, MATH 461, MATH 471, MATH 472, 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 480 and two courses from the following: CHE 426, ENVE 401, ENVE 410, ENVE 450, ENVE 476.

Finance: ACCT 130, ACCT 131, FIN 350, and the following courses: FIN 452, FIN 454.

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

Food Safety and Technology—Six of the following courses: FST 401, FST 402, FST 403, FST 404, FST 421, FST 484, CHE 475, CHE 476.

* Departmental approval required.

Forensic Science: CHEM 321, CHEM 334, CHEM 335, CHEM 423, ID 113 or ID 258.

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 6 hours in European and 6 hours in American history on the 300 level or above.

Human Biology, Health, and Safety: BIOL 115, BIOL 116, BIOL 410, BIOL 425, BIOL 430.

Information Systems: CS 325, CS 425, IS 326, IS 440, IS 445 or IS 441.

Law and Society—at least 15 credit hours must be completed, including the following: MGT 221, PS 256, PS 318, SOC 348, PHIL 362.

Legal Studies: *Specified first year law courses*— Department of major studies and Chicago-Kent College of Law permission required. Permission is usually contingent upon an expectation of admission to the College of Law. Consult the Legal Studies Adviser.

Literature—at least 15 credit hours in 300-level English courses must be completed, including: ENGL 337 or ENGL 338 and at least two courses chosen from the sequence ENGL 371 through 374.

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 346, PHIL 350.

Management: ACCT 130, ECON 211, MGT 351 and two of the following: ACCT 131, ECON 212, ECON 423, FIN 350, IS 326, MGT 314, MGT 421, MKT 371, and OM 312. Chemical engineering majors should also take CHE 426 or another engineering science course.

Management for Electrical Engineering Majors: ACCT 130, ECON 211, MGT 351, and two of the following: ACCT 131, ECON 212, ECON 423, MKT 371, OM 312 or OM 433.

Manufacturing Management: MSC 221, OM 312, OM 423 or OM 425, OM 433, OM 442 and two of the following: ACCT 332, MSC 221, MGT 351 or MGT 421.

Marketing: MKT 371 and four of the following: MKT 471, MKT 478, MKT 481, MKT 483 or MKT 486.

Materials Engineering: (ME majors only) METM 302, METM 321, METM 411, METM 427 and one of the following courses: METM 475, METM 486 or METM 483. (AE majors only) METM 302, METM 427, MAE 479, METM 411 and one of the following courses: METM 475, METM 486 or METM 483.

Materials Science: MS 101, METM 220 and at least 3 of the following: METM 305, METM 326, METM 328, METM 405, METM 427, METM 435.

* Departmental approval required.

Mathematical Analysis: MATH 332, MATH 400, MATH 402, MATH 461 or MATH 488, MATH 471.

Mechanical Engineering (AE majors only): MAE 315, MAE 403, MAE 404, MAE 405, MAE 461, MAE 479.

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*. Chemical engineering majors are required to take CHE 426 or another engineering science course.

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, MGT 351, NS 402.

Marine Option: NS 101, NS 202, NS 310, NS 402.

Numerical Methods: MATH 332, MATH 471, MATH 486, MATH 487 or MATH 488.

Organizational Psychology: PSYC 121, PSYC 301, PSYC 303, PSYC 310 or SOC 201, PSYC 409.

Philosophy—at least 15 credit hours must be completed, including: PHIL 301, PHIL 302, PHIL 305 and at least two additional 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 and at least three courses from the following: CHE 492, CHE 538, CHE 555, CHE 575, CHE 581, CHEM 535, METM 452, METM 479, METM 581 and at least one course from the following: CHE 426, CHE 460, CHE 489, CHEM 423, CHEM 537, MAE 422, MAE 479, FST 404.

Probability and Statistics: MATH 332, MATH 471 or MATH 482, MATH 475, MATH 476, MATH 483.

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 560, MATH 486 and at least two courses from the following (only one of the ENVE offerings): CHE 402, CHE 430, CHE 455/557, CHE 465, CHE 489, CHE 492, ENVE 410, ENVE 450, ENVE 476, FST 403.

Programming Languages: CS 200, CS 325, CS 331, CS 350, CS 440.

Psychology—at least 15 credit hours must be completed, including the following three required courses: MSC 221 or MATH 221, PSYC 121, PSYC 204.

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

* Departmental approval required.

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

Sociology: At least 15 credit hours must be completed, chosen in consultation with the chair of the Department of Social Sciences.

Software Engineering: CS 200, CS 331, CS 350, CS 387, CS 487.

Statistics: MATH 332, MATH 475, MATH 476, MATH 483, MATH 482 or MATH 487.

Systems Programming/Operating Systems: CS 200, CS 350, CS 351, CS 450, CS 455.

Technical Communication for Management: CS 105, ENGL 421, ENGL 423, ENGL 427, ID 101, EG 225* and at least three credits from the following courses: ENGL 334, ENGL 401, ENGL 425, ENGL 435.

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.

Toxicology: BIOL 107, BIOL 115, BIOL 403, BIOL 514*, ENVE 410, ENVE 463.

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

* Departmental approval required.

Undergraduate First-year Admission

Test scores and grade point averages are only part of what we consider in determining admission to Illinois Institute of Technology. We also look for evidence of promise to succeed. Students need to have a solid high school record built around challenging classes. Students selecting an IIT technical major need to have a sound background in high school math. Though calculus is not required for admission to IIT, it is to a student's advantage to have taken a calculus course before enrolling at IIT. Most students admitted to IIT are from the top quarter of their high school class. We require applicants to take either the SAT I or ACT. Test scores are used supportively in the admission decision-making process. We are equally interested in those things you have experienced that make you unique. Many of our students were very active in high school clubs and organizations, or in sports, religious activities, or community service; or they worked long hours at a job. Applicants receive individual attention and consideration.

Student Classification and Admission Procedures

Full Time—All students formally admitted by the Office of Admission to a degree program and registering for 12 or more credit hours, as well as all co-op students, are classified as full-time students. For application forms, instructions, and specific information, contact the Office of Admission, Illinois Institute of Technology, 10 W. 33rd St., Chicago, IL 60616. Phone (312) 567-3025. Outside of Chicago 1(800) 448-2329.

Part Time—All students whose course load does not exceed 11 credit hours are classified as part-time students. Many IIT degree programs can be completed through evening classes on a part-time basis. All new part-time undergraduate students, whether degree-seeking or non-degree, must be admitted by the Office of Educational Services prior to registration. For application forms, instructions, and specific information, contact the Office of Educational Services, Illinois Institute of Technology, 3300 S. Federal St., Chicago, IL 60616. Phone (312) 567-3300. Graduation requirements apply to all degree-seeking students regardless of full or part-time status.

First-year Requirements

High School Requirements

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.

1. The minimum high school units required for all undergraduate majors at IIT are:

English	4
History or Social Sciences	2
Mathematics	Total 3½
Algebra	(2)
Geometry	(1)
Trigonometry	(½)
(Calculus ½ strongly recommended, but not required)	
Laboratory Science	2
(Physics and chemistry are recommended, as well as a third year of laboratory science.)	

Preparation in mathematics, for example, must have sufficient depth in geometry, trigonometry, and especially in algebra, to permit applicants for science and engineering programs to begin immediately the study of college-level calculus and analytic geometry.

A background in English must prepare a student to write well and to read intelligently and analytically, with depth and sensitivity of comprehension. Official high school transcripts should be forwarded directly to the IIT Office of Admission by the applicant's high school.

Entrance Examinations

All degree-seeking candidates for admission to the fall first-year class are required to take the College Entrance Examination Board's Scholastic Aptitude Test (SAT1) or the American College Test (ACT). The tests may be taken in the student's junior or senior year, preferably by the December testing date in the senior year. Applicants for admission to the Spring class must have taken the SAT1 or the ACT by the preceding November. Permanent residents who have not attended an American high school or college for at least two years must also take the Test of English as a Foreign Language (TOEFL).

Applicants should consult their high school counseling offices or testing companies directly for details regarding test dates, times, costs, etc., and arrange to have official reports of their scores sent to the IIT Office of Admission.

Addresses:

<i>SAT and Achievement Tests</i>	<i>TOEFL</i>	<i>ACT</i>
College Board ATP	P.O. Box 899	ACT Registration
P. O. Box 592	Princeton, N.J. 08541	P. O. Box 414
Princeton, N.J. 08541		Iowa City, Iowa 52243

Advanced Placement Program

Students requesting advanced placement credit as a result of advanced courses taken in high school, should take the College Entrance Examination Board's Advanced Placement examinations given in May and have their exam results sent to the IIT Office of Undergraduate Admission. The awarding of Advanced Placement credit varies by department. Questions can be directed to the Office of Admission at (312) 567-3025.

Transfer Student Requirements

Students who have taken a minimum of 15 semester hours of transferable courses at an accredited community college or at a four-year college or university are considered transfer students. Transfer students interested in full-time admission at IIT need to submit a Transfer Application, \$30 non-refundable application fee, transcripts from all colleges attended, a personal statement, and a letter of recommendation to the IIT Office of Admission. Admission is based upon a cumulative GPA and individual grades in all classes that apply to the major. If transfer applicants have less than 30 hours of transferable graded college course work, high school transcripts and ACT or SAT scores must be submitted. Transfer students must be in good academic and financial standing at all previous schools in order to be considered for admission to IIT. Transfer students may apply for the fall or spring term in all majors except Architecture, which is a fall entry only program. Recommended deadlines for transfer applications are April 1 for the fall term and November 1 for the spring term. To receive a full-time transfer application, contact the IIT Office of Undergraduate Admission at (312)567-3025.

Permanent residents who have attended United States high schools or colleges for less than two academic years must also take the Test of English as a Foreign Language (TOEFL).

Transfer Credit

Courses may be acceptable for transfer credit from other accredited colleges and universities provided they are comparable in nature, content, and level to those offered at IIT and the grades are the equivalent of a C or higher. A grade of C- is not acceptable for transfer credit. A maximum of 68 applicable transfer credit hours is permitted from a two-year institution. IIT does not require an associate degree prior to transferring. IIT does not grant credit for technology courses, career or vocational courses, or experiential learning. For transfer guidelines from most Illinois Community and City Colleges, please contact the IIT Office of Undergraduate Admission at (312) 567-3025. Official credit evaluations are completed only after a student is admitted to the university.

Nondegree Student Requirements

Applicants wishing to enroll in undergraduate courses solely for professional development, for the purpose of removing deficiencies in order to meet graduate admissions requirements, or to complete the requirements for a degree at another school, may apply as non-degree students. Applicants in this category generally will be restricted to part-time enrollment. Contact the Office of Educational Services, Illinois Institute of Technology, 3300 S. Federal St., Chicago, IL. 60616. Phone (312)567-3300.

International Student Requirements

IIT welcomes international student applications. International students intending to enroll with a student visa must register for a full-time load of 12 or more credit hours. The undergraduate admission criteria for international students are as follows:

1. A good secondary school record.
2. TOEFL (Test of English as a Foreign Language) results of at least 550.
3. An official affidavit of financial support showing adequate funding for one year.
4. Original or certified copies of all documents. (Certified English translations of foreign language documents must be provided.)
5. Additional information as required to assist the Committee on Admission in its evaluation.

International students may transfer to IIT from an accredited institution of higher learning if they meet the admission requirements and are in good standing at their previous school. Please see Transfer Student Requirements. For international application and materials, contact the International Cultural Center, 402 Farr Hall. Phone (312)808-7105.

Undergraduate Application Procedures

IIT admits students on a rolling basis beginning September 1 and continuing until July if there are spaces available. It is to the student's advantage to apply before March for priority consideration for financial aid and housing.

Honors Programs and special scholarships have a January 1 application deadline.

IIT admission application and materials are available from IIT's Office of Undergraduate Admission. Room 101, Perlstein Hall, 10 West 33rd Street, Chicago, IL 60616-3793. The phone number is (312) 567-3025. Out of Chicago applicants can call toll-free 1-800-448-2329.

E-mail: admission@vax1.ais.iit.edu

General Information

1. Take the American College Test (ACT) or the College Entrance Examinations Scholastic Aptitude Test (SAT1). You may take the tests in your junior or senior year, preferably by the December testing date in the senior year. If you are applying for January admission, you must have taken the SAT1 or the ACT by the preceding November.
2. Complete the application and essay and return it to the IIT Office of Admission.
3. Have your guidance counselor send your official high school transcripts to the Office of Admission.
4. Have your counselor or the designated authority in your school complete and return the Teacher/Counselor Evaluation.
5. We encourage you to visit our campus and have an interview with an admission counselor. Your interview, although optional, is an excellent opportunity to learn more about the university and to share additional information

about yourself. Appointments are available from 9 a.m. to 4 p.m. daily and from 9 a.m. to noon one Saturday a month during the academic year. An overnight visit provides a particularly good opportunity to meet IIT students. We can also arrange for you to go on a campus tour, talk with faculty members, or attend a class if schedules permit. If you can't make it to our campus, members of our national network of Alumni Admission representatives are available to talk with you about their experiences at IIT and their careers after graduation.

Application Calendar

Completed Application

received by:

September 1
October 1
November 1
December 1
January 1
February 1
March 1
April 1
After May 1

Decision Notification

by:

October 1
November 1
December 1
January 1
February 1
March 1
April 1
May 1
Within 3 Weeks

Your file is complete when we have received your application and essay, \$30 (U.S.) nonrefundable application fee or fee waiver, high school transcripts, and Teacher/Counselor Evaluation. Applications received after March 15 will receive notification 2 weeks **after the file is complete**.

If you are admitted, we request that you notify us of your decision by May 1, the National Candidates' Reply Date. Since IIT does have rolling admissions, you are welcome to apply after May 1. Be aware, however, housing and financial aid may be limited after that date.

All students admitted to the university will be asked to pay a nonrefundable \$100 confirmation fee to indicate their intent to enroll at IIT. This reserves a place in the class for the initial semester of enrollment and is applied to your first year tuition. Transfer student recommended deadlines are April 1, for the Fall term (beginning in August) and November 1 for the Spring term (beginning in January).

Reinstatement To The University

Former IIT students who want to reenter IIT as full-time or part-time undergraduate students must submit an application for reinstatement to the Office of Educational Services, Room 101, Main Building, 3300 S. Federal St., Chicago, IL 60616-3793. For further information, call (312) 567-3300.

Applications from all students seeking reinstatement must be submitted no later than two weeks prior to the week of registration for the semester of intended enrollment. No fee is required. Students who have attended other schools since their last attendance at IIT must also submit appropriate transcripts by this time. Students who have not previously done so may also be required to provide proof of immunization. International students seeking to be

reinstated with a student visa must also contact the International Cultural Center, 402 Farr Hall, 3300 S. Michigan Ave., Chicago, IL 60616-3793. Phone (312) 808-7105.

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 as 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 immunity. 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 immunity shall be prevented from registering for classes in the next semester. Questions regarding the policy should be directed to Counseling and Health Service at (312) 808-7199.

Financial Aid

IIT administers a comprehensive financial aid program of loans, work, scholarships, and grants for full-time undergraduate students. In determining financial need, IIT subscribes to the nationally recognized formula of need analysis and reviews all information provided by the student and the family in an effort to match the award with the student's computed financial need.

IIT's philosophy is one of service to individuals, and this philosophy guides the operation of the financial aid and scholarship program.

Computing Financial Need

The first step in computing financial need is the construction of a comprehensive budget that reasonably reflects the entire cost of attending IIT. In addition to tuition and room and board, the budget should include allowances for books, transportation, and modest personal expenses.

IIT uses a base room and board budget equal to the lowest cost for a single person living on campus. Each student is expected to contribute some earnings from summer or other employment to the amount included in the budget beyond tuition and room and board.

Eligibility For Financial Aid

Students enrolled on a full-time basis (12 credit hours or more) and paying full-time tuition are eligible to be considered for federal, state, and university financial aid awarded by IIT.

IIT offers limited academic scholarship assistance to international students.

Degree-seeking students enrolled on a part-time basis may qualify for assistance from some federal financial aid programs. For up-to-date information, consult a Student Services Specialist in the Student Services Center Main Building, (312) 567-3100.

Application Process

New First-year Students

Freshmen seeking to enter IIT must file a 1995-96 Free Application for Federal Student Aid (FAFSA). Forms are available from high schools and from IIT's Office of Admission and the Student Services Center. The priority date for financial aid consideration is March 15.

New Transfer Students

Transfer students seeking to enter IIT should follow the instructions given above. Transfer students are also required to submit a financial aid transcript from each college previously attended whether financial aid was received or not. These financial aid transcript forms are available in the Student Services Center.

Continuing Students

Application materials are available in the IIT Student Services Center after January 1.

All Students

The FAFSA should be filed as early as possible after January 1, 1996, or immediately following completion of 1995 income tax returns. In order that financial aid requests be given full consideration, all applications should be on file in the Student Services Center by March 15. New students should therefore not wait until a final admission decision is given before filing a FAFSA.

Because financial aid is awarded only on an annual basis, students should be aware that new applications must be filed each year. The amount of financial aid awarded each year will depend on the demonstrated need of the applicant and available funds.

Federally Supported Financial Aid Programs

Federal Pell Grant

Established under the federal Education Amendments of 1972, these grants are based on financial need as determined by a federally approved formula. Applicants should note, however, that even if they are ineligible for Pell Grants, extremely high financial need might still be met with other sources of financial aid. Therefore, all students must turn in their Pell Grant Student Aid Reports to the Student Finance Center. Students may apply for a Pell Grant by using the FAFSA. The maximum grant in 1994-95 was \$2,300.

Federal Supplemental Educational Opportunity Grant (FSEOG)

Established in 1965, this program provides gift aid to exceptionally needy students. Students may apply for a FSEOG by completing the FAFSA.

Federal Perkins Loan

Formerly the National Direct Student Loan (NDSL), this program provides long-term, low-interest loans to students who demonstrate financial need. When students leave IIT, repayment begins after a nine-month, interest-free grace period at an annual 5 percent simple interest rate. Payments are due thereafter on a quarterly basis. Students who are planning to enter secondary teaching should note the cancellation provisions included on the promissory note. Awards are made to students through IIT.

Federal Work Study Program

Established under the Economic Opportunity Act of 1964, this program provides resources to universities to support additional student employment opportunities both on and off campus. To be eligible for the program, students must demonstrate financial need. Students employed under the FWS program are not

permitted to work more than 20 hours per week during the academic term, more than one job on campus, or during scheduled class times.

Federal Stafford Loan

This program is a cooperative effort of private lending institutions, and the federal government offering low-interest, long-term educational loans to qualified students. Further information may be obtained from the Student Services Center.

State-Supported Financial Aid Program

Illinois Student Assistance Commission Monetary Award

This program provides gift aid, based on financial need, to Illinois residents to attend Illinois colleges. The maximum award for 1994-95 to attend IIT was \$3,800. Illinois students must apply for a Pell Grant in order to be considered for an ISAC monetary award, since the ISAC receives its data directly from the Pell Grant processor. The ISAC will then notify students of their award amounts.

University-Supported Financial Aid Programs

More than 90 percent of IIT students receive financial assistance. In assessing financial need, family circumstances as well as family income are considered. When applying for financial aid, students are considered for all applicable scholarships. IIT's comprehensive financial aid program also recognizes merit. Each year a number of talented students receive IIT grant assistance even though they do not require much or any financial aid.

IIT Grants

These grants are university funded and are awarded on the basis of need. IIT Grants are awarded at the discretion of IIT.

Transfer Student Scholarships

\$1,000 to \$3,000 merit awards are made to transfer students from Illinois public community colleges who have strong college and high school records. Awards are renewable based on grade point average at IIT. Application deadline is March 15. For more information contact the Office of Admission, (312) 567-3025.

Athletic Scholarships

As an N.A.I.A. member, IIT awards athletic scholarships based solely on athletic ability, regardless of need. In compliance with N.A.I.A. rules, athletic scholarships are officially made by the director of financial aid, upon recommendation of the athletic director. Recipients are not precluded from receiving additional need-based financial aid, if additional financial need is demonstrated.

IIT Endowed Scholarships

These scholarships are made possible through donations by individuals, corporations, and foundations. For descriptions and information regarding availability of endowed scholarships, contact the Student Services Center.

University Loans

Loans are available to undergraduate students demonstrating financial need. For more information contact the Student Services Center.

Part-Time Employment

Part-time employment is available on campus (on a non-FWS basis) and off campus in the greater Chicago area. For information concerning on-campus jobs contact the Student Finance Center; for off-campus jobs contact the Career Development Center, 404 Farr Hall, (312) 808-7110. This office also assists students in finding permanent jobs after graduation and summer employment (see page 9).

ROTC Programs

The U.S. Air Force, Army, and Navy offer ROTC scholarships. For details, consult the section on ROTC Programs in this Bulletin.

Veterans' Educational Benefits and Social Security Benefits

The Office of Student Records and Registration, Room 104, Main Building, (312) 567-3310, helps students complete forms certifying enrollment so that eligible students can receive their veterans' and/or social security benefits to attend IIT.

Privately Supported Financial Aid Programs

National Merit and National Achievement Programs

IIT sponsors both the National Merit and National Achievement Scholarship Programs. Students who qualify as finalists for one of these awards and list IIT as their first choice are assured of receiving an award from IIT. IIT will sponsor all finalists who have not obtained a corporate/business sponsor.

The annual competition for these merit awards begins with the PSAT/NMSQT exam in October of the student's junior year of high school. In September of the student's senior year, National Merit Program semifinalists are announced. To become a finalist, each semifinalist must meet additional requirements that include being endorsed and recommended for merit scholarship consideration by the high school principal, substantiating PSAT/NMSQT exam scores by an equivalent performance on the Scholastic Aptitude Test (SAT), and submitting evidence of high academic standing in his or her high school class. Finalist determination is completed in January of the senior year.

Sponsored Scholarships

Qualified applicants are automatically considered for sponsored scholarships administered by IIT, its departments, and programs. Students are encouraged to contact their high school guidance counselors about local scholarships for which they might be eligible to apply. For more information contact the Student Services Center.

Continuation of Financial Aid

Continuation of student financial aid is contingent on the demonstration of reasonable progress as stipulated in the IIT Financial Aid Reasonable Academic Progress Policy. The policy has been created in compliance with state and federal regulations governing the awarding of financial aid from those sources. The purpose of the policy is to ensure that students receiving state and federal financial aid make reasonable progress toward graduation. Reasonable progress includes both a satisfactory cumulative and major grade point average and adequate credit hours earned. Failure to comply with these two requirements will lead to the loss of financial aid. You may request a copy of the IIT Financial Aid Reasonable Progress Policy from the Student Services Center, Main Building. Office hours are 8:30 a.m. to 5 p.m.

Expenses

Tuition

Application Fee

All formal applications for admission must be accompanied by a nonrefundable fee of \$30 or a fee waiver.

Undergraduate Tuition

Tuition for full-time undergraduates is \$15,280 for the 1995-96 academic year. Part-time undergraduate students (those taking fewer than 12 credit hours) will be charged at the rate of \$480 per credit hour. Tuition for courses taken by part-time undergraduate students that are offered by the Stuart School of Business will be \$300 per credit hour for the first six hours of Business School courses taken during the semester. If more than six hours of Stuart School courses are taken, all credit hours will be charged at the normal undergraduate per credit hour rate of \$480.

Alumed Program

IIT and Midwest College of Engineering graduates are permitted to register as **part-time undergraduate or graduate students for one course** each semester at a reduced tuition rate. A tuition credit voucher must be obtained from the Office of Educational Services, Room 101, Main Building, (312) 567-3300, prior to the day of registration. A voucher must be requested each semester, either in person, by mail, or by telephone. Alumni must present the tuition credit voucher and pay the remainder of tuition charges at the time of registration. One course per semester at half tuition will be permitted for alumni registering as undergraduates. Courses completed may be used for credit toward either a second undergraduate degree or an advanced degree at IIT. Registration for credit courses only is permitted excluding short courses, special problems, research and thesis, or intercession courses. A reduced tuition rate also is available for graduate students.

Alumni must register as part-time undergraduate or graduate students. Alumni registering as full-time students or as students in a law school degree program are not eligible.

The Alumed Program cannot be applied retroactively; requests for vouchers for prior semesters will not be honored.

Payment of Tuition, Fees, Room and Board

IIT's Semester Payment Plan, Monthly Budget Plan, and Tuition Deferment Plan for payment of Tuition and Room and Board are described in the current *Bulletin: Schedule of Classes*. Or, contact the Bursar's Office, Illinois Institute of Technology, 207 Main Building, 3300 S. Federal St., Chicago, IL 60616. Phone: (312) 567-3785.

Outstanding Debts

A financial hold is placed on a student's record when that student is delinquent in fulfilling his or her financial obligation to the university. A student will be considered delinquent when his or her account is not current according to established payment due dates listed in the *Bulletin: Schedule of Classes*. Students

with outstanding debts may be suspended from current semester classes until the amount due is paid. Students whose accounts are not current will not be allowed to register until all outstanding indebtedness is cleared. No certificates of attendance or transcripts of academic records will be issued until all financial obligations have been met.

Payment of a past due balance must be made by cashier's check, money order, MasterCard, or Visa payable to Illinois Institute of Technology. Personal checks will not be accepted. Payments made by cashier's check or money order should be mailed to:

Illinois Institute of Technology
P. O. Box 95152
Chicago, IL 60694

Refunds of Tuition

A tuition credit may be generated upon receipt of a "drop/add" form by the Office of Student Records and Registration, 104 Main Building, if the change in registration results in a change of course load. The date the form is received by the Office of Student Records and Registration shall constitute the official drop date, and the amount of the tuition credit will be based on the schedule published in the current *Bulletin: Schedule of Classes*. If the tuition credit results in a credit balance to the student account, the student may request a refund by submitting a "refund form" to the Student Services Center.

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

1. If a course for which the student is registered is canceled by the university.
2. If a student's death or serious injury causing incapacity 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 pro-rata refund or credit for unused tuition upon written request to the bursar.

Other Academic Expenses

All charges listed herein are for the 1995-96 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.

Confirmation Deposit

Each student admitted as a degree-seeking undergraduate is required to make a \$100 confirmation deposit, which is credited toward the student's tuition and holds his or her 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 either:

- 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 your tuition and fees by the third billing cycle (usually eight to nine weeks into the semester) unless you submit a valid declination to the plan's underwriters by the dates listed in the Insurance Brochure issued at registration. Once a declination is accepted it will be valid throughout the academic year.

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 fee of \$30 for full-time students and \$1.50 per credit hour for part-time students will be charged each semester. This applies only to students at the Main Campus.

Parking Fee

All students parking on campus parking lots must register their cars with the Campus Police Department and pay a parking fee. The \$30 per semester fee can be paid at the beginning of each semester, or students can pay \$50 at the beginning of the fall semester for the full academic year. Students authorized to park on IIT's lots will receive windshield decals and gate-control cards.

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
Application for Graduation fee	25.00
Special examination (per credit hour).....	100.00
Returned check fee.....	25.00
Breakage deposit (For students taking laboratory courses in biology or chemistry).....	25.00

Books and Supplies

Books and other supplies are available at Follett's Commons Bookstore. Their costs differ widely, depending upon the field of study. Most students can expect to spend approximately \$500 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; a 35mm camera is required for architecture majors.

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 rule may be granted by the associate vice president for student and academic 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 range from \$4,720 to \$4,795 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 different meal plans. Meal plans and meals on a cash basis are available to non-residents.

Payment of Room and Board Charges

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 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 on an annual basis and are available to full-time faculty, staff, married students, and single full-time graduate students if space is available. Rentals, including all utilities except telephone, range from approximately \$405 to \$815 per month, unfurnished. 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.

Academic Information and Regulations

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 during 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. Part-time degree-seeking students wishing to register for 9 to 11 credit hours require permission from the college. Non-degree students requesting overloads must secure permission from the Office of Educational Services.

Students who wish to change their class schedules need to apply at the Student Services Center for the necessary forms. Changes can only be made according to the deadlines stated in the *IIT Bulletin: Schedule of Classes*.

Academic Program Audit

A program audit provides a summary of a student's academic status to date and lists the courses he or she must complete in order to receive a degree.

Most undergraduate students who have completed at least 70 semester hours of credit (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 advisers regarding this requirement.

Academic Progress, Probation, and Dismissal

All students who are degree candidates are expected to maintain satisfactory grade-point averages and satisfactory rates of progress toward the completion of their degree programs.

Students who do not maintain at least 2.00 cumulative and 1.85 current grade point averages and 2.00 cumulative averages in their major fields are placed on academic probation. Their eligibility for financial aid will also be reviewed (see page 36). If in the next semester of registration, these above standards are not met, students are subject to dismissal from IIT.

Degree-seeking students are expected to maintain satisfactory rates of progress. For full-time students this means a minimum of 12 credit hours per semester or a minimum 20 credit hours per academic year applicable to their degrees. For part-time students, satisfactory rates of progress will enable them to graduate within 12 academic years after achieving degree-seeking status. Students who do not maintain satisfactory rates of progress over a period of two

semesters are placed on probation and may continue at IIT only with the permission of the dean of the undergraduate college.

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.

The progress of non-degree part-time students is also reviewed, and any such students failing to maintain an acceptable record are also 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 relative 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 individual's circumstance warrant a further review of the case.

Associate and Assistant Deans

Academic associate and assistant deans are the initial contacts for the dean of the undergraduate college. They are the main source of information on college policies and are responsible for most student records. They screen and pass judgment on most appeals related to academic matters.

Change or Declaration of Major

A student who wishes to change or declare majors must obtain a change-of-major request form from the Office of Educational Services and approval from the chair of the intended major department and the dean of the Undergraduate College.

Change of Status

Students who wish to change their classifications and/or registration status must complete the applicable procedures listed below no later than two weeks prior to registration (or preregistration).

Full-time to Part-time (Degree-seeking)

Notify the Student Finance Center, if applicable. International students with student visas must be registered as full-time students.

Part-time (Degree-seeking) to Full-time

Part-time students who have already been approved for regular, degree-seeking status (identified as classification U1 through U10) may register for full-time course loads following normal procedures and securing necessary advisers' approvals. Students in this category who wish to apply for financial aid must notify the Student Finance Center regarding their changes of status.

Graduate to Undergraduate (Full-time or Part-time)

Apply for reinstatement in the Office of Educational Services.

Part-time (Non-degree) to Full-time or Part-time (Degree-seeking)

A student must satisfactorily complete at least one semester prior to requesting degree-seeking status. A student should consult the Office of Educational Services regarding a change of status from non-degree to degree-seeking.

Class Attendance

All students are expected to attend their classes regularly. When illness or emergency requires an absence for more than two days of classes, notify the Office of Student Affairs in writing. Excessive absences may be grounds for receiving a failing grade.

Credit by Examination

Credit may be earned through one or more of the following examination procedures. Total credit from Proficiency Examinations and CLEP (not including advanced placement) may not exceed 18 credit hours.

Advanced Placement Program

Refer to the section on admission, page 31.

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 particular course may petition for an examination. With the approval of the head of the department offering the course and the dean of the undergraduate college, a proficiency examination will be administered. A letter grade is then entered on the permanent record. Proficiency examinations are not allowed for courses in which the student has previously enrolled. Proficiency examinations must be completed before a student's final 45 semester hours of enrollment at IIT. A fee of \$100/credit hour is charged for each examination.

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.

The Dean's List

The names of all undergraduate students who have completed at least 12 graded hours with a semester grade point average of 3.00 or better appear on the Dean's List.

Faculty Advisers

Each IIT undergraduate 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 college requirements. Students are urged to consult their advisers often.

Free Period

Few classes are scheduled during the "free period" from noon to 2 p.m. on Tuesdays and Thursdays. This time is recommended for student meetings, ROTC, and intramural sports.

Grades

The following grades are used to report the quality of an undergraduate'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" submit a withdrawal form to the Office of Student Records and Registration before the end of the 10th week of the semester (the sixth week of an eight-week summer session and the fourth week of a six-week 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.
- X** Audit. A student may, with the instructor's written permission, register to audit a course. There is no credit given for an audited course. **Courses may not be changed to or from audit after registration.** 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 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 should also 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 incomplete may 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 by that date no regular grade has been received in the Office of Student Records and Registration, the incomplete grade will revert to a grade of "E."

P Pass. For designated courses only. "P" grades are not used in the calculation of grade point average.

Retaking Courses

Students may repeat a course for a change of grade. To repeat a course for a change of grade, notify the registrar **at the time of registration**. Forms may be obtained in the Office of Student Records and Registration if registering by mail or at arena registration if registering in person. Re-registration for courses in which a student received a passing grade requires the approval of the student's adviser and the dean of the undergraduate college. A course repeated for change of grade must be taken within one calendar year after initial enrollment in that course or the next time it is offered (whichever is longer). No more than three courses may be repeated for grade changes.

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 "X." If a course is no longer offered by the university, the provision to retake the course for a grade change does not apply. The same course may be repeated only once for a change in grade.

Graduate Courses

Undergraduate students enrolled in graduate-level courses are expected to meet graduate school standards. Work done in such courses must be of graduate quality and will receive the appropriate graduate grade (A, B, C, E, etc.). Only degree-seeking undergraduates may seek approval to register for graduate-level courses.

Grade Point Average

To determine 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 course registrations graded "P," "I," "W," or "X." All courses taken at IIT apply to the GPA, including those that do not apply toward graduation.

Graduate Course Enrollment Approval for Undergraduates

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 and must be presented at the time of registration. An undergraduate nondegree student may be allowed to enroll in a graduate 500-level course in some instances. Please consult the Office of Educational Services. Undergraduate degree-seeking students who enroll in graduate courses are governed by the graduate 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.

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 individual academic program.

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 accordingly by the relevant department chair.

Note: Students must file Application for Graduation forms 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 a student's graduation. 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.
2. Credit hour requirements as appropriate to the various curricula (a minimum of 126 hours).
3. General Education requirements as outlined on page 18.
4. Residence requirements as outlined on page 51.
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, be able to 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 approved, this extension may involve additional compensating academic requirements.
7. Payment of all financial obligations to the university.

Any incomplete coursework must have been submitted to the satisfaction of the instructor prior to the date of graduation. A posted grade of "I" (incomplete) that has not been removed through successful submissions of coursework prior to the date of 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:

1. Taken a minimum of 60 graded semester hours required for a particular degree at IIT.
2. No record of disciplinary action.

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 graduates with a grade point average of at least 3.00 but less than 3.50 will graduate with “Honors.”

Illness or Emergency

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 and Academic Affairs (312) 567-3080 should be notified at the earliest possible date.

In case of an emergency on campus, students should contact the Public Safety Department at (312) 808-6363.

Placement Testing

Prior to first enrollment, all first-year and transfer students are required to take the English placement test administered by the Education Technology Center. Entering freshmen and transfer students who have not completed a course in calculus also are required to take the mathematics placement test. Depending on the intended major, other tests may also be required. 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 January, special arrangements will be made by the Office of Admission with the individual candidate.

Residence Requirement

Once enrolled at IIT, an undergraduate degree-seeking student is not permitted to enroll at another institution without obtaining permission. A student should submit an academic petition to the Office of Educational Services for approval prior to registration at another institution.

A course failed at IIT must be repeated at IIT.

The final 45 hours of work must be completed in residence at IIT. Any proficiency examinations or enrollment at another institution must be completed before this period.

Second Bachelor's Degree

A student whose first degree was granted by IIT must complete a minimum of 30 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.

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.

Complaints of student misconduct are handled by the Campus Judicial Officer, the Campus Judicial Board or, in case of less serious incidents concerning residence hall or fraternity regulations, by the Residence Hall Association or the Greek Council.

Students are expected to inform themselves of all university regulations and requirements that are published in the *Student Handbook*.

Student Rights and Privileges

Students are expected to be thoroughly familiar with the university's provisions for maintaining privacy of educational records; the means by which students may obtain access to their own educational records; and the procedures for petitioning redress of grievances. These statements are published in the *Student Handbook*.

Transcripts

Transcripts can be requested from the Student Services Center, 104 Main Building. Requests must bear 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 and should include the student's Social Security or I.D. Number, dates of attendance, and address where the transcript should be sent. 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 \$5.00 is charged for each transcript issued.**

Withdrawal from the University

A full-time degree-seeking student intending to withdraw from the university must file a withdrawal form in the Office of Educational Services, 101 Main Building. Failure to file a withdrawal form may create difficulties in the student's eligibility to receive tuition credit, if any is appropriate, in clearing his or her financial record, and in having academic records reflect a withdrawal.

Undergraduate Programs and Courses

College of Architecture

Interim Dean: *George Schipporeit S. R. Crown Hall Ext. 73230*

Associate Dean for Academic Affairs: *Dirk Denison S. R. Crown Hall Ext. 73232*

Associate Dean: *Peter Beltemacchi S. R. Crown Hall Ext. 73364*

Assistant Dean: *Lee Waldrep S. R. Crown Hall Ext. 78835*

Professors: *Elnimeiri, Harrington (Joint Appointment), Land*

Research Professor: *Goldsmith*

Visiting Institute Professor: *Caldwell*

Associate Professors: *Beltemacchi, Hovey, Schipporeit, Sharpe, Takeuchi, Thomas*

Visiting Assistant Professor: *Christenson*

Studio Professors: *Brown, Cole, Conger-Austin, Denison, Eggen, Gadelha,*

Karidis, Krawczyk, Krueck, Nelson, Nicholson, Olsen, Roesch, Sherefkin, Wetzell

Adjunct Professors: *Abdelrazaq, Baker, Bihler, Bowman, Fernandez, Fujikawa,*

Hartray, Henthron, Horn, Ketchmark, Kriegshauser, Myefski, Shaver, Sobel,

Turley, Windhorst, Yurko

Faculty Emeriti: *Danforth, Hannaford, Utsunomiya*

Instructors: *Bielenberg, Cap, Fisher, Hamill, Kuhlman, Miller*

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, increasing 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.

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.

Today, 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 the most significant buildings of the 20th century.

The first 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. Each of the three years are 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 which consider each student as his/her own architect in the tutorial design studios.

IIT has also established an academic climate that provides a leadership role in addressing the responsibilities of professional education for the next century’s global workplace. While technical proficiency will always be necessary, it also recognizes that colleges must 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’ inter-disciplinary 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 at the leading edge of higher education.

To clarify the different architectural degree programs it should be noted that most states require that an individual intending to become an architect hold an accredited degree. There are two types of degrees that 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 who aspire to registration and license to practice as architects.

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.

Architecture

Required Core	Credit
Major Courses	Hours
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 121, 122	6
Physics Requirements	
PHYS 211, 212	6
Civil Engineering Requirements	
CAE 286, 287, 351, 352, 425	16
Art & Architectural History Requirements	
AAH 119, 120	6

Undergraduate Programs and Courses

Architecture History Elective	3
Humanities and Social Science Requirements	
ENGL 101, 100-level HUM	6
Humanities Electives (300-level and above)	6
Social Science Electives (6 hrs. 300-level)	12
Architecture Elective or Specialized Minor	18
Total Credit Hours	168

Curriculum**

First Semester	Lect.	Lab.	Credit Hrs.	Second Semester	Lect.	Lab.	Credit Hrs.
ARCH 100	1	0	1	ARCH 200	0	2	1
ARCH 113	0	12	6	ARCH 114	0	12	6
ARCH 109	0	4	2	ARCH 110	0	4	2
MATH 121	3	0	3	MATH 122	3	0	3
ARCH 125	2	2	3	PHYS 211	3	0	3
ENGL 101*	3	0	3	HUM 100-level course*	3	0	3
Totals	9	18	18	Totals	9	18	18
Third Semester				Fourth Semester			
ARCH 201	0	10	5	ARCH 202	0	12	6
AAH 119	3	0	3	AAH 120	3	0	3
CAE 286	4	0	4	CAE 287	3	0	3
PHYS 212	3	0	3	CRP 465	3	0	3
ARCH 225	1	2	3	Social Sciences Elective*	3	0	3
Totals	12	12	18	Totals	12	12	18
Fifth Semester				Sixth Semester			
ARCH 305	0	12	6	ARCH 306	0	12	6
ARCH 309	3	0	3	ARCH 310	3	0	3
CRP 201	3	0	3	CAE 352	3	0	3
CAE 351	3	0	3	Architecture History Elective	3	0	3
Architecture Elective/Minor	3	0	3	Architecture Elective/Minor	3	0	3
Totals	12	12	18	Totals	12	12	18
Seventh Semester				Eighth Semester			
ARCH 417	0	12	6	ARCH 418	0	12	6
CAE 425	3	0	3	Architecture Elective/Minor	3	0	3
ARCH 313	3	0	3	Social Sciences Elective*	3	0	3
Architecture Elective/Minor	3	0	3	Humanities Elective*	3	0	3
Totals	9	12	15	Totals	9	12	15
Ninth Semester				Tenth Semester			
ARCH 419	0	12	6	ARCH 420	0	12	6
ARCH 423	3	0	3	Architecture Elective/Minor	3	0	3
Architecture Elective/Minor	3	0	3	Social Science*	3	0	3
Social Sciences Elective*	3	0	3	Humanities Elective*	3	0	3
Totals	9	12	15	Totals	9	12	15
				Total Credit Hours			168

* Humanities and social sciences components of General Education Program (see p. 18 for details).

** Pending final review by the University faculty.

Optional Programs

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

These minor fields of study should be chosen early in the student's program in consultation with a departmental adviser.

Bachelor of Architecture/M.B.A. Double Degree Option: Qualified students may earn both the Bachelor of Architecture and Master of Business Administration 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 counseling in the Stuart School of Business and the Department of Architecture early in their studies at IIT.

Course Descriptions

Numbers in parentheses indicate: (lecture hours-laboratory hours-credit hours).

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)

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 skills 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 219, 220 History of Architecture Survey I, II

These courses are a survey giving the comprehensive background of the architecture from individual cultures from ancient to modern times. This broad view of architecture and culture is a prerequisite for all subsequent architecture history. Specific details and expressions of more generalized theories and strategies will be explored. (3-0-3), (3-0-3)

ARCH 225 Computer-Aided Design in Practice

This course reviews 2-D computer-aided design concepts. Prerequisite: ARCH 125. (0-3-3)

ARCH 305, 306 Architecture V, VI

Continued development of architectural principles of Architecture III and IV 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. Prerequisites: ARCH 201, 202. ARCH 305 is prerequisite for 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 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)

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)

ARCH 315 Microstation 2-D

This course covers basic and advanced 2-D design and drafting commands in Microstation v5.0. Topics covered will include: setting the drawing environment, drawing tools, manipulating and modifying elements, cells and cell libraries, reference files, using curves, multi-lines, plotting and patterning. (0-6-3)

ARCH 316 Microstation 3-D

This course covers 3-D design and modeling commands in Microstation v5.0, from basic 3-D concepts to rendering and visualizing 3-D models. Topics covered will include: auxiliary coordinate systems, using 3-D drawing tools manipulating and modifying elements in 3-D, using 3-D cells and perspective view camera. (0-6-3)

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)

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)

ARCH 331, 332 Visual Training I, II

Aesthetic expression as experienced 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 332. (3-0-3); (3-0-3)

ARCH 400 Graphic Techniques and Introduction to Architectural Design

This course teaches the development of drawing techniques in various media, both freehand and with instruments in pencil and ink, as a basic architectural language. These techniques will be used as a means of studying and communicating problems of visual perception and aesthetic judgment. (0-16-8) (*Summer course available to incoming students*)

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. (0-4-2)

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 410, 412 Architectural Theory and Criticism in History I, II

This course will make an analysis of significant building types from the past and present and their interrelation with technology and ideas as they shape the architecture of their time.

ARCH 410 is a prerequisite for ARCH 412. (3-0-3); (3-0-3)

ARCH 415 Architecture and Civilization

A study of the history of architecture, as an expression of the development of civilizations, from the Egyptian, Greek, Early Christian, Gothic. The significance of modern architecture is related as a parallel to developments in the past. The emphasis is on architecture as idea and symbol in the nature of man. This is a study of architecture and humanity. (3-0-3)

ARCH 416 Landscape Architecture

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. (2-2-3)

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, 306. ARCH 417 is prerequisite for 418 (0-12-6); (0-12-6)

ARCH 419, 420 Architecture IX, X

This studio represents a synthesis of the entire curriculum and the experience of simulating the total design process. As a final thesis project a major building or group of related buildings is planned for a specific site. The ability to make value judgments is tested with the complete interrelationship of architectural considerations. Prerequisites: ARCH 417, 418. ARCH 419 is prerequisite for ARCH 420. (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. 421 is a prerequisite for 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. Course work 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)

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 2D and 3D 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 3D Animation in CAD Presentations

Review 3D 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 451 Ethics in Architecture

Students will investigate in a seminar format questions of ethical conduct in the Profession of Architecture and related fields. (3-0-3)

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 465, 466 Pre-Columbian Art and Architecture

In a two semester seminar format students investigate the architecture of the Mayan and Inca Cultures. (3-0-3); (3-0-3)

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

The objective of this studio drawing course is the development of 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: Italian Study Program. (0-6-3)

ARCH 469 Urban Design in Italy

This seminar course will explore current notions of urbanity as observed in the built environment of several small cities in the Tuscany region of Italy. 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: Italian Study Program. (3-0-3)

ARCH 470 Image City: Mediation of Space

This seminar surveys the interaction between *ômediaö* and the city from the 19th century to the present. A history of the technological innovations of the last two hundred years turns out to be in large part a history of the development of the contemporary city, and no account of contemporary urban issues can be considered complete without taking into account the role played in our lives by the media. Accordingly, every space we encounter or create has to be considered mediated.

ARCH 471 Architecture & 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 472 Modern Post Modern

A grasp of the theory and history of Modernism enables students to comprehend and to engage actively in current architectural discourse.

Through intensive study of the artistic, intellectual and political currents of Modernism, students will acquire and understanding of the historical dynamic of 20th century architecture within a larger historical context. (3-0-3)

ARCH 473 Conflict & Time

This seminar employs comparative studies of other arts, in particular cinema, to illuminate architectural esthetics and the creative process. (3-0-3)

ARCH 474 Production/Design

This seminar examines aspects of design in motion pictures. The premise underlying the course is that the act of perception constitutes an act of design; we produce and design the world we perceive. This becomes particularly evident through analysis of the artificially constructed, illusory reality of films. (3-0-3)

ARCH 476 Modernism, Theory and Practice

This course will identify and critique continuing development in the history, theory and practice of Modernism up to the present. Projects and built work will be examined to illustrate development in construction, engineering theory and practice, the economics of building and above all the aesthetics of architectural and engineering form. Particular attention will be paid to engineers and engineering structures (bridges, towers, etc.), and to historical and vernacular architectures which displays a kinship with modernist principles.(3-0-3)

ARCH 477 Architectural Concept in Photography

Instruction in 35mm B&W and color photography. Deals with general concerns of architectural photography, including issues of spatial abstraction, color theory, documentation of the urban landscape and the architectural exteriors. B & W dark room procedures and studio lighting. (1-4-3)

ARCH 478 Advanced Architectural Photography

Advanced study of the process and composition of architectural photography. (1-4-3)

ARCH 485, 486 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 statically indeterminate systems. ARCH 485 is the prerequisite for ARCH 486. (3-0-3); (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 place 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. The implications of particular theories for such other questions as tradition, change, innovation, revolution. (3-0-3)

ARCH 497.001 Additions & Subtractions: Theory

This course proposes to examine and analyze some of the techniques of inserting a design in the middle of an architectural duration. During the architect's career, one is likely to be asked to work within an existing condition, to build within the interior structure, to add to and alter an existing structure. The existing condition could be considered an architectural monument which contains not only a memory of its previous use(s), but also the memory of its cultural and political context. Any intervention into this context will inevitably question issues of continuity and duration, temporality and entropy, typology and style. (3-0-3)

ARCH 497.002, 20th Century Modernism

Students will acquire an understanding of the historical dynamic of 20th century architecture within a larger cultural context. The course will serve to acquaint students with the discourse of other artistic disciplines, such as painting, film, literature, etc., which can be relevant to their architectural practice and which will contribute to their general cultural literacy. (3-0-3)

ARCH 497.003 Presentation & Communication

Investigate strategies in the preparation of the architectural presentation. The emphasis will be on presentations as a synthesis of the design process. Working through a series of architectural design problems, this course will focus on defining intended objectives of presentation and assessing an effective plan of action. Study of visual media, technology and technique as well as developing verbal and graphic skills. (3-0-3)

ARCH 497 Special Projects

Independent study of projects and problems. Students must be advised and have consent of the instructor. (Credits: Variable)

City & 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 of and their amelioration. Buildings 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 relationships in size and location. Related infrastructure, including traffic, potable water, storm drainage, sewerage, natural gas, and electric. Prerequisite: CRP 203. (0-6-3)

CRP 207, 208 City and Regional Planning I, II

Planning at different scales. Human and social factors in planning. Importance. Orientation. Density. Housing types. The dwelling in history. Origin of settlements. Buildings in settlements. Housing developments. Functional examination of the community. The whole and the part; the settlement. (3-9-6); (3-9-6)

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 308 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 309, 310 City and Regional Planning III, IV

Larger settlements. Density. Effect of size on city form and development. Scale. Elements of cities. Nature of cities. Reconstruction of cities. Pre-industrial, industrial, and post-industrial settlements. Balance. Proportion. Topographical and environmental considerations. Prerequisites: CRP 207, CRP 208. (3-9-6); (3-9-6)

CRP 311, 312 Seminar III, IV

Readings, written assignments, and discussions related to work in CRP III and IV. (2-0-2); (2-0-2)

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 the 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 413, 414 Landscape Work I, II

Selection and use of plant materials in relation to architectural work. Small-scale works beginning with the house and garden. Groups of buildings. The settlement and its elements as landscape problems. Prerequisite: Consent of instructor. (2-0-2); (2-0-2)

CRP 417, 418 City and Regional Planning V, VI

Area planning. Location and distribution of settlements. New settlements. Nature of regions. Factors determining a region. Geographic and economic considerations. Scale, size, balance, proportion. Density. Idea. Prerequisites: CRP 309, 310. (3-9-6); (3-9-6)

CRP 419, 420 Seminar V, VI

Readings, written assignments, and discussions related to work in CRP V, VI. (2-0-2); (2-0-2)

CRP 421 Seminar in History and Architecture of Cities

Selected topics examined in depth. Topics will be announced prior to registration each semester. (2-0-2)

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 442 The Airport and the Community

Government and corporate responsibilities: land use and zoning; airport siting principles, location, climate, and topography; user requirements, access, ground transportation; utilities; noise contours, and other pollutants; EIS; reading and written assignments, airport visits; role of airport technical staff and consultants today. Prerequisites: CRP 441. (3-0-3)

CRP 443 The Airport and Regional/National Planning

Governmental planning agencies' effect on design, construction, and airport operations; airport airways system; airport structure; airfield elements; apron-terminal complex; service areas and facilities. Airport operating costs/usage fees and charges; airport standards; airline and tenant standards; airport vehicle requirements; site and control center visits; reading assignments and reports. Prerequisites: CRP 442. (3-0-3)

CRP 444 Airport Design

Two distinctive airport design projects: a private general aviation airport and a public regional airport; criteria, programming, siting, and local considerations; preparation of facility analysis, site adaptation, apron-terminal complex, and airport access consideration; airport site visits; reading assignments. Prerequisites: CRP 443. (3-0-3)

CRP 445 Airport Capacity Analysis

Airfield capacity and delay factors; existing airfield demand and forecast demand; effect of planned or required airport improvements on capacity. Analytical and computer simulation models; monetary valuations; delay versus improvement costs. Airfield pavement configurations, navigational aids, meteorological considerations, aircraft types, environmental concerns, gate availability, and other factors which affect airport capacity. Prerequisite: CRP 444. (3-0-3)

CRP 450 Contemporary Environmental Issues

Environmental problems in the context of social, economic, and political trends. Environment as site and source. Role of commercial economies in meeting human needs. Transportation and manufacturing. Competing demands on air, water, and land. Location of environmental problems in time and space. Technological and legal approaches. Governmental and private programs in land use research and planning. Alternative development patterns. (3-0-3)

CRP 463, 464 Problems and Principles of City and Regional Planning I, II

Problems of cities and regions. Critical analysis. Elements of cities and regions. The basis of planning. Planning aims and planning process. Development of principles. Investigation and consideration of possibilities. Recent proposals. Problems of development and renewal. Readings, reports, discussions, drawings. (3-0-3); (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 466 Landscape Planning

The role of land in meeting human needs. Examination of planned landscapes, environmental planning methodologies, and techniques

of plan effectuation. Readings, individual reports, and field trips. (3-0-3)

CRP 490 Directed Reading

Prerequisite: Consent of the department. (Credit: Variable; maximum 3 credit hours)

CRP 497 Undergraduate Special Problems

Prerequisite: Consent of the department. (Credit: Variable)

CRP 497.001 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 which 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)

CRP 497.002 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 497.001. (2-2-3)

CRP 497.003 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 students will prepare designs for unit types and diagrammatic clustering. Prerequisite: Graduate or upper level Undergraduate standing. (2-8-6)

**CRP 497.004 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: 497.003. (2-8-6)

Biological, Chemical & Physical Sciences

Chair: *Dr. T.I. Morrison 182 Life Science Ext. 73381*

Associate Chair: *Dr. Benjamin Stark 182 Life Sciences Ext. 73488*

Associate Chair: *Dr. Carlo U. Segre 182 Life Sciences Ext 73498*

Biology Faculty

Professors: *Cork, Lechowich, Roth, Webster*

Adjunct Professors: *Peak, Sedita*

Associate Professors: *Erwin, Jasper, B. Stark*

Adjunct Associate Professors: *Gendel, McCormick, Ratajczak, Rubenstein*

Assistant Professors: *Garfinkel, T.C. Irving (Visiting)*

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

Chemistry Faculty

Professors: *P.Y. Johnson, Lykos, Schug*

Visiting Professors: *Bonham*

Associate Professors: *Eisenberg*

Adjunct Associate Professor: *Stetter*

Assistant Professors: *Khan, Mandal, Smotkin, Stagliano*

Faculty Emeriti: *Fanta, Filler, Miller, Wood*

Physics Faculty

Institute Professor: *Lederman (Pritzker Professor of Science)*

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

Adjunct Professor: *Faber*

Associate Professors: *Bunker, Chapman, Kaplan, Longworth, Morrison, Segre*

Assistant Professors: *Coffey*

Instructor: *Karagiannes*

Faculty Emeriti: *Colvert, Hauser, Malhiot, Markham, Zwicker*

A thorough understanding of the sciences is essential for the successful professional leadership in our technological society. The roles of biology, chemistry, and physics in most technology related careers are not only complementary but have become so interrelated that it is necessary to have a truly interdisciplinary perspective. Individuals with this perspective are in demand in a wide variety of professional careers including the health professions, law, business, and research. Scientists work with professionals in various disciplines and apply their knowledge to challenging and constantly changing sets of problems. In recognition of the interdisciplinary needs of tomorrow's decision-making professionals, IIT has merged its traditional science departments into a single unit to provide students with the flexibility and competencies needed to successfully compete in the job market and advance in their careers.

The IIT science major will be exposed to this interdisciplinary approach and will gain a better understanding of how the sciences relate to each other and how

they relate to those professions that have not traditionally required a science background. IIT science students will most likely continue their education in professional or graduate schools where the principles of scientific inquiry (in effect, “learning how to learn”) which they have developed at IIT will serve them well throughout their professional careers.

Biology, chemistry, and physics are the bases for IIT’s preprofessional B.S. degree program that provides a strong interdisciplinary science foundation and specialized preparation for students seeking advanced degrees in medicine, law, business, and graduate level science (see Preprofessional program, page 172).

A single B.S. degree program provides a unique educational experience while allowing the students to develop strength in depth in specific concentration areas such as biology, chemistry, physics, environmental studies, etc. and prepare the students for graduate studies in a number of professions by designing programs of study that prepare students for studies in law, medicine, environmental studies, or research in the sciences.

Information about the new program can be obtained by contacting the Department of Biological, Chemical, and Physical Sciences.

Biology Program

The preprofessional B.S. degree with a *Biology* specialization/major provides excellent preparation for the health professions including medical, osteopathic medical, and dental schools. In addition, the rigorous interdisciplinary program prepares graduates for careers in biotechnology, biochemistry, patent law, and environmental and biomedical engineering. Graduates also prepare for immediate entry into positions in industrial, medical and other research laboratories, and for graduate study in microbiology, biotechnology, biophysics, cell biology, biochemistry, genetics, and molecular biology. In consultation with faculty advisers, students can create programs that provide additional opportunities in special areas.

Bachelor of Science: Specialization/Major in Biology

Students interested in Biology can choose Biology as a specialization/major. In addition to other requirements of the preprofessional program, the Biology major/specialization will include: general, organic and analytical chemistry, mathematics through calculus, computer science, physics and biotechnology/molecular biology. In the junior and senior years, students may concentrate in specialized areas or develop further interdisciplinary breadth. Students are also encouraged to participate in research projects with the faculty.

Chemistry Program

The professional B.S. degree with a *Chemistry* specialization/major provides excellent preparation for a number of professions including law (patent and intellectual property), medicine, business, or research. In addition, the rigorous interdisciplinary nature of the program prepares graduates with a greater breadth of understanding of how Chemistry interrelates with other sciences and with the professional areas mentioned above. Graduates are also prepared for immediate entry into positions in industrial, medical and other research laboratories, and for graduate study in analytical, inorganic, organic, or physical chemistry. In consultation with faculty advisers, students can create concentrations that provide additional opportunities in special areas.

Bachelor of Science: Specialization/Major in Chemistry

Students interested in Chemistry can choose Chemistry as a specialization/major. In addition to other requirements of the professional program, the Chemistry concentration will include: general physics, mathematics through calculus, computer science, and biology. In the junior and senior years, students may concentrate in specialized areas or develop further interdisciplinary breadth. Students are also encouraged to participate in research projects with faculty.

Physics Program

The preprofessional B.S. degree with a *Physics* specialization/major provides excellent preparation for a number of professions including law (patent and intellectual property), health physics, business, or research. In addition, the rigorous interdisciplinary nature of the program prepares graduates with a greater breadth of understanding of how physics is interrelated with the other sciences and with the professional areas mentioned above. Graduates are also prepared for immediate entry into positions in industrial, medical and other research laboratories, and for graduate study in all areas of physics. In consultation with faculty advisers, students can create programs that provide additional opportunities in special areas.

Bachelor of Science: Specialization/Major in Physics

Students interested in Physics can choose Physics as a specialization/major. In addition to other requirements of the preprofessional program, the Physics concentration will include: general chemistry, mathematics through calculus, computer science, and biology. In the junior and senior years, students may concentrate in specialized areas or develop further interdisciplinary breadth. Students are also encouraged to participate in research projects with the faculty.

Course Descriptions

Numbers in parentheses indicate: (lecture hours-laboratory hours-credit hours).

Biology

BIOL 101 Introduction to the Profession I

Introduction to the biological sciences, scientific method, computing tools, and interrelations of biological sciences with chemistry, physics and other professions. (1-2-2)

BIOL 102 Introduction to the Profession II

Continuation of BIOL 101. Applications of scientific fundamentals to basic problem solving in biological sciences. (0-4-2)

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 116 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. (1-4-3)

BIOL 115 Human Biology

This course covers selected topics in biology of particular relevance to humans and to human health and disease. Topics include biology of human cells and selected organ systems; neurobiology including psychoactive drugs and drug addiction; development and birth defects; genetics and genetic diseases; toxicology; the immune system and immunologic diseases such as AIDS; human nutrition and nutritional effects; microbial human diseases. BIOL 115 plus BIOL 107 (General Biology) constitutes a two-semester sequence in Science. (3-0-3)

BIOL 116 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. (1-4-3)

BIOL 214 Genetics and Genetic Technology

An introduction to genetic engineering and genetics designed for both biology and non-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, 115, or consent of the instructor. (3-0-3)

BIOL 315 Genetics Laboratory

A laboratory course in genetics. Prerequisite: Prior or concurrent enrollment in BIOL 214. (1-4-3)

BIOL 403 General Biochemistry

Molecular organization of cell structures, cell membranes. Protein, nucleic acids, carbohydrates and lipids, their molecular structure, characterization, chemical reactions. Enzymes and enzyme-catalyzed reactions and metabolism. Prerequisite: BIOL 107 or 115 and CHEM 237. (4-0-4)

BIOL 404 Laboratory in Biochemistry

Analytical methods in the chemistry and metabolism of proteins, amino acids, and nucleic acids, including chromatography, spectrophotometry, electrophoresis. Enzyme reactions. Prerequisite: Previous or concurrent enrollment in BIOL 403. (0-6-3)

BIOL 410 Principles of Microbiology

A study of microorganisms and their relation to food, milk, water, soil, sanitation, disease and immunity. Prerequisite: BIOL 107 or 115 or equivalent. (3-0-3)

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 on a topic integrating engineering and biological principles will be required in addition to three examinations. Prerequisite: Consent of the instructor. (3-0-3)

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 403, 410, and 425. (0-9-3)

BIOL 425 General Microbiology Laboratory

A laboratory course in microbiology designed for majors in biology and biotechnology. 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: BIOL 410 or consent of instructor. (0-4-2)

BIOL 430 Animal Physiology: Lecture

Respiration; circulation; energy metabolism; temperature regulation; water and osmotic regulation; digestion and excretion; muscle and movement; nerve excitation; information control and integration; chemical messengers. Emphasis on general principles with examples drawn from various animal phyla. Prerequisite: BIOL 107 or 115. (3-0-3)

BIOL 445 Cell Biology

Modern studies of cell structure and function at the cellular, subcellular, and molecular level. Topics include molecular components of cells membranes, membrane bound organelles, microtubular and cytoskeletal components and principles of bioenergetics. Prerequisites: BIOL 107 or 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. (0-4-2)

BIOL 490 Individual Study

Prerequisite: Consent of instructor. (Credit: Variable; maximum 3 credit hours.)

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)

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

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 full descriptions.

BIOL 503 Viruses

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****BIOL 565 Vertebrate Physiology****BIOL 571 Clinical Microbiology****BIOL 595 Colloquium in Biology****Chemistry****CHEM 101 Introduction to the Profession I**

Introduction to the chemical sciences, scientific method, computing tools, and interrelations of chemical sciences with biology, physics and other professions. (1-2-2)

CHEM 102 Introduction to the Profession II

Continuation of CHEM 101. Applications of scientific fundamentals to basic problem solving in chemical sciences. (0-4-2)

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, kinetics. Molecular basis for chemical reactivity; atomic structure, periodicity, chemical bonding. (3-3-4)

CHEM 125 Principles of Chemistry II

Chemical equilibria, the chemistry of acids and bases, solubility and precipitation reactions. Introduction to thermodynamics and electro-

chemistry. Chemistry of selected elements and their compounds. Prerequisite: CHEM 124. (3-3-4)

CHEM 126 Principles of Chemistry II

Same as CHEM 125 except without the laboratory. Prerequisite: CHEM 124. (3-0-3)

CHEM 130 Chemistry in Action

An introductory course for non-technical majors designed to inform students about the impact of chemistry on society. Special emphasis will be placed on materials, sources of energy, environmental problems, drugs, and living systems. (3-0-3)

CHEM 237 Organic Chemistry I

General principles of synthetic and theoretical organic chemistry. Prerequisite: CHEM 125 or consent of instructor. (3-4-4)

CHEM 239 Organic Chemistry II

Continuation of CHEM 237. (3-0-3)

CHEM 240 Organic Chemistry Laboratory

Laboratory part of CHEM 239. Corequisite: CHEM 239. (1-4-2)

CHEM 243, 244 Physical Chemistry I, II

A study of the equilibrium properties of chemical systems based on the laws of thermodynamics, transport properties, and chemical kinetics. Prerequisites: CHEM 125 (or consent of instructor), MATH 251. Corequisite: PHYS 203. (4-0-4) (3-0-3)

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). Pre-

requisite: CHEM 125 or consent of instructor. (2-4-3)

CHEM 297 Special Projects

Research projects for first- and second-year students under the direct supervision of a faculty member. (Credit: Variable)

CHEM 321 Instrumental Analysis

Theory and application of instruments in chemical procedures. Prerequisites: CHEM 244, 247. Pre- or corequisite: PHYS 203. (2-6-4)

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, 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, 247; corequisite: CHEM 334. (0-6-2)

CHEM 345 Physical Chemistry III

Introduction to modern physical chemistry, including quantum theory, spectroscopy, statistical mechanics, and molecular dynamics. Prerequisites: CHEM 244, CHEM 247. (4-0-4)

CHEM 347 Physical Chemistry Laboratory

Experiments in classical and modern physical chemistry. Corequisite: CHEM 345. (0-4-1)

CHEM 415 Inorganic Chemistry

Survey of inorganic chemistry with emphasis on the modern concepts and theories of inorganic chemistry and electronic and geometric structure of inorganic compounds. Prerequisite: CHEM 345. (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, 321, 345. (1-7-3)

CHEM 423 Chemical Microscopy

Survey of the use of the polarized light microscope and its application to various technical fields. Students may elect one of the following options: polymers, criminalistics, mineralogy, air pollution, fibers, crystallography, small particle identification, polymorphism or hot stage methods. Laboratory assignments will be based on the option chosen. Prerequisites: CHEM 237, 244, 247. (1-6-3)

CHEM 435 Introduction to Polymers

An introduction to polymer science with major emphasis on the 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, 244 or consent of instructor. (3-0-3)

CHEM 450 Introduction to Research

Required for chemistry majors in the B.S. and B.A. programs. Designed to give research experience in one of the division's laboratories. Prerequisites: CHEM 334, 335, 345. (0-8-2)

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, 243. (2-0-2)

CHEM 452 Computers in Experimental Chemistry

Fundamentals of interfacing laboratory experiments to digital computers. Analog-to-Digital and Digital-to-Analog converters, timers, operational amplifiers, programmable amplifiers, etc. Real time data acquisition and control hardware and software. Data analysis and graphical display. Prerequisites: CHEM 244, 247 (or consent of the instructor), and CS 105 or equivalent. (2-3-3)

CHEM 453 Chemometrics

Signal processing, data analysis, and data enhancement. Partial least squares and non-linear regression analysis. Pattern recognition.

Expert systems. Prerequisites: MATH 252 or consent of instructor. (3-0-3)

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 345. (3-0-3)

CHEM 455 Advanced Organic Chemistry

Physical organic chemistry; stereochemistry; organic reaction mechanisms. Prerequisites: CHEM 239, 244. (3-0-3)

CHEM 456 Undergraduate Seminar

(1-0-1)

CHEM 487 Senior Thesis in Chemistry

Original work carried on by the student under the guidance of a staff member. A careful search of the literature is required before the study is begun and continued reference to the chemical literature is expected as the work progresses. A written resume is required. (0-12-4)

CHEM 497 Special Projects

For juniors and seniors. (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.

Physics

PHYS 100 Physical Science

Introduction to the basic concepts of physical science. Mechanics, fluids, heat, electromagnetic spectrum, radioactive decay. Periodic table, chemical formulas and equations, stoichiometry. Development of skills needed for chemistry, materials science, and physics. Does not count for graduation in an engineering or science degree program. (3-0-3)

PHYS 101 Introduction to the Profession I

Introduction to the physical sciences, scientific method, computing tools, and interrelations of physical sciences with chemistry, physics and other professions. (1-2-2)

PHYS 102 Introduction to the Profession II

Continuation of PHYS 101. Applications of scientific fundamentals to basic problem solving in physical sciences. (0-4-2)

PHYS 103 General Physics I: Mechanics

Elementary concepts in vectors and calculus; their use in the kinematical description of particle motion. Newton's three laws and their application to simple systems. Energy, momentum and angular momentum; rotational kinematics and dynamics and equilibrium of rigid bodies. Corequisite: MATH 151 or 161 or permission of the department. (3-0-3). PHYS 153 is Honors PHYS 103.

PHYS 104 General Physics II: Waves and Thermal Physics

Oscillatory motion. Gravitation. Fluid mechanics. Waves: vibrating stretched strings and sound waves; reflection, refraction, and lenses. Temperature, first and second laws of thermodynamics, and kinetic theory of gases. Prerequisite: PHYS 103. Corequisite: MATH 152 or 162 or permission of the department. (3-3-4). PHYS 154 is Honors PHYS 104.

PHYS 120 Astronomy

A descriptive survey of observational astronomy, the solar system, stellar evolution, pulsars, black holes, galaxies, quasars, the origin and fate of the universe. (3-0-3)

PHYS 203 General Physics III: Electromagnetism and Optics

Charge, electric field, Gauss's law and potential. Capacitance and resistance. Magnetic field, Ampere's law, Faraday's law, inductance. Electromagnetic oscillation. Physical optics: interference, diffraction, and polarization. Prerequisite: PHYS 104. Corequisite: MATH 251 or MATH 252. (3-3-4). PHYS 253 is Honors PHYS 203.

PHYS 207, 208 Electromagnetism: Optics, and Modern Physics I, II

Charge, electric field, Gauss's law, potential. Capacitance and resistance. Magnetic field, Ampere's Law, Faraday's Law, induction. Electromagnetic waves. Physical optics: interference, diffraction, polarization. Quantum physics, matter waves, atomic structure and spectra, solids, nuclei. Prerequisite: PHYS 104. Corequisite: MATH 251. (3-0-3) (1-3-2)

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, Heat, and Sound

Corequisite: PHYS 211. (0-3-1)

PHYS 214 Basic Physics Lab: Electromagnetism and Optics

Corequisite: PHYS 211. (0-3-1)

PHYS 240 Introduction to Computational Physics

Application of computational techniques to investigating and visualizing fundamental physics. Introduction to FORTRAN. Computational projects in periodic and chaotic motion of simple pendulum, motion of falling body and projectiles, energy storage in springs and electric circuits. LRC circuits. Satellite motion. Electric and magnetic fields. Random numbers in modeling radioactivity and evaluating integrals. Prerequisites: PHYS 103, 104, 203 or permission of the department. (2-3-3)

PHYS 300 Instrumentation Laboratory I

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. Corequisite: PHYS 203. (2-3-3)

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 203. (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 203, MATH 252. (3-0-3) (3-0-3)

PHYS 348 Modern Physics for Scientists and Engineers

An introduction to modern physics with the 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. Corequisite: PHYS 203. (3-0-3)

PHYS 358 Geophysics

Survey course on solid-earth geophysics. Solar system. Age and rotation of earth. Gravity and tides. Earthquakes, seismic waves, and internal structure of earth. Earth's internal heat. Geomagnetic field. Paleomagnetism. Tectonics and an elasticity. Prerequisite: PHYS 203. (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 203, 304, 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, dif-

ferential 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 203. (3-0-3)

PHYS 405, 406 Fundamentals of Quantum Theory I, II

The experimental origins and mathematical foundations of quantum theory. Wave formalism and matrix formalism. Harmonic oscillator and other simple one-dimensional systems. Angular momentum and spin. The hydrogen atom. Approximation methods. Temporal evolution of quantum mechanical systems. Prerequisites: PHYS 309, MATH 252. (3-0-3) (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 203 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 EE 413.

Prerequisites: PHYS 348 or consent of instructor, CS 105. (3-0-3)

PHYS 413, 414 Electromagnetism I, II

Vector fields. Electrostatics and magnetostatics. Electromagnetic induction, radiation, and propagation phenomena. Polarization and magnetization. Introduction to classical electrodynamics. Prerequisites: PHYS 309, MATH 252. (3-0-3) (3-0-3)

PHYS 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 EE 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, solid state lasers. Laser applications. Same as EE 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 the instructor. (2-3-3) (2-3-3)

PHYS 437 Solid State Physics

Crystal structure and binding, lattice vibrations, phonons, free electron model, band theory of electrons. Electrical, thermal, optical, and magnetic properties of solids. Superconductivity. Prerequisite: PHYS 348 or consent of instructor. (3-0-3)

PHYS 440 Advanced Computational Physics

Basic computational techniques. Finding roots, solving ordinary differential equations using Runge-Kutta technique, solving eigenvalue problems using Numerov technique, Gaussian Quadrature, matrix operations, overview of solution of partial differential equations, Monte Carlo methods. Physics applications will be scattering by central potential, chaotic motion, white dwarf stars, Schroedinger equation, partial wave analysis, shell model of nucleus, steady state hydrodynamics, diffusion equation, Ising model and H₂ molecule. Prerequisites: PHYS 240, 309, 348, and 405 or permission of the department. (2-3-3)

PHYS 491 Undergraduate Research

Student participation in undergraduate research, usually during the junior or senior year. Prerequisite: Recommendation of adviser and approval of the department chair. (Credit: Variable)

PHYS 497 Special Topics in Physics

(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.

PHYS 501 Methods of Theoretical Physics

PHYS 505 Electromagnetic Theory

PHYS 508 Analytical Dynamics

PHYS 509 Quantum Mechanics

Additional 500-level courses may be taken with special permission.

Stuart School of Business

Dean: *Dr. M. Zia Hassan 430C Downtown Campus Ext. 66515*

Director: *Mr. Shawn T. Thelen 458 Downtown Campus Ext. 66513*

Computer Systems Manager: *Ken Gibson Downtown Campus 421
Ext. 66557*

Financial Markets & Trading Director: *Sally Blomstrom
454 Downtown Campus Ext. 66507*

Financial Markets & Trading Assistant Director: *Ms. Vicki DuFour
456 Downtown Campus Ext. 66508*

Professors: *Chung, Goldhar, Hassan, S.B. Smith, Thomopoulos*

Associate Professors: *Bariff (Coleman-Fannie Mae Candies Foundation
Associate Professor), Beighley (visiting), Bilson (visiting), Ginn, Hall, Knowles,
Kraft, Prabhaker (visiting), Tourk*

Assistant Professors: *Barlow (visiting), Flanagan (visiting), Hamilton (visiting),
Imam (visiting), Twombly*

Lecturers: *Hampson, Rausch*

Faculty Emeriti: *Calero, Cohen, P. Davis, Spencer*

The Stuart School of Business offers graduate degrees and teaches undergraduate courses.

Minor in Business

Management Minor

- ACCT 130 Accounting Principles I
- ECON 211 Principles of Macroeconomics
- MGT 351 Theory of Organization and Management
and two of the following:
- ACCT 131 Accounting Principles II
- ECON 212 Principles of Microeconomics
- ECON 423 Economic Analysis of Capital Investments
- FIN 350 Corporate Finance
- IS 326 Information Systems
- MGT 314 International Business
- MGT 421 Human Resource Management
- MKT 371 Marketing
- OM 312 Introduction to Operations Management

CHE Majors should also take CHE 426

Double Degree Program: Bachelor/M.B.A.

One of the most appealing career preparations is the combination of any Bachelor's degree with the Master of Business Administration (M.B.A.) degree. IIT students who complete the necessary undergraduate business courses may earn both any bachelor's degree **and** the M.B.A. degree in five 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 six rather than the usual seven years.

To help the student select undergraduate business courses for which he or she might be awarded advanced standing in the M.B.A. program, the following list indicates the courses that should be taken and their equivalents in advanced standing toward the M.B.A.:

<i>Take as undergraduate:</i>	<i>Advanced standing in graduate school for:</i>
ACCT 130, 131	MBA 510
MGT 351	MBA 520
MSC 221	MBA 540
ECON 212	MBA 530
FIN 350	MBA 550
OM 312	MBA 570
MKT 371	MBA 560
MGT 314	MBA 580

Students who are considering the Bachelor/M.B.A. program should consult with the Director of the Stuart School of Business as early as possible in their academic career in order to plan a program enabling them to receive the maximum amount of advanced standing credits toward their M.B.A.

Since employment in many professions often leads to management responsibility, non-business majors 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 conclusion of their undergraduate program.

Formal application to the M.B.A. program should be submitted prior to the completion of the seventh semester of the bachelor's program.

Course Descriptions

Numbers in parentheses indicate: (lecture hours-laboratory hours-credit hours).

Accounting

ACCT 130 Accounting Principles I

Basic concepts of financial accounting are introduced. The accounting equation, accrual accounting, and financial statement preparation are explored, as well as specific asset areas. (3-0-3) *Offered in Fall.*

ACCT 131 Accounting Principles II

The companion course and sequel to Accounting 130. Basic financial accounting concepts and fundamentals continue to be explored with an emphasis on partnerships, corporations, and financial statement analysis. An introduction to management accounting concepts is also provided. Prerequisite: ACCT 130. (3-0-3) *Offered in Spring.*

ACCT 330 Intermediate Accounting I

This course, the first in a two-semester sequence, provides an in-depth examination of the generally accepted accounting principles that underlie financial statement presentation. After a review of the accounting process and the content and presentation of the three major financial statements, ACCT 330 focuses on revenue recognition and asset valuation issues. Although the major thrust is external reporting, the course considers the relationship of financial accounting to both income tax and managerial accounting. Prerequisites: ACCT 131 and Junior standing. (3-0-3) *Offered in Fall.*

ACCT 331 Intermediate Accounting II

The companion course and sequel to ACCT 330. Coverage of long-term investments, owner's equity, pensions, leases, income taxes treatment, cash flows, and financial statement disclosures and issues are emphasized. Prerequisite: ACCT 330. (3-0-3) *Offered in Spring.*

ACCT 332 Cost and Managerial Accounting I

Provides an understanding of cost and managerial concepts and fundamentals. Deals with cost accounting techniques (job, process, and standard

costing), joint and byproduct costs, cost-volume-profit analysis, and relevant cost analysis for decision-making. Prerequisites: ACCT 131 and Junior standing. (3-0-3) *Offered in Fall.*

ACCT 337 Federal Income Tax I

The basic concepts of Federal tax laws as they relate to the taxation of individuals. Concepts of gross income, exclusions, deductions, exemptions, and credits are covered, as well as property transactions. Prerequisites: ACCT 330 and Junior standing. (3-0-3) *Offered in Spring.*

ACCT 430 Advanced Accounting I

Accounting concepts and practices are investigated in the areas of accounting for multi-corporate entities and acquisitions, accounting for not-for-profit organizations, partnership accounting, statement of cash flows, segment reporting, and international accounting. Prerequisite: ACCT 331. (3-0-3) *Offered in Fall.*

ACCT 432 Cost and Managerial Accounting II

The application of cost and managerial accounting to management decision-making. Topics covered include capital budgeting, transfer pricing, and segment performance evaluation. Students will use the case study approach after exposure to cost and managerial topics of ACCT 332 and ACCT 432. Prerequisite: ACCT 332. (3-0-3) *Offered in Spring.*

ACCT 435 Auditing Theory I

Examination of the process of accumulating and evaluating audit evidence. Areas covered include generally accepted auditing standards, professional ethics, auditors' legal responsibilities, organization of the accounting profession, financial and operational audits, and the impact of U.S. securities laws on auditing. Prerequisite: ACCT 331. (3-0-3) *Offered in Fall.*

ACCT 436 Auditing Theory II

The companion course and sequel to ACCT 435. This course covers recent professional pronouncements as well as the implementation of generally accepted auditing standards through

the integration of sampling techniques and computer software. Practice in solving CPA examination-level problems. Prerequisite: ACCT 435. (3-0-3) *Offered in Spring.*

ACCT 437 Federal Income Tax II

The companion course and sequel to ACCT 337. Federal tax law as it relates to corporations and partnerships in the areas of formation, operations, and distributions is the main emphasis. Other topics include the Internal Revenue Service, estate and gift taxation, and an introduction to tax-research methods. Prerequisite: ACCT 337. (3-0-3) *Offered in Fall.*

ACCT 491 Independent Reading and Research

Independent investigation of problems within the area of the student's special interest, to be supervised by a faculty member. Prerequisites: Consent of instructor and Junior standing. (Credit: Variable)

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) *Offered in Fall and Spring.*

ECON 212 Principles of Microeconomics

Introduction to the theory of markets and the determination of outputs and prices. Topics include demand theory, production theory, a discussion of competition, monopoly and oligopoly and input markets. (3-0-3) *Offered in Spring.*

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) *Offered in Fall and Spring.*

NOTE: STUART SCHOOL OF BUSINESS STUDENTS ARE NOT PERMITTED TO ENROLL IN THIS COURSE.

ECON 491 Independent Reading and Research

Independent investigation of problems within the area of the student's special interest, to be supervised by a faculty member. Prerequisites: Consent of instructor and Junior standing. (Credit: Variable)

Finance

FIN 350 Financial Management

The first course in the study of finance, FIN 350 provides an introduction to the theory and practice of corporate financial management. The main focus is on discounted cash flow techniques, valuing financial instruments, and capital budgeting. In addition, this course introduces capital market theory, capital structure alternatives, risk and return tradeoffs, and financing decision and return tradeoffs, and financing decision considerations. Prerequisites: ACCT 131 and Junior standing. (3-0-3) *Offered in Fall.*

FIN 452 Investments, Portfolio Theory and Portfolio Management

A comprehensive study of portfolio theory, asset classes and investment instruments, securities analysis and portfolio management techniques. The course will examine, not only the traditional securities markets for stocks and bonds, but also recently developed markets for managing portfolio exposures such as equity options, stock index futures and currency contracts. Prerequisite: FIN 350. (3-0-3) *Offered in Fall.*

FIN 454 Options and Futures

An in-depth study of options and futures contracts. Topics will include: contract design, pricing, arbitrage conditions, trading strategies (such as delta-neutral option spreading and technical systems for trading futures), and the uses of options and futures for hedging price risks and for managing portfolio risks and corporate cash flows. Prerequisite: FIN 350. (3-0-3) *Offered in Fall.*

FIN 491 Independent Reading and Research

Independent investigation of problems within the area of the student's special interest, to be supervised by a faculty member. Prerequisites: Consent of the instructor and Junior standing. (Credit: Variable)

Financial Markets & Trading

FMT 351 The Equity Markets

An overview of the markets for stocks and related instruments such as equity options, warrants, stock index baskets, stock index futures. The course will examine the markets for new issues, the secondary, third and fourth markets, as well as derivative markets; and it will focus on how trading in those markets operates and how the various markets are interrelated. Prerequisites: ACCT 131, ECON 211, MSC 221 or permission of the instructor. (3-0-3)

FMT 352 The Markets For Interest Rate Instruments

An overview of the Treasury bill, note and bond markets, markets for short-end interest rate instruments such as bankers acceptances and federal funds, markets for corporate paper and government agency debt, etc. The course will also survey futures, forward and swap markets in interest rate instruments; and it will include discussion of the major foreign debt markets. Prerequisites: ACCT 131, ECON 211, MSC 221 or permission of the instructor. (3-0-3)

FMT 353 The Foreign Currency Markets

An overview of the markets for trading in foreign currencies, including spot and forward markets, swaps, futures and options. The course will include discussion of what determines relative currency prices and some discussion of the pricing of the various derivative instruments. It will include examination of corporate and institutional trading in and uses of these markets and instruments. Prerequisites: ACCT 131, ECON 211, MSC 221 or permission of the instructor. (3-0-3)

FMT 354 The Commodity Markets

An overview of the spot, forward, futures and swap markets for various kinds of commodities, including metals, oil and other energy products,

agricultural products such as grains and meats, and developing areas such as emission allowances. The course will examine the importance of these different markets in the economics of various industries in which they are used, examining topics such as the impact of hedging on pricing decisions and profit margins; and it will examine managed accounts as an investment vehicle. Prerequisites: ACCT 131, ECON 211, MSC 221 or permission of the instructor. (3-0-3)

FMT 356 Investments, Portfolio Theory and Portfolio Management

A comprehensive study of portfolio theory, asset classes and investment instruments, securities analysis and portfolio management techniques. The course will examine, not only the traditional securities markets for stocks and bonds, but also recently developed markets for managing portfolio exposures such as equity options, stock index futures and currency contracts. Prerequisites: FMT 351 or 352, FIN 350, and Junior standing or permission of the instructor. (3-0-3)

FMT 459 Options and Futures

An in-depth study of options and futures contracts. Topics will include: contract design, pricing, arbitrage conditions, trading strategies (such as delta-neutral option spreading and technical systems for trading futures), and the uses of options and futures for hedging price risks and for managing portfolio risks and corporate cash flows. Prerequisites: FMT 351, 352, 353, 354, FIN 350, and Junior standing or permission of the instructor. (3-0-3)

FMT 463 Investment and Trading Strategies

Investment strategies for stocks, bonds, and other traditional investment vehicles; assumptions underlying the various approaches; the trading tactics necessary to implement and manage those strategies; problems that might be expected. Hedging tactics and risk management. Short-term trading strategies for stocks, bonds, currencies, futures, options, and other derivative instruments, and the assumptions underlying each. Software available for some of these approaches. Will involve simulated trading as a critical part

of the subject matter and the final grade.
Prerequisites: FMT 351, 352, 353, 354, 458, and 459 or permission of the instructor. (3-0-3)

Information Systems

IS 326 Information Systems

Applications of information systems to improve business strategy and performance. Functional capabilities of hardware and software. System development and successful implementation. Case studies and software exercises. Prerequisites: CS 103 or 105 and Junior standing. (3-0-3) *Offered in Fall.*

IS 440 Systems Analysis, Design, and Implementation

Structured and object-oriented systems analysis methods are used to prepare user information requirements and hardware specifications. Computer-assisted software engineering (CASE) tools are used. Prerequisites: IS 326. (3-0-3) *Offered in Fall.*

IS 441 Business Data Communications

Data and voice communication systems design address both local and wide-area business applications. Prerequisite: IS 326. Corequisite: IS 440. (3-0-3) *Offered in Fall.*

IS 445 Decision Support & Expert Systems,

The design and use of decision support, expert, and neural network systems to improve business opportunity identification, problem finding, and problem solving. Applications are developed using commercial software. Prerequisite: IS 326 (3-0-3) *Offered in Spring.*

IS 491 Independent Reading and Research

Independent investigation of problems within the area of the student's special interest, to be supervised by a faculty member. Prerequisites: Consent of instructor and Junior standing. (Credit: Variable)

Management

MGT 201 Introduction to Business

This course has been replaced by MGT 421.

MGT 221 Business Law I

Legal implications of business transactions are studied. Specific topics include: the nature of law and its place in society, especially in relation to business; contracts and property law studied by the case method; formation and operation of contracts; their significance to the economic order. (3-0-3) *Offered in Fall.*

MGT 222 Business Law II

A continuation of MGT 221. Agency, partnership, corporations, and negotiable instruments (uniform commercial code) of law studied by the case method. The nature and operation of the judicial process, and its significance for society and business. Prerequisites: MGT 221 or consent of instructor. (3-0-3) *Offered in Spring.*

MGT 314 International Business

An introductory course that studies the economic, financial, marketing, political and cultural environment of international business. Specific topics include: international trade and investment, international monetary systems and foreign exchange markets, multinational corporations and some of the major issues involved in the functional aspects of international business. Prerequisite: Junior standing. (3-0-3) *Offered in Spring.*

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) (S) *Offered in Fall and Spring.*

MGT 421 Human Resources Management

Introduction to the theory and practice of human resources management; basic organization and management problems arising from the employee-employer relationship; wages, recruiting, and selection; health and safety; government regulations; discrimination; unions; and changing work force demographics. Also covered are organization and design of the human resources department, techniques in wage and salary administration, benefits, labor relations, records systems, job analysis, job descriptions, human resources planning, and career planning. Prerequisite: MGT 351 (3-0-3) *Offered in Fall.*

MGT 450 Management Policy

Integration and application of the knowledge and skills learned in the foundation, tools and concepts, and functional field components of the undergraduate management core. Management policy considerations in different settings: private sector, government agencies, non-profit organizations, multinational enterprises. Case studies, field projects, management simulations. Prerequisites: Approximately 40 credit hours in Management, Economics, and Management Sciences; Senior standing or approval of instructor. (3-0-3) *Offered in Fall and Spring.*

MGT 488 The Changing World of Business: A New Perspective for the Technical Professional

The evolution of the business environment. Development of a customer focus in a global environment. Product and service design and development. Helping the workforce deal with the new business environment. (4-0-4)

Management Science

MSC 221 Basic Probability and Statistics

Introduction to probability concepts; descriptive statistics; probability distributions (binomial, Poisson, normal, and t) and their applications. Statistical inference (confidence intervals, hypothesis testing and sample size determination); simple regression and correlation. (3-0-3) *Offered in Fall.*

MSC 312 Introduction to Operations Management

This course has been changed to OM 312.

MSC 315 Management Science

Introduction to the use of mathematical models in the solution of business problems. Linear programming. Network analysis and simulation. Analysis of waiting lines. Prerequisite: MATH 142 or equivalent. (3-0-3) *Offered in Spring.*

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.*

MKT 471 Marketing Research and Consumer Behavior

The marketing research component of this course deals with the techniques used to obtain actionable marketing information. Covered are ways to identify and define marketing opportunities and problems, the design of methods to collect information, management and implementation of the data collection process, the analysis of the results and the communication of these results and their implications to management. Consumer behavior topics include societal, group, lifestyle and cross-cultural influences on behavior, the effects of learning, memory, motivation and attitudes on consumer purchases and the study of the consumer decision process. Prerequisites: MSC 221 or equivalent, and MKT 371. (3-0-3) *Offered in Spring.*

MKT 478 Business Marketing

Covers the analysis of the activities and decisions faced by marketers responsible for selling to businesses and other organizations. Business marketing topics covered include: product/ market selection, segmenting organizational markets, industrial market research, selling in global markets, developing demand forecasts, and cross-

functional coordination required for effective marketing strategies. Prerequisites: MKT 371 and MKT 472. (3-0-3) *Offered in Fall.*

MKT 481 Managing the Marketing Mix

Detailed examination of the ways in which the four components of the marketing mix—the product, the price, distribution channels and communications methods—are managed to achieve desired business objectives. Product policy issues include life cycle, branding, packaging, new product development and product management. Various pricing methods are covered, based on behavioral and economic approaches to pricing. Rationales for their use are discussed. Distribution issues include channel structure and function, retail and wholesale operations, logistics, channel member power and conflict and legal interactions. Communications covers target market identification, sales force participation, setting objectives and budgets, creative message generation, media decisions, and sales and trade promotion. Prerequisite: MKT 371. (3-0-3) *Offered in Fall.*

MKT 482 Promotion/Advertising and Pricing

This course has been replaced by MKT 486, International Marketing.

MKT 483 Sales and Sales Management

Covers the process of selling of business and consumer goods, its functions and techniques. Provides a realistic understanding of what sales people actually do, how they behave, and the problems with which they contend. Focus is on four types of selling: direct, commercial, technical, and consultative. The role of sales management and the purchasing specialist is analyzed. Case studies, role playing, projects are used. Prerequisite: MKT 371. (3-0-3) *Offered in Spring.*

MKT 486 International Marketing

Analysis of the implications of global market dynamics on the strategies of western firms. The increasing global interdependence of various markets will be discussed. Marketing implications of the changes taking place in Western Europe, the former Soviet Union, the people's Republic of China, the Pacific-Rim countries, etc. will be studied. Topics in international mar-

keting include: the concept of globalization; cultural aspects of marketing in international marketplaces; international market entry strategies; global advertising and promotion; political and legal issues; product pricing and distribution decisions in an international environment. Prerequisites: MKT 371. (3-0-3) *Offered in Spring.*

MKT 491 Independent Reading and Research in Marketing

Individualized instruction for students who are advanced in marketing or who have a particular interest in a specific marketing problem. Prerequisites: Submission to the instructor of a concrete program of proposed study, MKT 471, and MKT 472. (Credit: Variable)

MKT 497 Marketing Seminar

Lectures in marketing topics of current interest not covered by regular course offerings. Prerequisites: MKT 471 and MKT 472. (3-0-3)

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.*

OM 423 Operations Systems Design

Analysis and design of product, process, and operations for high-quality and low-cost production. Production process planning and capacity planning. Facilities location and layout planning. Prerequisite: OM 312. (3-0-3) *Offered in Spring.*

OM 424 Operations Planning, Scheduling, and Control

This course has been replaced by OM 442.

OM 433 Quality Management

This course examines the role of quality in organizational effectiveness. Discussion of tools and concepts of continuous improvement in

process, products, services, and internal functions of a business enterprise to continuously improve customer satisfaction. Review of the Baldrige Award criteria and ISO 9000. (3-0-3)
Offered in Spring.

OM 442 Materials Management

The planning and management of the materials functions in manufacturing, purchasing, and distribution. Topics include productions planning, master production scheduling, material requirements planning, distribution requirements planning, inventory control, operation scheduling, capacity planning, and implementation. Prerequisites: OM 312 and MSC 315. (3-0-3)
Offered in Fall.

OM 491 Independent Reading and Research

Independent investigation of problems within the area of the student's special interest, to be supervised by a faculty member. Prerequisites: Consent of instructor and Junior standing.
(Credit: Variable)

Chemical and Environmental Engineering

Chair: *Dr. Hamid Arastoopour 124 Perlstein Hall Ext. 73040*

Professors: *Arastoopour, Beissinger, B. Bernstein, Cinar (Associate Chair, Chemical Engineering), Gidaspow, Linden (Max McGraw Professor), Moschandreas, Noll, Selman, Wasan*

Associate Professors: *Anderson, Holsen (Associate Chair, Environmental Engineering), Parulekar, Venerus*

Assistant Professors: *Chang, Khalili, Pagilla, Schieber, Teymour (S.C. Johnson Polymer Assistant Professor)*

Adjunct Professors: *Caracotsios, Fields, Knowlton, Lindahl, Wang*

Research Professors: *Nikolov*

Part-time Faculty: *Aderangi, Butler, Chylla, Franek, Rasouli*

Faculty Emeritus: *Swanson*

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, and math and engineering sciences. 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 curriculum. Since engineering is largely a team effort, the department develops the individual's ability to work effectively as a team member. To accomplish this, the laboratory program is 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 instruction 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 also have the opportunity to become involved at the undergraduate level with state-of-the-art research projects. As a follow-on, the industry/university co-op program is available to students who would like to use one extra semester 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 (E³)
 Environmental Engineering
 Polymer Science and Engineering
 Bioengineering
 Process Design and Operation

These programs are described on the following pages.

Students may also choose the following minors (see page 25):

Air Force Aerospace Studies	Food Technology
Applied Mathematics	Management for Non-Business Majors
Fire Protection and Safety Engineering	Military Science 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.

Undergraduate Program in Chemical Engineering

	Credit Hours
Required Core	
Major Courses	
CHE 100, 101, 202, 301, 303, 317, 351, 406, 418, 422, 436, 439, 451, 495, 496	42
Mathematics Requirements	
MATH 151, 152, 251, 252	18
Physics Requirements	
PHYS 103, 104, 203	11
Chemistry Requirements	
CHEM 124, 125, 237, 239, 243, 244, 247	25
Computer Science Requirement	
CS 105	2
Engineering Course Requirements	
MECH 200, ECE 383	6
Humanities and Social Sciences Requirements	
ENGL 101, HUM 100-level	6
Humanities Electives (300-level and above)	6
Social Sciences Electives (6 hours 300-level and above)	12
Electives	
Technical Electives	12
Total Credit Hours	140

B.S. Chemical Engineering Curriculum

				Credit									
				Lect.	Lab.	Hrs.							
First Semester							Second Semester						
MATH 151				4	2	5	MATH 152				4	2	5
CHEM 124				3	3	4	PHYS 103				3	0	3
CS 105				2	1	2	CHEM 125				3	3	4
CHE 100				1	2	2	HUM 100-level course*				3	0	3
ENGL 101*				3	0	3	CHE 101				0	4	2
Social Sciences Elective*				3	0	3							
Totals				16	8	19	Totals				14	9	17
Third Semester							Fourth Semester						
MATH 252				4	0	4	MATH 251				4	0	4
CHE 202				2	2	3	PHYS 203				3	3	4
CHEM 237				3	4	4	CHEM 239				3	0	3
PHYS 104				3	3	4	CHEM 243				4	0	4
MECH 200				3	0	3	CHE 301				3	0	3
Totals				15	9	18	Totals				17	3	18
Fifth Semester							Sixth Semester						
CHE 303				4	0	4	CHE 317				1	3	2
CHE 351				3	0	3	CHE 439				3	0	3
CHEM 244				3	0	3	ECE 383				3	0	3
CHEM 247				2	4	3	Technical Elective				3	0	3
Humanities Elective*				3	0	3	Humanities Elective*				3	0	3
Totals				15	4	16	Totals				16	3	17
Seventh Semester							Eighth Semester						
CHE 418				1	3	2	CHE 406				3	0	3
CHE 422				4	0	4	CHE 451				2	0	2
CHE 436				3	3	4	CHE 496				2	2	3
CHE 495				1	2	2	Technical Elective				3	0	3
Technical Elective				3	0	3	Technical Elective				3	0	3
Social Sciences Elective*				3	0	3	Social Sciences Elective*				3	0	3
Totals				15	8	18	Totals				16	2	17
								Total Credit Hours				140	

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

* Humanities and social sciences components of the General Education Program (see p. 18 for details).

Professional Specializations

Students choosing one of the Professional Specializations should take a total of five courses in each specialization area in place of four technical electives plus one social sciences elective.

- Energy/Environment/Economics (E³)** — Program Adviser: H. Arastoopour
Students selecting the E³ specialization take three- or six-credit-hour courses in Special Problems or Research in Energy (CHE 492 or MAE 491/497 or ECE 491/497). In addition they choose three or four courses, at least one course from each of the following three areas. Appropriate substitutions may be made with the approval of E³ program advisers.

- Energy Sources and Conversion—CHE 430, 460, 465, 481, 482, 483, ECE 331, 431, and MAE 450.
 - Energy and Power Distribution and Utilization/Environment—CHE 488, 489, MAE 452, 453, 454, and ENVE 463, 476, 480, 485, ECE 411, 419, 420, 434/438.
 - Energy Analysis, Economics, and Policy—CHE 426, 541, 543, CS 480, ECON 423, LAW 330, and PS 338.
2. **Environmental Engineering** — Program Adviser: T. Holsen
Students must take the following three courses: ENVE 404, 463, 480. In addition they should choose two courses from the following: CHE 426, ENVE 401, 476, 485, 496, 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, and the manufacture of polymeric raw materials and their processing into finished products. Five courses (15 credit hours) should be taken as follows: CHE 450 (required), at least three courses (9 credit hours) chosen from CHE 492, 538, 555, 575, 581, CHEM 535, METM 480, 542, 581, and up to one course (3 credit hours) from the following: CHE 426, 460, 489, CHEM 423, 435, 537, MAE 422, 479, and FST 404. Appropriate substitutions may be made with the approval of the program adviser.
 4. **Bioengineering** — Program Advisers: R. Beissinger and S. Parulekar
Bioengineering has two career specializations:
 - Biomedical Engineering: The five elective courses (15 credit hours) are allocated as follows: BIOL 107 and CHE 411 must be taken. Three electives are chosen from BIOL 403, 410, 414, and 430.
 - The Biotechnology option, designed for students interested in careers in biochemical engineering and biotechnology, is described on page ??.
Students choosing this option may substitute CHE 426 for CHE 411 with approval of the program adviser.
 5. **Process Design and Operation** — Program Adviser: A. Cinar
For students interested in design, operation, monitoring, optimization, and control of chemical processes. At least three courses (9 credit hours) must be taken from the following: CHE 426, 431, 437, 507, 508, 528, 530, 532, 560, and MATH 486. Up to two courses may be selected from the following (only one ENVE course): CHE 402, 430, 455/555, 461, 465, 489, 492, ENVE 450, 476, 485 and FST 403.

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.

B.S. Environmental Engineering Curriculum

First Semester				Credit			Second Semester				Credit				
	Lect.	Lab.	Hrs.		Lect.	Lab.	Hrs.		Lect.	Lab.	Hrs.		Lect.	Lab.	Hrs.
ENVE 100	0	2	2	ENVE 101	0	2	2	MATH 151	4	2	5	MATH 152	4	2	5
MATH 151	4	2	5	CHEM 124	3	3	4	CHEM 124	3	3	4	CHEM 125	3	3	4
CHEM 124	3	3	4	CS 105	2	1	2	PHYS 103	3	0	3	PHYS 103	3	0	3
CS 105	2	1	2	ENGL 101*	3	0	3	Humanities Elective*	3	0	3	Humanities Elective*	3	0	3
ENGL 101*	3	0	3	BIOL 107	3	0	3	Totals	13	7	17	Totals	13	7	17
BIOL 107	3	0	3	Totals	15	8	19								
Totals	15	8	19												
Third Semester				Credit			Fourth Semester				Credit				
	Lect.	Lab.	Hrs.		Lect.	Lab.	Hrs.		Lect.	Lab.	Hrs.		Lect.	Lab.	Hrs.
MATH 252	4	0	4	MATH 251	4	0	4	MATH 251	4	0	4	MATH 301	3	0	3
CHE 202	2	2	3	CHE 301	3	0	3	CHE 301	3	0	3	PHYS 203	3	3	4
PHYS 104	3	3	4	PHYS 203	3	3	4	PHYS 203	3	3	4	CHEM 243	4	0	4
CHEM 237	3	0	3	CHEM 243	4	0	4	CHEM 243	4	0	4	Social Sciences Elective*	3	0	3
MECH 200	3	0	3	Social Sciences Elective*	3	0	3	Social Sciences Elective*	3	0	3	Totals	17	3	18
Totals	15	5	17	Totals	17	3	18	Totals	17	3	18				
Fifth Semester				Credit			Sixth Semester				Credit				
	Lect.	Lab.	Hrs.		Lect.	Lab.	Hrs.		Lect.	Lab.	Hrs.		Lect.	Lab.	Hrs.
ENVE 302	2	3	3	ENVE 305	3	0	3	ENVE 305	3	0	3	ENVE 463	3	0	3
CHE 303	3	0	4	ENVE 463	3	0	3	ENVE 463	3	0	3	BIOL 421	3	3	4
CHE 351	3	0	3	BIOL 421	3	3	4	BIOL 421	3	3	4	ENVE 404	3	0	3
CHEM 244	3	0	3	ENVE 404	3	0	3	ENVE 404	3	0	3	Humanities Elective*	3	0	3
Social Sciences Elective*	3	0	3	Humanities Elective*	3	0	3	Humanities Elective*	3	0	3	Social Sciences Elective*	3	0	3
Totals	14	3	16	Social Sciences Elective*	3	0	3	Social Sciences Elective*	3	0	3	Totals	18	3	19
Totals	14	3	16	Totals	18	3	19	Totals	18	3	19				
Seventh Semester				Credit			Eighth Semester				Credit				
	Lect.	Lab.	Hrs.		Lect.	Lab.	Hrs.		Lect.	Lab.	Hrs.		Lect.	Lab.	Hrs.
CHEM 247	2	2	3	ENVE 490	1	3	2	ENVE 490	1	3	2	ENVE 481	2	3	3
CHE 422	4	0	4	ENVE 481	2	3	3	ENVE 481	2	3	3	ENVE 496	3	0	3
CHE 426	3	0	3	ENVE 496	3	0	3	ENVE 496	3	0	3	Technical Elective	3	0	3
ENVE 495	2	0	2	Technical Elective	3	0	3	Technical Elective	3	0	3	Humanities Elective*	3	0	3
ENVE 407	1	3	2	Humanities Elective*	3	0	3	Humanities Elective*	3	0	3	Social Sciences Elective*	3	0	3
Technical Elective	3	0	3	Social Sciences Elective*	3	0	3	Social Sciences Elective*	3	0	3	Totals	15	6	17
Totals	15	5	17	Totals	15	6	17	Totals	15	6	17	Totals	15	6	17
Totals	15	5	17	Totals	15	6	17	Totals	15	6	17	Total Credit Hours	140		

ROTC students may substitute two technical electives and one social sciences courses with ROTC required courses.

* Humanities and social sciences components of the General Education Program (see page 18 for details).

Double Degree Option

This innovative program has been designed to train a new breed of engineer for the 21st century—one who is knowledgeable in the fundamental principles of chemical engineering science and design, who also has a clear understanding of environmental issues and their assessment. At the end of this 4 1/2-year program, the student receives a double B.S. degree in chemical engineering and environmental engineering, and is qualified to assume a leading role in the design and development of technologies and processes that prevent pollution and eliminate waste.

Double Degree Curriculum**

				Credit							Credit		
First Semester				Lect.	Lab.	Hrs.	Second Semester				Lect.	Lab.	Hrs.
CHE/ENVE 100				1	2	2	CHE/ENVE 101				1	2	2
MATH 151				4	2	5	MATH 152				4	2	5
CHEM 124				3	3	4	CHEM 125				3	3	4
CS 105				2	1	2	PHYS 103				3	0	3
ENGL 101*				3	0	3	Humanities Elective*				3	0	3
BIOL 107				3	0	3	Totals				14	7	17
Totals				16	8	19							
Third Semester							Fourth Semester						
MATH 252				4	0	4	MATH 251				4	0	4
CHE 202				2	2	3	CHE 301				3	0	3
PHYS 104				3	3	4	PHYS 203				3	3	4
CHEM 237				3	4	4	CHEM 243				4	0	4
MECH 200				3	0	3	CHEM 239				3	0	3
Totals				15	9	18	Totals				17	3	18
Fifth Semester							Sixth Semester						
ENVE 302				2	3	3	ENVE 305				3	0	3
CHE 303				4	0	4	ENVE 463				3	0	3
CHE 351				3	0	3	BIOL 421				3	3	4
CHEM 244				3	0	3	ENVE 404				3	0	3
Social Sciences Elective*				3	0	3	CHE 317				1	3	2
Social Sciences Elective*				3	0	3	CHE 439				3	0	3
Totals				18	3	19	Totals				16	6	18
Seventh Semester							Eighth Semester						
CHE 418				1	3	2	ENVE 490				1	3	2
CHE 422				4	0	4	ENVE 481				2	3	3
CHE/ENVE 495				2	0	2	ENVE 496				3	0	3
CHE 436				3	3	4	CHE 496				3	0	3
Social Sciences Elective*				3	0	3	CHE 406				3	0	3
Humanities Elective*				3	0	3	CHE 451				2	0	2
Totals				16	6	18	Totals				14	6	16
				Credit									
Ninth Semester				Lect.	Lab.	Hrs.							
ENVE 407				1	3	2							
CHE 426				3	0	3							
CHEM 247				2	4	3							
EE 383				3	0	3							
Social Sciences Elective*				3	0	3							
Humanities Elective*				3	0	3							
Totals				15	7	17							
Total Credit Hours										160**			

* Humanities and social sciences components of the General Education Program (see page 18 for details).

** Total credit hour requirement is pending final approval by the University faculty. ROTC students require 5 years to complete the double degree program.

Course Descriptions

Numbers in parentheses indicate: (lecture hours-laboratory hours-credit hours).

Chemical Engineering

CHE 100 Introduction to Profession I

Introduction to engineering and software of the PC. Typically will include word processing, spreadsheets, graphics, data communications and database software. (1-2-2).

CHE 101 Introduction to Profession II

A continuation of CHE 100. Application of PC software to engineering problems with emphasis on numerical methods and statistical techniques. Prerequisite: CHE 100. (0-4-2)

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 year of chemistry. (2-2-3)

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. Corequisite: CHEM 243, MATH 251. (3-0-3)

CHE 303 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. Prerequisites: CHE 301 Corequisite: CHEM 244. (4-0-4)

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)

CHE 351 Chemical Engineering Thermodynamics

Laws of thermodynamics and their application to chemical engineering operations. Prerequisite: CHEM 243. (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 orthogonal 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 303, and MATH 252. (3-0-3)

CHE 411 Introduction to Bioengineering

Application of engineering principals to biochemical and biomedical systems. The principals of transport phenomenon and reaction kinetics are applied to biological systems. Topics include: microbial pathways, biological systems, energetics and control systems, enzyme and macrobial kinetics and the design and analysis of biological reactors. Biomedical engineering 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 303. Corequisite: CHE 422. (3-0-3)

CHE 418 Chemical Engineering Laboratory II

Laboratory work in distillation, humidification, drying, gas absorption, filtration, and other areas. Prerequisites: CHE 303, CHE 317, and CHEM 247. (1-3-2)

CHE 422 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 303, CHE 351. (4-0-4)

CHE 426 Statistical Tools for Engineers

Probability distributions, random sampling, independence, significant 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 495. (3-0-3)

CHE 431 Artificial Engineering 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 436 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 303. (4-0-4)

CHE 437 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, applications. Prerequisite: Consent of instructor. (3-0-3)

CHE 439 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 303, 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, calendaring, fiber spinning, injection molding, mixing, and polymerization reaction. Prerequisites: CHE 301, CHE 303. (3-0-3)

CHE 460 Interfacial and Colloidal Phenomena with Applications

Applications of the basic principles of physical chemistry; surfactants and interfacial phenomena, surface and interfacial tension, adsorption of surfactants from solutions, spreading, contact

angles, wetting, electrokinetic phenomena, rheology, dynamic interfacial properties, mass transport across interfaces. Applications include emulsions, foams, dispersions, tribology, detergency, flotation, enhanced oil recovery, suspension and emulsion polymerization and liquid membranes. Hands-on laboratory experience for making measurements of interfacial properties will be emphasized. Prerequisite: CHEM 243. (2-2-3)

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 and 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 481 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 482 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 483 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 486 Applied Particulate Technology

Applications of the 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 489 Fluidization

Regimes of fluidized beds, rheology behavior of fluidized beds, particles 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 303. (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 495 Chemical Process Design I

Introduction to design techniques and economic aspects of chemical processes. The technical and economic aspects of equipment selection and design, alternative methods of operation. Prerequisite: CHE 303. (1-2-2)

CHE 496 Chemical Process Design II

Comprehensive problems are assigned which include heat, material and economic balances, unit operations and processes, kinetics and thermodynamics. The major responsibility is placed on individuals or small groups for the optimum

design and selection of equipment, and for the calculations of required sizes, plant layout, and cost analyses. Prerequisite: CHE 495. (2-2-3)

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.

CHE 501 Transport Phenomena

CHE 503 Chemical Engineering Thermodynamics

CHE 507 Computer-Aided Design

CHE 512 Heat Transfer

CHE 518 Principles of Diffusional Operations

CHE 525 Chemical Reaction Engineering

CHE 530 Advanced Process Control

CHE 535 Applications of Mathematics to Chemical Engineering

CHE 543 Energy, Environment, and Economics

CHE 560 Statistical Quality and Process Control

CHE 587 Particle Processing and Characterization

Environmental Engineering

ENVE 100 Introduction to Profession I

Introduction to engineering and software of the PC. Typically will include word processing, spreadsheets, graphics, data communications and database software. (1-2-2)

ENVE 101 Introduction to Profession II

A continuation of ENVE 101. Application of PC software to engineering problems with emphasis on numerical methods and statistical techniques. Prerequisite: ENVE 101. (0-4-2)

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 244. (2-3-3)

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.

Prerequisite: 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: CHE 426. (1-3-2)

ENVE 450 Analysis of Environmental Systems

Principles and procedures required for analysis of data from experimental, pilot, and full-scale environmental systems. Includes applications of

statistical and other mathematical techniques in the design and evaluation of complex systems, and in the interpretation of environmental phenomena. (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. Prerequisite: ENVE 305, CHE 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. Corequisite: ENVE 404, ENVE 463. (2-3-3)

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 490 Environmental Processes Laboratory

Laboratory work in environmental processes including filtration, gas transfer, adsorption, biological systems, and other selected topics. Prerequisite: ENVE 404, ENVE 463 (1-3-2)

ENVE 495 Environmental Engineering Design I

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 303. (2-0-2)

ENVE 496 Environmental Engineering Design II

A lecture and laboratory course on the design of physical, chemical, and biological treatment processes. Includes problem definition, evaluation of treatment options, and detailed design of optimal solutions. Prerequisite: ENVE 404, ENVE 463, ENVE 495. (3-0-3)

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 Meteorology

ENVE 572 Ambient Air Monitoring

ENVE 576 Indoor Air Pollution

ENVE 585 Groundwater Contamination and Pollutant Transport

Civil and Architectural Engineering

Chair: *Dr. David Arditi 228 Alumni Memorial Ext. 73540*

Professors: *Arditi, Dygdon, Guralnick (Perlstein Distinguished Professor), Khisty, Mohammadi*

Adjunct Professors: *Carreira, Gill*

Associate Professors: *Budiman, O'Leary*

Adjunct Associate Professors: *Bak, Paintal*

Assistant Professors: *Novak (visiting), Shen, Suen*

Adjunct Assistant Professors: *Domel, Fazio, Frano, Jahedi*

Instructors: *Briggs, Rybicki*

Faculty Emerti: *Chu, Fiesenheiser, Hrachovsky, Loving, Milbradt*

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 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 upon technical knowledge but also on 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 25).

Architecture students who plan to pursue a master's degree in structural engineering should take CAE 303, 304, 307, 310, 340, 437, and 438 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 before their senior year. The examination is offered by the State of Illinois in October and April. Please contact the Civil and Architectural Engineering Department office for information on how to register to take the examination.

Civil Engineering

Required Core	Credit
Major Courses	Hours
CAE 100, 101, 301, 303, 304, 305, 307, 310, 321 (or ENVE 404), 323, 419, 437, 438, 457, 460, 470, and two technical electives	53
Mathematics Requirements	
MATH 151, 152, 251, 252, and one applied MATH Elective	21
Physics Requirements	
PHYS 103, 104, 203	11
Chemistry Requirements	
CHEM 124	4
Computer Science Requirement	
CS 105	2
Engineering Course Requirements	
ECE 383, MECH 201, 202, 203, 305, MAE 205	18
Humanities and Social Sciences Requirements	
ENGL 101, 100-level HUM	6
Humanities Electives (300-level and above)	6
Social Science Electives (6 hrs. 300-level +)	12
Electives	
Science Elective (MS 101 or CHEM 126)	3
Total Credit Hours	136

Curriculum for Civil Engineering

First Semester	Credit			Second Semester	Credit		
	Lect.	Lab.	Hrs.		Lect.	Lab.	Hrs.
MATH 151	4	2	5	MATH 152	4	2	5
CHEM 124	3	3	4	Science Elect.			
CAE 100	1	2	2	(MS 101 or CHEM 126)	3	0	3
ENGL 101*	3	0	3	CS 105	2	1	2
Social Sciences Elective*	3	0	3	CAE 101	0	4	2
Totals	14	7	17	PHYS 103	3	0	3
				HUM 100-level course*	3	0	3
				Totals	15	7	18
Third Semester				Fourth Semester			
MATH 251	4	0	4	MATH 252	4	0	4
MECH 201	3	0	3	MECH 202	3	0	3
CAE 305	2	2	3	MECH 203	3	0	3
PHYS 104	3	3	4	PHYS 203	3	3	4
Social Sciences Elective*	3	0	3	MAE 205	3	0	3
Totals	15	5	17	Totals	16	3	17

				Credit							Credit		
Fifth Semester				Lect.	Lab.	Hrs.	Sixth Semester				Lect.	Lab.	Hrs.
MECH 305				3	0	3	CAE 301				2	3	3
CAE 303				2	3	3	CAE 307				2	3	3
CAE 304				3	0	3	CAE 310				3	0	3
Applied MATH Elective**				3	0	3	CAE 321						
Humanities Elective*				3	0	3	or						
Social Sciences Elective*				3	0	3	ENVE 404				3	0	3
Totals				17	3	18	CAE 323				2	3	3
							Humanities Elective*				3	0	3
							Totals				15	9	18
Seventh Semester							Eighth Semester						
CAE 419				3	0	3	CAE 438				3	3	4
CAE 437				3	3	4	CAE 460				1	3	2
CAE 457				3	0	3	ECE 383				3	0	3
CAE 470				2	3	3	Social Sciences Elective*+				3	0	3
Technical Elective				3	0	3	Technical Elective				3	0	3
Totals				14	6	16	Totals				13	6	15
							Total Credit Hours						136

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

* Humanities and social sciences components of the General Education Program (see p. 18 for details).

** Applied MATH elective: Choose one of MATH 331, MATH 471, or MATH 474.

+ Students who select a specialization will take a technical elective instead.

Professional Specializations in Civil Engineering

Students who select an area of specializations must take nine credit hours of technical electives. A minimum of six credit hours must be taken from the following technical electives listed under the respective area of specialization. The remaining three credit hours can be any 400-level CAE course taken with prior approval of the student's adviser and chair. Students who do not select an area of specialization must take six credit hours of CAE technical electives and may replace CAE 437 and 438 by CAE technical electives of their choice.

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 321-Engineering Geology, 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 473-Construction Project Administration.

Civil-Environmental Engineering: ENVE 401-Introduction to Water Resources Engineering, ENVE 480-Solid Waste Engineering, and CE 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 that offers students an opportunity to obtain their 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 as 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 application of building projects. Architectural engineering students should have an aptitude of appreciation for 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.

Architectural Engineering

Required Core	Credit Hours
Major Courses	
CAE 100, 101, 201, 202, 302, 401, 402, ARCH 203, 205 309, 310, CAE 303, 304, 305, 307, 310, 323, 457, 470, 471 and three technical electives**	68
Mathematics Requirements	
MATH 151, 152, 251, 252	18
Physics Requirements	
PHYS 103, 104, 203	11
Chemistry Requirement	
CHEM 124	4
Computer Science Requirement	
CS 105	2
Engineering Course Requirements	
EE 383, MAE 205	6
Humanities and Social Sciences Requirements	
ENGL 101, 100-level HUM	6
Humanities Electives (300-level and above)	6
Social Science Electives (6 hrs. 300-level +)	12
Electives	
Science Elective (METM 101 or CHEM 126)	3
Total Credit Hours	136

Curriculum for Architectural Engineering

				Credit							
First Semester				Lect.	Lab.	Hrs.	Second Semester				
							Lect.	Lab.	Hrs.	Credit	
MATH 151				4	2	5	MATH 152	4	2	5	
CHEM 124				3	3	4	MS 101 or				
CAE 100				1	2	2	CHEM 126	3	0	3	
ENGL 101*				3	0	3	CS 105	2	1	2	
Social Sciences Elective*				3	0	3	CAE 101	0	4	2	
Totals				15	7	17	PHYS 103	3	0	3	
							HUM 100-level*	3	0	3	
							Totals	15	7	18	
Third Semester							Fourth Semester				
MATH 251				4	0	4	MATH 252	4	0	4	
ARCH 203				3	0	3	CAE 201	2	3	3	
CAE 305				2	2	3	CAE 202	4	0	4	
PHYS 104				3	3	4	ARCH 205	2	2	3	
Humanities Elective*				3	0	3	PHYS 203	3	3	4	
Totals				15	5	17	Totals	15	8	18	
Fifth Semester							Sixth Semester				
MAE 205				3	0	3	CAE 302	3	0	3	
CAE 303				2	3	3	CSE 307	2	3	3	
CAE 304				3	0	3	ARCH 310	3	0	3	
ARCH 309				1	2	2	CAE 323	2	3	3	
Humanities Elective*				3	0	3	CAE 310	1	2	2	
Social Sciences Elective*				3	0	3	EE 383	3	0	3	
Totals				15	5	17	Totals	14	8	17	
Seventh Semester							Eighth Semester				
CAE 457				3	0	3	CAE 471	3	0	3	
CAE 470				2	3	3	CAE 402	0	6	2	
CAE 401				1	3	2	Social Science Elective*	3	0	3	
Social Science Elective*†				3	0	3	Technical Elective	4	0	4	
Technical Elective				4	0	4	Technical Elective	4	0	4	
Totals				13	6	15	Totals	14	6	16	
Total Credit Hours										136	

* Humanities and social sciences components of the General Education Program (see p. 18 for details).

† Students who select a specialization will take a technical elective instead.

Professional Specializations in Architectural Engineering

Students who select an area of specializations must take fifteen credit hours of technical electives from the following courses listed under the respective area of specialization. Students who do not select an area of specialization must take twelve credit hours of technical electives from the courses listed under the area of specializations.

Structural Engineering: CAE 435-Experimental Analysis of Structures, CAE 437-Steel and Timber Design, CAE 438-Concrete and Foundation Design, CAE 442-Finite Element Methods in Framed Structures, and CAE 410-Introduction to Wind and Earthquake Engineering.

Mechanical and Environmental Systems: CAE 422-Finite Element Methods in Framed Structures, CAE 425-Fire Protection and Life Safety in Building Design, CAE 483-Environmental Systems for Buildings I, CAE 484-Environmental Systems for Buildings II, ARCH 421-Energy Conscious Design I, and ARCH 422-Energy Conscious Design II.

Construction Management: CAE 430-Probability Concepts in Civil Engineering, CAE 437-Steel and Timber Design, CAE 438-Concrete and Foundation Design, CAE 472-Construction Site Operation, CAE 473-Construction Project Administration, and CAE 486-Soil and Site Improvement.

Fire Protection and Safety: CAE 421-Risk Assessment Engineering, CAE 422-Sprinklers, Standpipes, Fire Pumps, Special Detection and Suppression Systems, CAE 424-Introduction to Fire Dynamics, CAE 425- Fire Protection and Life Safety in Building Design, and CAE 426- Computer Fire Modeling Theory and Application.

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, and 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.

Architectural Technology

- 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)

Engineering Graphics and CAD

- 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 his or her professional goals. Consult the department for advice on appropriate courses.

Course Descriptions

Numbers in parentheses indicate: (lecture hours-laboratory hours-credit hours).

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

CAE 100 Introduction to Engineering I

Introduction to engineering and software of the PC. Typically will include word processing, spreadsheets, graphics, data communications and database software. (1-2-2)

CAE 101 Introduction to Engineering II

A continuation of CAE 100. Application of PC software to engineering problems with emphasis

on numerical methods and statistical techniques. Basic traditional and computer-based technology and applications, multiview sketching, orthographic projection, isometric and oblique pictorials, sectioning, auxiliary views, principles of description geometry, dimensioning, detail drawings, introduction to design and computer-aided drafting and design (CAD). Prerequisite: CAE 100. (0-4-2)

CAE 201 Construction Materials

A study of physical and chemical properties, types, uses, and application of construction

materials, construction methods, systems, and standards; moisture control; heat control; sound control. Basic principles, concepts and role of specification writing and relations to contract documents are discussed. Prerequisite: Consent of instructor. (3-0-3)

CAE 202 Statics and Strength of Materials

Two- and three-dimensional statics of particles and rigid bodies. Statically equivalent force systems. Simple trusses analysis. Beam analysis, shear and bending moment diagrams. Concept of stress and strain, stress-strain relations. Beam theory, statically indeterminate beams. Buckling of column. (4-0-4)

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)

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: MECH 305. (2-3-3)

CAE 302 Fluid Mechanics and Hydraulics

Fundamental concepts; fluid statics; properties of fluid in motion; fluid flows through orifices,

weirs, venturi meters; laminar and turbulent flow in closed conduits; flow in open channels; turbomachinery; measurement in fluid mechanics and hydraulics. Prerequisites: MAE 205, 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: MECH 203. (2-3-3) (D)

CAE 304 Structural Analysis I

The analysis of statically determinate trusses and frames. Determination of internal forces and calculation of deflections. Application of the principle of virtual work and energy methods. Column stability. Prerequisites: MECH 203, MATH 252. (3-0-3)

CAE 305 Geodetic Science

Measurement of distances and angles. Theory of errors. Study of leveling, traversing, topographic mapping, route surveying, earthwork computation, photogrammetry, and boundary surveys. Practice in the use of tapes, levels, transits, and photogram-metric equipment. Prerequisites: EG 105, MATH 151. (2-2-3)

CAE 307 Structural Design II

Design loads, factor of safety, load and resistance factors for concrete structures. Properties of concrete making materials and the proportioning of concrete mixtures. Experimental and analytical study of plain and reinforced concrete subjected to various states of stress. Failure theories and the ultimate strength of plain and reinforced concrete structural components. The design of beams, columns, and slabs in reinforced concrete. Prerequisites: MECH 203, CAE 304. (2-3-3) (D)

CAE 310 Structural Analysis II

The analysis of statically indeterminate frames. Application of classical methods including superposition, slope deflection, and moment

distribution. Introduction to the direct stiffness method and computer analysis of structures. Prerequisite: CAE 304. (3-0-3)

CAE 321 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 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: MECH 203, CAE 301. (2-3-3)

CAE 351* Structures II: Steel and Timber 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)

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)

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

Newton's laws of motion, energy, 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)

CAE 419 Highway 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. (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: MECH 305. (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: MAE 310, MECH 305, 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 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, 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, 310; or CAE 351, 352. (2-2-3)

CAE 437 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. (3-3-4) (D)

CAE 438 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, 310. (3-3-4) (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 457 Geotechnical Foundation Design

Methods of subsoil exploration. Study of types and methods of design and construction of foundations for structures, including single and combined footings, mats, piles, caissons, retaining walls, and underpinning. Drainage and stabilization. Prerequisites: CAE 301, CAE 323. (3-0-3) (D)

CAE 460 Computer-Aided Design in Civil Engineering

This is a design project with emphasis on understanding and implementing concepts of civil engineering design in real applications with the use of computer-aided design (CAD) system. The project requires design of a civil engineering facility and involves such topics as design of steel or reinforced concrete structures,

foundation design, transportation planning, construction scheduling and cost estimating, and water treatment facility design. Introduction to CAD system is presented and the project is conducted in the CAD laboratory. Prerequisite: Senior standing. (1-3-2) (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)

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 482 Hydraulic Design of Open Channel Systems

Uniform flow design; backwater profiles in natural streams; gradually varied flow practical problems; spatially varied flow; flow through nonprismatic and nonlinear channels; gradually varied unsteady flow; rapidly varied unsteady flow; flood routing; numerical solutions of open channels. Prerequisite: CAE 301 or consent of instructor. (3-0-3) (D)

CAE 483, 484 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 486 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)

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 empha-

sis 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, 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 draw-

ings, 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 which 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, 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. 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 multimedia 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.

Computer Science and Applied Mathematics

Chair: *Dr. C. Robert Carlson 236B Stuart Building Extension 75150*

Professors: *Byrne, Campbell, Carlson, Deliyannis, Edelstein, Evens, Frank, B. Bernstein (jointly with Chemical Engineering), Erber (jointly with Physics), Nair (jointly with Mechanical and Aerospace Engineering)*

Associate Professors: *Adler, Bauer, I. Burnstein, Christopher, Elrad, Grace, Greene, Heller, Kenevan, Korel, Lubin, Robergé (Associate Chair, Computer Science), Stueben*

Assistant Professors: *Wang*

Adjunct Associate Professors: *Biernat, Drakopoulos, Lidinsky, Rinaldo, Soneru, Wallace*

Adjunct Assistant Professors: *Goldberg, Nowicki*

Senior Lecturers: *Maslanka, Sitton*

Instructors: *Biardo, Bistriceanu, Brandle, Manov*

Faculty Emeriti: *Darsow, De Cicco, Pearson, Reingold, Sklar, Wilcox*

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, for instance. 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.

The department offers a Bachelor of Science in Computer Science. This program begins with a set of introductory courses that work together to provide students with a firm foundation in computer science. These introductory courses use weekly laboratories to immerse students in the practice of computer science by encouraging them to explore “hands-on” how contemporary software development techniques can be used to create solutions to interesting problems. Having completed the introductory sequence, 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 the B.S. Program build upon this foundation. Students explore the conceptual underpinnings of fundamental algorithms, programming languages, operating systems, and software engineering techniques. In addition, students choose from a rich set of electives in areas such as artificial intelligence, computer graphics, database systems, computer networks, and computer architecture, among others. As with the introductory sequence, these advanced courses stress learning by doing. A generous allotment of free elec-

tives allows students to balance study in computer science with study in other fields—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. In this way, students to learn to combine theory with practice to solve problems in a range of domains and computational environments.

The Bachelor of Science Degree in Computer Engineering (B.S.C.P.E.) is offered in conjunction with the Department of Electrical and Computer Engineering. 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 (see page 126).

The Department of Computer Science and Applied Mathematics also offers a set of specialized minors in selected areas in applied mathematics (actuarial science, applied mathematics, engineering analysis, probability and statistics) and computer science (artificial intelligence, computational structures, computer architecture, database management, programming languages, software engineering, and systems programming/operating systems). These minors provide a solid background for students in other disciplines who wish to apply computing and applied mathematics within their chosen field of study (see page 115).

Preprofessional Bachelor of Science with a Specialization in Computing

The department will soon offer a preprofessional Bachelor of Science with a specialization in Computing that 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. Graduates will be well-situated to pursue advanced study and careers in which they blend their computer science abilities with skills specific to another domain to solve problems in that domain. Examples include: computing with a business focus (accounting, finance, management information systems, etc.), computing with a physical science focus (computational chemistry, physics, etc.), and computing with a design focus (information design).

Preprofessional Bachelor of Science with a Specialization in Applied Mathematics

The department is in the process of developing a Bachelor of Science degree with a specialization in Applied Mathematics. The multidisciplinary nature of the preprofessional program combined with the Applied Mathematics specialization will help the student develop logical thinking and quantitative ability best serving as excellent preparation for professions such as law, business, and

medicine. The program also provides students with the necessary background to apply mathematical techniques to a variety of problems arising in engineering or in the sciences. Those interested should contact the Department of Computer Science and Applied Mathematics for an approved program of study.

Bachelor of Science in Computer Science

Required Core	Credit Hours
Major Courses	Hours
CS 100, 101, 105, 200, 330, 331, 350, 351 430, 440, 450, 487, 493, 494	36
Computer science electives	14
Mathematics requirements	
MATH 151, 152, 251 or 252	14
Math electives	6
Science / engineering requirements	
PHYS 103, 104	7
Science / engineering electives	6
Humanities requirements	
ENGL 101	3
HUM 100level	3
PHIL 374 or CS 485	3
Humanities electives	6
Social science requirements	
Social science electives (at least 3 hours in ECON or MGT)	12
Non-technical elective	3
Minor / free electives	15
Total credit hours	128

Bachelor of Science Curriculum

Computer Science

First Semester	Credit			Second Semester	Credit		
	Lect.	Lab.	Hrs.		Lect.	Lab.	Hrs.
CS 100	1	2	2	CS 101	0	4	2
CS 105	2	1	2	CS 200	2	2	3
MATH 151	4	2	5	MATH 152	4	2	5
ENGL 101	3	0	3	PHYS 103	3	0	3
Social Science Elective	3	0	3	HUM 100-level	3	0	3
Totals	13	5	15	Totals	12	8	16

Third Semester	Credit			Fourth Semester	Credit		
	Lect.	Lab.	Hrs.		Lect.	Lab.	Hrs.
CS 330	3	0	3	CS 350	2	2	3
CS 331	2	2	3	CS 430	3	0	3
MATH 251 or 252	4	0	4	Math elective			
PHYS 104	3	3	4	Science/Eng. Elective	3	0	3
Humanities Elective	3	0	3	Social Science Elective	3	0	3
Totals	15	5	17	Totals	13	5	15

Fifth Semester	Credit			Sixth Semester	Credit		
	Lect.	Lab.	Hrs.		Lect.	Lab.	Hrs.
CS 351	2	2	3	CS 440	3	0	3
CS Elective	3	0	3	CS Elective	2	0	2
Science/Eng. Elective	3	0	3	Math Elective	3	0	3
Humanities elective	3	0	3	Social Science Elective	3	0	3
Free Elective	3	0	3	Free Elective	3	0	3
Totals	14	2	15	Totals	17	0	17

Seventh Semester	Credit			Eighth Semester	Credit		
	Lect.	Lab.	Hrs.		Lect.	Lab.	Hrs.
CS 493	0	2	1	CS 494	0	4	2
CS 450	3	0	3	CS Elective	3	0	3
CS 487	2	2	3	CS Elective	3	0	3
CS Elective	3	0	3	PHIL 374 or CS 485	3	0	3
Social Science Elective	3	0	3	Non-tech. elective	3	0	3
Totals	14	4	16	Free elective	3	0	3
				Totals	15	4	17

Total Credit Hours **128**

Computer Science Specialized Minors

Artificial Intelligence: CS 200, CS 330, CS 331, CS 430, CS 480.

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.

Database Management: CS 200, CS 325, CS 331, CS 425, CS 430.

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

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

Systems Programming/Operating Systems: CS 200, CS 350, CS 351, CS 450, CS 455.

Mathematics Specialized Minors

Actuarial Science: MATH 332, MATH 471, MATH 475, MATH 476, and one of the following: MATH 472, MATH 486, or MATH 487.

Applied Mathematics: MATH 402, MATH 461, MATH 487, and MATH 471 or MATH 488.

Engineering Analysis: MATH 332, MATH 402, MATH 461, MATH 471, MATH 472, MATH 488.

Probability and Statistics: MATH 332, MATH 471 or MATH 482, MATH 475, MATH 476, MATH 483.

Statistics: MATH 332, MATH 475, MATH 476, MATH 483, MATH 482 or MATH 487.

Course Descriptions

Numbers in parentheses indicate: (lecture hours-laboratory hours-credit hours).

Computer Science

CS 100 Introduction to the Professions 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, social, and so forth. (1-2-2)

CS 101 Introduction to the Professions 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)

CS 103 Computers

An introductory course for nontechnical majors who have had little or no prior experience with computer programming. Algorithms, program design, and documentation. Introduction to analyzing and construction of solutions to numerical problems using an interactive computer system and personal computers. BASIC and C++ programming. This course does not count for graduation in any engineering or science degree program. (2-1-2)

CS 105 Introduction to Computing

Designed for students who have had little or no prior experience with computer programming. Algorithms, program design, and documentation. Introduction to analyzing and construction of solutions to numerical and nonnumerical problems using an interactive computer system and personal computers. FORTRAN and C++ programming. (2-1-2)

CS 200 Introduction to Computing II

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: CS 105 or consent of instructor (2-2-3)

CS 325 Data Processing and File Management

Introduction to database systems and file processing techniques. Retrieval, access, and maintenance of sequential and direct files. Data storage and manipulation techniques. Methods of system analysis for and construction of information systems. Introduction to a standard file processing computer language and related exercises. Prerequisite: CS 105. (3-0-3)

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 105. (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 200. (2-2-3)

CS 350 Computer Organization / Assembly Language Programming

Provides students with an understanding of the architectural features of computers with examples of micro, mini, and mainframe architectures. Provides insight into the relationships between machine hardware, native instruction set and implementation of high level languages in a machine. Familiarizes students with the instruction set of a computer through programming assignments. Instructs students in the use of assembly language as a tool for analysis of computer architecture. Prerequisite: CS 200 or consent of instructor. (2-2-3)

CS 351 Systems Programming

Systems of software tools; macroprocessors, loaders, and text editors. Physical I/O and I/O programming. Interfacing to assembly language routines and interrupt handling. Prerequisites: CS 331, 350. (2-2-3)

CS 387 UNIX/C Programming

Introduction to the C programming language and the UNIX operating system. Focuses on the use of UNIX system tools in the program development process. Prerequisite: CS 331. (3-0-3)

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, 350. (3-0-3)

CS 425 Database Organization

Overview of database architectures including Relational, Hierarchical, Network, and Object Models. Interfaces including the SQL query language. Database design using the Entity-Relationship Model. Issues such as security, integrity, and query optimization. Prerequisite: CS 200 or 325. (3-0-3)

CS 430 Introduction to Algorithms

An 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, 331. (3-0-3)

CS 440 Programming Languages and Translators

Study of commonly used computer programming languages with emphasis on precision of definition and facility in use. Extensive programming work in a variety of languages. Scanning, Parsing, and introduction to compiler design. Use of compiler generating tools.

Prerequisites: CS 351 or consent of instructor. (3-0-3)

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. An introduction to programming language semantics. The language Ada — its use and evaluation with respect to the principles of programming language design — is covered. Pre/Corequisite: CS 440. (3-0-3)

CS 450 Operating Systems I

Introduction to operating system concepts: system organization for uniprocessors and multiprocessors, scheduling algorithms, process management, deadlocks, paging and segmentation, files and protection, process coordination and communication. Prerequisites: CS 331, CS 350 or ECE 242, or consent of instructor. (3-0-3)

CS 455 Data Communications

Introduction to data communication concepts and facilities with emphasis on protocols and interface specifications. There is an emphasis on the lower four layers of the ISOOSI reference model. Prerequisite: CS 450. (3-0-3)

CS 460 Fundamentals of Multimedia

Introduction to techniques in personal computer-based multimedia. Includes desktop publishing, hypermedia text and tutorials, presentation media, animated sequencing, sound, graphics and video, and integrated authoring techniques. Prerequisite: CS 105 or equivalent. (2-2-3)

CS 461 Practicum in Teaching and Training Using Multimedia

Study and practical experience in teaching and training using computer-based multimedia. Introduction to pedagogy and application of instructional methodologies; participation in laboratory sessions. Prerequisite: CS 460. (3-0-3)

CS 470 Computer Architecture I

Introduction to 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: ECE 218, CS 350. (2-2-3)

CS 471 Computer Architecture II

Further study of the internal design and organization of computer architectures. Various methods of interconnecting devices: bus structures, independent channels, interrupt driven controllers, synchronous and asynchronous devices. Survey of the various microprocessors and microcomputer systems available today. The hardware/ software interfacing and applications of these systems. Hands-on experience and construction of a typical microcomputer system. Prerequisite: CS 470. (2-2-3)

CS 480 Artificial Intelligence

Styles of programming and software engineering with applications to artificial intelligence and to creation of good programming environments through programming key ingredients of these styles. These include techniques of search, data driven programming, demons, frames, object oriented programming, production rules systems, logic programming, and code that constructs code, including language extension through macros. Prerequisite: CS 331. (3-0-3)

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 200 and at least junior standing. (3-0-3)

CS 487 Software Engineering I

Study of 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 in building a software system using the waterfall life cycle model in the lab environment. Students working in teams develop all life cycle deliverables: the requirements, specification and design documents, the system code,

test plan, and user manuals. Prerequisite: CS 351 or consent of instructor. (2-2-3)

CS 488 Software Engineering II

Study of advanced principles and practices in software engineering: 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 (CASE). Prerequisite: CS 487. (3-0-3)

CS 491 Undergraduate Research

Prerequisite: Written consent of instructor. (Credit: Variable)

CS 493 Senior Project Design

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)

CS 494 Senior Project

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 that meet (or exceed) these objectives using contemporary software engineering techniques and tools. Emphasizes the need for innovation, experimentation, and communication in the design process. Offered spring semester only. Prerequisite: CS 493. (0-4-2)

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 degrees seeking undergraduate students with the approval of the course instructor and faculty adviser. See the current *IIT Bulletin: Graduate Programs* for course descriptions.

CS 511 Advanced Topics in Computer Graphics

CS 524 Database Design and Management

CS 525 Advanced Database Organization

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 Principles of Computer Networks

CS 543 Advanced Topics in Computer Networks

CS 544 Computer Networks II

CS 545 Concurrent Programming

CS 546 Parallel Processing

CS 548 Integrated Broadband

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 Architecture

CS 587 Programming Project Management

CS 588 Advanced Software Engineering Development

CS 589 Software Testing and Quality Assurance

Mathematics

** This course does not count for graduation in any engineering or computer science degree program.*

***MATH 120 College Algebra**

Fundamental concepts, exponents, polynomials, equations, inequalities, and functions. Credit may not be granted for both MATH 120 and MATH 121 or 141. (3-0-3)

***MATH 121 Introduction to Mathematics I**

Fundamental concepts, equations, inequalities, functions. Elementary analytic geometry and trigonometry. Credit may not be granted for both MATH 121 and MATH 120, or 141. (3-0-3)

***MATH 122 Introduction to Mathematics II**

Basic concepts of calculus of a single variable; limits, derivatives, integrals, and applications. Credit may not be granted for both MATH 122 and MATH 142. Prerequisite: MATH 121. (3-0-3)

***MATH 141 Mathematical Analysis for Business I**

Real numbers, sets and functions, mathematics for finance, equations and graphs, systems of linear equations. Credit may not be granted for both MATH 141 and MATH 120 or 121. (3-0-3)

***MATH 142 Mathematical Analysis for Business II**

Vectors and matrices, systems of linear inequalities. Differential and integral calculus. Credit may not be granted for both MATH 142 and MATH 122. Prerequisite: MATH 141. (3-0-3)

***MATH 150 Functions and Graphs**

Polynomial, rational, and root functions. Trigonometric, exponential, and logarithmic functions. Graphing techniques, analytic geometry. Prerequisite: Placement or MATH 120. (3-2-4)

MATH 151 Calculus I

Analytic geometry. Functions and their graphs. Limits and continuity. Derivatives of algebraic and trigonometric functions. Applications of the derivative. Introduction to integrals and their

applications. Prerequisite: MATH 150 or placement. (4-1-5)

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: MATH 151. (4-1-5)

MATH 161 Honors Calculus I

Functions. Limits and continuity. Derivatives of algebraic functions. Implicit differentiation. Applications of the derivative: rates, curve sketching, optimization, approximation. Introduction to integration. Applications of the integral: area, volume, work, hydrostatic pressure. Prerequisite: Placement. (5-0-5)

MATH 162 Honors Calculus II

Calculus of transcendental functions: trigonometric, inverse trig., logarithmic, exponential, hyperbolic. Integration techniques. Applications of the integral: arc length, surface area, moments. Indeterminate forms and improper integrals. Parametric equations. Polar coordinates. Numerical series. Power series expansions. Prerequisite: MATH 161, advanced placement credit for MATH 151, or consent of department. (5-0-5)

MATH 200 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 162 and permission of instructor. (3-2-3)

***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 162. (4-0-4)

MATH 252 Introduction to Differential Equations

Differential equations (ODEs) of order one. Linear ODEs of higher order. Systems of linear ODEs. Laplace transforms. Series solutions of ODEs. Special equations: Bessel, Legendre, etc. Applications. Prerequisite: MATH 152 or 162. (4-0-4)

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 252. Credit not granted for both MATH 331 and 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 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, multiple integrals. Prerequisite: MATH 400. (3-0-3)

MATH 402 Complex Analysis

Analytic functions, conformal mapping, contour integration, series expansions, singularities and residues, 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 and 252 and one of the following: MATH 331, 332, or 333, or consent of the instructor. (3-0-3)

MATH 420 Fourier Analysis

Fourier series, convergence and summability; Fourier integrals. Applications. Prerequisite: MATH 401. (3-0-3)

MATH 430 Algebra

Introduction to groups, rings, fields, vector spaces, polynomials. Prerequisite: MATH 332. (3-0-3)

MATH 440 Number Theory

Prime numbers, congruences, arithmetical functions; quadratic residues; further selected topics. Prerequisite: Consent of instructor. (3-0-3)

MATH 445 Mathematical Logic

Models of languages; propositional, Aristotelian, and predicate logic; formal theories. Prerequisite: CS 330 or consent of instructor. (3-0-3)

MATH 450 Projective Geometry

The projective plane, laws of Desargues and Pappus; introduction of coordinates, analytic projective geometry. Prerequisite: MATH 332. (3-0-3)

MATH 451 Differential Geometry

Theory of curves, the Frenet formulas; theory of surfaces, fundamental forms, curvature; further selected topics. Prerequisite: MATH 251. (3-0-3)

MATH 452 Topology

Fundamentals of point-set topology; metric and topological spaces, study of continuous mappings; 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 and 252. (3-0-3)

MATH 471 Numerical Methods I

Taylor polynomials, computer representation of numbers, error, numerical linear algebra. Prerequisite: Familiarity with Fortran. Corequisite: MATH 331, 332, or 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 and 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 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 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 482 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 483 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 476. (3-0-3)

MATH 486 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 487 Mathematical Modeling II

The formulation of mathematical models, solution of mathematical equations, interpretation of results. Case studies from dynamics, fluid mechanics, population dynamics, traffic flow, chemical and biological reactions, etc. Prerequisite: MATH 252. (3-0-3)

MATH 488 Ordinary Differential Equations

Boundary-value problems: Green's functions, Sturm-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 489 Partial Differential Equations

First-order equations, characteristics. Classification of second-order equations. Laplace's equation: potential theory, Green's function, maximum principles. The wave equation: characteristics, general solution. The heat equation: use of integral transforms. Prerequisite: MATH 461. (3-0-3)

MATH 490 History of Mathematics

A history of mathematics from ancient times to the twentieth century. Prerequisite: MATH 152. This course does not count for graduation in any ECE degree program. (3-0-3)

MATH 491 Reading and Research

(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.

MATH 500 Real Analysis I**MATH 510 Ordinary Differential Equations****MATH 512 Partial Differential Equations****MATH 514 Integral Equations****MATH 526 Calculus of Variations****MATH 530 Algebra****MATH 532 Linear Algebra****MATH 540 Probability****MATH 555 Tensor Analysis****MATH 556 Metric Spaces****MATH 563 Statistics****MATH 564 Applied Statistics****MATH 581 Theory of Finite Elements**

Institute of Design

Director: *Patrick F. Whitney IITRI Research Tower Ext. 85300*

Professors: *Fahnstrom, Heskett, Owen, Whitney*

Associate Professors: *Grimes, Poggenpohl, Prygrocki*

Assistant Professors: *Blevis, Wolke*

Senior Lecturers: *K. McCoy, M. McCoy*

Lecturers: *Thaler*

Visiting Faculty: *Cain, Keeley, Ichikawa, Nemeth, Pycha, Robinson, Zihlman*

For information about the B.S. in Design, which will be offered for the last year in 1995-1996, see the 1993-1995 undergraduate bulletin or contact the Institute of Design for information.

The Institute of Design encourages students with undergraduate degrees in other disciplines to apply to its Master's program. For further information, call x85306.

Electrical and Computer Engineering

Chair: *Dr. Henry Stark 136 Siegel Hall Ext. 73400*

Associate Chairs: *Dr. Donald R. Ucci 127 Siegel Hall Ext. 73400*
Dr. John Nestor 226 Siegel Hall Ext. 73386

Professors: *Arzbaecher, Jaeger (jointly with Pritzker Institute), LoCicero, Saniie, Shahidehpour, H. Stark (Carl and Paul Bodine Distinguished Professor)*

Adjunct Professor: *Briley*

Associate Professors: *Atkin, Galatsanos, J. Nestor, Saletta, Troyk, Ucci, Weber, Williamson, Wong*

Adjunct Associate Professor: *Clarkson*

Assistant Professors: *Behera, Chan (Motorola Assistant Professor), Gupta, Patterson, Ramesh, Takach, Wernick*

Visiting Assistant Professor: *Mills*

Adjunct Assistant Professor: *Borkar*

Instructor: *Tagliavia*

Faculty Emeriti: *Armington, Jones, Martin, Peach, Whitehead*

Electrical and computer engineering is concerned with the generation, transmission, and utilization of electrical energy and with transmitting and processing information. Electrical and computer 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 automated mass transit, power distribution, computerized traffic control, communication, pollution monitoring and abatement, and medical instrumentation.

The Department of Electrical and Computer Engineering offers the Bachelor of Science Degree in Electrical Engineering (B.S.E.E.). The Department also offers Bachelor of Science Degree in Computer Engineering (B.S.C.P.E.) in conjunction with the Department of Computer Science and Applied Mathematics.

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, electro-dynamics, linear systems and energy conversion are introduced in the second and third years. In the senior year, students further explore their specific areas and gain in-depth exposure to engineering design through their choice of electives. The curriculum is described in detail on page 127.

The B.S.C.P.E. curriculum concentrates on the design and application of computer hardware and software systems. It combines a foundation of mathematics, physics, chemistry and computer science during the first two years with fundamental and advanced courses in both electrical engineering and computer science. This curriculum is described in detail on page 131.

The B.S.C.P.E. curriculum is highly focused on computer engineering. However, some students may wish to combine the full breadth of the B.S.E.E. curriculum with a concentration on computer engineering topics. For these students, the department offers a Computer Systems specialization of the B.S.E.E. degree. This specialization includes the full B.S.E.E. curriculum and specific courses in computer science and electrical engineering. (see page 129).

The Department is also developing a specialization in energy/environment/economics (E³) focusing on rapidly changing needs of energy conversion, distribution, and management. Please contact Anup Behera at (312) 567-3269. In addition, the department offers the following minors (see page 25):

- Air Force Aerospace Studies
- Applied Solid State Physics
- Computer Architecture
- Management for EE Majors
- Military Science
- Naval Science

The ECE department considers advising of students an important obligation. Each student must meet with his/her faculty adviser during the preregistration period each semester. Students must closely adhere to course prerequisites to maximize academic performance and satisfy requirements for ABET accreditation. Faculty advisers for all ECE students are listed on a departmental bulletin board. The B.S.E.E. degree is accredited by the Engineering Accreditation Commission of the Accreditation Board of Engineering and Technology.

Electrical Engineering

Required Core	Credit
Major Courses	Hours
ECE 100, 101, 211+, 212+, 213+, 214+, 218+, 242, 307, 308, 309, 311, 312, 319+	40
Professional Electives	14
Mathematics Requirements	
MATH 151, 152, 251, 252, 333, and MATH 475 or ECE 475	24
Physics Requirements	
PHYS 103, 104, 203	11
Chemistry Requirement	
CHEM 124	4
Computer Science Requirement	
CS 105	2
Engineering Course Requirements	
MECH 200, MAE 205	6
Humanities and Social Sciences Requirements	
ENGL 101, 100-level HUM	6
Humanities Electives (300-level and above)	6
Social Sciences Electives (6 hrs. 300-level and above)	12
Electives	
Science Elective (METM 101 or CHEM 126)	3
Technical Elective	3
Free Electives	6
Total Credit Hours	137

+Any student admitted prior to the Fall 1995 semester should consult with an ECE adviser for appropriate course sequencing.

B.S.E.E. Degree Curriculum

				Credit							Credit		
First Semester				Lect.	Lab.	Hrs.	Second Semester				Lect.	Lab.	Hrs.
MATH 151				4	2	5	MATH 152				4	2	5
CHEM 124				3	3	4	PHYS 103				3	0	3
ECE 100				1	2	2	Science Elective**				3	0	3
ENGL 101*				3	0	3	CS 105				2	1	2
Social Sciences Elective*				3	0	3	ECE 101				0	4	2
Totals				14	7	17	HUM 100-level course*				3	0	3
							Totals				15	7	18
Third Semester							Fourth Semester						
MATH 252				4	0	4	MATH 251				4	0	4
PHYS 104				3	3	4	PHYS 203				3	3	4
ECE 211				3	0	3	MECH 200				3	0	3
ECE 212				0	3	1	ECE 213				3	0	3
ECE 218				3	0	3	ECE 214				0	3	1
Social Sciences Elective*				3	0	3	ECE 242				3	0	3
Totals				16	6	18	Totals				16	6	18
				Credit							Credit		
Fifth Semester				Lect.	Lab.	Hrs.	Sixth Semester				Lect.	Lab.	Hrs.
MATH 333				3	0	3	ECE 308				3	0	3
MAE 205				3	0	3	ECE 309				3	0	3
ECE 307				3	3	4	ECE 312				3	3	4
ECE 311				3	3	4	ECE 319				3	3	4
Humanities Elective*				3	0	3	Social Sciences Elective*				3	0	3
Totals				15	6	17	Totals				15	6	17
Seventh Semester							Eighth Semester						
Professional ECE Electives†				6	3	7	Professional ECE Electives†				6	3	7
ECE 475 or MATH 475				3	0	3	Technical Elective††				3	0	3
Free Elective***				3	0	3	Free Elective***				3	0	3
Humanities Elective*				3	0	3	Social Sciences Elective*				3	0	3
Totals				15	3	16	Totals				15	3	16
							Total Credit Hours						137

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

* Humanities and social sciences components of the General Education Program (see p. 18 for details).

** Science elective must be CHEM 126 or METM 101.

*** Courses from any of the IIT colleges that are more advanced than the admission requirements of the Armour College and are approved by an adviser may be taken for free elective credit.

† Professional ECE electives may be chosen from any of the 400-level ECE courses identified with a **P** in the course descriptions. Courses at the 500 level may be taken with the consent of the instructor, faculty advisers, and the department chair. At least two of the electives must contain laboratories.

†† The technical elective may be a biology, chemistry, computer science, mathematics, physics, or any engineering courses. These courses must be more advanced than the admission requirements of the Armour College and must be approved by an adviser.

NOTE: Elective courses have varying amounts of design content. Professional ECE electives with laboratories are taught so as to include considerable design content. To assure that students meet ABET design requirements, all EE majors are required to select a minimum of eight hours of design in the elective courses. The list of design hours for elective courses is updated periodically and is posted in the ECE department.

B.S.E.E. Degree – Professional Specialization in Computer Systems

Curriculum

Required Core

Major Courses

ECE 100, 101, 211+, 212+, 213+, 214+, 218+, 242, 307, 308, 309, 311, 312, 319+, 441, 429 or 446, 448	51
Professional Elective	3

Mathematics Requirements

MATH 151, 152, 251, 252, 333, and MATH 475 or ECE 475	24
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Physics Requirements

PHYS 103, 104, 203	11
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Chemistry Requirement

CHEM 124	4
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Computer Science Requirements

CS 105, 200, 331, 450	11
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Engineering Course Requirements

MECH 200, MAE 205	6
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Humanities and Social Sciences Requirements

ENGL 101, 100-level HUM	6
Humanities Electives (300-level and above)	6
Social Sciences Electives (3 hrs. 300-level and above)	9

Electives

Science Elective (METM 101 or CHEM 126)	3
Free Elective	3

Total Credit Hours

137

+Any student admitted prior to the Fall 1995 semester should consult with an ECE adviser for appropriate course sequencing.

	Credit				Credit		
Fifth Semester	Lect.	Lab.	Hrs.	Sixth Semester	Lect.	Lab.	Hrs.
MATH 333	3	0	3	ECE 308	3	0	3
MAE 205	3	0	3	ECE 309	3	0	3
ECE 307	3	3	4	ECE 312	3	3	4
ECE 311	3	3	4	ECE 319	3	3	4
CS 200	3	0	3	CS 331	3	0	3
Totals	15	6	17	Totals	15	6	17

Seventh Semester

ECE 441	3	3	4
ECE 475 or MATH 475	3	0	3
Professional ECE Elective***	3	0	3
Humanities Elective*	3	0	3
Free Elective**	3	0	3
Totals	15	3	16

Eighth Semester

ECE 429 or 446	3	3	4
ECE 448	3	0	3
CS 450	3	0	3
Social Sciences Elective*	3	0	3
Humanities Elective*	3	0	3
Totals	15	3	16

Total Credit Hours

137

* Humanities and social sciences components of the General Education Program (see p. 18 for details).

** Courses from any of the IIT colleges that are more advanced than the admission requirements of the Armour College and are approved by an adviser may be taken for free elective credit.

*** Professional ECE elective may be chosen from any of the 400-level ECE courses designated with a **P** in the course descriptions. A course at the 500 level may be taken with the consent of the instructor, faculty advisers and the department chair.

Computer Engineering

Associate Chair: *Dr. John Nestor 226 Siegel Hall Ext. 73386*

Program Faculty: *Campbell (CSAM), Chang (CSAM), Gupta (ECE), Korel (CSAM), Nestor (ECE), Robergé (CSAM), Sanjie (ECE), Takach (ECE)*

Computer Engineering involves the design and application of computer *hardware* and computer *software*. Computer hardware consists of the physical components that implement a computer system: processor and memory chips, circuit boards, and peripheral devices. Computer software consists of computer programs that accomplish a specific task using sequences of simple, programmable steps. Computer engineers must have a detailed knowledge of both hardware and software to design, build, and use complex information processing systems for a wide range of applications.

Over the last 40 years, dramatic improvements in technology have fueled a computer revolution. Large, expensive mainframe computers have been replaced by small, inexpensive, high-performance workstations and personal computers that are used in nearly all aspects of business and education. At the same time, computers have become an integral part of many large systems that require sophisticated control including automobiles, medical instrumentation, telecommunications 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. The development of these applications requires engineering professionals with skills in both hardware and software design. The B.S. in Computer Engineering (B.S.C.P.E.) is designed to meet this need.

The B.S.C.P.E. is offered by the Electrical and Computer Engineering Department in conjunction with the Computer Science and Applied Mathematics Department (page 111). 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. To provide further flexibility, the B.S.C.P.E. degree is offered in two specializations: a *hardware specialization* that emphasizes computer system design and applications, and a *software specialization* that emphasizes software engineering. Students follow a common curriculum for the first four semesters before choosing a specialization.

The Computer Engineering program considers advising of students an important obligation. Each student must meet with his/her faculty adviser during the preregistration period each semester. Students must closely adhere to course prerequisites and satisfy requirements for ABET accreditation. Faculty advisers for all computer engineering students are listed on an ECE departmental bulletin board.

Computer Engineering

Required Core	Credit Hours
Mathematics Requirements	
MATH 151, 152, 251, 252, 474	21
Junior Math Elective (Math 333 or 370)	3
Physics Requirements	
PHYS 103, 104, 203	11
Chemistry Elective	
CHEM 124	4
Science Elective	
CHEM 126 or METM 101	3
Engineering Science Requirement	
MECH 200 or MAE 205	3
Humanities and Social Sciences Requirements	
ENGL 101, 100-level HUM	6
Humanities Electives (300-level and above)	6
Social Science Electives (6 hrs. at 300 level and above)	12
Major Core Courses	
ECE 100, 101	4
CS 200, 330, 331, 350, 351, 450, 470, 487	24
ECE 211+, 212+, 213+, 214+, 218+, 311, 441	19
Required Core Hours	116
Major Courses - Hardware Specialization	
Junior CPE Elective (either ECE 307, 308, 312, or 319+)	3-4*
ECE 309	3
Professional Electives	10
Total Credit Hours - Hardware Specialization	132-133**
*3 credits if ECE 308 is taken as Junior CPE Elective; otherwise 4 credits	
**132 credits if ECE 308 is taken as Junior CPE Elective; otherwise 133 credits	
Major Courses - Software Specialization	
CS 430, 440, 471, 493, 494	12
Professional Electives	6
Total Credit Hours - Software Specialization	134

+ Any student admitted prior to the Fall 1995 semester should consult with a CPE adviser for appropriate course sequencing.

B.S.CP.E. Degree Curriculum

Hardware and Software Specialization - First and Second Years

First Semester	Credit			Second Semester	Credit		
	Lect.	Lab.	Hrs.		Lect.	Lab.	Hrs.
MATH 151	4	2	5	MATH 152	4	2	5
ECE 100	1	2	2	ECE 101	0	4	2
ENGL 101	3	0	3	HUM 100 -level course*	3	0	3
CHEM 124	3	3	4	Science Elective**	3	0	3
CS 200	2	2	3	CS 331	2	2	3
Totals	12	5	17	Totals	12	8	16

Third Semester	Credit			Fourth Semester	Credit		
	Lect.	Lab.	Hrs.		Lect.	Lab.	Hrs.
MATH 252	4	0	4	MATH 251	4	0	4
PHYS 103	3	0	3	PHYS 104	3	3	4
ECE 211	3	0	3	ECE 213	3	0	3
ECE 212	0	3	1	ECE 214	0	3	1
ECE 218	3	0	3	CS 350	3	0	3
CS 330	3	0	3	Social Science Elective*	3	0	3
Totals	16	3	17	Totals	16	6	18

Hardware Specialization - Third and Fourth Years

Fifth Semester	Credit			Sixth Semester	Credit		
	Lect.	Lab.	Hrs.		Lect.	Lab.	Hrs.
Junior Math Elective***	3	0	3	ECE 309	3	0	3
Engineering Science Elective†	3	0	3	Junior CPE Elective††	3	0-3	3-4
ECE 311	3	3	4	MATH 474	3	0	3
PHYS 203	3	3	4	Humanities Elective*	3	0	3
CS 351	2	2	3	Social Science Elective*	3	0	3
Totals	14	8	17	Totals	15	0-3	15-16

Seventh Semester	Credit			Eighth Semester	Credit		
	Lect.	Lab.	Hrs.		Lect.	Lab.	Hrs.
ECE 441	3	3	4	Prof CPE Elective†††	3	3	4
Prof CPE Elective†††	3	0	3	Prof CPE Elective†††	3	0	3
CS 450	3	0	3	CS 487	3	0	3
CS 470	2	2	3	Humanities Elective*	3	0	3
Social Science Elective*	3	0	3	Social Science Elective*	3	0	3
Totals	14	4	16	Totals	15	3	16

Total Credit Hours 132 - 133

* Humanities and social sciences components of the General Education Program (see p. 18 for details).

** Courses from any of the IIT colleges that are more advanced than the admission requirements of the Armour College and are approved by an adviser may be taken for free elective credit.

*** Professional ECE elective may be chosen from any of the 400-level ECE courses designated with a **P** in the course descriptions. A course at the 500 level may be taken with the consent of the instructor, faculty advisers and the department chair.

Software Specialization - Third and Fourth Years

Fifth Semester	Credit			Sixth Semester	Credit		
	Lect.	Lab.	Hrs.		Lect.	Lab.	Hrs.
Junior Math Elective***	3	0	3	Engineering Science Elective†	3	0	3
CS 430	3	0	3	CS 440	3	0	3
ECE 311	3	3	4	CS 450	3	0	3
PHYS 203	3	3	4	MATH 474	3	0	3
CS 351	2	2	3	Social Science Elective*	3	0	3
Totals	14	8	17	Totals	15	0	15

Seventh Semester	Credit			Eighth Semester	Credit		
	Lect.	Lab.	Hrs.		Lect.	Lab.	Hrs.
ECE 441	3	3	4	Prof CPE Elective†††	3	0	3
CS 487	3	0	3	Prof CPE Elective†††	3	0	3
CS 470	2	2	3	CS 471	2	2	3
CS 493	0	2	1	CS 494	0	4	2
Humanities Elective*	3	0	3	Humanities Elective*	3	0	3
Social Science Elective*	3	0	3	Social Science Elective*	3	0	3
Totals	14	7	17	Totals	15	3	16

Total Credit Hours 134

*Humanities and social sciences components of General Education Program (see page 18 for details).

**Science Elective must be either CHEM 126 or METM 101

***Junior Math Elective: Choose either MATH 333 or MATH 370.

†Engineering Science Elective: Choose either MECH 200 or MAE 205.

††Junior CPE Elective: Choose one of ECE 307, 312, 319 (4 credits) or 308 (3 credits).

†††Professional CPE Electives may be chosen from any of the 400-level ECE courses identified with a P in the course description and any 400-level CS course except CS 460, 461, and 485. In the hardware specialization at least one Professional CPE Elective must be an ECE course containing a laboratory.

NOTE: Elective courses have varying amounts of design content. Professional CPE electives with laboratories are taught so as to include considerable design content. To assure that students meet ABET design requirements, all CPE majors in the Hardware Specialization are required to select a minimum of six hours of design in elective courses. Similarly, all CPE majors in the Software Specialization are required to select a minimum of three hours of design in elective courses. The list of design hours is updated periodically and is posted in the ECE department.

Course Descriptions

Numbers in parentheses indicate: (lecture hours-laboratory hours-credit hours).

ECE 100 Computers in Electrical Engineering I

Introduction to electrical engineering principles and software tools used on the PC. Concepts covered include word processing, spreadsheets, graphics, data communications, and database software. (1-2-2)

ECE 101 Computers in Electrical Engineering II

Use of an application software package on the PC for engineering problems with emphasis on numerical methods and statistical techniques. Prerequisite: ECE 101. (0-4-2)

ECE 211 Circuit Analysis I (Formerly ECE 201)

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. Concurrent registration in ECE 212 and ECE 218 is strongly encouraged. Corequisite: MATH 252. (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. Concurrent registration in ECE 211 and ECE 218 is strongly encouraged. Corequisites: ECE 211, ECE 218. (0-3-1)

ECE 213 Circuit Analysis II (Formerly ECE 203)

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. Concurrent registration in ECE 214 is strongly encouraged. Prerequisite: ECE 211. (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. Concurrent registration in ECE 213 is strongly encouraged. Prerequisite: ECE 212. Corequisite: ECE 213. (0-3-1)

ECE 218 Digital Systems (Formerly ECE 228)

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 211 and ECE 212 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 203, 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 203. (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)

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)

ECE 316 ECE Laboratory

Basic electrical circuit implementation and measurement techniques. Equipment familiarization. Circuit construction using passive and active components, power supplies, signal generators, oscilloscopes, meters. Circuit testing and troubleshooting. Prerequisite: ECE 213. **Note: This course will be last offered in the Spring 1996 semester.**

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. Credit will be given for either ECE 331 or ECE 319, but not for both. Prerequisites: ECE 213, ECE 214, PHYS 203. (3-3-4)

ECE 331 Energy Conversion

Principles of electromechanical energy conversion and its application to develop a unified treatment of electric machinery. Emphasis on engineering considerations applied to transformers. AC induction and synchronous machines in the steady state. DC generators and motors. Laboratory experiments reinforce concepts. Credit will be given for either ECE 331 or ECE 319, but not for both. Prerequisites: ECE 213, ECE 214, PHYS 203. (3-3-4) **Note: This course will be last offered in the Fall 1995 semester.**

ECE 383 Electric and Electronic Circuits

Circuit concepts, Ohm's Law. Kirchoff'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.C.P.E. degree and will not count in the E.E. or C.P.E. major GPA. Prerequisite: PHYS 203 or PHYS 207. (3-0-3)

ECE 386 Analog and Digital Electronic Circuits

Circuit analysis including Kirchoff's Laws, mesh and node analysis, Thevenin and Norton equivalent circuits. Sinusoidal steady state analysis applied to three phase circuits, power distribution, motors, generators, and transformers. Basic analog electronics: diodes, transistors, and amplifiers with instrumentation applications. Introduction to digital systems and microprocessors, including arithmetic, logic, and sequential operations. Credit for this course not applicable to a B.S.E.E. or B.S.C.P.E. degree Prerequisite: PHYS 203 or PHYS 207. (4-0-4)

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, detec-

tion, 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)

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. Credit will not be given for ECE 409 if either ECE 416 or ECE 417 were taken. Prerequisites: ECE 309, ECE 312. Corequisite: ECE 403. (3-3-4) (P)

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, colorimetry, 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 and ECE 319 or ECE 331. (3-3-4) (P)

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)

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 319 or ECE 331. (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. (3-3-4) (P)

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 using SPICE. 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)

ECE 433 Real-Time Data Acquisition and Processing

A design oriented course stressing real-time applications of signal and system theory, com-

puters, 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)

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)

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 METM 435. Prerequisite: ECE 311 or METM 318. (3-0-3) (P)

ECE 436 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)

ECE 437 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 trouble-shooting. Emphasis on examples. Prerequisites: ECE 218 or CS 470, ECE 242 or CS 350, and Senior standing. (3-3-4) (P)

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 214 or ECE 229, ECE 311, and Senior standing. (3-3-4) (P)

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 200, 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 and 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, and ECE 312. (3-3-4) (P)

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. Prerequisites: ECE 308 and the instructor's permission. (3-0-3).

ECE 481 Image Processing

Introduction to video and imaging systems. Application of communication theory, visual models, and probability theory in the design and synthesis of algorithms for image enhancement. Introduction to data compression and its application in the design and synthesis of image-compression algorithms. Introduction to image recognition, understanding, and interpretation. Prerequisites: ECE 308. Corequisite: ECE 475 or MATH 475. (3-0-3) (P)

ECE 483 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, 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 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 509 Electromagnetic Field Theory

ECE 510 Passive Network Synthesis

ECE 511 Analysis of Random Signals

ECE 513 Communication Engineering Fundamentals

ECE 523 Advanced Electronic Circuit Theory

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 Advanced Power System Analysis

ECE 557 Fault Tolerant Power Systems

ECE 558 Power System Reliability

ECE 564 Control and Operation of Electric Power Systems

ECE 565 Multi-dimensional Signal Processing

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

Food Safety and Technology

Director: *Dr. Richard Lechowich* Moffett Campus (708) 563-1576

Faculty: *Gombas, Sadler*

Adjunct Faculty: *Armstrong, Fleischman, Fu, Gendel, Hargraves, Jackson, Keller, Komolprasert, Larkin, McDonald, Murakami, Reddy, Schlessler, Skinner, Tortorello*

Program Coordinator: *Ms. Isabel D. Wolf* Moffett Campus (708) 563-1578

Certificate Program in Food Safety and Technology

The National Center for Food Safety and Technology (NCFST) is located at the IIT Moffett Campus, 6502 South Archer Ave., in Bedford Park, Ill. Undergraduate students may earn a certificate of proficiency in Food Safety and Technology upon the successful completion of six of the courses described below or other approved food safety and technology courses (see CHE 475 and CHE 476). Students interested in this option need to confer with both their academic department advisers and the academic coordinator at the NCFST.

Course Descriptions

Numbers in parentheses indicate: (lecture hours-laboratory hours-credit hours).

FST 401 Biotechnology and Food Safety

Applications of biotechnology and genetic engineering to the food industry including the use of genetically modified microorganisms in fermentations and the production of flavors, colors and processing enzymes. Food safety and hazard analysis; legal aspects of new foods production. Prerequisite: Biochemistry. (3-0-3)

FST 402 HACCP Approach to Food Safety

Theory of Hazard Analysis and Critical Control Point approach. Consideration in hazard analysis, process control and design of HACCP systems. (3-0-3)

FST 403 Food Safety and New Food Processing Technologies

Importance of processing, traditional safeguards for low-acid canned foods and milk, challenges

of new technologies, evaluation of the new technologies from a food safety viewpoint. (3-0-3)

FST 404 Food Packaging Safety

Material usage in food packaging, interactions of packages and foods, the packaging process, new technologies, package integrity, recycling of food packages. (3-0-3)

FST 405 Microbiological Food Safety

An in-depth examination of the significant food-borne pathogens, including both traditional and emerging pathogens that present safety problems to the contemporary food supply. Emphasis will be placed on detection, enumeration and development of systems to control these food-borne pathogens in food processing and packaging systems. Regulatory, legal and public health aspects of microbiological food safety will be included. Prerequisite: General Microbiology. (3-0-3)

FST 484 Topics in Food Chemistry

Symposium on current topics in Food Chemistry. New developments in the basic chemistry of lipids, proteins, and carbohydrates and in areas like flavors, pigments, preservatives, and nutritional and functional additives. Review of recent development of analytical instrumentation used in the analysis of foods and food components. Emphasis on problem solving. Prerequisites: CHEM 237 and BIOL 403. (3-0-3)

Lewis Department of Humanities

Chair: *Dr. John D. Root 106 Life Sciences Ext. 73465*

Professors: *Feinberg, Harrington, Ladenson, Root, Schmaus*

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

Assistant Professors: *Amato, Basu, Bergmann, Pulliam*

Instructor: *Dabbert, Coogan*

Faculty Emeriti: *Applebaum, Davis, Irving, Knepler, Sawyer, Zesmer*

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 moreover 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 help all IIT students 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.

Course Descriptions

Numbers in parentheses indicate: (lecture hours-laboratory hours-credit hours).

(H) identifies courses that may be taken to fulfill the Humanities General Education Requirements.

Art and Architectural History

† May not be used by architecture majors to fulfill Humanities General Education requirements.

NOTE: All art and architectural history courses numbered above 300 require as prerequisites the satisfaction of the Basic Writing Requirement (usually completion of ENGL 101) and a HUM 100-level course.

† 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) **(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. (3-0-3) **(H)**

AAH 491 Independent Reading and Research

For advanced students. Prerequisite: Consent of the department. (Credit: Variable) **(H)**

AAH 494 Senior Seminar: Theories of Architecture in Historical Perspective

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 empha-

sized. The implications of particular theories for such other questions as tradition, change, innovation, revolution, and meaning will be considered. Prerequisites: AAH 119, AAH 120 and ARCH 319, ARCH 320 or consent of instructor. (3-0-3) **(H)**

English

NOTE: All English courses numbered above 300 require as prerequisites satisfaction of the Basic Writing Proficiency requirement (usually by completion of ENGL 101) and a HUM 100-level course.

ENGL 101 Techniques of Prose Writing

A course that offers an introduction to college-level writing, including intensive practice in prose forms, rhetorical principles, and clear style. (3-0-3) **(H)**

ENGL 105 Intensive Composition

Equivalent to ENGL 101, this course demands two additional hours each week of practice in a writing laboratory. For students whose placement tests indicate a need for additional work. (3-2-3) **(H)**

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)

ENGL 111 Techniques of Prose Writing 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) **(H)**

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. (3-0-3) **(H)**

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. (3-0-3) (H)

ENGL 332 Rhetoric of Technology

A literary examination of reports and articles about technology. The course analyzes assumptions about technical progress and the relation between experts and nonexperts, through a study of style, arrangement, selection and omission of contents, genre conventions, and the social and political dynamics of writing in technology. (3-0-3) (H)

ENGL 334 Literature of Modern Science

A study of the literature of science from the Renaissance to modern times. (3-0-3) (H)

ENGL 337 Shakespeare I

Analysis of Shakespeare's dramatic and nondramatic works before 1600; histories, comedies, and tragedies through Hamlet. (3-0-3) (H)

ENGL 338 Shakespeare II

Analysis of the later plays, "problem" plays, major tragedies, and romances. May be taken independently of ENGL 337. (3-0-3) (H)

ENGL 339 The Short Story

Development of the short story as a literary form from the early masters to such major modern writers in the genre as de Maupassant, Chekhov, Mann, Joyce, and Hemingway. (3-0-3) (H)

ENGL 340 World Drama

Study of the major dramatists of Western civilization. Sophocles, Lope de Vega, Marlowe, Shakespeare, Moliere, Goethe, Ibsen, and others. (3-0-3) (H)

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. (3-0-3) (H)

ENGL 342 Theater in Chicago

Designed to introduce students to the variety of professional theater performances in and around Chicago. Main emphasis on seeing plays, ancient to contemporary; essays and oral reports; study of dramatic genres and theater history. (3-0-3) (H)

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. (3-0-3) (H)

ENGL 345 The Art of the Novel

Analysis of the novel as a literary form with attention to its historical development and its function as a tool in the shaping of man's social, political, and cultural environment. (3-0-3) (H)

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, and Gabriel Marquez. (3-0-3) (H)

ENGL 348 American Poetry

Study of poetry and imaginative prose by recent American poets. Course includes the study of theoretical, literary, and social backgrounds of these works. (3-0-3) (H)

ENGL 351 American Literature Before 1900

Study of representative works of such writers as Franklin, Poe, Emerson, Hawthorne, Melville, Whitman, Mark Twain, Kate Chopin, and Emily Dickinson. (3-0-3) (H)

ENGL 353 Outside the Mainstream: Ethnic and Minority Literature

An examination of works written by those authors often relegated "outside the mainstream"-women, ethnic, and/or minority writers. Authors may include Alice Walker, Charlotte Perkins Gilman, Bernard Malamud, Isaac Bashevis

Singer, Anne Sexton, and Richard Wright. (3-0-3) (H)

ENGL 356 Literature of the Third World

An examination of literatures of the “third world,” from Asia, Africa, the Caribbean, and South America. Readings also include a limited number of “third world” writers living in the U.S. This permits a comparison of different post-colonial contexts and their relevance to the U.S. (3-0-3) (H)

ENGL 360 Chicago in Literature

A survey of great American writers—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. (3-0-3) (H)

ENGL 366 Twentieth-Century American Literature

Study of such writers as Steinbeck, Frost, Eliot, Anderson, O’Neill, Hemingway, Wolfe, Faulkner, and contemporary writers such as Updike and Toni Morrison. (3-0-3) (H)

ENGL 367 Topics in Recent Literature: Conceptions of Beauty

Examines the representation of “beauty” in American culture in literary, critical, historical, and cinematic texts. Looks at how these works present changing ideals of beauty in human body, beauty in nature, the beautiful city, etc. (3-0-3) (H)

ENGL 371 Religion and Tradition of Romance

An historical examination of the beginning of English Literature to its first Golden Age under Elizabeth I: Arthurian romance, Chaucer, and English drama through Marlowe and Shakespeare. (3-0-3) (H)

ENGL 372 Science, Reason, and Imagination in English Literature

The impact of the Scientific Revolution of the seventeenth century and the Age of Reason upon English literature as expressed in the

works of John Donne and the metaphysical poets, Milton, and later, Dryden, Pope, Fielding, and Johnson. (3-0-3) (H)

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. (3-0-3) (H)

ENGL 374 Twentieth-Century British Literature

Study of such writers as Shaw, Yeats, Virginia Woolf, Joyce, Huxley, Auden, Spender, and Dylan Thomas. (3-0-3) (H)

Note: No more than one of the following may be used for humanities General Education: ENGL 401, 411, 421, 423.

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. (3-0-3) (H: see note above)

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. (3-0-3) (H: see note above)

ENGL 421 Technical Writing

Principles and practice in the communication of technical materials. Writing of reports, articles, manuals, procedures, proposals. The use of technical graphics. Works by modern writers are analyzed. (3-0-3) (H: see note above)

ENGL 423 Communications for Management

Study and practice of business communications related to the productive and efficient management of personnel and resources. (3-0-3) (H: see note above)

ENGL 425 Writing Workshops

Writing workshops in professional fields, such as technical writing, arranged in cooperation with departments of the university or with industry. (3-0-3)

ENGL 427 Verbal and Visual Communication

Designed to assist students in effective integration of verbal and visual materials for presentation. Analysis of audience types and presentation situations. Practice in public address, oral reports, and panel discussions. Critiques. (2-0-2)

ENGL 429 Technical Editing

An introduction to the fundamentals of editing technical prose, with emphases on proofreading versus substantive editing, and on the art of conveying tables and supporting visual materials. (3-0-3)

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. (3-0-3) (H)

ENGL 480 Special Problems in Shakespeare

An independent research project addressing a particular Shakespearean work or theme, to be arranged in advance with the instructor. Enrollment limited. Prerequisite: ENGL 337 or 338. (3-0-3) (H)

ENGL 485 Internship Program

A program of individual work and study designed to give the student practical experience in writing and editing scientific, technological, and managerial material. The student will work with an appropriate organization in these fields under the joint supervision of an editor or writer and a staff member at IIT and will design, write, and edit reports. (Credit: Variable)

ENGL 491 Independent Reading and Research

For advanced students. Prerequisite: Consent of department. (Credit: Variable) (H)

ENGL 497 Special Project

(Credit: Variable)

French

Foreign language courses below the 200 level may not be taken for General Education credit in Humanities. 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 Armour 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 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 with an emphasis on written reports. Prerequisite: FREN 201. (3-0-3) (H)

German

Foreign language courses below the 200 level may not be taken for General Education credit in Humanities. 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 Armour 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 German are prepared for GER 201.

GER 101 Elementary German I

An introduction to modern 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 with an emphasis on written reports. Prerequisite: GER 201. (3-0-3) (H)

History

All history courses numbered 300 and above require as prerequisites satisfaction of the Basic Writing Requirement (usually by completion of ENGL 101) and a HUM 100-level course.

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. (3-0-3) (H)

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. (3-0-3) (H)

HIST 305 Latin America: 1810-Present

The history of Latin America from colonial times emphasizing the political evolution of the several republics. Special consideration will be given to the political, economic, military, and social relations of the U.S. with Latin American countries in the 20th century. (3-0-3) (H)

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. (3-0-3) (H)

HIST 311 Twentieth-Century Europe: 1890-1945

Nationalism and nation states; patterns of diplomacy; origins, conduct, and settlement of World War I; Russian Revolution; fate of democracy; rise of totalitarianism; World War II and the Holocaust. (3-0-3) (H)

HIST 312 Introduction to Contemporary Europe, 1945-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. (3-0-3) (H)

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. (3-0-3) (H)

HIST 333 Ethnicity in American History and Life

Examines the creation of the American nationality from its diverse roots, which include almost all of the world's great cultures. Special stress on immigration, African American history, and the relationships among concepts of race, class, and gender. (3-0-3) (H)

HIST 334 The Creation of America: The New World to 1789

Examines how the U.S., its values, and 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. (3-0-3) (H)

HIST 336 The Industrialization of America: 1789-1898

Traces America's transformation from agrarian republic to Industrial Empire. Stresses impact of industrialization on all aspects of life, the nature of slavery, the failures of "Reconstruction," and the western and urban frontiers. Explores the adventures that made America a great power. (3-0-3) (H)

HIST 337 The American Century, 1898-1975

Traces how America attained economic and military power and what she 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. (3-0-3) (H)

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. (3-0-3) (H)

HIST 340 History of American Business

Surveys America's "business civilization" and the forces shaping its institutions. Charts advent

of management, marketing, decentralization, and evolving government-business relations. Concludes with "reindustrialization" case study. (3-0-3) (H)

HIST 341 Modern East Asia

A survey of East Asia history since 1800, with a special emphasis on the political and cultural history of China, Japan, and the Koreans. (3-0-3) (H)

HIST 346 America and Vietnam

Utilizing video materials, 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)

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. (3-0-3) (H)

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. (3-0-3) (H)

HIST 352 History of Chicago

Basic institutions of the contemporary city studied in their historical context, using Chicago as a case study. Political machines, social and political reform traditions, planning agencies, ethnic neighborhoods, organized crime, and many other urban institutions. (3-0-3) (H)

HIST 372 History of Engineering

An introduction to the history of engineering in the United States. The course will focus on the contributions of individual engineers and a social history of the engineering profession. (3-0-3) (H)

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. (3-0-3) (H)

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. (3-0-3) (H)

HIST 382 Technology in History, 1500-1850

Explores the process of technological change during the birth of industrial societies. Considers the context of early industrial development in Europe, then examines the industrial revolution in Britain and America. Concludes by assessing technology's role in European domination of Asia and Africa. (3-0-3) (H)

HIST 383 Technology in History, 1850 to Present

Examines technological change as a characteristic activity of modern societies. Investigates the science-based "second" industrial revolution in Europe and America. Explores the varied responses of artists, writers, architects, and philosophers to the machine age. Concludes by discussing technology's place in the modern nation-state. (3-0-3) (H)

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. (3-0-3) (H)

HIST 491 Independent Reading and Research

For advanced students. Prerequisite: Consent of department. (Credit: Variable) (H)

HIST 494 Senior Seminar in European History

(3-0-3)

HIST 495 Senior Seminar in American History

(3-0-3)

HIST 496 Senior Seminar in Urban History

(3-0-3)

HIST 497 Senior Seminar in the History of Science and Technology

(3-0-3)

Humanities

The Basic Writing Proficiency requirement is a prerequisite for all Humanities courses. This requirement is usually satisfied by the completion of ENGL 101 or its equivalent. All 300-level Humanities courses also require the completion of a HUM 100-level course as prerequisite.

HUM 102 Industrial Culture

An interdisciplinary course which 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)

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)

HUM 106 Life Stories

An interdisciplinary study of autobiographies, written chiefly by Americans. The syllabus varies, but may include Harriet Jacobs, Maya Angelou, Malcolm X, Richard Rodriguez, Thomas Merton, Frank Lloyd Wright. In addition to considering the nature of 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)

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 on student projects. (3-0-3) (H)

Music History and Appreciation

MHA 301 Introduction to Music

The aim of the course is to familiarize the student with the language of Western music and to enhance his or her listening enjoyment. The course will present musical examples ranging from seventeenth-century polyphonic music to contemporary jazz in order to extract from these styles a view of the basic components of musical experience: rhythm, melody, harmony, color, and structure. Prerequisites: ENGL 101 or equivalent and HUM 100-level course. (3-0-3) (H)

Philosophy

All philosophy courses numbered above 300 require as prerequisites satisfaction of the Basic Writing Requirement (usually by completion of ENGL 101) and a HUM 100-level course.

PHIL 301 Ancient Philosophy

A study of major works by Plato, Aristotle, and other important ancient philosophers. (3-0-3) (H)

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. (3-0-3) (H)

PHIL 304 19th Century Philosophy

A study of major 19th century philosophers, such as Hegel, Comte, J. S. Mill, Peirce, James, Nietzsche. (3-0-3) (H)

PHIL 305 20th Century Philosophy

A study of recent philosophical trends (or movements), including logical positivism, existentialism, ordinary language philosophy, etc. (3-0-3) (H)

PHIL 310 American Philosophy

A survey of the most important thinkers and movements in American philosophy. (3-0-3) (H)

PHIL 311 Great Philosophers

An in-depth study of a single outstanding philosopher, chosen by the instructor. The focus of the course will be announced when the course is scheduled. (3-0-3) (H)

PHIL 326 Philosophy of Language

An analysis of the concept of language in both the works of philosophers and the works of linguists. The course looks into theories of linguistic meaning, sentence structure, the speech acts, and the assumptions underlying research in modern linguistics. (3-0-3) (H)

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. (3-0-3) (H)

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. (3-0-3)

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. (3-0-3) (H)

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. (3-0-3) (H)

PHIL 343 Philosophy of Social Inquiry

An examination of the methods and theories of the social sciences, especially sociology and anthropology, and their relationships to the natural sciences. (3-0-3) (H)

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. (3-0-3) (H)

PHIL 346 Philosophy of the Life Sciences

An examination of the philosophical problems arising from the study of the biological sciences, including controversies in evolutionary theory and the reduction of biology to physics and chemistry. (3-0-3) (H)

PHIL 350 Science and Method

A history of the interaction between science and philosophy in recent centuries, 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. (3-0-3) (H)

PHIL 360 Ethics

A study of the fundamental issues of moral philosophy. (3-0-3) (H)

PHIL 361 Political and Social Philosophy

An analysis of the concepts of legitimate political authority, social justice, natural rights, sovereignty, etc. (3-0-3) (H)

PHIL 362 Philosophy of Law

An analysis of the concept of law and how it differs from custom, religion, and morality. The course looks into issues of judicial reasoning, the assumptions that underlie the criminal justice system and the imposition of liability, and legal ethics. (3-0-3) (H)

PHIL 363 Aesthetics

The philosophy of the fine arts, including an analysis of the concepts of beauty, representation, expression, and the purpose of art. (3-0-3) (H)

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, government regulation, etc. (3-0-3) (H)

PHIL 371 Moral Issues in Architecture and City and Regional Planning

Examination of moral problems faced by architects and planners; the concept of professional behavior. (3-0-3) (H)

PHIL 373 Business Ethics

Ethical issues relating to individual and corporate responsibility, self- and governmental regulation, investment, advertising, urban problems, the environment, preferential hiring. (3-0-3) (H)

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. (3-0-3) (H)

PHIL 380 Topics in Philosophy

An investigation into a topic of current interest in philosophy. The topic for the course will be announced by the instructor when the course is scheduled. (3-0-3) (H)

PHIL 490/491 Independent Study

Supervised individual research for advanced students. (Credit: Variable.) (H: with permission of the Dean of Lewis College)

Spanish

Foreign language courses below the 200 level may not be taken for General Education credit in Humanities. 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 Armour 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 with an emphasis on written reports. Prerequisite: SPAN 201. (3-0-3) (H)

Manufacturing Institute

Director: Dr. Stephen M. Copley 207A Engineering 1 Ext. 73877

BMT Program Director: Dr. Keith E. McKee Materials Building Ext. 74800

The Manufacturing Institute brings together the resources of IIT and IIT Research Institute, industry, and government to innovate educational and research programs in this field.

Graduate programs include the Master of Science in Manufacturing Engineering and Master of Manufacturing Engineering, which are interdisciplinary master's degree programs intended for engineers working in a broad range of industries. The programs focus on manufacturing processes and computer-integrated manufacturing.

The Bachelor of Manufacturing Technology is a transfer program designed to enable community college AAS graduates who are interested in manufacturing to complete their bachelor's degree while they are working. Admission to the B.M.T. 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 associate's degree in applied science (AAS) 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. A grade of C- is not acceptable for transfer. Students admitted must have previously completed the following requirements, or may make them up while working on the B.M.T. degree. The degree requires 126 hours including transfer and course work completed at IIT.

B.M.T. Admission Requirements:

Mathematics: 6 credit hours of mathematics at the level of college algebra or above.

Computer Science: 3 credit hours of computer programming.

Natural Science: 11 credit hours of science or engineering courses. Relevant courses include physics, chemistry, or biology. Up to 6 credit hours may be in graphics/drafting. Course work should include at least one laboratory science. In some cases, certain technology courses might be applied to this requirement.

Humanities: 6 credit hours. Relevant studies include literature, philosophy (except logic), and history. Applicants may include up to three credit hours of composition or speech courses.

Social Sciences: 6 credit hours. These typically include anthropology, geography, political science, psychology, sociology, and economics.

B.M.T. Curriculum

A total of 66 credits (22 courses) is required for the degree for a total of 126 credit hours. This includes four senior-level humanities and social science electives. The 18 required BMT courses focus on all facets of plant operations including materials, marketing, planning, and budgeting, as well as communications, supervisory skills and software applications. The BMT program was developed with support from the Illinois Board of Higher Education through the Higher Education Cooperative Act.

	Credit Hours		Credit Hours
First Semester		Fifth Semester	
MT 301 Technical Communications	3	MT 404 Sales, Marketing, and Product Introduction in Manufacturing	3
MT 305 Computers in Manufacturing	3	MT 406 Quality Control in Manufacturing	3
MT 313 Materials in Manufacturing	3	Social Science/Humanities Elective	3
Second Semester		Sixth Semester	
MT 311 Production and Operations	3	MT 412 Manufacturing Processes	3
MT 315 Manufacturing Enterprises	3	MT 432 Vendor/Customer Relations	3
Social Science/Humanities Elective	3		
Third Semester		Seventh Semester	
MT 321 Computer Integrated Manufacturing	3	MT 422 Manufacturing Technology	3
MT 323 Strategic Planning and Forecasting	3	MT 424 Management Information Systems in Manufacturing	3
Social Science/Humanities Elective	3	MT 426 Decision-Making and Risk Analysis in Manufacturing	3
Fourth Semester		Eighth Semester	
MT 331 Product Design in Manufacturing	3	MT 414 Topics in Manufacturing	3
MT 333 Cost Management in Manufacturing	3	MT 434 Manufacturing Futures	3
Social Science/Humanities Elective	3		

Course Descriptions

Numbers in parentheses indicate: (lecture hours-laboratory hours-credit hours).

MT 301 Technical Communications

Communication formats found in manufacturing environments. Identify, analyze, and practice verbal and written communications exercises that include technical writing, word processing, discussion leadership, and audio-visual and related graphic communications enhancement. (3-0-3)

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)

MT 311 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

Presents a typology of prevailing manufacturing settings, then analyzes all significant aspects of plant manufacturing, such as organizational patterns, sales, production control, business plan development, and labor relations. (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 Strategic Planning and Forecasting in Manufacturing

Focus on skill development formulating and implementing strategic plans to guide operations and use of forecasting tools to predict need and guide commitment of resources. Prerequisites: MT 301, MT 305, MT 315. (3-0-3)

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)

MT 333 Cost Management in Manufacturing

Cost represents an important measure for all aspects of manufacturing. This course introduces and analyzes financial and operating statements and includes such topics as techniques for distributing indirect costs, related basic cost accounting procedures, and determination of costs for products, organizational elements, and equipment. Prerequisite: MT 305. (3-0-3)

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)

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 312, 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)

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 312. (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 402, MT 404, MT 406. (3-0-3)

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 presents a futuristic view of manufacturing. Anticipated changes in work force preparedness, relations between management and labor, technology, quality, and systems changes are reviewed from an "alternative futures" perspective. Prerequisite: MT 422. (3-0-3)

Mechanical, Materials and Aerospace Engineering

Chair: Dr. Marek Dollar 243 Engineering I Ext. 73175

Professors: Acharya, Barnett, Copley, Corke, Dix, M. Dollar, Higgins, Kallend, Kalpakjian, Nagib (*Rettaliata Distinguished Professor*), Nair, Nash, Porter, Sciammarella, Way (*Associate Chair, Aerospace Engineering*), Williams

Associate Professors: Aronov, Meade (*Associate Chair, Mechanical Engineering*), Mostovoy, Ruiz, Todd (*Associate Chair, Metallurgical and Materials Engineering and Iron and Steel Society Professor*), Wark

Assistant Professors: A. Dollar, Foley (*Finkl Professor*), Tarabishy (*visiting*)

Research Professors: Broutman, Kumar

Assistant Research Professor: Naguib

Lecturer: Jennings

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

Adjunct Associate Professor: Thakkar

Faculty Emeriti: Bonthron, Breyer, Budenholzer, Donnell, Fejer, Gordon, Graham, Lavan, Morkovin, Rasof, Rettaliata, Tao, Torda, Winston

The department offers the Bachelor of Science degrees in Mechanical Engineering (B.S.M.E.), Aerospace Engineering (B.S.A.E.), and Metallurgical and Materials Engineering (B.S.M.M.E.) All three degree programs are accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).

The first year student in the Mechanical, Materials, and Aerospace Engineering program is exposed to engineering topics from his/her first semester. In the first year, the student takes Introduction to the Professions courses, intended to introduce the student to the scope of the engineering profession and provide an understanding of the broader context of his/her professional activities. The student's professional experience is developed by participation in case studies and interprofessional projects. The graduate of mechanical, materials and aerospace engineering is well prepared to go directly into industry or pursue graduate studies aimed at a career in research, teaching or industry.

The MMAE department considers advising of students an important obligation. Each student must meet with his/her 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.

Mechanical Engineering

Mechanical engineering is an essential part of most industries and modern technologies, and includes the analyses, 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 electro-mechanical devices; the generation of energy from fossil and nuclear fuels; and the utilization, storage and distribution of alternate energy sources.

Materials Engineering

Metallurgical and materials engineering examines processing and microstructure and the relationship between microstructure and material properties. This understanding allows for the development of both new materials and the improvement of existing materials in order to optimize the manufactured product. The scope of the subject is extremely broad, covering the extraction, processing, application and economics of such diverse materials as structural metals and alloys, ceramics, semiconductors, polymers, and composites. Laboratory experience is an important part of the program and emphasizes microstructural characterization with the modern analytical techniques such as: X-ray diffraction, and electron and optical microscopes. Students also learn about material behavior by performing standard tests that characterize the physical and mechanical behavior of materials. Graduating students find positions in companies that require knowledge of new material development and material processing and selection.

Aerospace Engineering

Aerospace engineering explores both the design and manufacture of aircraft, and 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 composites and other new materials.

Minors

Minors available to students who wish to broaden their knowledge can be found on page 158 and 161. A student completes a minor or specialization by substituting required minor courses for two departmental electives, two technical electives, and one social sciences elective. Other minors 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 fourth or fifth semester.

Undergraduate Programs in Mechanical and Aerospace Engineering

The Mechanical and Aerospace Engineering curricula at IIT are based on a strong foundation of courses in the pure sciences and the applied engineering sciences and professional courses in mechanical and aerospace engineering. Among the minors that are available to ME and AE students are:

- Aerospace Engineering* (for ME students only)
- Air Force Aerospace Studies**
- Construction Management
- Design Process
- Electromechanical Design and Manufacturing
- Energy and Power/Environment/Economics (E³)
- Environmental Engineering
- Fire Protection and Safety Engineering
- Management
- Materials Engineering
- Mechanical Engineering* (for AE students only)
- Military Science**
- Naval Science**
- Probability and Statistics
- Product Design**
- Software Engineering

* Requires one extra course

** Requires more than one extra course

Courses Required for both the B.S.A.E. and B.S.M.E.

	Credit Hours
Mathematics:	
MATH 151, 152, 251, 252, 331	21
Physics:	
PHYS 103, 104, 207, 208	12
Chemistry:	
CHEM 124	4
Science Elective:	
MS 101 or CHEM 126	3
Computer Science:	
CS 105	2
Mechanics:	
MECH 201, 202, 203, 305	12
Metallurgical and Materials Engineering:	
METM 326	3
Electrical and Computer Engineering:	
ECE 386	4
Mechanical and Aerospace Engineering:	
MAE 100, 101, 205, 301, 306, 307, 310, 401, 402	21
Technical Electives:	
Two courses	6

Humanities and Social Sciences:

ENGL 101, HUM 100-level course	6
Humanities Electives (300-level and above)	6
Social Sciences Electives (6 hours at 300-level and above)	12

Additional Courses Required for the B.S.M.E.

Mechanical and Aerospace Engineering:

MAE 308, 315, 403, 404, 405, 461, 479	19
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ME Electives:

MAE 413 or MAE 422	3
MAE 480 or MAE 481	3

Total Credit Hours, B.S.M.E. 137

Additional Courses Required for the B.S.A.E.

Mechanical and Aerospace Engineering:

MAE 304, 330, 339, 439, 440, 441, 442	20
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AE Electives:

MAE 479 or MAE 481	3
MAE 413 or MAE 443	3

Total Credit Hours, B.S.A.E. 138

Bachelor of Science Curricula

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

First Semester	Credit			Second Semester	Credit		
	Lect.	Lab.	Hrs.		Lect.	Lab.	Hrs.
MAE 100	1	2	2	MAE 101	0	4	2
MATH 151	4	2	5	MATH 152	4	2	5
CHEM 124	3	3	4	PHYS 103	3	0	3
ENGL 101**	3	0	3	Science Elective*	3	0	3
Computer Science 105	2	1	2	Humanities Elective**	3	0	3
or Social Sciences Elective**	3	0	3	Social Sciences Elective**	3	0	3
Totals	13	7	16	or Computer Science 105	2	1	2
	or 14	or 8	or 17	Totals	15	6	18
					or 16	or 7	or 19
Third Semester				Fourth Semester			
MATH 251	4	0	4	MATH 252	4	0	4
PHYS 104	3	3	4	PHYS 207	3	0	3
MECH 201	3	0	3	MECH 202	3	0	3
Social Sciences Elective**	3	0	3	MECH 203	3	0	3
Social Sciences Elective**	3	0	3	MAE 205	3	0	3
Totals	16	3	17	Totals	16	0	16

Mechanical Engineering: Third and Fourth Years

				Credit							Credit			
Fifth Semester				Lect.	Lab.	Hrs.	Sixth Semester				Lect.	Lab.	Hrs.	
MATH	331			3	0	3	PHYS	208			1	3	2	
MECH	305			3	0	3	MAE	307			0	3	1	
MAE	301			3	0	3	MAE	308			3	0	3	
MAE	306			0	3	1	MAE	310			3	0	3	
METM	326			3	0	3	MAE	315			3	0	3	
ECE	386			4	0	4	Technical Elective				3	0	3	
Totals				16	3	17	Humanities Elective**				3	0	3	
				Totals				16	6	18				
Seventh Semester				Eighth Semester										
MAE	401			2	3	3	MAE	402			1	6	3	
MAE	403			2	3	3	MAE	404			0	6	2	
MAE	461			3	0	3	MAE	405			1	3	2	
MAE	479			3	0	3	Technical Elective†				3	0	3	
ME Elective***				3	0	3	ME Elective***				3	0	3	
Humanities Elective**				3	0	3	Social Sciences Elective**				3	0	3	
Totals				16	6	18	Totals				11	15	16	
				Total Credit Hours								137		

Aerospace Engineering: Third and Fourth Years

				Credit							Credit			
Fifth Semester				Lect.	Lab.	Hrs.	Sixth Semester				Lect.	Lab.	Hrs.	
MATH	331			3	0	3	PHYS	208			1	3	2	
MECH	305			3	0	3	MAE	304			3	0	3	
MAE	301			3	0	3	MAE	307			0	3	1	
MAE	306			0	3	1	MAE	310			3	0	3	
METM	326			3	0	3	MAE	330			3	0	3	
ECE	386			4	0	4	MAE	339			3	0	3	
Totals				16	3	17	Humanities Elective**				3	0	3	
				Totals				16	6	18				
Seventh Semester				Eighth Semester										
MAE	401			2	3	3	MAE	402			1	6	3	
MAE	439			3	0	3	MAE	442			1	3	2	
MAE	440			3	0	3	Technical Elective				3	0	3	
MAE	441			2	3	3	Technical Elective				3	0	3	
AE Elective#				3	0	3	AE Elective#				3	0	3	
Humanities Elective**				3	0	3	Social Sciences Elective**				3	0	3	
Totals				16	6	18	Totals				14	9	17	
				Total Credit Hours								138		

* Science Elective must be chosen from MS 101 or CHEM 126.

** Humanities and social sciences components of the General Education Requirements (see p. 18).

*** One ME Elective must be selected from group A and the other from group B:

Group A: MAE 413 or MAE 422 Group B: MAE 480 or MAE 481

In general, a technical elective is a 300 or higher level course in any engineering discipline (other than required MAE 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 both the faculty adviser and the chair of the department.

One AE Elective must be selected from group I and the other from group II:

Group I: MAE 479 or MAE 481 Group II: MAE 413 or MAE 443

Undergraduate Program in Metallurgical and Materials Engineering

The Metallurgical and Materials Engineering Curriculum at IIT is solidly based on fundamental courses in pure and engineering science, and professional courses in various specialized topics and applications of the field.

Students may choose a professional specialization in Materials and Processing of Materials or Materials Science as described on page 162 or one of the following minors:

- Air Force Aerospace Studies
- Applied Solid State Physics
- Industrial Engineering
- Management for Non-Business Majors
- Military Science
- Naval Science

Metallurgical and Materials Engineering

	Credit Hours
Required Core	
Major Courses	
MS 101, MAE 100, 101, METM 220, 302, 305, 317, 321, 326, 411, 427, 475, 479, 485, 494, MAE 479	45
METM Electives	9
Mathematics Requirements	
MATH 151, 152, 251, 252	18
Physics Requirements	
PHYS 103, 104, 203	11
Chemistry Requirements	
CHEM 124, 125	8
Computer Science Requirement	
CS 105	2
Engineering Course Requirements	
ECE 383, MECH 201, 202, 203	14
Humanities and Social Sciences Requirements	
ENGL 101, HUM 100-level	6
Humanities Electives (300-level+)	6
Social Science Electives (6 hours 300-level+)	12
Other Electives	
Science Elective (300-level)	3
Technical Elective	3
Total Credit Hours	137

B.S.M.M. Professional Specializations

Materials and Processing of Materials

This professional specialization consists of 15 credit hours selected from:

- *METM 402 — Ferrous Technology
- METM 403 — Corrosion
- METM 413 — Powder Metallurgy
- METM 416 — Powder Materials Laboratory
- METM 428 — Commercial Alloys
- METM 430 — Service Failure Analysis
- METM 446 — Forging
- METM 461 — Welding & Fabrication
- METM 481 — Composite Materials
- *MAE 480 — Manufacturing Processes and Machinery
- *MATH 475 — Probability
- *MATH 476 — Statistics
- *OM 423 — Operations Systems Design
- *OM 425 — Simulation of Operation Systems
- *CHE 455 — Polymer Processing
- *CHE 465 — Electrochemical Energy Conversion

Materials Science

This professional specialization consists of 15 credit hours selected from:

- *METM 403 — Corrosion
- METM 405 — Diffraction and Microscopy
- METM 413 — Powder Metallurgy
- *METM 435—Electrical, Optical, and Magnetic Properties
- METM 440 — Computer Applications in Materials Science and Engineering
- METM 471 — Microstructural Characterization
- METM 483 — Structure and Properties of Polymers
- METM 485 — Introduction to Ceramic Materials
- METM 488 — Composite Materials
- *CHEM 243 — Physical Chemistry I
- *CHEM 244 — Physical Chemistry II
- *PHYS 348 — Modern Physics for Scientists and Engineers
- *PHYS 412 — Modern Optics and Lasers

*A maximum of two courses in these options.

Other appropriate courses may be included subject to approval by the student's adviser and the chair of the department.

Bachelor of Science Curriculum

Curriculum for B.S.M.M.

				Credit							Credit		
First Semester				Lect.	Lab.	Hrs.	Second Semester				Lect.	Lab.	Hrs.
MAE 100				1	2	2	MAE 101				0	4	2
MATH 151				4	2	5	MATH 152				4	2	5
CHEM 124				3	3	4	PHYS 103				3	0	3
ENGL 101				3	0	3	MS 101				3	0	3
Social Sciences Elective				3	0	3	Humanities Elective*				3	0	3
or Computer Science 105				2	1	2	Social Sciences Elective				3	0	3
Totals				13	7	16	Totals				16	7	19
				or 14	or 8	or 17					or 15	or 6	or 18
Third Semester							Fourth Semester						
MATH 251				4	0	4	PHYS 203				3	3	4
METM 220				1	6	3	MECH 202				3	0	3
PHYS 104				3	3	4	MECH 203				3	0	3
MECH 201				3	0	3	CHEM 125				3	3	4
Social Sciences Elective*				3	0	3	Humanities Elective*				3	0	3
Totals				14	9	17	Totals				15	6	17
Fifth Semester							Sixth Semester						
MATH 252				4	0	4	ECE 383				3	0	3
METM 305				3	0	3	METM 302				3	0	3
METM 317				4	0	4	MAE 479				3	0	3
METM 326				3	0	3	METM 321				1	6	3
Humanities Elective*				3	0	3	Science Elective (300 level)				3	0	3
Totals				17	0	17	Totals				16	6	18
Seventh Semester							Eighth Semester						
METM 475				3	0	3	METM 494				3	0	3
METM 427				3	0	3	METM Elective II				3	0	3
METM 479				3	0	3	METM Elective III				2	3	3
METM 485				3	0	3	METM 411				2	3	3
METM Elective I				3	0	3	Technical Elective				3	0	3
Social Sciences Elective*				3	0	3	Totals				13	6	15
Totals				18	0	18	Total Credit Hours				137		

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

* Humanities and social sciences components of the General Education Program (see p. 18 for details).

Course Descriptions

Numbers in parentheses indicate: (lecture hours-laboratory hours-credit hours).

Mechanics Courses

MECH 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. Kinematics of particles: Newton's laws of motion, energy, momentum. Systems of particles. Dynamics of rotating bodies. Credit for this course is not applicable to the B.S.M.E. or B.S.A.E. programs. Prerequisites: PHYS 103, MATH 152, CS 105. Corequisite: MATH 252. (3-0-3)

MECH 201 Statics

Equilibrium concepts. Statics of a particle. Statics of a system of particles and rigid bodies. Distributed forces, centroids, and centers of gravity. Forces in frames, structures, beams, and cables. Friction. Moments of inertia. Prerequisites: CS 105, MAE 101, and PHYS 103. Corequisite: MATH 152. (3-0-3)

MECH 202 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: MECH 201. Corequisite: MATH 252. (3-0-3)

MECH 203 Mechanics of Solids

Stress and strain relations, mechanical properties, torsion of circular shafts, shear and bending moment diagrams, elementary bending theory, compound stresses, plane stress and strain. Mohr's circle, combined stresses, yield criteria, beam deflection. Prerequisite: MECH 201. (3-0-3)

MECH 305 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; poten-

tial flow; Navier-Stokes equations, parallel flow, pipe flow, and the Moody diagram. Introduction to laminar and turbulent boundary layers.

Prerequisites: MECH 202, MATH 251, MATH 252, MAE 205. (3-0-3)

Mechanical and Aerospace Engineering Courses

MAE 100 Introduction to the Professions 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. Emphasis is placed on the development of professional communications and teamwork skills. (1-2-2)

MAE 101 Introduction to the Professions II

Continuation of MAE 100, primarily through short projects. (0-4-2)

MAE 205 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. Maximum work. Prerequisites: CHEM 124, CS 105, MAE 101, PHYS 104, MATH 251. Corequisite: MATH 252. (3-0-3)

MAE 301 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. Prerequisite: MAE 205. (3-0-3)

MAE 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: MECH 203, MATH 251, MATH 252. (3-0-3)

**MAE 306 Solid Mechanics/
Manufacturing Laboratory**

Introduction to measurements of basic mechanical properties of solid materials and the design and manufacturing of parts. Topics include: determination of stress, strain, and the stress-strain response of materials to failure; uniaxial tension, torsion, impact, and hardness; coordinate measuring machines and microscopy; computer numerical control machines and programming. Laboratory experiments in small groups. Prerequisite: MECH 203. (0-3-1)

**MAE 307 Fluids/Thermal Sciences
Laboratory**

Introduction to measurements of fluid properties, basic features of fluid flows, thermodynamic and heat transfer processes; flow through pipes and channels; flow-induced forces on bodies; performance of fluid machinery; combustion; thermodynamic cycles; conduction, convection, and radiation heat transfer. Laboratory experiments in small groups supplemented by demonstrations and films. Corequisites: MAE 301, MECH 305. (0-3-1)

**MAE 308 Mechanics of Solids and
Design**

Interrelationships between stress, strength and design. Failure under combined stresses, yielding, stress and strain fields. Fatigue, endurance limits, cumulative damage; design against fatigue. Analysis and design of plates, thin and thick-walled cylinders. Stress concentration factors. Fracture, stress intensity factors. Design charts and applications. Properties and applications of light-weight alloys and composites; design considerations. Prerequisites: MATH 251, MATH 252, METM 326. (3-0-3)

MAE 310 Heat and Mass Transfer

Basic laws of transport phenomena. Similarity relations and analogies. Steady-state heat conduction; heat generation and extended surfaces. Multidimensional and transient heat conduction. Numerical and graphical analysis. Fundamentals and empirical relations of forced and natural convection. Radiation concepts, net-

works, solar energy. Combined effects. Electrical analogies. Prerequisites: MATH 331, MECH 305. (3-0-3)

**MAE 315 Introduction to Systems
Dynamics**

Description of mechanical and electrical systems using ordinary differential equations. Linearization techniques. Dynamic response and stability. Numerical techniques for solving system models. Prerequisite: MECH 202. Corequisite: ECE 386. (3-0-3)

MAE 330 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: MECH 305, MAE 301. (3-0-3)

**MAE 339 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: MECH 305, MAE 301, MATH 331. (3-0-3)

**MAE 401 Measurement Systems:
Application and Design**

Introduction to types of applications of measurement instrumentation. Generalized configurations and functional descriptions of measuring instruments. Operational amplifiers and analog signal processing. Measurement of motion, force, strain, torque, shaft power, pressure, sound, flow, temperature, and heat flux. Prerequisite: ECE 386. Corequisite: MAE 310. (2-3-3)

**MAE 402 Engineering Experiments:
Analysis and Design**

Application of the fundamental principles of dynamics, thermodynamics, fluid mechanics, heat transfer, and electricity to the design and analysis of experiments. Individual experimen-

tal design research projects selected from areas involving supersonic gas flow, heat transfer and combustion, vibrations, or other areas of student interest. Some topics especially designated for aerospace engineering students. Prerequisite: MAE 401. (1-6-3)

MAE 403 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: MAE 308. (2-3-3)

MAE 404 Design of Mechanical Systems

Small group design projects drawn from industry. Prerequisite: MAE 403. (0-6-2)

MAE 405 Design of Thermal Systems

Application of principles of fluid mechanics, heat transfer, and thermodynamics to design of components and 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: MAE 301, MAE 310. (1-3-2)

MAE 406 Design for Mechanical Reliability

Reliability and hazard functions; static and dynamic reliability models for series, parallel and complex systems; reliability allocation. Probabilistic design; stress and strength distributions; safety factors; loading random variables; component geometry as random variable; 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: MAE 403. (3-0-3)

MAE 413 Mechanical Vibrations

Study of free, forced, and damped vibrations of single degree of freedom mechanical systems: resonance, critical damping, vibration isolation. Two degree of freedom systems: natural frequencies, normal modes, resonances, vibration absorbers. Introduction to vibrations of multiple

degree of freedom systems. Prerequisites: MECH 202, MATH 331. (3-0-3)

MAE 414 Introduction to Robotics

Classification of robots; kinematics and inverse kinematics of manipulators; trajectory planning; robot dynamics and equations of motion; position control. Prerequisite: MAE 315. (3-0-3)

MAE 419 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 out of 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 skills for expert witnesses. Prerequisite: Senior standing. (3-0-3)

MAE 422 Finite Element Methods in Engineering

Principles of minimum potential energy for 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, problems of stress concentration. General finite element codes—data generation and checks, ill-conditioned problems, node numbering. Prerequisites: MAE 304 or MAE 308. (3-0-3)

MAE 426 High-Speed Ground Transportation

Elements of rail transportation, resistance, power and high speed requirements. Modern high-speed rail systems—TGV, Shin Kan Sen, and others. Magnetic levitation and other high-speed systems. Guideway and track considerations. Mechanics and comparative study of various systems. Stability, efficiency and special features. Prerequisite: MECH 202. (3-0-3)

MAE 439 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: MAE 330, MAE 339. (3-0-3)

MAE 440 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: MAE 339. (3-0-3)

MAE 441 Design of Aerospace Vehicles I

Aircraft design including aerodynamic, structural, and powerplant characteristics to achieve performance goals. Focus on applications ranging from commercial to military, from manpowered to high-speed to long-duration aircraft. Semester project is a collaborative effort in which small design groups complete the preliminary design cycle of an aircraft to achieve specific design requirements. Prerequisites: MAE 304, MAE 330, MAE 339. (2-3-3)

MAE 442 Design of Aerospace Vehicles II

Design of spacecraft systems including mission profile, booster characteristics, interplanetary astrodynamics, communications, sensor systems, power distribution, thermal management, spacecraft dynamics, and life-cycle cost. Semester-long project is focussed on the integration of multiple systems into a coherent spacecraft design. Extensive use of computer graphics and design software. Prerequisites: MAE 439, MAE 440, MAE 441. (1-3-2)

MAE 443 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: MAE 440. (3-0-3)

MAE 450 Direct Energy Conversion

A study of various methods available for the direct conversion of thermal energy into electrical energy. Introduction to the principles of operation of magnetohydrodynamic generators, thermoelectric devices, thermionic converters, fuel cells, and solar cells. Prerequisites: MAE 301, PHYS 208. (3-0-3)

MAE 452 Air Conditioning and Refrigeration

Environmental control for winter and summer; elements of psychometrics; load calculations. Space heating and cooling methods; extended surface coils; solar shading techniques for summer and winter. Absorption refrigeration. System analysis and planning. Prerequisites: MAE 301, MAE 310. (3-0-3)

MAE 454 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. Prerequisite: MAE 301, MAE 310. (3-0-3)

MAE 461 Systems Analysis and Control

Mathematical modeling of lumped-parameter dynamical systems. Linearization techniques. Laplace transformations and transfer functions. Transient and frequency 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. Prerequisite: MAE 315. (3-0-3)

MAE 475 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: MAE 308 and consent of instructor. Corequisite: MAE 401. (3-0-3)

MAE 479 Materials Processing

Principles of material forming and removal processes and equipment. Force and power requirements, surface integrity, final properties, dimensional accuracy as influenced by material properties and process variables. Design for manufacturing. Factors influencing choice of manufacturing process. Prerequisite: METM 326. (3-0-3)

MAE 480 Manufacturing Processes and Machinery

Analysis of basic manufacturing processes, with emphasis on secondary and finishing operations. Casting, powder metallurgy, processing of polymers and composite materials, and quality assurance. The material/design/manufacturing interface. Competitive aspects and modern trends in manufacturing and computer-integrated machinery. Prerequisite: MAE 479 or equivalent. (3-0-3)

MAE 481 CAD/CAM with Numerical Control

Computer graphics for engineering design and analysis of CAD software and hardware. Numerical control of machine tools by various methods. Prerequisites: CS 105, MATH 252. (3-0-3)

MAE 482 Gear Design

Geometry and analysis of spur, worm, spiral, bevel, and helical gears and their applications. Software for gear design. Gear wear and failures. Prerequisite: Senior standing or consent of instructor. (3-0-3)

MAE 483 Gear Manufacture

Methods of gear manufacture: forging, rolling, casting, powder metallurgy, machining (form cutting and gear generating). Finishing processes and heat treatment. Design considerations. Characteristics of gear manufacturing machinery, gear quality, economics, and competitive aspects. Prerequisite: Senior standing or consent of instructor

MAE 491 Undergraduate Research

Student undertakes an independent research project under the guidance of an MMAE faculty member. Requires the approval of the MMAE

Department Undergraduate Studies Committee. (Credit: Variable; 3 hours maximum.) . (3-0-3)

MAE 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; 3 hours maximum.)

MAE 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.

Metallurgical and Materials Engineering

MS 101 Materials Science

Introduction to the science of solid materials. Emphasis is placed on the relations between the structure of materials (on the microscopic and macroscopic levels) and their electrical, thermal, and mechanical properties. Physical, chemical, and processing factors affecting the structure of polymeric, ceramic, metallic, and semi-conducting materials are treated. Prerequisite: CHEM 124. (3-0-3)

METM 202 Electron Microscopy of Materials

Applications of microscopy in metallurgy and materials science, including electronic materials. Hands-on practice with scanning electron microscopes and energy dispersive analyzers. Light microscopy, transmission electron microscopy, sample preparation, technical photography, and darkroom experience. Prerequisite: MS 101. (1-3-2)

METM 220 Materials Laboratory I

Basic metallurgy and materials laboratory methods including thermal analysis, mechanical testing, specimen preparation, optical and electron microscopies, X-ray diffraction, and radiography. Prerequisite: MS 101. (1-6-3)

METM 302 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 101, METM 326. (3-0-3)

METM 305 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 101. (3-0-3)

METM 317 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 101. (4-0-4)

METM 321 Materials Laboratory II

Continuation of METM 220. Fatigue, fracture, and corrosion of metals and alloys. Cold working and annealing. Characterization of polymers and composites. Sintering of ceramics. Powder metallurgy. Prerequisites: METM 220, METM 326. (1-6-3)

METM 326 Engineering Materials and Design

Physical principles of elastic and plastic deformation of materials. Mechanical testing methods including tensile, hardness, impact, toughness, fatigue, and creep. Mechanical properties of materials as related to microstructure and service conditions. Strengthening mechanisms in single-phase and composite materials. Prerequisites: MS 101 or CHEM 125, and MECH 203. (3-0-3)

METM 400 Metallurgical and Materials Engineering Review

Intensive review of undergraduate metallurgical and materials engineering principles. Intended

for graduate students whose backgrounds did not include all the materials fundamentals necessary as preparation for METM graduate study. Prerequisite: Consent of adviser. (4-0-4)

METM 402 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: METM 302. (3-0-3)

METM 403 Corrosion

Theory and prevention of corrosion of metals, including oxidation, sulphidation, other atmospheric attacks, aqueous corrosion, and other topics. Prerequisite: METM 302. (3-0-3)

METM 405 Diffraction and Microscopy

Theory of diffraction of X-rays, neutrons, and electrons by crystals. Operation of X-ray diffractometers; X-ray safety. Practical applications of X-ray diffraction in problems in materials engineering. Applications of the transmission electron microscope and the theory of image formation. Prerequisites: METM 302, METM 305. (2-3-3)

METM 411 Metals Processing

Melting and casting of alloys. Heat treatment of ferrous and nonferrous alloys. Prerequisite: MAE 479. (2-3-3)

METM 413 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. Prerequisite: METM 302. (3-0-3)

METM 416 Powder Metallurgy Laboratory

Basic techniques of powder materials technology from powder to finished product; manufactured parts such as porous bronze bearings, fil-

ters, structural ferrous parts, and ceramic components. Prerequisite: METM 413. (1-6-3)

METM 423 Metal Casting

Melting and alloying procedures, metal-mold reactions, riser and gate design, process optimization, special casting processes. Prerequisite: METM 328. (2-3-3)

METM 425 Heat Treatment

Annealing, solution treatments, hardening treatments, tempering, carburizing, and nitriding. Power metallurgy. Prerequisite: METM 328. (2-3-3)

METM 427 Physical Metallurgy

Principles of solid state phase transformations: precipitation reactions; spinodal decomposition; particle coarsening; order-disorder transitions; eutectoid, massive, bainitic and martensitic transformations. Strengthening mechanisms in solids and their relationship to phase structure. Prerequisites: METM 302, METM 326. (3-0-3)

METM 428 Commercial Alloys

The characteristics and properties of commercial alloys. Their selection, fabrication, and use. Prerequisite: METM 302. (2-0-2)

METM 430 Service Failure Analysis

Theory and practice of the approaches to the analysis of failures which have occurred in service. Prerequisite: Consent of instructor. (2-3-3)

METM 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 ECE 435. Prerequisite: ECE 311 or METM 305. (3-0-3)

METM 440 Computer Applications in Materials Science and Engineering

Numerical modeling. Thermodynamic modeling of phase equilibria. Laboratory applications involving data acquisition, statistical analysis, and data presentation. Modeling of structure

property relationships, image analysis, X-ray, and electron diffraction. Finite element determination of stresses and strains. Modeling of metallurgical processes, such as forging, rolling, and casting. Prerequisite: Consent of instructor. (3-0-3)

METM 446 Forging

Raw materials, fabrication, and other metallurgical aspects of press and drop forgings, including inspection and finishing. Prerequisite: METM 326 or consent of instructor. (2-0-2)

METM 450 Electroplating

Electrochemistry of plating. Plating processes. Efficiency and throwing power. Structure and properties of electrodeposited layers. Prerequisite: METM 317. (2-3-3)

METM 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: METM 302. (2-3-3)

METM 471 Microstructural Characterization of Materials

Advanced optical microscopy. Scanning and transmission electron microscopies. X-ray microanalysis. Surface characterization. Quantitative microscopy. Elements of applied statistics. Prerequisite: METM 321. (2-3-3)

METM 475 Composites

Types. Synthesis of precursors. Fabrication of composites. Design. Mechanical properties. Environmental effects. (3-0-3)

METM 479 Fundamental Principles of Polymeric Materials

An overview of the basic principles of polymeric materials. Topics discussed include types of polymers, methods of polymer synthesis, structure, and morphology and their relationship to properties, and basic polymer processing methods. (3-0-3)

METM 481 Composite Materials

Structure and methods of preparation of fibers and fiber reinforced composites. Micromechanics of fiber and particle reinforced composites. Prediction of elastic constants and strength, stress analysis, interfacial mechanics, and properties. Prerequisites: MECH 203, METM 479. (3-0-3)

METM 483 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, semicrystalline structure, and polymers melts. Effects of molecular weight and different types of intermolecular interactions are presented. Prerequisite: METM 479. (3-0-3)

METM 484 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)

METM 485 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 101 or equivalent. (3-0-3)

METM 486 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 101 or equivalent and METM 302. (3-0-3)

METM 488 Fiber Composite Materials

The materials, structure and fabrication methods for fiber composites will be discussed. Prediction of mechanical properties such as stiffness and strength. Prediction methods for laminates. Thermal and diffusion properties. Prerequisite: MECH 203. (2-0-2)

METM 494 Material Design Project

A group project in which students explore a specific design problem involving elements of materials selection, materials processing and materials development. The projects focus on both technical aspects of the design and non-technical factors, such as economics and environmental considerations. Oral and written communication skills are also emphasized. (1-6-3)

METM 497 Special Problems

Individualized instruction. (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.

Preprofessional Program

Dr. T.I. Morrison, Chair, Biological, Chemical and Physical Sciences
182 Life Sciences Ext. 73381

Dr. James Robergé, Associate Chair, Computer Science and Applied Mathematics
237B Stuart Building Ext. 75168

Dr. M. Ellen Mitchell, Director, Institute of Psychology
252 Life Sciences Ext. 75130

Dr. William J. Grimshaw, Chair, Social Sciences
232 Life Sciences Ext. 75128

Legal studies adviser: *Dr. Scott Peters, Assistant Professor of Political Science*
232 Life Sciences Ext. 75130

Medical studies adviser: *Dr. Benjamin Stark, Associate Chair, Biological, Chemical and Physical Sciences* 182 Life Sciences Ext. 73488

The Preprofessional Degree Program combines in-depth preparation in a particular area of specialization or major with broad knowledge required in every profession and a coordinated series of enhancements to prepare students for professional or graduate studies. Each student's preprofessional program is highly individualized—integrating courses, projects, research and field work relevant to the student's professional goals as well as his or her undergraduate specialization. The flexibility and broad base of this degree make it ideal preparation for students planning careers in medicine, dentistry and other graduate health professions, law, psychology, environmental studies, and graduate business, as well as for those planning to pursue Master's and Doctoral programs. This program will also provide excellent preparation for students who seek employment immediately after the completion of their undergraduate degree should they decide not to pursue advanced studies.

All preprofessional students will take a common interdisciplinary academic core that emphasizes science, human behavior, and knowledge of social policy and is strengthened by courses and projects aimed at developing students' proficiency in oral and written communication, computational skills, and computer proficiency. This interdisciplinary core complements the course work in the student's particular field of undergraduate specialization. Preprofessional Degree Program students may specialize in one of the following areas:

Applied Math
Biology
Chemistry
Computing
Physics
Political Science
Psychology

Undergraduates from Engineering or Architecture planning to pursue graduate or professional study, who would benefit from the enhancements of the Preprofessional Program, are invited to participate in this program.

Curriculum Overview

The curriculum of the Preprofessional Program is comprised of

- (a) a first-year common course **Introduction to the Professions**
- (b) a common interdisciplinary core of courses that includes specified course work in: math, biology, chemistry, physics, computer science, psychology, social science, and humanities
- (c) the major core to attain in-depth knowledge in a particular field
- (d) the sophomore and junior year interprofessional project and student-organized conference
- (e) the senior year capstone project.

In addition to the curriculum, a series of enhancements aimed at ensuring academic and employment success will be made available to students. These include: preparation for graduate school exams such as the LSAT, MCAT, and GRE, help with obtaining field experience, opportunities for contact with persons working in the profession of interest, a research experience, tutorials to assist students with rigorous course work, and activities to develop professional interpersonal skills. Students should refer to the description of their intended area of specialization or major in this bulletin for a more detailed explanation of programs, curriculum and graduation requirements.

Preprofessional Degree Program Sample Curriculum

The following two samples are drawn from the many possible combinations of areas of specializations or majors with programs of preparation for professional or graduate study. Students will work with advisers to plan their specific academic programs.

Specialization/major: Biological Sciences

Professional emphasis: Medicine

The four-year program consists of the following components:

Year 1

1. A year long tutorial course, "Introduction to the Professions," in which clusters of 10-20 students gain experience in basic skills and explore professional aspects of the discipline in which they are to focus.
2. Introductory studies in biology
3. Core requirement studies in chemistry and mathematics
4. The development of skill in oral and written communication
5. The study of human behavior, growth and learning

Year 2

1. Studies in biological and physical sciences; organic chemistry, physics, genetics and microbiology
2. The development of computational skills
3. Studies in sociological and psychological issues in contemporary society
4. Interprofessional project
5. Medically related fieldwork

Year 3

1. Studies in physical and analytical chemistry, genetics, physiology and biochemistry
2. Philosophical and historical studies of science
3. Medically related fieldwork and preparation for MCAT
4. Interprofessional project

Year 4

1. A senior capstone course in biological science spanning the year
2. Cell biology and in-depth study of selected topics in biology
3. Free electives, for example, studies of the interface between science and technology

Preprofessional Degree Program Sample Curriculum

Specialization/major: Political Science

Professional emphasis: Law

The four-year program consists of the following components:

Year 1

1. A year long tutorial course, "Introduction to the Professions," in which clusters of 10-20 students gain experience in basic skills and explore professional aspects of the discipline in which they are to focus.
2. Introductory studies in political science
3. Core requirement studies in science and mathematics
4. The development of skill in oral and written communication
5. The study of human behavior, growth and learning

Year 2

1. Foundation studies in logic, the philosophy of the law, or constitutional issues
2. An exploration of research and statistical methods in political science.
3. Studies in psychology and economics
4. Core requirement study in chemistry
5. A continued focus on writing skills
6. Interprofessional project

Year 3

1. Studies in the areas of ethics, policy analysis, accounting and urban politics
2. Computational skills for the professions
3. Core requirement study in physics
4. An interprofessional project throughout the junior year
5. Fieldwork related to the legal profession and preparation for LSAT
6. Free elective

Year 4

1. A capstone course in political science spanning the year
2. In-depth studies in required political and social science courses and in 12 credits of free electives

Note: IIT's Chicago-Kent College of Law offers a minor for IIT undergraduates. This minor is only open to a small number of qualified students who are prepared to take courses at the campus at 565 W. Adams St., Chicago, and who satisfy the admission standards set by the Chicago-Kent College of Law. See page 27.

Prospective IIT students interested in careers in law might consider two accelerated B.S./J.D. programs offered with Chicago-Kent College of Law. See page 23.

Institute of Psychology

Director: *M. Ellen Mitchell* 252 Life Sciences Ext. 73500

Professors: *Geist, Huyck, Lam, Schleser, Wolach*

Associate Professors: *Ayman, Hopkins, Larson, Merbitz, Mitchell*

Assistant Professors: *Cassisi, Morris, Penn, Roldan, Sher, Stetson*

Visiting Assistant Professors: *Fleer, Hilburger, Jeleniewski*

Faculty Emeritus: *Vermillion*

Psychology has as its objective understanding the manner in which human beings and animals behave and the ways in which their behavior can be modified. Traditional undergraduate curricula, principally of a general experimental focus, abound in colleges and universities across the United States. A traditional Bachelor of Science in Psychology is available and detailed below.

The Institute of Psychology also offers 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, bright, 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. This program is currently under development and review. Students will be provided with materials describing specific approved requirements at the time of admission. Below is a preliminary version of required courses and a sample program of study. Students should also refer to page 172 of this bulletin for additional information on this preprofessional 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, our curriculum encompasses the major changes which have occurred in psychology over the past 25 years and prepares students for the 21st Century, whether it be in psychology or another professional field. The proposed preprofessional Bachelor of Science with a psychology area of specialization includes:

Preprofessional Program Bachelor of Science, Psychology Specialization

NOTE: Curriculum currently under development and review.

	Credit Hours
Required Core	
Major Courses	
PSYC 121, 122, 204, 301, 303, 406, 435 or 436, X82, X83, 487, 488,	33
Intro to the Professions 100, 101	4
Psychology Electives	15
Mathematics Requirements	
MATH 1*, MATH 221	6
Computer Science Requirements	
CS 130*	3
Natural Science Requirement	
CHEM 124 and lab, BIOL 107 and/or 115**, PHYS 1*,	11-13**
Humanities and Social Sciences Requirements	
ENGL 101, 100-level HUM, PS 200 or 2XX	9
Electives: 300-level and above	15
Second- and third-year interprofessional projects*	6
Fourth-year capstone project*	6
Free electives	18
Total Credit Hours	126-128

* Under revision for preprofessional programs

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

A sample curriculum would be as follows. Interested students should contact the Institute directly to consult with a faculty adviser about the curriculum and its tailor-made opportunities. The program is currently under review for approval.

Curriculum

First Semester	Crd. Hrs.	Second Semester	Crd. Hrs.
Intro to the Professions	2	Intro to the Professions	2
English 101	3	Biology 115	3-4
Chemistry 124	4	200-level Social Sciences elective	3
Psychology 121	3	Psychology 122	3
Math 221	4	Math I	3
Totals	16	Totals	14-15
Third Semester	Crd. Hrs.	Fourth Semester	Crd. Hrs.
Psychology 204	3	Psychology 303	3
Psychology X82	3	Psychology X83	3
Psychology 301	3	Computer Science 130*	3
Biology 107	3	Physics I	3
Interprofessional projects	3	HUM 1XX	3
Humanities elective	3	Totals	15
Totals	18		

Undergraduate Programs and Courses

Fifth Semester	Crd. Hrs.	Sixth Semester	Crd. Hrs
Psychology 436	3	Psychology electives	6
Interprofessional projects	3	Social Science elective	3
Psychology elective	3	Humanities elective	3
Free elective	3	Free electives	6
Political Science 3XX	3		
Totals		Totals	
	15		18

Seventh Semester	Crd. Hrs.	Eighth Semester	Crd. Hrs.
Capstone Project I	3	Psychology Honors Project	3
Integrative Psychology Seminar I 487	3	Integrative Psychology Seminar II 488	3
Psychology 406	3	Psychology elective	3
Psychology elective	3	Social Sciences elective	3
Free elective	3	Free elective	3
Totals		Totals	
	15		15

Bachelor of Science Psychology (Traditional) Curriculum

	Credit				Credit		
First Semester	Lect.	Lab.	Hrs.	Second Semester	Lect.	Lab.	Hrs.
PSYC 121	3	0	3	PSYC 122	2	2	3
ENGL 101**	3	0	3	PSYC 303	3	0	3
MATH 151*	4	2	5	MATH 152*	4	2	5
CS 113	0	2	1	HUM 100-level course**	3	0	3
Social Sciences Elective**	3	0	3	CS 105	2	1	2
Totals				Totals			
	13	4	15		14	5	16
Third Semester				Fourth Semester			
PSYC 310	3	0	3	PSYC 204	3	0	3
BIOL 107	3	0	3	PHYS 103	3	0	3
CS 200	2	2	3	BIOL 115	3	0	3
Social Sciences Elective**	3	0	3	Social Sciences Elective**	3	0	3
Humanities Elective**	3	0	3	Individualized Minor***	3	0	3
Totals				Totals			
	14	2	15		15	0	15
Fifth Semester				Sixth Semester			
PHYS 104	3	3	4	PSYC 435	3	0	3
MATH 221	3	0	3	CHEM 126	3	0	3
CHEM 124	3	3	4	Humanities Elective**	3	0	3
Free Elective	3	0	3	Individualized Minor****	3	0	3
Individualized Minor ***	3	0	3	Free Electives	6	0	6
Totals				Totals			
	15	6	17		18	0	18
Seventh Semester				Eighth Semester			
PSYC 452	3	0	3	PSYC 487	3	0	3
PSYC 406	3	0	3	Psychology Elective	3	0	3
Social Science Elective**	3	0	3	Individualized Minor***	3	0	3
Individualized Minor***	3	0	3	Free Electives	6	0	6
Psychology Elective	3	0	3				
Totals				Totals			
	15	0	15		15	3	15

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

** Humanities and social sciences components of the General Education Program (see p. 18 for details).

*** 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.), public administration (B.S./M.P.A.), personnel and human resource development, or rehabilitation counseling (B.S./M.S.) offered by IIT. With the consent of the institute 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) from students earning undergraduate degrees from IIT are encouraged.

Course Descriptions

Numbers in parentheses indicate: (lecture hours-laboratory hours-credit hours).

(S) identifies courses that may be taken to fulfill Social Sciences General Education requirements. All 300 level courses marked with an (S) require as prerequisites that students have successfully completed at least one other course with an (S) and ENGL 101.

(N) may be applied toward the General Education requirement in natural sciences.

PSYC 121 Human Behavior, Growth and Learning

Survey of personality, developmental, assessment, learning and social psychological aspects of human behavior. (3-0-3)*

PSYC 122 Brain, Mind and Behavior

Survey of sensation, perception, motivation, physiological and neuropsychological bases of behavior. (3-0-3) *

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 201, MATH 221. (2-2-3) (N)

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)

PSYC 303 Abnormal Psychology

Survey of the dynamics underlying behavior deviations. Considers therapeutic procedures, psychopathology. (3-0-3) (S)

PSYC 310 Social Psychology

Description and analysis of behavior and experience as determined by social conditions. Includes social issues, human relations, prejudice, and leadership. (3-0-3) (S)

PSYC 406 History and Systems of Psychology

Historical development of influential psychological systems: structuralism, functionalism, behaviorism, psychoanalysis, and Gestalt psychology. Prerequisite: 12 hours of psychology. (3-0-3) (S)

PSYC 409 Psychological Testing

Survey of current group tests, emphasizing basic concepts; e.g., validity, reliability, as well as practical applications and measurement techniques. Prerequisites: PSYC 121, 122 and 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 201. (3-0-3) (S)

PSYC 411 Medical Aspects of Disabling Conditions

Survey of human organ systems, medical terminology, unique characteristics of disabling conditions, including severe disabilities. Vocational consequences, environmental impact and implications for the rehabilitation process. One of a two-course sequence. Prerequisite: PSYC 121, 122. (3-0-3) (S)

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 121, 122. (3-0-3) (N)

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. Prerequisite: PSYC 121, 122 (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)

PSYC 423 Learning Theory

Survey of contributions of major learning theorists and pertinent studies. Prerequisite: 12 hours of psychology. (3-0-3) (S)

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: 9 hours of Psychology or consent of instructor. (3-0-3)*

PSYC 436 Adult Development

Explores processed and changes in cognitive, social, physical and emotional functioning across adult life. Prerequisite: 9 hours of Psychology or consent of instructor. (3-0-3)*

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, 411, and 412 or concurrent registration. (3-0-3)

PSYC 452 Personality Theory

Survey of personality theories and their application to everyday life. Prerequisite: PSYC 121, 122. (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, maintain-

ability, safety, and engineering evaluation. Prerequisite: PSYC 201. (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 121, 122 and 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 488 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 credits in Psychology. (3-0-3)

PSYC 489 Undergraduate Psychology Seminar

Reports and discussion of current problems and issues in psychology. Prerequisites: PSYC 121, 122 and 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

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.

* Under review as appropriate for fulfillment of social science general education requirement(s).

ROTC: Air Force Aerospace Studies

Chair: *Lt. Col. Robert Kwiatkowski* *Stuart Building* *Ext. 73525*

Professor: *Kwiatkowski*

Assistant Professors: *Backes, Kravchin, Kruk*

Air Force ROTC is conducted at approximately 600 colleges and universities throughout the United States in order to select and train 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. Others, 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.

Financial Aid

Scholarships are available to qualified graduate and undergraduate students in both the four-year and two-year programs. These pay full tuition and fees, text-book 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 men and women 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 six-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 six-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 six-week program, which includes the GMC academic curriculum, transfer credit of three semester hours will be applied toward the completion of the AFROTC minor.

Minor

Students may select a minor in Air Force Aerospace Studies. See page 25 for course requirements.

Curriculum

				Credit							Credit		
First Semester				Lect.	Lab.	Hrs.	Second Semester				Lect.	Lab.	Hrs.
AS	101			1	1	1	AS	102			1	1	1
Third Semester							Fourth Semester						
AS	201			1	1	1	AS	202			1	1	1
Fifth Semester							Sixth Semester						
AS	301			3	1	3	AS	302			3	1	3
Seventh Semester							Eighth Semester						
AS	401			3	1	3	AS	402			3	1	3

1. Air Force aerospace students may not take any Air Force aerospace courses on a pass-fail basis.
2. GMC courses AS 101, 102, 201, and 202 academic curricula are included in the Two-Year Program's Six-Week Field Training.

Course Descriptions

Numbers in parentheses indicate: (lecture hours-laboratory hours-credit hours).

AS 101 Air Force Today I

Survey course introduces students to the U.S. Air Force and Air Force ROTC, Air Force customs, core value and Air Force installations. Leadership Laboratory develops leadership potential and ability to work with small units. (1-1-1)

AS 102 Air Force Today II

Continuing study of topics covered in AS 101. Basic principles of leadership, communication skills, Air Force organizational structure and missions. Leadership Laboratory continued. (1-1-1)

AS 201 Air Force Way I

Survey course designed to facilitate the transition from Air Force cadet to Air Force ROTC candidate. Air Force heritage, Air Force leaders, Quality Air Force and introduction to ethics and values. Leadership Laboratory continued. (1-1-1)

AS 202 Air Force Way II

Continuing study of topics covered in AS 201. Concepts of ethical behavior, basics of leadership, Air Force officer environment, group leadership problems, and oral communication application. Leadership Laboratory continued. (1-1-1)

AS 301 Air Force Leadership and Management I

Study of leadership and quality management fundamentals, professional knowledge, Air Force doctrine, leadership ethics and communication skills required of an Air Force junior officer. Advanced Leadership Laboratory complements this course by providing leadership experiences in officer-type activities. (3-1-3)

AS 302 Air Force Leadership and Management II

Study of Air Force officer's responsibilities in counseling and feedback process, responsibility and authority of an Air Force officer and selected concepts, principles and theories of quality Air Force leadership and management. Continuation of Advanced Leadership Laboratory. (3-1-3)

AS 401 Preparation for Active Duty I

Study of the national security process, regional studies, advanced leadership ethics, Air Force doctrine and selected determinants and constraints relating to the use of national power. Special topics include the military as a profession, officership and military justice. Advanced Leadership Laboratory for development and practice in dealing with large and more complex groups. (3-1-3)

AS 402 Preparation for Active Duty II

Study of the responsibility, authority and functions of an Air Force commander and staff officer, Air Force issues, roles and missions. Continued emphasis on refining communications skills. Discussion of officer commissioning which will facilitate a transition from civilian to military life. Advanced Leadership Laboratory. (3-1-3)

Leadership Laboratory

A study of Air Force customs and courtesies, drill 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.

ROTC: Military Science

Chair: LTC Patrick D. Flanagan University of Illinois at Chicago
(312) 996-3451

IIT Program Director: Maj. Timothy Michels 103 SB Ext. 77553

Professor: Flanagan

Assistant Professors: Mazo, Michels, Smith

Instructors: LaRoche, Springman, Allen, Hamilton

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.

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, 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 \$100 per month is paid to each cadet in the Advanced Course except during attendance at summer camp, when pay is approximately \$100/week. Upon graduation and successful completion of the Advanced Course and the Professional Military Education Requirements (PME's), 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 (PME’s)

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 \$12,000 per year to qualified students. IIT offers an excellent incentive package to scholarship winners. For further information, call (312) 567-7553 or visit the Military Science Office.

Curriculum

				Credit							Credit		
First Semester				Lect.	Lab.	Hrs.	Second Semester				Lect.	Lab.	Hrs.
MILS 101				1	2	1	MILS 102				1	2	1
MILS 147*				0	3	2	MILS 148*				0	3	2
Totals				1	5	3	Totals				1	5	3
Third Semester				Lect.	Lab.	Hrs.	Fourth Semester				Lect.	Lab.	Hrs.
MILS 201				2	2	2	MILS 202				3	2	3
MILS 247*				0	3	2	MILS 248*				0	3	2
Totals				2	5	4	Totals				3	5	5
Fifth Semester				Lect.	Lab.	Hrs.	Sixth Semester				Lect.	Lab.	Hrs.
MILS 301				3	2	3	MILS 302				3	2	3
MILS 347**				0	3	2	MILS 348**				0	3	2
Totals				3	5	5	Totals				3	5	5
Seventh Semester				Lect.	Lab.	Hrs.	Eighth Semester				Lect.	Lab.	Hrs.
MILS 401				3	2	3	MILS 402				3	2	3
MILS 447**				0	3	2	MILS 448**				0	3	2
Totals				3	5	5	Totals				3	5	5

* MILS 147-48/247-48 (Aerobic Conditioning) is required for all scholarship cadets in the Basic Program.

** MILS 347-48/447-48 (Aerobic Conditioning) is required for all Advanced Course cadets.

Course Descriptions

Numbers in parentheses indicate: (lecture hours-laboratory hours-credit hours).

MILS 101 Leadership Dynamics

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)

MILS 102 U.S. Defense Establishment

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; the concept of civilian control of the military. A practical laboratory is required for Army ROTC cadets. (1-2-1)

MILS 107 American Military History

In-depth study of American Military History through examination of evolution of the Army and warfare. (3-2-3)

MILS 147 Aerobic Conditioning

Participation in aerobic exercise program; evaluation of the level of cardiovascular fitness. (0-3-2)

MILS 148/247/248/347/348/447/448

Same as above. (0-3-2)

MILS 201 Leadership Techniques

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 Introduction to United States Military History

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 I

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, and MILS 201 or the equivalent and departmental approval. (3-2-3)

MILS 302 Military Operations and Tactics II

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, and MILS 201 or the equivalent and departmental approval. (3-2-3)

MILS 388 Group Practicum in Staff Skills

Demanding application of leadership and staff skills in a realistic, military, group environment. Students task organize, plan and implement advanced group projects. Requires approval of Professor of Military Science. (Credit: 1-4 hours)

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, and MILS 201 or the equivalent and departmental approval. (3-2-3)

MILS 402 The Professional Officer

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 departmental approval. (3-2-3)

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)

ROTC: Naval Science

Chair: *Capt. Don A. Nestor* 217 Stuart Bldg. Ext. 73530

Professor: *D.A. Nestor*

Associate Professor: *Yaple*

Assistant Professors: *Briolat, Kovacs, Madroñero, Polley*

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 power 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.

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 — for example, 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 six 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 and 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, 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 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 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 27 for course requirements.

Curriculum

First Semester				Second Semester			
	Lect.	Lab.	Credit Hrs.		Lect.	Lab.	Credit Hrs.
NS 101	2	2	2	NS 202	3	2	3
				NS 103*	0	2	0
Third Semester				Fourth Semester			
NS 102	3	2	3	NS 201	3	2	3
Fifth Semester				Sixth Semester			
NS 301	3	2	3	NS 302	3	2	3
Seventh Semester				Eighth Semester			
MGT 351	3	0	3	NS 402	2	2	2

Marine Option

Fifth Semester				Sixth Semester			
	Lect.	Lab.	Credit Hrs.		Lect.	Lab.	Credit Hrs.
NS 310	3	2	3	No Required Courses			
Seventh Semester				Eighth Semester			
No Required Courses				NS 402	3	2	3

* Required for graduation for Navy Option midshipmen only.

Course Descriptions

Numbers in parentheses indicate: (lecture hours-laboratory hours-credit hours).

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. Offered fall semester.

Prerequisite: Consent of instructor. (3-2-3)

NS 103 Sail Training

Designed as an introduction to small boat handling, students gain knowledge of and an appreciation for the forces of wind and sea. Topics include relative motion, navigation and piloting, marlinespike seamanship, leadership and teamwork, and preventive and corrective maintenance.

Prerequisite: Consent of instructor. (0-2-0)

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. Offered spring semester. Prerequisite: Consent of instructor. (3-2-3)

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. Offered spring semester. Prerequisite: Consent of instructor. (3-2-3)

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)

NS 402 Naval Leadership and Management

This course is designed to provide the student with a comprehensive exposure to leadership principles and applications. An emphasis on leadership development complements NS 401's concentration on management methods. Prepares the midshipman for the personal and professional responsibilities he or she will encounter upon commissioning as a Navy Ensign assigned to Division Officer duties. Prerequisite: Consent of instructor. (2-2-2)

NS 410 Amphibious Warfare

The course is designed to provide the student with an historical survey of the evolution of amphibious warfare in the twentieth century. An in-depth survey of the Gallipoli landing is followed by 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)

Social Sciences

Chair: *Dr. William J. Grimshaw* 232 Life Sciences Ext. 75128

Professor: *Grimshaw*

Associate Professors: *Beam, DeForest, Segerstrale*

Assistant Professors: *Nippert-Eng, Peters*

Adjunct Professor: *Cohen, Gillio, Hollander, Kuner, Maloney, Marcus, Markle, Pounian, Risley, Stafford*

Faculty Emeritus: *Goldman, Stover*

The Department of Social Sciences encompasses the disciplines of political science (including public administration) and sociology, each of which retains its separate identity. An undergraduate program is offered leading to the degree of Bachelor of Arts, with concentration in political science. Political science and sociology also contribute to the social sciences requirement of the General Education Program.

Political Science

Political science deals with the analysis and appraisal of political ideas, institutions, problems, and issues, including those developing at the intersection of science and technology with society. The Bachelor of Arts degree with a political science concentration may lead directly to a career as a policy analyst or as an elected political official. More likely, it will lead to further professional training in law, public or private management or planning, and to careers in local, state, federal, or international governmental agencies, in nonprofit organizations, or in for-profit firms.

Bachelor of Arts Concentration in Political Science

All political science majors must take a course in statistics approved by the department as part of their math requirement and at least 33 credits in political science, including PS 200 — American Government.

With departmental approval, up to six of the required credit hours may be taken in related departments. For students entering in the Fall of 1996 and subsequent years, it is anticipated that the Bachelor of Arts Concentration in Political Science will be supplemented by the Bachelor of Science Concentration in Political Science described below.

B.A./J.D. Double Degree Program

Political science is an especially appropriate major for a student planning to enter law school upon completion of his or her undergraduate degree. Qualified students may satisfy the requirements for the Bachelor of Arts in political science and for the Juris Doctor in six years, with law courses taken during the senior year serving as the minor field.

B.A./M.P.A. Double Degree Program

The requirements for the B.A. in political science and Master of Public Administration (M.P.A.) degree may be completed in five years. Qualified stu-

dents 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 B.A. 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 provisional 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 B.A. in political science is awarded. If admitted to the M.P.A. program, the remaining course requirements are completed during the fifth academic year. A typical program for such students would consist of:

Undergraduate	Credit Hours	Graduate	Credit Hours
General Education Requirement	49	Public Administration Foundations (completed as undergraduate)	12
Political Science Major (including a maximum of six hours in Public Administration Foundations)	33	Remaining M.P.A. Core and Electives	20
Minor	15-18	Total	32
Senior Seminar	3		
Free Electives (including a minimum of six hours in Public Administration Foundations)	23-26		
Total	126		

The political science program is one of the preprofessional programs offered at IIT which are intended to prepare students for further professional training and practice in areas including law, health, environment and management and administration. Political Science students in this program will be expected to complete 33 credits in political science courses. This requirement may also be met by sociology or public administration courses approved by the department. In addition, majors will be expected to take a statistics course approved by the department and other courses required as part of the preprofessional program. General requirements of the preprofessional program will be available in the Winter of 1995-96 and are expected to include the following: two math courses, four science courses, a course in computer science, two courses in human behavior and courses in the humanities. Additional courses to prepare students for professional training, practice and for entrance exams in their chosen field (i.e. law or medicine) will also be required for students designating a professional field.

Sociology

Sociology is the study of societies, communities, and smaller groups; it deals with the way in which these groups are organized and maintained and how individual behavior is related to group experiences. The study of human behavior offers essential knowledge to all students wishing to understand the crucial problems facing society. Sociology has two major objectives: to prepare future social scientists, who will continue their work in graduate schools; and to provide skills and information for those entering applied professions such as social planning, law, and medicine.

Course Descriptions

Numbers in parentheses indicate: (lecture hours-laboratory hours-credit hours).

(S) identifies courses that may be taken to fulfill Social Sciences General Education requirements. All 300-level courses marked with an (S) require as prerequisites that students have successfully completed at least one other course marked with an (S) and the basic writing requirement (usually by completion of ENGL 101).

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)

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)

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)

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)

NOTE: All political science courses numbered above 300 require as prerequisites suc-

cessful completion of at least one other course marked with an (S), and ENGL 101.

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 308 Methods of Policy Analysis

This course introduces analytic methods used in policy analysis. The course is usually taught using the case method. Students will be introduced to the use of quantitative models in policy analysis and evaluation, and to some standard techniques, usually including cost-benefit analysis, queuing models, and decision theory. (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)

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)

PS 311 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)

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)

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)

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 organization 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. (3-0-3) (S)

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)

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)

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)

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)

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)

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 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)

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)

PS 462 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)

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)

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 credit 4 hours) (S)

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)

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)

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 1960's rise of concerns about pollution, the 1970's 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)

SOC 240 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)

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)

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)

SOC 259 Race and Ethnic Relations

The course examines the social, psychological, and cultural dimensions of race and ethnic relations in the context of modern 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)

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 ENGL 101.

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)

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 pseudo-science. The course also examines cultural and ideological influences on scientific knowledge and public faith in science. (3-0-3) (S)

SOC 303 Science in Society

Examines the role of the institution of science, scientific knowledge, and scientists in society. The course focuses on areas where science significantly influences and is influenced by political, economic, and cultural institutions and contexts. The course addresses broader theoretical issues such as boundaries of science, autonomy, and control of science and science and power. (3-0-3) (S)

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; 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)

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)

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)

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, government) in light of relevant theories. (3-0-3) (S)

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)

SOC 330 Sports and Society

Exploration of sports as a multi-billion dollar "microcosm" of society. How do structure and cultural expectations constrain various partici-

pants 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)

SOC 348 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)

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)

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)

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)

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)

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)

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)

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)

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)

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)

SOC 480 Sociology of Disability and Rehabilitation

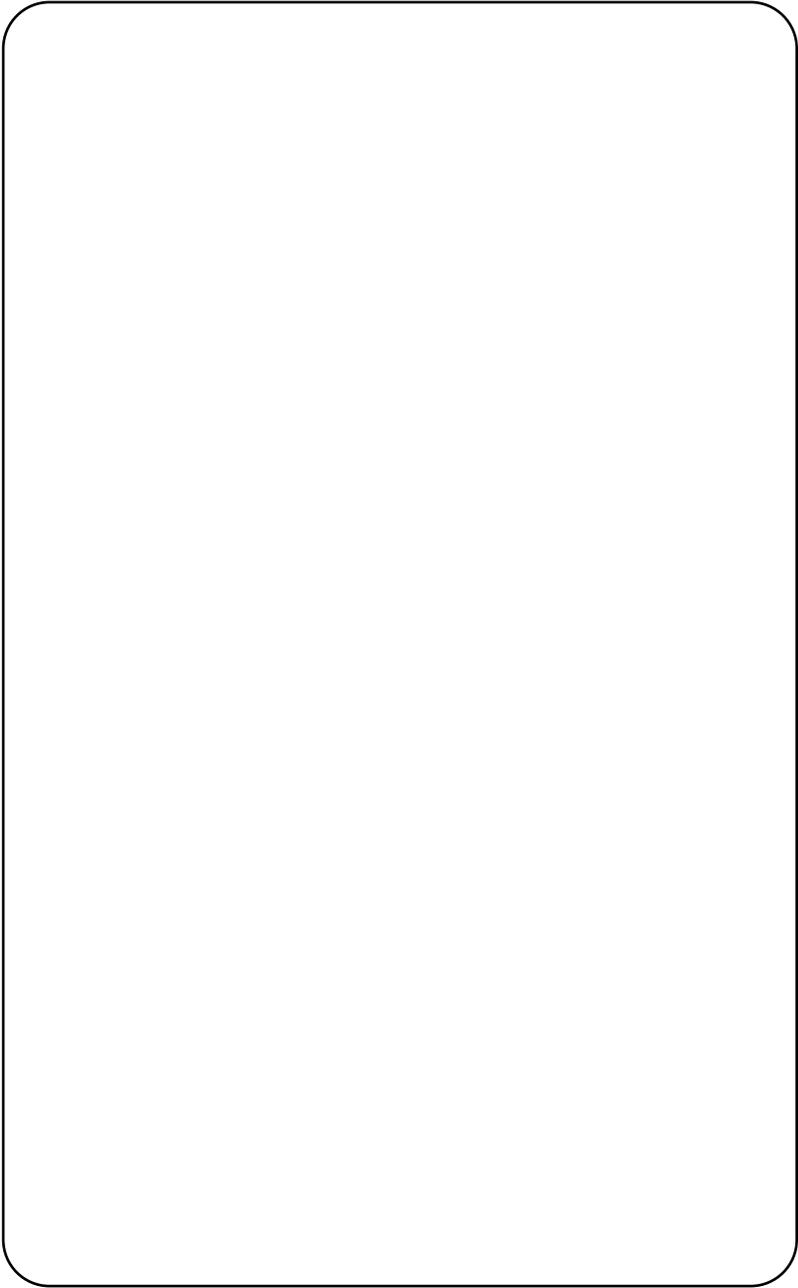
Examines the institutions and groups that interact with disabled individuals. Topics include the service professions and rehabilitation; labeling and disability; sheltered care versus mainstreaming; disability and the family; the role of support groups; employment of individuals; and a cross-cultural survey of rehabilitation. (3-0-3) (S)

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)

SOC 497 Directed Readings

Students read selected literature on a particular topic. Prerequisite: Consent of instructor. (Credit: Variable) (S)



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Dean and Vice President of the Main Campus

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Liz Sanders, B.A.
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Student and Academic Affairs

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Associate Vice President of
Main Campus Student and Academic Affairs

Eric Schwister, B.A.
Campus Minister

James B. Darrah, B.S.
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Bonnie Gorman, B.A., M.S., M.A.
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Assistant Dean of Development for Armour College

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Chair, Chemical and Environmental Engineering

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C. Robert Carlson, B.A., M.S., Ph.D.
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Marek Dollar, M.Sc., Ph.D., D.Sc.
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William J. Grimshaw, B.A., M.A., Ph.D.
Chair, Social Sciences

Timothy I. Morrison, B.A., Ph.D.
Chair, Biological, Chemical and Physical Sciences

John D. Root, B.A., M.A., Ph.D.
Chair, Lewis Department of Humanities

Henry Stark, B.E.E., M.S.E.E., D.Eng.Sc.
Chair, Electrical and Engineering

College Of Architecture

George Schipporeit
Interim Dean

Dirk Denison, AIA, B. Arch., M. Arch., M.B.A.
Associate Dean for Academic Affairs

Peter Beltemacchi, B.S. CRP, M.S. CRP
Associate Dean

Lee Waldrep, B.S., M.Arch, Ph.D.
Assistant Dean for Student Programs

Anita Anderson, B.S. MALS
Director, Graham Resource Center

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Model Shop Supervisor

Institute of Design

Patrick F. Whitney, B.F.A., M.F.A.
Director

Elizabeth Hughes, B.A.
Associate Director

Greg Prygrocki, B.I.D., M.V.A.
Associate Director

Institute of Psychology

Glen O. Geist, B.S., M.S., Ph.D.
Interim Director

M. Ellen Mitchell, B.A., M.A., Ph.D.
Director (effective 1/1/96)

Graduate College

Mohammad Shahidehpour, B.S., M.S., Ph.D.
Dean of Graduate Studies

Mamie Phillips, B.S.Ed., M.P.A.
Assistant Dean

Judy Masilun, B.S.
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John Kallend, B.A., M.A., Ph.D.
Interim Dean

Gerald F. Saletta, B.S., E.E., M.S. E.E., Ph.D.
Interim Associate Dean

Sue Sitton, B.A., M.S., Ph.D.
Interim Assistant Dean

Cheryl Caplan, B.A, M.P.A.
Director, Educational Technology Center and Coordinator of Pre-college Programs

Irma Dobbins, B.S.
Director of Multicultural Programs

James Karagiannes, B.S., Ph.D.
Interim Assistant Dean

Helen Oloroso, B.S., M.S.
Director of Career Development

Carole A. Orze, B.S.
Director, Educational Services

Normandie Zagorski, B.S, M.S.
Director, Women's Educational Development Center

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Elizabeth Sullivan, B.S.N., J.D.
Associate Vice President of the Downtown Campus

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Richard Matasar, B.A., J.D.
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Associate Dean for Interdisciplinary Studies
and co-director, Program in
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Assistant Dean for Admissions

Gary S. Laser, B.B.A., J.D.
Director, Clinical Education

Molly Warner Lien, B.Mus., J.D.
Director, Legal Research and Writing Program

Susan O'Brien, B.A., J.D.
Assistant Dean for Public Affairs

Dawn Rucpich, B.S.
Assistant Dean for Administration,
Finance, and CLE

Jeffrey Sherman, A.B., J.D.
Director, Graduate Program in Taxation

Rosemary Shiels, B.A., M.A. J.D.
Director, Center for Law and Computers

Ronald Staudt, B.S., B.A., J.D.
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A. Dan Tarlock, A.B., LL.B.
Associate Dean for Faculty Development
and Co-Director of the Program in
Environmental and Energy Law

Jeanne Van Kirk, B.S., M.A. Assistant
Dean for Development and Alumnae/i Relations

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Stuart School of Business

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Dean

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Director, Financial Markets and Trading Program

Ken Gibson, B.S.B.A., M.B.A.
Manager of Computer Systems

Carol Ginise
Admissions Associate

Jane McGuire, B.A., M.B.A.
Director of Part-time M.B.A. Programs

Lynn Miller, B.S., M.A., Ph.D.
Director, M.B.A. Marketing and Admission

Bernard Rausch, B.Ch.E., M.S.
Director of Career Planning

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Director of Facilities

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Director of Student Finance Center

Kevin Shalla, B.A., M.A.
Interim Director, Administrative Information Systems

Daryn Frank
Director, Public Safety

Robert Paschen
Manager, Office Services

Beverly Perret, B.S.
Director of Human Resources

General Counsel

Mary Anne Smith, B.A., M.S., J.D.
Vice President, General Counsel,
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Rina Hakimian, B.A., J.D.
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Professor of Law, 1989

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Professor of Mechanical and Aerospace Engineering,
1986

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Engineering, 1986

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Assistant Professor of Electrical and Computer
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Associate Professor of City and Regional Planning
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Assistant Professor of Clinical Practice, 1994

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Visiting Assistant Professor of Law, 1993

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Assistant Professor of English, 1991

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Barry Bernstein

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Professor of Applied Mathematics and Chemical and
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Instructor in Computer Science, 1986

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B.Ec., M.Ec., Monash University (Australia); Ph.D.,
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Visiting Associate Professor, 1995

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B.A., J.D., University of Illinois (Champaign-Urbana)
Professor of Law, 1961

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Research Professor of Materials Engineering, 1963

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B.A., Evergreen State College;
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Professor of Physics, 1965

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B.S., Creighton, M.S., Ph.D., Iowa State University
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Director of the Computational Science and
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Visiting Assistant Professor in the Institute of Design,
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Visiting Institute Professor of Architecture, 1983

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Assistant Professor of Psychology, 1989

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Ethics in the Professions, and Instructor of Ethics, 1986

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Studio Professor of Architecture and Associate Dean
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Associate Professor of Chemistry, 1987

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Northwestern University
Professor of Architecture, 1990

Tzilla Elrad

B.S., The Hebrew University (Israel); M.S., Syracuse
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Research Professor of Computer Science, 1995-96 -
1999-2000 (5 yrs.)

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B.S., M.S., St. John's University; Ph.D.,
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Associate Professor of Biology, 1967

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Professor of Computer Science and Associate Chair of
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Professor in the Institute of Design, 1966

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Professor of Military Science
and Department Director, 1995

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Visiting Assistant Professor, 1995

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Finkl Assistant Professor of Metallurgical and
Materials Engineering, and Director of the Midwest
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Marc Grinker

B.A., Emory University, J.D., Hofstra University
Visiting Associate Professor of Law, Director of the
Ilana Diamond Rovner Program in Appellate
Advocacy, 1990

Vivien C. Gross

B.A., Northwestern University; M.A.,
University of Illinois (Champaign-Urbana);
J.D., Indiana University (Bloomington)
Clinical Professor of Law, 1979

Leonard Irwin Grossweiner

B.Ch.E., City College of New York; M.S., Ph.D.,
Illinois Institute of Technology
Research Professor Physics, 1995-96 (1 yr.)

Sanjay Gupta

B. Tech., Indian Institute of Technology (Kanpur);
M.S., Ph.D., University of Pennsylvania
Assistant Professor of Electrical and Computer
Engineering, 1993

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,
1958

*Member of the faculty of IIT by election according to the provision of article I, Section 2, of the IIT Faculty Constitution.

Philip Norman Hablutzel

B.A., Louisiana State University; M.A., J.D., University of Chicago
Professor of Law and Director of Graduate Program in Financial Services Law, 1971

Warren Clayton Hall, Jr.

B.S., A.M., University of Missouri;
Ph.D., University of Illinois
Associate Professor of Economics, 1966

Nancy Hamill

B.A., Southern Illinois University; M.Arch, Illinois Institute of Technology
Instructor of Architecture and Director of Facilities, 1992

Charles Hamilton

B.S., M.A.S., Ph.D., University of Illinois (Champaign-Urbana); Certified Public Accountant
Visiting Assistant Professor of Accounting, 1991

Jane J. Hampson

B.S., Vanderbilt University; M.I.M., American Graduate School of International Management
Lecturer of Financial Markets & Trading, 1993

Sarah Harding

B.A., McGill University; L.L.B., Dalhousie University; B.Ch., Oxford University; L.L.M., Yale Law School
Assistant Professor, 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
Assistant Professor of Law, 1990

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 (Govt. Engr. College) (Pakistan); M.S., Ph.D., Illinois Institute of Technology
Professor of Industrial Management and Dean of the Stuart School of Business, 1960

Barbara Ruth Heller

A.B., University of Chicago; B.S., Roosevelt University; M.S., Ph.D., University of Chicago
Professor of Applied Mathematics, 1980

Cardell Hervey, Jr., Maj., U.S. Army*

B.S., United States Military Academy, West Point; M.B.A., Embry Riddle University
Assistant Professor of Military Science, 1992

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

Geoffrey Trevor Higgins

B.Sc., M.Sc., Ph.D., University of Manchester (England)
Professor of Metallurgical and Materials Engineering and Director of the Center for Innovative Learning and Education, 1969

John Hilburger

B.A., M.Ed., University of Illinois (Champaign); Ph.D., Illinois Institute of Technology
Visiting Assistant Professor of Psychology, 1994

Linda R. Hirschman

B.A., Cornell University; J.D., University of Chicago
Professor of Law, 1983

Thomas M. Holsen

B.S., M.S., Ph.D., University of California (Berkeley)
Associate Professor of Chemical and Environmental Engineering and Associate Chair of Environmental Engineering Division, 1988

Joyce Hopkins

B.A., McGill University; M.A., Tufts University; Ph.D., University of Pittsburgh
Associate Professor of Psychology, 1992

David Charles Hovey

B.Arch., M.S., Illinois Institute of Technology
Associate Professor of Architecture, 1969

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)
Visiting Assistant Professor of Biology, 1994

Robert J. Jaeger

B.S., Ph.D., University of Illinois (Chicago); M.S., University of Texas
Professor of Medical Engineering and Director of the Seven-Year Honors Program in Engineering and Medicine, 1981

Donald Komen Jasper

B.Sc., Howard University; Ph.D., University of York (England)
Research Professor of Biology, 1995-96 (1 yr.)

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B.S., Eastern Illinois University; M.S., Ph.D., Illinois Institute of Technology
Visiting Assistant Professor, 1995

Mark Jennings

B.S., University of Illinois (Champaign); M.S., Ph.D., Illinois Institute of Technology
Lecturer of 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 and Chair of the Department, 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 Mechanical, Materials, & Aerospace Engineering and Interim 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 and Interim Assistant Dean of the Undergraduate College, 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

James R. Kenevan

B.S., University of Illinois (Chicago);
S.M., University of Chicago;
Ph.D., Illinois Institute of Technology
Associate Professor of Computer Science, 1981

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; M.S., M.C.P., University of Cincinnati; Ph.D., The Ohio State University
Professor of Civil and Architectural Engineering, 1990

Max King-Cap

B.F.A., Columbia College;
M.F.A., University of Chicago
Instructor of Architecture, 1990

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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; I.B.A., Ph.D., University of Chicago
Associate Professor of Management Sciences and Operations Management, 1969

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M.S., Technical University of Kiev;
Ph.D., Oakland University
Associate Professor of Computer Science and Applied Mathematics, 1994

Lorrie B. Kovacs, Capt., USMC*

B.S., University of Florida
Assistant Professor of Naval 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

Steven Kravchin, Capt., USAF

B.S., Carnegie-Mellon University;
M.S., University of Southern California
Assistant Professor of Aerospace Studies, 1994

Robert Krawczyk

B.Arch., University of Illinois (Chicago)
Studio Professor of Architecture, 1993

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A.B., Princeton University; J.D., New York University School of Law
Associate Professor of Law, 1994

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B.Arch., Illinois Institute of Technology
Studio Professor of Architecture, 1992

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B.S., University of Illinois (Chicago);
M.B.A., Wright State University
Assistant Professor of Aerospace Studies, 1995

Sudhir Kumar

B.S., M.S., Agra University; M.S., Indian Institute of Science; Ph.D., The Pennsylvania State University
Research Professor of Mechanical and Aerospace Engineering, 1995-96

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B.C.E., Manhattan College; M.S.,
Central Michigan University
Professor of Aerospace Studies and Chair
of the Department, 1993

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, 1985

Peter David Land

A.A. Dipl., M.Arch., Carnegie Institute of
Technology; M.C.P., Yale University
Professor of City and Regional Planning, 1976

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B.A., Metropolitan State College (Denver); M.S.,
Ph.D., University of Utah; J.D., DePaul University
Associate Professor of Psychology, 1993

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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); J.D.
Harvard University
Visiting Assistant Professor, 1995

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B.A., M.S., University of Chicago; Ph.D., University
of Illinois (Champaign-Urbana)
Professor of Biology and Director of National Center
for Food Safety and Technology, 1989

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

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B.A., Yale College; J.D., University of Chicago
Law School
Professor of Law, 1990

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B.A., Wellesley College; J.D., DePaul University;
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Assistant Professor of Clinical Practice, 1995

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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

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B.S., Michigan State University; M.A., Ph.D.,
University of Wisconsin
Associate Professor of Applied Mathematics, 1975

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B.S., Northwestern University; Ph.D.,
Carnegie Institute of Technology
Professor of Chemistry and Associate Dean for
Academic Planning for Armour College, 1955

Hernando Madroñero, Lt, USN*

B.E., State University of Ny Maritime College
Assistant Professor of Naval Science, 1995

Martin H. Malin

B.A., Michigan State University; J.D.,
George Washington University
Professor of Law, 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
Assistant 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; Ph.D., Illinois Institute of
Technology
Senior Lecturer in Applied Mathematics, 1992

Richard Matasar

B.A., J.D., University of Pennsylvania
Professor of Law, Vice President of the Downtown
Campus and Dean of Chicago-Kent College of Law,
1991

Eloy H. Mazo, CPT, U.S. Army

B.A., Wharton University
Assistant Professor, 1995

Richard H. McAdams

B.A., University of North Carolina (Chapel Hill);
J.D., University of Virginia
Assistant Professor of Law, 1990

Katherine McCoy

B.A., Michigan State University
Senior Lecturer in the Institute of Design, 1995

Michael McCoy

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University
Senior Lecturer in the Institute of Design, 1995

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B.S., University of Illinois (Chicago)
Instructor in Athletics and Basketball and Cross-Country Coach, 1988

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

Timothy J. Michels, Major, U.S. Army

B.A., St. Norberts College
Assistant Professor, 1994

Jonathan Miller

B.A., Yale University; M.F.A., New York University
Adjunct Professor of Architecture, 1994

Jeffery P. Mills

B.S., Northwestern University; M.S., Ph.D., Illinois Institute of Technology
Visiting 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; M.A., Fairleigh Dickinson University; Ph.D., University of Tennessee
Associate Professor of Psychology and Director of the Institute of Psychology, 1987

Jamshid Mohammadi

B.S., M.S., University of Teheran; M.S., Ph.D., University of Illinois (Champaign-Urbana)
Professor of Civil and Architectural Engineering, 1979

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 Chemistry 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

Hassan Mahmoud Nagib

B.S., M.S., Ph.D., Illinois Institute of Technology
Rettaliata Distinguished Professor of Mechanical and Aerospace Engineering, Vice President of the Main Campus and Dean of Armour College, 1971

Ahmed M. Naguib

B.S., Ain-Shams University (Cairo, Egypt); M.S., Ph.D., Illinois Institute of Technology
Research Assistant Professor of Mechanical and Aerospace Engineering, 1994

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

Richard Nelson

B.Arch., M.Arch., Washington University
Studio Professor of Architecture, 1990

Christopher Nemeth

B.A., Marquette University; M.S., Illinois Institute of Technology
Visiting Assistant Professor and Associate Director in the Institute of Design, 1991

Don A. Nestor, Capt., USN*

B.S., U.S. Naval Academy; M.S., U.S. Naval Postgraduate School
Professor of Naval Science, 1994

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

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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Terrence A. Norton

B.A., University of Notre Dame; J.D.,
DePaul University
Associate 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, 1980

Keith Olsen

B. Arch., Illinois Institute of Technology
Studio Professor of Architecture, 1989

Charles Lewis Owen

B.S., Purdue University; M.S., Illinois Institute of
Technology
Distinguished Professor in the Institute of Design, 1965

Kristhna Pagilla

Ph.D., University of California at Berkley
Assistant Professor of Environmental Engineering,
1995

Satish J. Parulekar

B.Ch.E., University of Bombay (India); M.S.,
University of Pittsburgh; Ph.D., Purdue University
Associate Professor of Chemical and Environmental
Engineering, 1985

David Brian Patterson

B.S., Iowa State University; M.S., Ph.D., Stanford
University
Assistant Professor of Electrical and Computer
Engineering, 1991

Glenn Paulson

B.S., Northwestern University; Ph.D.,
Rockefeller University
Research Professor of Chemical and Environmental
Engineering, 1988

David L. Penn

B.S., State University of New York-College at
Brockport; M.S., Vilanova University; Ph.D.,
University of Nebraska (Lincoln)
Assistant Professor of Psychology, 1993

Scott Peters

B.A., Macalester College; J.D., Washington
University; Ph.D., University of Illinois (Chicago)
Assistant Professor of Political Science, 1993

Sharon Helmer Poggenpohl

B.S., M.S., Illinois Institute of Technology
Associate Professor in the Institute of Design, 1993

Christopher W. Polley, Lt., U.S.N.*

B.S., Marquette University
Assistant Professor of Naval Science, 1994

Robert William Porter

B.S., University of Illinois (Champaign-Urbana);
M.S., Ph.D., Northwestern University
Professor of Mechanical and Aerospace Engineering,
1966

Paul R. Prabhaker

B. Tech., M.B.A., Indian Institute of Management;
M.S., Ph.D., University of Rochester
Visiting Associate Professor of Marketing, 1992

Greg Prygrocki

B.I.D., University of Manitoba (Winnipeg); M.V.A.,
University of Alberta (Edmonton)
Associate Director and 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

Debra Queuntel

B.A., J.D., University of Wisconsin
Visiting Assistant Professor, 1994

Joyce E. Racicot, Capt., USAF*

B.S., Illinois Institute of Technology; M.S.,
University of Southern California
Assistant Professor of Aerospace Studies, 1992

V. C. 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, 1986

Michele Baker Richardson

B.A., Brown University; J.D., Yale Law School
Assistant Professor of Law, 1994

James Robergé

B.S., M.S., Ph.D., Northwestern University
Associate Professor of Computer Science and
Engineering and Associate Chair of Computer
Science, 1988

Peter Roesch

Ingenieur fur Hochbau, Staats bauschule Coburg,
(Germany); M.S., Arch., Illinois Institute of
Technology
Studio Professor of Architecture, 1980

Gwen K.M. Roldan

B.S., University of Hawaii (Manoa); M.S., University
of Wisconsin (Stout); Ph.D.,
Illinois Institute of Technology
Assistant Professor of Psychology, 1992

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B.A., University of Notre Dame, M.A., Ph.D., Indiana University
Professor of History and Chair of the Department of Humanities, 1969

Robert Mark Roth

B.S., Brooklyn College; Ph.D., Brandeis University
Professor of Biology, Associate Chair, Biology Division of the Department of Biological, Chemical and Physical Sciences, Chair of the Health Professions Advisory Committee, and Director of the Biotechnology Center, 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

Diana Lynn Troutman Runcie

A.B., Harvard-Radcliffe College; J.D., Harvard Law School
Visiting Assistant Professor of Law, 1993

Gary W. Rybicki

B.S., M.S., Chicago State University
Instructor in Engineering Graphics, 1983

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 Undergraduate College, 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

George Schipporeit

Associate Professor of Architecture and Interim Dean, 1980

Jay D. Schieber

Ph.D., University of Wisconsin (Madison)
Assistant Professor of Chemical Engineering, 1995

Robert C. Schleser

B.A., Rutgers University; M.I.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 and Director of the Program for Science and Technology in Context, 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
Professor of Mechanical and Materials Engineering, 1972

Ullica Segerstrale

Fil. kand., Pol. kand., University of Helsinki (Finland); M.A., University of Pennsylvania; Ph.D., Harvard University
Associate Professor of Sociology and Social Sciences Coordinator for Science and Technology in Context Program, 1988

Carlo U. Segre

B.S., (Physics), B.S., (Chemistry), University of Illinois (Champaign-Urbana); M.S., 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 Shahidepour

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 Carol 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; 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

Donald Shereffkin

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Studio Professor of Architecture, 1991

*Member of the faculty of IIT by election according to the provision of article I, Section 2, of the IIT Faculty Constitution.

Jeffrey Guy Sherman

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Professor of Law, Co-Director, Graduate Program in
Taxation, 1978

Rosemary Shiels

B.A., Mundelein College; M.A., University of
Colorado; J.D., Chicago-Kent College of Law
Law and Computer Fellow, Director of Center for
Law and Computers, 1991

Susan S. Sitton

B.A., Grinnell College; M.S., Northwestern
University; Ph.D., Illinois Institute of Technology
Assistant Dean of Undergraduate College and Senior
Lecturer in Applied Mathematic, 1987

Phillip G. Smith, Capt., U.S. Army*

B.A., University of New York
Assistant Professor of Military Science, 1993

Spencer B. Smith

B. Eng., McGill University; M.S., Eng. Sc. D.,
Columbia University
Professor of Management Sciences and Industrial
Management, 1966

Eugene S. Smotkin

B.S., San Jose State University; M.S.,
San Francisco State University; Ph.D.,
University of Texas at Austin
Assistant Professor of Chemistry, 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

Alfred S. Spencer, Capt., U.S.A.F.*

B.S., Baptist College at Charleston; M.A.,
Webster University
Assistant Professor of Aerospace Studies, 1992

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
Associate 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 and Chair of the
Department, 1988

Ronald William Staudt

B.S., B.A., St. Joseph College; J.D.,
University of Chicago
Professor of Law and Director of Computer
Development, 1978

Joan Ellen Steinman

A.B., University of Rochester, J.D., Harvard
University
Professor of Law, 1977

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
Visiting Assistant Professor, 1994

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B.S., M.S., Ph.D., Illinois Institute of Technology
Associate Professor of Applied Mathematics, 1966

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Institute of Technology
Assistant Professor of Civil and
Architectural Engineering, 1989

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Princeton University
Assistant Professor of Electrical and Computer
Engineering, 1993

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Associate Professor of Architecture, 1965

Liang Neng Tao

B.S., National Chiao Tung University (China); M.S.,
Ph.D., University of Illinois
Professor of Mechanics and Applied Mathematics,
1955

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B.S., Damascus University (Damascus, Syria); M.S.,
Ph.D., Wichita State University
Visiting Assistant Professor of Mechanical and
Aerospace Engineering, 1994

*Member of the faculty of IIT by election according to the provision of article I, Section 2, of the IIT Faculty Constitution.

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A.B., L.L.B., Stanford University
Distinguished Professor of Law; Associate Dean for
Faculty Development; Co-Director, 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 Assistant Professor of
Chemical and Environmental Engineering, 1992

Martin Thaler

B.A., Rhode Island School of Design; M.F.A., Royal
College of Art (London)
Visiting Assistant Professor in the Institute of Design,
1994

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 City and Regional Planning,
1958

Nick Ted Thomopoulos

B.S., M.S., University of Illinois (Champaign-
Urbana); Ph.D., Illinois Institute of Technology
Professor of Management Sciences, 1966

Robert D. Throne

B.S., Massachusetts Institute of Technology; M.S.,
Ph.D., University of Michigan
Visiting Assistant Professor in the Pritzker Institute of
Medical Engineering, 1990

Judith Ann Todd

B.A., M.A., Ph.D., Cambridge University (England)
Associate 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

John R. Twombly

B.S., University of Pennsylvania; M.B.A.,
Ph.D., University of Chicago;
Certified Public Accountant
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 Associate Chair of the Department,
1987

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

Timothy B. Wagner

B.S., University of Wisconsin;
Ph.D., Arizona State University
Visiting Assistant Professor of Chemistry, 1990

Mei Wang

B.S., M.S., Beijing Institute of Technology; M.S.,
Ph.D.; University of Michigan
Assistant Professor of Applied Mathematics, 1990

Candace Wark

B.S., M.S., Michigan State University; Ph.D., Illinois
Institute of Technology
Associate 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
Assistant 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, Senior Vice President, and Provost, 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

Erwin Wilbur Weber

B.S., M.S., Ph.D., Illinois Institute of Technology
Associate Professor of Electrical and Computer
Engineering and Director of the Daniel F. and Ada L.
Rice Campus, 1961

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, 1987

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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

Bryam Wildenthal

A.B., J.D., Stanford University
Visiting Assistant Professor, 1994

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 Graduate Program Director of the
Department, 1989

Allen Harvey Wolach

B.S., 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
Associate 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

Roy L. Yapple, 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.E., Northern Jiatong University, M.S.
Applied Math, PhD, Illinois Institute of Technology
Visiting Assistant Professor of Electrical and
Computer Engineering, 1994

John F. Zasadzinski

B.S., Illinois Benedictine College;
Ph.D., Iowa State University
Professor of Physics, 1982

Emeriti

William Applebaum

Associate Professor of History, 1972-1995

Ralph Elmer Armington

Professor of Electrical Engineering, 1966-1982

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

Albert Joseph Brouse

Associate Professor of English, 1962-1987

Roland Anthony Budenholzer

John T. Rettaliata Institute Professor of Mechanical
Engineering and Chair of the American Power
Conference, 1940-1978

Thomas Manuel Calero

Associate Professor of Management, 1968-1993

Kwang-Han Chu

Professor of Civil Engineering, 1956-1984

Martin Alvin Cohen

Associate Professor of Economics Management,
1964-1980

William White Colvert

Associate Professor of Physics and Dean of the
Evening Division, 1919-1964

Alexander Cowie

Professor of Mechanical Engineering, 1938-1967

George Edson Danforth

Professor of Architecture, 1940-1981

William Frank Danforth

Professor of Physiology, 1952-1984

William Frank Darsow

Associate Professor of Applied Mathematics,
1961-1990

Alva Leroy Davis

Professor of English and Linguistics, 1963-1980

Pearce Davis

Professor of Economics, 1948-1973

John DeCicco

Professor of Applied mathematics, 1962-1976

Ida Marie Didier

Associate Professor of Home Economics,
1941-1961

Lloyd Hamilton Donnell

Research Professor of Mechanics, 1939-1962

*Member of the faculty of IIT by election according to the provision of article I, Section 2, of the IIT Faculty Constitution.

John Drac

Associate Professor of Law, 1957-1980

Paul Edward Fanta

Professor of Chemistry, 1948-1984

Andrew Akos Fejer

Professor of Mechanics and Mechanical and Aerospace Engineering, 1958-1978

Elmer Irving Fiesenhiser

Professor of Civil Engineering, 1943-1971

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

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

Francis Clifford George Hoskin

Research Professor of Biology, 1969-1994

Frank Maria Hrachovsky

Associate Professor of Engineering Graphics, 1946-1973

Robert Francis Irving

Associate Professor of English, 1967-1995

Elton Wright Jones

Associate Professor of Electrical Engineering, 1948-1969

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 Olin Loving

Professor of Engineering Graphics, 1941-1980

Robert Joseph Malhot

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 Applied mathematics, 1943-1975

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

Marie Wilkinson Spencer

Assistant Professor of Economics, 1925-1958

Leon Eugene Stover

Professor of Anthropology, 1965-1995

Bernet Steven Swanson

Professor of Chemical and environmental Engineering, 1945-1985

T. Paul Torda

Professor of Mechanical Engineering and Director of the E³ Program Center, 1962-1977

San Utsunomiya

Associate Professor of Architecture, 1966-1993

Mary Ella Vermillion

Associate Professor of Psychology, 1959-1985

Edwin Robert Whitehead

Professor of Electrical Engineering, 1946-1972

Lee Roy Wilcox

Professor of Applied mathematics, 1940-1977

Stanton Edwin Winston

Professor of Mechanical Engineering and Dean of the Evening Division, 1919-1957

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

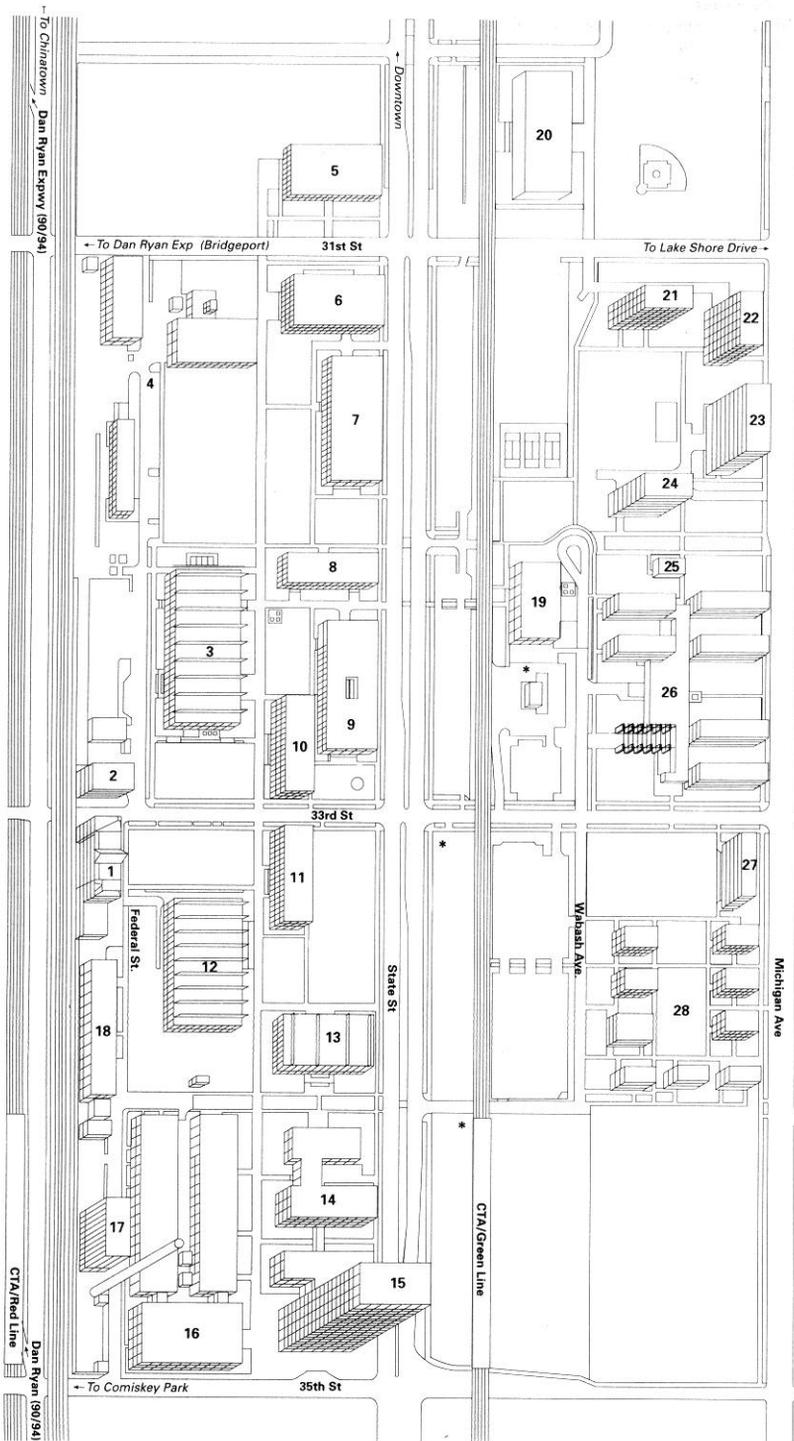
David Mordecai Zesmer

Professor of English, 1962-1992

Earl Frederick Zwicker

Professor of Physics, 1956-1991

Main Campus



Map Key

Buildings

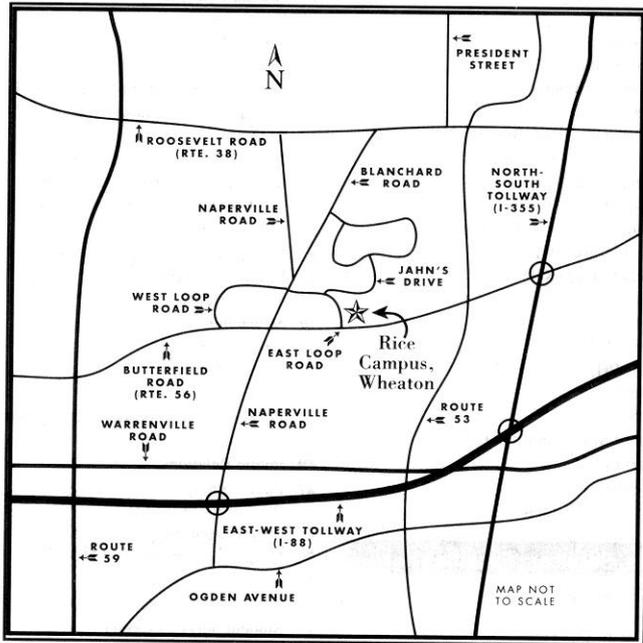
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- 24 Carman Hall Apartments
- 25 Robert F. Carr Memorial Chapel
- 19 Commons
- 13 S.R. Crown Hall (CR)
- 22 Cunningham Hall Apartments
- 7 Engineering 1 Building (E1)
- 27 Farr Hall (FA)
- 28 Fraternity Houses
- 12 Paul V. Galvin Library (GL)
- 23 Gunsaulus Hall Apartments
- 17 Heating Plant
- 3 Grover M. Hermann Union Building (HUB) (HH)
- 16 IITRI Chemistry Research Building
- 16 IITRI Engineering Building
- 18 IITRI Materials Technology Building
- 16 IITRI Mechanics Research Building
- 15 IITRI Research Tower (RT)
- 20 Keating Sports Center (KH)
- 6 Life Sciences Building (LS)
- 2 Machinery Hall
- 1 Main Building (MB)
- 9 Perlstein Hall (PH)
- 26 Residence Halls
- 11 Siegel Hall (SH)
- 5 Harold Leonard Stuart Building (SB)
- 10 Wishnick Hall (WH)
- 4 100 W. 31st Street Complex
- 14 3424 S. State Street Complex

Departments, Services, Facilities

- 5 Academic Computing Center
- 9 Administration
- 9 Admission—Full-time UG
- 1 Admission—Part-time UG
- 5 Air Force Aerospace Studies
- 9 Alumni Relations
- 13 Architecture, College of
- 7 Armour College
- 20 Athletics and Recreation
- 6 Biological, Chemical and Physical Sciences
- 19 Bookstore
- 1 Bursar
- 3 Cafeteria
- 3 Campus Union
- 27 Career Development
- 6 Center for the Study of Ethics in the Professions
- 9 Chemical and Environmental Engineering
- 19 Chicago Area Health & Medical Careers Program
- 8 Civil and Architectural Engineering
- 5 Computer Science and Applied Mathematics

- 27 Cooperative Education
- 27 Counseling and Health Service
- 15 Design, Institute of
- 9 Development Office
- 6 Disability Resources
- 1 Educational Services
- 6 Educational Technology Center (ETC)
- 11 Electrical and Computer Engineering
- 7 Fluid Dynamics Research Center
- 1 Graduate Records
- 19 Housing Office
- 1 Human Resources
- 6 Humanities
- 18 INFAC (Instrumented Factory for Gears)
- 5 Interactive Instructional Television Network (IITV)
- 27 International Cultural Center
- 18 Manufacturing Productivity Center
- 7 Mechanical, Materials & Aerospace Engineering
- 5 Military Science
- 9 Minorities in Engineering Program
- 9 Multicultural Programs
- 5 Naval Science
- 19 Newman Center
- 3 Orientation
- 1 Parking Permits
- 9 Pre-College Programs
- 7 Pritzker Institute of Medical Engineering
- 6 Psychology, Institute of
- 19 Public Relations
- 27 Public Safety
- 1 Registrar's Office
- 6 Social Sciences
- 7 Student and Academic Affairs
- 1 Student Finance Center
- 1 Student Records & Registration
- 1 Student Services Center
- 14 Teacher's Academy for Mathematics and Science in Chicago
- 3 Technology News
- 7 Undergraduate College
- 7 Women's Center
- * Visitors' Parking

Daniel F. and Ada L. Rice Campus



201 East Loop Road
Wheaton, Illinois

IIT Calendar 1995-1997

1996		Spring Semester	1997	
December	18, 1995	Last day for reinstatement	December	27, 1996
January	8-12	Regular registration and orientation period	January	13-17, 1997
January	15	Dr. Martin Luther King, Jr. Holiday	January	20
January	16	Classes begin	January	21
January	26	Last day to submit application for graduation form	January	31
February	23	Last day to remove incomplete grades	February	28
March	11-15	Spring vacation	March	17-22
March	29	Last day for official withdrawal	April	4
May	1	Last day to apply for financial aid	May	1
May	4	Classes end	May	10
May	6	Study day	May	12
May	7-11	Final examination period	May	13-17
May	11	Semester ends	May	17
May	10	Commencement (Tentative)	May	16

1996		Summer Session	1997	
May	15	Last day for reinstatement	May	14
May	29-30	Registration Period	May	28-29
June	3	Classes begin	June	2
June	7	Last day to submit application for graduation form	June	6
July	4	Independence Day Holiday	July	4
July	12	Last day for official withdrawal	July	11
July	27	End of eight-week session	July	26

1995		Fall Semester	1997	
August	6	Last day for reinstatement	August	9
August	18-23	New student orientation	August	17-22
August	19-23	Registration week	August	18-22
August	26	Classes begin	August	25
September	2	Labor Day Holiday	September	1
September	6	Last day to submit application for graduation form	September	5
October	4	Last day to remove incomplete grades	October	3
November	1	Last day for official withdrawal	October	31
November	28-30	Thanksgiving Holiday	November	27-29
December	6	Classes end	December	6
December	9	Study day	December	8
December	10-14	Final examination period	December	9-13
December	14	Semester ends	December	13
December	17	Commencement	December	14

Calendar is subject to change; changes will be published.

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Telephone Directory

Main Campus map on page 224. Rice Campus map on page 226.
When calling from a campus phone, use last five digits only.

Offices Room/Building Area Code 312

Administrative And Service

Academic Computing Center.....	Lower Level	SB.....	567-5962
Academic Services Division.....	102	MB.....	567-3315
Admission Office (Full-time Undergraduate).....	101	PH.....	567-3025
Admission Office (Part-time Undergraduate).....	101	MB.....	567-3300
Admission Office (Graduate).....	301	MB.....	567-3024
Architecture and Planning.....		CR.....	567-5858
Business.....	4th Floor	(DT).....	906-6544
Design.....	13th Floor	IITRI (RT).....	808-5300
Engineering and Science.....	Consult major department		
Public Administration.....		DT.....	906-5197
Technical Communication.....			517-3471
Alumni Relations 19th Floor.....		RT.....	808-5432
Athletics and Recreation.....		KH.....	567-3298
Bookstore.....		Commons.....	567-3120
Bursar's Office.....	207	MB.....	567-3320
Business Manager.....	205	MB.....	567-3327
Campus Ministry.....		Commons.....	567-3160
Career Development.....	404	FH.....	808-7100
Cooperative Education Office.....	301	FH.....	808-7110
Counseling and Health Service.....	103	FH.....	808-7100
Disability Resources.....	218	LS.....	567-5744
Educational Services Office.....	101	MB.....	567-3300
Educational Technology Center.....	011	LS.....	567-5216
Graduate Records Office.....	301	MB.....	567-6887
Housing.....		Commons.....	567-5075
IITV.....	226	SB.....	567-3460
International Cultural Center.....	401	FH.....	808-7105
Library (Galvin).....		LB.....	567-6844
Moffett Campus, 6502 South Archer Road, Summit-Argo.....			(708) 563-1576
Multicultural Programs Center.....	127	PH.....	567-5249
Orientation (New Students).....		E1.....	567-3080
Public Relations.....		Commons.....	567-3104
Public Safety Department.....		FH.....	808-6300
Daniel F. and Ada L. Rice Campus, 201 E. Loop Road, Wheaton.....			(708) 682-6000*
Student Services Center.....	104	MB.....	567-3100
Women's Educational Development Center.....	226	E1.....	567-3775

Colleges And Academic Departments

Armour College.....	117	E1.....	567-3009
Biological, Chemical & Physical Sciences.....	182	LS.....	567-3480
Chemical & Environmental Engineering.....	124	PH.....	567-3040
Civil & Architectural Engineering.....	228	AM.....	567-3540
Computer Science & Applied Mathematics.....	236	BSB.....	567-5150
Electrical and Computer Engineering.....	132	SH.....	567-3400
Mechanical, Materials and Aerospace Engineering.....	243	E1.....	567-3175
Humanities.....	106	LS.....	567-3465
Social Sciences.....	232	LS.....	567-5129
College of Architecture.....		CR.....	567-3230
College of Law, Chicago-Kent.....		DT.....	906-5000
Graduate College.....	301	MB.....	567-3024
Institute of Design.....		RT.....	808-5300
Institute of Psychology.....	252	LS.....	567-3500
School of Business, Stuart.....		DT.....	906-6500
Undergraduate College.....	208	E1.....	567-3163
Air Force Aerospace Studies.....	208	SB.....	567-3525
Military Science.....	103	SB.....	567-7553
Naval Science.....	215	SB.....	567-3530

*Area code is expected to change to (630) in August 1996.