

Special Programs

Dual-Degree Option

The dual-degree program is a special academic option, intended for superior students, in which both a bachelor of science and either a bachelor of arts or bachelor of fine arts degree can be earned in about five years. Students registered in the College of Engineering, the College of Arts and Sciences, or the College of Architecture, Art, and Planning may apply and, after acceptance of their application, begin the dual-degree program in their second or third year. Students interested in this option should contact the appropriate coordinators of dual-degree programs at the following locations: 55 Goldwin Smith Hall (for Arts and Sciences) or 135 East Sibley (for Architecture, Art, and Planning); and the Engineering Advising office, 167 Olin Hall.

Ordinarily, students need at least ten semesters to complete a dual-degree program, although exceptional students may be able to arrange an accelerated program and have it approved by petition. Such a program may not rely on summer work or credits earned at community colleges. Students who run into trouble are not required to finish the work for both degrees, but it may be difficult to complete the requirements for either degree in four years because of the way their curriculum has been structured.

Double Majors

The double-major option makes it possible to develop expertise in two allied engineering disciplines. Students who decide to pursue a double major must complete all the requirements of two different Majors, which generally requires at least one semester beyond the usual four years. (Students dependent on financial aid who spend more than eight semesters as an

undergraduate will have a change in their financial aid package.)

A student who wants to embark on a double major must complete the prerequisites for entry into both Major programs and have a cumulative GPA of at least 3.0 after the first four semesters. Affiliation with the first Major proceeds in the usual manner. Before the end of the junior year, the student presents a Petition for Double Major form to enter the second Major. The Petition for Double Major form must include a plan of study, and it requires the formal approval of the faculty in both Majors and ASPAC. The second Major may set its own requirements, and admission is not guaranteed. (Petition for Double Major forms are available from Engineering Advising and should be returned there when completed.)

Those who have been accepted as double-major degree candidates have a faculty advisor in each Major. Both Majors maintain records, approve course changes and eventually certify to the registrar that all requirements for the B.S. degree have been met.

Double-major students must meet the standards for academic performance set by both Majors, although the consequences for failing to do so for one or the other are somewhat different. A required leave of absence from the primary Major results in a required leave of absence from the college, while deficient performance in the secondary Major simply terminates the double major. Similarly, a student withdrawn from the primary Major is withdrawn from the college, while a student withdrawn from the secondary Major may be allowed to continue, with the permission of the primary Major.

Further information is available from Engineering Advising, 167 Olin Hall, and the individual major consultant offices.

The Independent Major

The Independent Major is a special opportunity for students whose educational objectives cannot be met by any of the regular Majors. This option allows students to create a specially tailored, interdisciplinary course of study. The program is developed by the student in consultation with faculty advisors and must be approved by the Independent Major Committee, which is responsible for supervising the student's work.

Every curriculum developed under the Independent Major, with the exception of certain faculty-sponsored programs, must include an engineering major and an educationally related minor. The major may be in any subject area offered by the schools or departments of the college; the minor may be in a logically connected area taught anywhere in the university. Total credits for major and minor courses must be at least 48, of which 32 must be in engineering. The overall program must clearly constitute an engineering education in scope and in substance, and all requirements of the Common Curriculum must be met.

Students who wish to enter the Independent Major must apply by the end of the first semester of the sophomore year and must be in good academic standing. They should seek assistance in developing a coherent program from professors in the proposed major and minor subject areas. If approved, the program becomes a curricular contract to which the student must adhere. For more information on the independent major, contact Engineering Advising, 167 Olin Hall.

Note: Because no single standardized curriculum exists, the Independent Major is not accredited. Independent Major students who intend to seek legal licensing as a Professional Engineer should be aware that this nonaccredited degree program will require additional education, work, and/or experience to qualify for eligibility to take the Fundamentals of Engineering examination.

Engineering Minors

The engineering minor, a supplement to the regular Majors in the college, including the Independent Major, recognizes formal study of a particular technical subject area in engineering normally outside the student's Major. For complete information, see the Engineering Minors section of this publication, beginning on page 88.

Bioengineering Option

Students who elect to pursue the bioengineering option will graduate with a B.S. degree in one of the traditional Majors with an administrative note on their transcript formally recognizing their efforts in bioengineering.

The requirements for completion of the option are four courses (12 credit hours minimum) and 1 credit hour of Bioengineering Seminar (ENGRG 501). These courses can satisfy other degree requirements simultaneously and are not necessarily four additional courses. These four courses must be selected from two categories: science-based courses and bioengineering courses. At least one course must be from the science-based course list and at least two (totaling at least 6 credits) from the bioengineering course list.

Students are asked to enroll after affiliation and before the beginning of their sixth term. Enrollment requires the student to select a bioengineering faculty consultant (in addition to the student's regular academic advisor) who will help the student select the appropriate bioengineering-related courses and will provide advice on careers in bioengineering. Forms to enroll in the bioengineering option and a list of approved courses are available in Engineering Advising or in the Engineering Undergraduate Programs office, both located in 167 Olin Hall.

Note: Students may participate in only one of the Bioengineering Option, the Biological Engineering minor, and the Biomedical Engineering minor.

International Engineering Programs

An international perspective, sensitivity to other cultures, and the ability to speak a second language are increasingly important to today's engineer. The College of Engineering encourages students to study or work abroad during their undergraduate years to prepare for participation in the global marketplace.

Because most engineering curricula are highly structured, with many sequential courses, making it relatively difficult to study abroad without interrupting progress toward a degree, students who wish to pursue this option have to decide early and plan carefully. Advisors and faculty members in the college can suggest a variety of ways for students to study abroad and still meet graduation requirements for Cornell. Students interested in studying or working abroad should begin gathering information early in the freshman year.

On campus, there are several sources of specific information on study abroad:

- Cornell Abroad office, 474 Uris Hall
- Engineering Advising, 167 Olin Hall
- The associate director of undergraduate studies in the student's Major.

Engineering Communications Program

The Engineering Communications Program (ECP), created in 1987 at the urging of the College of Engineering faculty and employers of Cornell engineers, provides instruction in technical writing, oral presentation, and the use of graphics in both.

Information about ECP members, courses, annual student awards, and the college's technical-writing requirement is

available at www.engineering.cornell.edu/ECP/index.htm. The program is a recipient of the Engineering Dean's Prize in Excellence and Innovation in Teaching.

The ECP's courses give students experience with the difficult task of explaining technical information to audiences having various levels of technical expertise. Students improve their writing style, become more comfortable with and effective at oral presentation, use standard forms and formats for presenting technical information, do library and Internet research on engineering topics, and study engineering situations in which an engineer has found that engineering ethics may have been breached.

Enrollment in the ECP's courses is twenty students per section; like writing seminars elsewhere at Cornell, they are discussion classes. Students' work receives abundant written comments, and conferences are frequent.

The ECP oversees the communications component of the Writing-Intensive Co-op and sits on the College Curriculum Governing Board's Subcommittee on Technical Writing. Members of the ECP are available to help engineering faculty develop materials for their own writing and oral-presentation assignments.

Feel free to call 255-8558, come by the ECP's office at 425 Hollister Hall, or stop at any ECP member's office elsewhere on the fourth floor of Hollister Hall.

Engineering Cooperative Education Program

A special program for undergraduates in most majors of engineering is the Engineering Cooperative Education (Co-op) Program, which provides an opportunity for students to gain practical experience in industry and other engineering-related enterprises before they graduate. By supplementing course work with carefully monitored, paid jobs, co-op students are able to explore their own interests and acquire a better understanding of

engineering as a profession.

To be eligible, a student must have been enrolled at Cornell for four semesters before working, with a cumulative GPA ≥ 2.7 . (Students in computer science and biological and environmental engineering are eligible, even though they may not be registered in the College of Engineering.) Applicants are interviewed by participating employer representatives and select their work assignments from any offers they receive.* Those students who are offered assignments and elect to join the program usually take their fifth-term courses at Cornell during the summer following their sophomore year and begin their first co-op work assignment that fall. They return to Cornell to complete term six with their classmates and then undertake a second work assignment with the same employer the following summer. Co-op students return to campus for their senior year and graduate with their class.

Further information may be obtained at www.engineering.cornell.edu/coop/swf/index.htm or by visiting the Engineering Co-op and Career Services office, 201 Carpenter Hall.

Undergraduate Research

The college's faculty and administration are committed to helping students acquire the finest possible undergraduate engineering education. By encouraging undergraduates to participate in new or ongoing research, the college offers another way for students to benefit from the expertise of its faculty and staff and the availability of some of the finest engineering facilities and equipment in the world. Each year an increasing number of engineering students gain insights into the research process by participating in one of the following undergraduate research programs.

- LIFE Alumni Undergraduate Research

Program: Students and faculty members develop funding proposals for research projects of mutual interest. Projects usually involve one student and one professor, although some projects may involve student teams. Students spend about ten hours each week in project activities during the academic year or 30 hours each week in more intensive summer projects. They produce a written report and also present highlights of their research at a spring poster session.

- Undergraduate research and special project courses: Many Majors offer credit-bearing courses that give students an opportunity to participate in a special individual or group research project under the direction of a faculty member. Typically, upper-division students in the college participate, and the credit awarded varies according to the extent of the project.
- Employment on research projects: Members of the faculty sometimes hire undergraduates to work on their research with them, giving students an opportunity to earn money while gaining research skills. Interested students should inquire about employment opportunities with professors they know, other faculty members in their area of interest, or their undergraduate Major consultant.
- National Science Foundation research experience for undergraduates: Engineering students may apply for funds that the National Science Foundation (NSF) provides for undergraduate research at Cornell. The availability of NSF funds for research changes continually.

Students should contact faculty members in their Major or undergraduate Major consultant to learn about research opportunities of this kind.

For more information on undergraduate research opportunities, stop by the LIFE

*Co-op employers and work locations may be local, national, or international.

Program, 167 Olin Hall, and visit the unit web site at www.engineering.cornell.edu/research/ugResearch.

Leadership and Teamwork Opportunities

Numerous opportunities exist for engineering undergraduate students to participate in co-curricular and classroom activities that can develop leadership and team-building skills. There are over 30 engineering student organizations, including engineering honor societies, major-specific organizations, and active chapters of the Society of Women Engineers (SWE), the National Society of Black Engineers (NSBE), the Society of Hispanic Professional Engineers (SHPE), and the American Indian Science and Engineering Society (AISES).

Other opportunities for developing teamwork and leadership skills include peer educator experiences such as peer advisors, undergraduate teaching assistants, Academic Excellence Workshop facilitators, tutoring, Encourage Youth, Educate Society (EYES), and program assistants for pre-freshman programs offered through Engineering Student Services.

Cooperative Programs with the Johnson Graduate School of Management

Three programs make it possible for students to earn degrees from both the College of Engineering and the Johnson Graduate School of Management (JGSM).

The Knight Joint Degree Scholarship Program allows a student to complete a master of engineering degree while deferring admission to the JGSM for three to five years. The Knight Program is a scholarship opportunity for admitted students to receive financial assistance toward the completion of both an M.Eng. and an M.B.A. degree. Admitted students are required to obtain three to five years

of relevant work experience after the completion of their M.Eng. program and before the start of their M.B.A. program. Students should begin the application process for the Knight program in the fall semester of their senior year.

The five-year program leads to a B.S. degree in engineering and an M.B.A. (master of business administration) degree. The six-year program leads to three degrees: the B.S. in engineering, the M.Eng. (master of engineering), and the M.B.A. Both the five- and six-year programs are highly selective, and opportunities are limited. The programs require students to take a specific set of courses at the undergraduate level; these curricula allow for a shortening of the combined programs by one academic year. Information about the specific requirements for each Major is available from the appropriate undergraduate Major consultant and graduate faculty representative. The curriculum must include eight core courses required for the M.B.A. or allowed substitutes. (The chart on the following page may be helpful in planning how to meet this requirement.) Students should consider selecting these courses for the sophomore fall term.

Students who decide to pursue any of these programs must apply separately to the College of Engineering and the Johnson Graduate School of Management. Students are also required to take the Graduate Management Admission Test (GMAT). Knight applicants should take the exam and submit their applications before March of their senior year. Applicants to the five- or six-year program should take the exam and submit their applications before March of their junior year. For more information on any of these programs, stop by the Office of Research and Graduate Studies, 201 Carpenter Hall, or the admissions office of the Johnson Graduate School of Management.

M.B.A. Course Requirement Substitutes and Possible Classifications for Business Courses or Substitutes for Five- and Six-Year Joint Programs

<i>M.B.A. Core Requirement*</i>	<i>Substitutions Allowed</i>	<i>Engr Distrib.</i>	<i>Social Science</i>	<i>Approved Elective</i>	<i>Field-Approved Elective</i>
NCC 500 (F 3cr) Financial Actting	none [†]				
NCC 501 (F 3cr) QuantMethods for Management	ENGRD 270 (3cr)	X		X	X
NCC 502 (F 3cr) Microecon Prin for Management	ECON 313		X	X	
NCC 503 (F 3cr) Marketing Mgt	none			X	
NCC 504 (F 3cr) Management and Organizations	none			X	
NCC 506 (F S 3cr) Manag Finance	none			X	
NCC 508 (F S 3cr) [‡] Prod and Oper Management	OR&IE 320 and 416 (F S 8cr)			X	X
NBA XXX (F S 1.5cr) (4th, 5th, or 6th year) The Strategy Requirement	none				

*Must be completed before the start of the sixth year.

[†]Students who have already taken OR&IE 350 might want to take the NCC 500 exemption exam.

[‡]NCC 508 may be taken in the fifth (M.Eng.) year with permission of the M.Eng. representative

Note: If ECON 101 and 102 are not taken before acceptance into the five- or six- year programs, a student may petition (through the Office of Advising) to use NCC 502 as a social science course to fulfill undergraduate degree requirements.