COLLEGE OF ENGINEERING

The College of Engineering offers undergraduate and graduate programs to prepare students for a broad spectrum of professional careers in engineering. Laboratory experience as well as real-world participation in technological problem-solving is a key aspect of a professional engineer's college education. The College of Engineering, in implementing this need, augments its own modern laboratory and research facilities by close contact with the professional societies and the many industries in the metropolitan Tampa Bay area.

Students in engineering choose from a variety of quality majors depending upon individual interests, career objectives, and capabilities for a significant technological contribution. The engineering programs of the College have been developed with an emphasis on three broad aspects of engineering activity: design, research, and the operation of complex technological systems. Students who are interested in advanced design or research should pursue the 5-Year Program leading to a Master of Science in Engineering degree. The Accreditation Board for Engineering and Technology, Inc. (ABET) has inspected and accredited the programs of the College of Engineering defined by the Chemical Engineering, Civil Engineering, Computer Engineering, Electrical Engineering, Industrial Engineering and Mechanical Engineering. The Bachelor of Science program in Computer Science is accredited by the Computer Science Accreditation Commission (CSAC) of the Computing Sciences Accreditation Board (CSAB).

See "Departments and Programs" in this section for descriptions of engineering fields and degrees offered by the college. The "Four Year Programs" section includes suggested courses students need to take, beginning with their first semester at USF.

Students interested in particular programs offered by the College of Engineering should direct their inquiries to the College of Engineering Office of Advising (see Advising section below). Information is also available on the College's website: http://www.eng.usf.edu/.

PROFESSIONAL ENGINEERING

The College of Engineering recognizes that modern engineering solutions draw on knowledge of several branches of engineering. It also recognizes that future technological and societal developments will lead to shifting of the relative emphasis on various branches of engineering, triggered by new needs or a reassessment of national goals. For this reason the College's programs include a strong engineering foundation portion, designed to equip the prospective engineer with a broad base of fundamental technical knowledge. To this foundation is added the student's specialization of sufficient depth to prepare him/her to successfully embark on a professional career.

The Bachelor of Science degrees offered in various engineering fields provide the student a broad education with sufficient technical background to effectively contribute in many phases of engineering not requiring the depth of knowledge needed for advanced design or research. However, while the baccalaureate degree is considered the minimum educational experience for participating in the Engineering profession, and as such is the first professional degree, students interested in design and research are strongly encouraged to pursue advanced work beyond the baccalaureate either at this or other institutions. It is becoming increasingly evident that large segments of today's engineering professionals are involved in some form of post baccalaureate study. Engineers are earning advanced degrees to obtain the information and training necessary to meet effectively tomorrow's technological challenges. All are faced with the continuing problem of refurbishing and updating their information skills and most are obtaining advanced information by means of formal graduate study, seminars, special institutes and other such systems designed for this purpose.

The Bachelor of Science degree program in a designated engineering field and the Master of Science degree in the same field may be pursued simultaneously in a program called the 5-Year Program. The 5-Year Program requires 30 semester hours of graduate work in addition to that of the Bachelor of Science degree. These programs are specifically designed to prepare an individual for a professional career as an engineer. These programs have as their foundation a core of subject material encompassing Humanities, Social Science, Mathematics, Science, and Engineering which is required of all students. In addition to the core subject material, each student will complete specialization studies in a designated field under the direction of one of the administrative departments of the College.

Preparation for Engineering

Students planning to attend USF's College of Engineering should familiarize themselves thoroughly with the College's admissions standards and requirements, which are more stringent than the University's minimum entrance requirements.

The high school student anticipating a career in engineering should elect the strongest academic program that is available while in high school, including four years each of English, mathematics and science (preferably including Chemistry and Physics), as well as full programs in the social sciences and humanities.

Prospective students considering engineering at the University of South Florida who lack certain preparation in high school must elect to follow a program to overcome their deficiencies. One alternative for these students, classified as "Pre-Engineering majors" might include preparatory coursework in a less accelerated program. The University of South Florida generally offers most required pre-engineering courses every semester. As another alternative, students may wish to avail themselves of the State's system of junior/community colleges which offer a wide range of preliminary coursework; many of these schools also offer full programs in pre-engineering (first two years' coursework).

Junior/community college students planning to transfer to the University of South Florida's engineering program at the junior level from a State of Florida operated college or university should follow a pre-engineering program leading to an A.A. degree. All transfer students should complete as much of the mathematics and science coursework as is available to them. Transfer students should be aware that the College expects them to meet its admission requirements listed in this section under college regulations for graduation just as it expects its own students to meet these requirements. Junior/community college transfer students should note that in addition to freshman and sophomore level courses, required junior level courses are given each semester thus permitting full continuity in studies for the student. Junior/community college students intending to pursue an engineering program at USF should contact the advisor at their institution and request a course equivalency list.

Although it is not mandatory, the College strongly recommends acquisition or personal access to a personal computer. For further details, contact the Associate Dean of Engineering.

The College of Engineering can assist students who are planning to obtain an Engineering degree from the University of South Florida and who have started their studies elsewhere in formulating a sound total program. Interested students should contact the College's Advising Office (813/974-2684) furnishing sufficient details to permit meaningful response.

Undergraduate Admission to the College of Engineering

Before declaring a particular major within the field of engineering, students must meet two sets of admission requirements: one for the College of Engineering and the other for the

student's chosen degree program (see "College of Engineering Admission Requirements" and "Admission Requirements for Programs in Engineering" below). Students may apply to the College of Engineering upon initial entry to the University by declaring Engineering as their intended major on their admissions application. When a student is accepted to USF, engineering staff will review the necessary credentials and notify the applicant of his or her Engineering status.

USF students may apply through the Advising Office, in the College of Engineering. To be considered for admission to the College, an applicant must be accepted by the University as a degree-seeking student and be academically in good standing.

Applicants whose native language is other than English must submit TOEFL scores to the College of Engineering. The minimum TOEFL score must be 550.

COLLEGE OF ENGINEERING ADMISSION REQUIREMENTS

1. Freshmen:
   a. Test Scores:
      SAT—composite of 1050 minimum with a minimum quantitative of 550.
      ACT—composite of 25 minimum and mathematics of 25 minimum.
   b. High School Mathematics: Should include sufficient algebra and trigonometry to enter Engineering Calculus I.
   c. High School Grade Point Average of 2.5/4.0.
2. Transfer Students:
   Transfer students should complete the following **prerequisite courses** listed below at the lower level prior to entering the University. If these courses are not taken at the community college, they must be completed before the degree is granted. Unless stated otherwise, a grade of "C" is the minimum acceptable grade.

   Communications:
   ENC 1101/1102 English I and II (6)

   Mathematics:
   MAC 2311 Engineering Calculus I (4)
   or MAC 2281, MAC 2282, MAC 2283
   MAC 2312 Engineering Calculus II (4)
   or MAC 2281, MAC 2282, MAC 2283
   MAC X283 Engineering Calculus III (4)
   or MAC 2281, MAC 2282, MAC 2283
   MAP X302 Differential Equations (3)

   Natural Sciences:
   CHM X045/X045L General Chemistry I (with lab) (4)
   or CHS 1440 Chemistry for Engineers
   PHY X048/X048L General Physics and Laboratory I
   PHY X049/X049L General Physics and Laboratory II

   Humanities & Social Sciences:
   Humaniteis Courses (6)
   Social Science Courses (6)
   Humanities or Social Sciences (3)

REQUIRED PREREQUISITES FOR ENTERING THE COLLEGE OF ENGINEERING

Once a student has been admitted to the College of Engineering, he/she must then seek admission into one of the specific departments.

The minimum requirements for acceptance by the departments administering the Engineering programs in Chemical, Civil, Electrical, Industrial and Mechanical Engineering are completion of English, Calculus, Differential Equations, Physics and Chemistry requirements.

The minimum requirements for admission to the Computer Engineering, Computer Science, and Information Systems programs offered by the Computer Science and Engineering Department are completion of English I & II , Physics I & II (and labs) and Calculus I & II with a grade point average of 3.0 or higher in those eight courses. Following departmental admission, it is necessary that a student complete the courses CDA 3100 (Computer Organization) , COP 3514 (Program Design), and COT 3100 (Discrete Structures) with a grade point average for all attempts of at least 3.0 prior to taking any other departmental courses.

Prior to being admitted to a department, a student may be permitted to take no more than two departmental engineering courses. Individual departments may have continuation requirements.

A student can have his or her academic records housed in a department and be advised by the department advisor prior to completing requirements for department admission if he or she so chooses. This type of student must still comply with all of the above-listed requirements prior to official acceptance by the department.

Engineering Advising

Effective pursuit of engineering and engineering related studies requires careful attention to both the sequence and the type of courses taken. The engineering curriculum differs in key respects from the study plans of other majors—even in the freshmen year.

New students must attend the University's Orientation program. They are assigned an engineering advisor during this program and receive advisement for their first semester at that time.

The student and advisor jointly work out a plan of study that meets both the student's career objectives and the College of Engineering's degree requirements. The advisors maintain the College of Engineering's student records.

Students not yet meeting departmental admissions requirements may elect to be advised by the general engineering advising office or the department of their intended specialization.

While the College provides advising services to assist students with academic planning, *the responsibility for seeing that all graduation requirements are met rests with the students.*

The College of Engineering requires all undergraduates to apply for graduation the semester prior to the anticipated graduation term. Necessary forms and instructions can be obtained in the Engineering Advising Office.

Advising Offices

Tampa Campus: The College of Engineering is located near the south-central side of campus; the Engineering Advising Office is on the Northeast corner of the portables west of Engineering II (ENX), Room 100, (813) 974-2684.

Sarasota Campus: Palmer "C" Building (PMC), Room 101, (941) 359-4331/4330.

Lakeland Campus: Student Services Office (LLC), Room 2100, (800) USF-5636 (in state only), (863) 667-7071

Office Hours

Usual office hours are 8 a.m. - 5 p.m., Monday through Friday.

DEPARTMENTS AND PROGRAMS

The supervision of the academic programs for the College is the function of the six administrative departments together with several coordinators. Each department is responsible for specific professional programs, faculty, laboratories, and student advising.

CHEMICAL ENGINEERING

Undergraduate Degree Offered:
Bachelor of Science in Chemical Engineering (B.S.Ch.E.)
Graduate Degrees Offered:
Master of Science in Chemical Engineering (M.S.Ch.E.)
Master in Chemical Engineering (M.C.H.E.)
Master of Engineering (M.E.)
Master of Science in Engineering (M.S.E.)
Doctor of Philosophy in Chemical Engineering (Ph.D.)
Doctor of Philosophy in Engineering Science (Ph.D.)

This department offers coursework and study in all areas fundamental to Chemical Engineering. Topics included are

thermodynamics, fluid flow, heat transfer, mass transfer, separation processes, chemical reactors, instrumentation and process control, economics optimization, computer methods, computer aided design techniques, and process plant design. These courses, together with mathematics, physics, chemistry, other interdisciplinary engineering fundamentals, English, and liberal arts courses, provide the basis for long-range professional progress. Because of the many professional areas available for employment to the chemical engineer, the students are also required to take a number of electives from areas such as biotechnology, materials, and environmental engineering. These electives are designed to broaden the experience, and, therefore, the employment possibilities of our graduates. The Chemical Engineering Department also offers a sequence of courses in Chemical Engineering Science, biotechnology and biomedical engineering.

A sequence of courses in the engineering aspects of biotechnology is currently available within the Chemical Engineering program. Topics include applied microbiology, fermentation, enzyme technology, and pharmaceutical engineering.

Biomedical Engineering is a highly interdisciplinary program, drawing from all engineering disciplines, biology, physical sciences, biomedical and clinical sciences. An undergraduate Certificate in Biomedical Engineering is available to students in all areas of engineering. This Certificate is designed with two main objectives: 1) to prepare interested students for admission into medical school, and 2) to prepare students for graduate work in either Biomedical Engineering, other engineering disciplines, or the Biomedical Sciences. Opportunities for students to gain research experience exist within the College of Engineering and the Health Sciences Center.

Please see the certificate programs section of this catalog for more information on these programs.

CIVIL AND ENVIRONMENTAL ENGINEERING

Undergraduate Degree Offered:
Bachelor of Science in Civil Engineering (B.S.C.E.)
Graduate Degrees Offered:
Master of Science in Civil Engineering (M.S.C.E.)
Master or Science in Engineering (M.S.E.)
Master of Science in Environmental Engineering (M.S.E.V.)
Master of Civil Engineering (M.C.E.)
Master of Engineering (M.E.)
Master of Environmental Engineering (M.E.V.E.)
Doctor of Philosophy in Civil Engineering (Ph.D.)
Doctor of Philosophy in Engineering Science (Ph.D.)

This department offers course work and study pertinent to Civil Engineering, Engineering Mechanics, Material Science, and Environmental Engineering. Areas of concentration are structural engineering, engineering mechanics, geotechnical engineering, transportation engineering, water resources engineering, materials and corrosion engineering, and environmental engineering.

Students completing the program may enter the profession as engineers in the civil, structural, geotechnical, transportation, water resources, environmental, hydraulics, or materials discipline. All of these disciplines share the need for knowledge in the areas of engineering mechanics, civil engineering, material science, and environmental engineering. Through choice of the proper area of concentration, a student has the opportunity to channel academic studies specifically towards his/her career choice.

Graduates of the program may commence their engineering careers in either industry, in engineering consulting firms, or in public service at the federal, state, or local level. Initial assignments may include planning, design and implementation of water resources systems; planning and design of transportation and housing systems; regional planning, design, and management for abatement of air, water and solid waste pollution problems; design of bridges and single and multistory structures; and supervision of construction projects.

COMPUTER SCIENCE AND ENGINEERING

Undergraduate Degrees Offered:
Bachelor of Science in Computer Engineering (B.S.Cp.E.)
Bachelor of Science in Computer Science (B.S.C.S)
Bachelor of Science in Information Systems (B.S.I.S)
Graduate Degrees Offered:
Master of Science in Computer Science (M.S.C.S)
Master of Science in Computer Engineering (M.S.C.E.)
Doctor of Philosophy in Computer Science and Engineering (Ph.D.)
Doctor of Philosophy in Engineering Science (Ph.D.)

This department offers coursework and study in all areas fundamental to Computer Science, Computer Engineering, and Information Systems. Topics dealt with are computer architecture and hardware design, software engineering, computer system organization, operating systems, algorithms and data structures, computer graphics, user interface, computer networks, database systems, robotics, theory of computation and artificial intelligence.

Our research areas of faculty concentration are 1) computer architecture and VLSI design/testing, 2) artificial intelligence and robotics, 3) graphics/image processing/computer vision, 4) database, 5) networks.

Computing facilities available to students in the Department include several microprocessor and design laboratories for hardware-oriented studies, personal computer laboratories for general use in programming assignments, and networked SUN and DEC workstations for use by majors. The Department also runs a research-oriented network consisting of an Intel Hypercube, a number of SUN, DEC, and IBM workstations, and special purpose image and graphics processors. In addition, the Department has access to a large IBM mainframe facility run by the University Computing Center.

ELECTRICAL ENGINEERING

Undergraduate Degree Offered:
Bachelor of Science in Electrical Engineering (B.S.E.E.)
Graduate Degrees Offered:
Master of Science in Electrical Engineering (M.S.E.E.)
Master of Engineering (M.E.)
Master of Science in Engineering (M.S.E.)
Master of Science in Engineering Science (M.S.E.S)
Doctor of Philosophy in Electrical Engineering (Ph.D).
Doctor of Philosophy in Engineering Science (Ph.D.)

This department offers study in all areas fundamental to Electrical Engineering and the electrical sciences: circuit analysis and design, electronics, communications, electromagnetics, controls, solid state, systems analysis, digital circuit design, etc. Basic concepts are augmented with well-equipped laboratories in networks, electronics, digital systems, microwave techniques and communications. In addition, a general-purpose computer facility, a microprocessor laboratory and a microelectronics fabrication laboratory are available to undergraduate and graduate students.

INDUSTRIAL AND MANAGEMENT SYSTEMS ENGINEERING

Undergraduate Degree Offered:
Bachelor of Science in Industrial Engineering (B.S.I.E.)
Graduate Degrees Offered:
Master of Science in Industrial Engineering (M.S.I.E.)
Master of Engineering (M.E.)
Master of Science in Engineering Science (M.S.E.S.)
Master of Industrial Engineering (M.I.E.)
Doctor of Philosophy in Industrial Engineering (Ph.D.)
Doctor of Philosophy in Engineering Science (Ph.D.)

This department offers study pertinent to the design, evaluation and operation of a variety of industrial systems, ranging from the analysis of public systems to the operation of manufacturing plants. Topics include production planning and control, production and plant design, applied statistics, operations research, human factors and productivity, manufacturing, and automation. The department has excellent laboratory facilities

which support class projects and research in microcomputer applications, computer-aided manufacturing, automation, and applications of robotics. Evening and off-campus programs are available through the Master of Science in Engineering Management (M.S.E.M.) program. The department also administers the manufacturing option in the M.S.E. program.

MECHANICAL ENGINEERING

Undergraduate Degree Offered:
Bachelor of Science in Mechanical Engineering (B.S.M.E.)
Graduate Degrees Offered:
Master of Mechanical Engineering (M.M.E.)
Master of Science in Mechanical Engineering (M.S.M.E.)
Master of Engineering (M.E.)
Master of Science in Engineering (M.S.E.)
Doctor of Philosophy in Mechanical Engineering (Ph.D.)
Doctor of Philosophy in Engineering Science (Ph.D.)

Coursework includes basic science and mathematics, thermal and fluid sciences, material science, solid mechanics, dynamics, machine design, vibrations, instrumentation and automatic control.

Graduates of this program are employed in research, design, production, marketing, service, installation (contracting), maintenance and operation in such industries as mining, petroleum, paper, food, power, manufacturing, air-conditioning, defense systems, aerospace, data processing, communications, and automotive.

Laboratories are available for basic instrumentation, thermal and fluid sciences, solid mechanics, data acquisition and control, CAD/CAE, vibrations, and aerodynamics.

Students pursuing the B.S.M.E. degree are required to take the Fundamentals of Engineering examination as the first step towards professional engineering registration.

Preliminary Coursework for Engineering Students

Both the four-year and five-year curricula of the College of Engineering Bachelor of Science programs are founded on a set of coursework that is required of all engineering students. This coursework is designed to give each student a thorough foundation of knowledge on which specialization studies and a professional career can be based. Emphasis is placed on three key elements; development of communication skills, familiarity with the social sciences and humanities and a solid base in science and mathematics.

Each degree-granting department has developed a list of courses to provide key elements for the degree offered. While the specific courses will vary slightly from one department to another, the categories are as follows:

General Education Courses
(Social Sciences, Humanities, Communications)
Mathematics, Chemistry and Physics
(Minimum)
Common Engineering Courses
Department Specialization

Special course requirements exist for Chemical Engineering, Computer Engineering, Computer Science, and Information Systems, and students selecting any of those fields should be aware of their specific requirements. Students may consult the degree granting department or the College's Advising Office for detailed information.

1. UNIVERSITY LIBERAL ARTS REQUIREMENTS

All students are required to take 45 semester hours to complete the University liberal arts requirements. Thirty-six (36) semester hours will satisfy the general education course requirements and 6 semester hours will satisfy the exit requirements. These requirements are distributed as follows:

General Education Requirements*	Semester Hours
English Composition	6
Quantitative Methods	6
Natural Sciences	6
Social Sciences	6
Historical Perspectives	6
Fine Arts	3
African, Latin American, Middle Eastern or Asian Perspectives	3
	36
Exit Requirements* (Must be taken at USF)	
Major Works and Major Issues	3
Literature and Writing	3

*Courses may be certified in more than one area, but students may use each course in ***only*** one (1) area.

Courses in the liberal arts requirements should incorporate the following components whenever they are relevant to the specific discipline: the learning skills of conceptual thinking, analytical thinking, creative thinking, written expression, oral expression, and the dimensions of values and ethics, international perspectives, environmental perspectives, race and ethnicity, and gender. When warranted by the subject matter, each course must incorporate consideration of at least one of the dimensions and one of the thinking skills to meet the liberal arts requirements.

Departments should ensure that courses proposed for the liberal arts have sufficient depth and breadth. These courses will share the substantive rigor and intellectual challenge of courses offered for major credit, with the specific feature of offering an integrative perspective of the discipline and its relationship to academia as a whole. Additionally, such courses will encourage majors to interact with students from other disciplinary backgrounds.

2. MATHEMATICS AND SCIENCE CORE REQUIREMENTS

In mathematics this coursework consists of a Calculus for Engineers sequence (or a calculus sequence of equivalent level), Differential Equations, and additional hours of designated courses supportive of the student's selective field of specialization, as specified by the department. In the science coursework students must take the Physics with Calculus sequence and the General Chemistry sequence.

Students whose high school preparation is insufficient to enter the Calculus for Engineers are required to take supplementary algebra and trigonometry prior to being considered for acceptance into the College.

FOUR-YEAR PROGRAMS

LEADING TO A BACHELOR OF SCIENCE DEGREE IN A DESIGNATED ENGINEERING FIELD

These engineering degrees are awarded upon successful completion of a program consisting of the required areas of coursework. Programs are offered in the following disciplines of Engineering:

• CHEMICAL ENGINEERING

Mission Statement

The mission of the Chemical Engineering Department for the undergraduate program is to impart state of the art skills and fundamental knowledge for the development, safe operation and economic design of chemical processes in a manner compatible with societal values.

Objectives

To Department has defined the following programmatic objectives. It will provide its students:

1. a significant background exposure to the Humanities and Social Sciences leading, through our capstone design course, to the incorporation of societal values in their practice.

2. a background in each engineering discipline in order to develop the foundations for effective communication among professionals collaborating in technical decisions.
3. a strong foundation in the engineering and enabling sciences to provide the tools for the analysis of processes involving transformations of matter and energy.
4. a sequence of courses integrating the students foundations in the above engineering and sciences for synthesis of environmental friendly, safe processes involving transformations of matter and energy leading to the selection of process flowsheets, operating conditions and equipment.
5. an interlocked laboratory experience in preparations for careers as researchers or managers of research and development.

Students pursuing the Bachelor of Science in Chemical Engineering take coursework in advanced chemistry, thermodynamics, fluids, heat, and mass transfer, separation processes, reacting systems, instrumentation, and control. Students must also satisfactorily complete a design project as part of their program. Students seeking the biotechnology/biomedical certificate are also required to take additional courses in general biology, microbiology, and biochemistry. Chemical Engineering Students must maintain a GPA of 2.0 in required departmental courses. Therefore, it is imperative that the students retain close contact with their advisor.

Students completing this program normally initiate their careers in manufacturing, environmental, and biological enterprises. Chemical engineers are found in administrative, technical, and research positions in these industries. Main products of these industries are petrochemicals, polymers, fibers, natural and synthetic fuels, electronic materials, fertilizers, pharmaceuticals, bio-materials, etc.

Solutions of modern societal and scientific problems often require the use of chemical engineering skills. Chemical Engineering students must have access to an IBM compatible personal computer during their last two years of study. Those who do not own one will be severely disadvantaged.

Four-Year Curriculum - Chemical Engineering

Courses indicated with XXXX had not yet been assigned a number when the catalog went to print. See your academic advisor for additional information.

In addition to the College's graduation requirements, all graduating seniors must take the Chemical Engineering Fundamentals of Engineering Examination.

Prerequisites (State Mandated Common Prerequisites) for Students Transferring from a Community College: If a student wishes to transfer without an A.A. degree and has fewer than 60 semester hours of acceptable credit, the student must meet the university's entering freshman requirements including ACT or SAT test scores, GPA, and course requirements.

Students should complete the following **prerequisite courses** listed below at the lower level prior to entering the University. If these courses are not taken at the community college, they must be completed before the degree is granted. Unless stated otherwise, a grade of "C" is the minimum acceptable grade.

Some courses required for the major may also meet General Education Requirements thereby transferring maximum hours to the university. The following are transferable courses from the Community College that will be accepted in the Math/Science/Engineering areas:

Communications:

ENC 1101/1102 English I and II (6)

Humanities & Social Sciences:

Humaniteis Courses (6)
Social Science Courses (6)
Humanities or Social Sciences (3)

Mathematics:

USF	C/C
MAC 2281	MAC 2311* (4)
MAC 2282	MAC 2312* (4)
MAC 2283	MAC 2313* (4)
MAP 2302	MAP 2302 (3)

*or MAC 2281, MAC 2282, MAC 2283

Natural Sciences:

USF	C/C
CHM 2045	CHM 1045* (3)
CHM 2045L	CHM 1045L* (1)
PHY 2048	PHY 2048 (3)
PHY 2048L	PHY 2048L (1)
PHY 2049	PHY 2049 (3)
PHY 2049L	PHY 2049L (1)

*or CHS 1440 Chemistry for Engineers

This is a limited access program. The schedule that follows indicates how a diligent student who can devote full time to coursework can satisfy requirements in four academic years. Students without a solid foundation and those who cannot devote full time to academics should plan a slower pace.

Semester I

ENC 1101	Freshman English I	3
MAC 2281	Eng. Calculus I	4
CHM 2045	General Chemistry I	3
EGN 3000	Found. of Engin.	1
Historical Perspectives Elective		3
Fine Arts Elective		3
Total		17

Semester II

ENC 1102	Freshman English II	3
MAC 2282	Eng. Calculus II	4
CHM 2046	General Chemistry II	3
CHM 2045L	General Chem. I Lab	1
PHY 2048	General Physics I	3
PHY 2048L	General Physics I Lab	1
ALAMEA Perspectives Elective		3
Total		18

Semester III

MAC 2283	Eng. Calculus III	4
CHM 2046L	General Chem. II Lab	1
PHY 2049	General Physics II	3
PHY 2049L	General Phys. II Lab	1
EGN 3311	Statics	3
Social Science Elective		3
Total		15

Semester IV

MAP 2302	Diff. Equations	3
CHM 4410	Physical Chem. I	3
EGN 3358	Thermo, Fluids & HT	4
EGN 3443	Engineering Statistics	3
EGN 3613	Engineering Econ. with Social and Global Implications	3
Total		16

Semester V

ECH 3023	PE 1, Description.	4
ECH 3303L	Chem Lab I	1
ECH 4264	Transp. Phenomena	3
CHM 2210	Org. Chem. I	3
CHM 2210L	Org. Chem. I Lab	2
EGN XXXX	Eng. Electronic Materials	3
Total		16

Semester VI

ECH 4322	Quant. Meth. Ch. E.	3
CHM 2211	Org. Chem. II	3
CHM 2211L	Org. Chem. II Lab	2
CHM 4412	Physical Chem. III	3
EGN 3373	Electrical Systems	3
Ch. E. Elective		3
Total		17

Summer

ECH 4265	PE 2, Sep. Processes	4
ECH 4244L	Chem. Eng. Lab II	2
Math/Science Elective		3
Total		9

Semester VII

ECH 4415C	PE 3, React. Systems	4
ENC 3211	Comm. for Engineers	3
Ch. E. Elective		3
Design Elective		2
Total		12

Semester VIII

ECH 4615	Plant Design	4
ECH 4323	Automatic Controls I	4
Social Science Elective		3
Elective		3
Total		14

• CIVIL AND ENVIRONMENTAL ENGINEERING

Mission Statement

The mission of the Department of Civil and Environmental Engineering is

1. to provide a high-quality educational experience for both undergraduate and graduate students,
2. to develop new knowledge, processes, or procedures through research which will benefit mankind, and
3. to provide service to the nation through professional activities.

A component of the Department's education mission is providing our undergraduate students a strong, broad-based, engineering education while giving them adequate training for careers in industry and government. To achieve this mission, the Department attempts to give our students the basic intellectual and organization skills that allow them to work with complex systems with technological, social and environmental components. Thus, the Department's curriculum is designed to provide a strong background in mathematics, science, and the fundamentals of engineering, as well as an appreciation for the larger social and ethical context of integrated systems. As many of our students begin work upon graduation in industry or with governmental organizations, the curriculum is designed to prepare our students for these roles by requiring a number of courses in the various fields of civil engineering and by providing limited specialization in one given area. An undergraduate education is but the first stage in a life-long learning process. The curricula is designed to further this concept and to prepare students for undertaking advanced studies in engineering or in other professional schools.

It is the mission of the Department to have faculty deal with society's pressing problems by influencing the directions of the profession and the plans and actions of the nation, regions, and communities. This mission is accomplished by

1. faculty contributing influential publications dealing with specialized topics and with the interfaces of science, technology, and public policy;
2. providing leadership on commissions, boards, and committees that review public and professional policies and that set the agenda for action by the profession and public bodies

Objectives

1. The Department will provide undergraduate students with the strong technical education needed for a career in civil engineering or one of the sub-disciplines of civil engineering (structural, geotechnical, transportation, water resources, environmental, materials
2. The Department will provide undergraduate students with an education that prepares them to perform effectively in the workplace with the communication skills needed to deal with fellow workers, clients, or the public.
3. The Department will provide undergraduate students with an education that allows them to understand the societal implications of engineering decisions and designs in both a local and global context.
4. The Department will provide undergraduate students with an education that promotes the full and continuing development of their potential as engineers and effective members of society.

Students pursuing the Bachelor of Science in Civil Engineering program take designated engineering mechanics, civil engineering, and environmental engineering coursework as well as courses from one of the following areas of concentration:

1. Environmental Engineering
2. Water Resources
3. Geotechnical/Transportation Engineering
4. Materials Engineering
5. Structural Engineering

As a culminating design experience, all students take a Capstone design course relevant to their respective areas of concentration.

In addition to the College's graduation requirements, the department has the following policies:

1. Mandatory academic advising of students for each term
2. Exit interviews as a graduation requirement for all students
3. Only 2 D grades in engineering courses can be used to fulfill graduation requirements, and
4. All graduating seniors must take the Fundamentals of Engineering Examination

The schedule which follows indicates how a serious, well prepared student who can devote full time to coursework can satisfy degree requirements in four academic years. Students without a solid foundation and those who cannot devote full time to academics should plan on a slower pace.

Four-Year Curriculum - Civil Engineering

Courses indicated with XXXX had not yet been assigned a number when the catalog went to print. See your academic advisor for additional information.

Prerequisites (State Mandated Common Prerequisites) for Students Transferring from a Community College: If a student wishes to transfer without an A.A. degree and has fewer than 60 semester hours of acceptable credit, the student must meet the university's entering freshman requirements including ACT or SAT test scores, GPA, and course requirements.

Students should complete the following **prerequisite courses** listed below at the lower level prior to entering the University. If these courses are not taken at the community college, they must be completed before the degree is granted. Unless stated otherwise, a grade of "C" is the minimum acceptable grade.

Some courses required for the major may also meet General Education Requirements thereby transferring maximum hours to the university. The following are transferable courses from the Community College that will be accepted in the Math/Science/Engineering areas:

Communications:

ENC 1101/1102 English I and II (6)

Humanities & Social Sciences:

Humaniteis Courses (6)
Social Science Courses (6)
Humanities or Social Sciences (3)

Mathematics:

USF	C/C
MAC 2281	MAC 2311* (4)
MAC 2282	MAC 2312* (4)
MAC 2283	MAC 2313* (4)
MAP 2302	MAP 2302 (3)

*or MAC 2281, MAC 2282, MAC 2283

Natural Sciences:

USF	C/C
CHM 2045	CHM 1045* (3)
CHM 2045L	CHM 1045L* (1)
PHY 2048	PHY 2048 (3)
PHY 2048L	PHY 2048L (1)
PHY 2049	PHY 2049 (3)
PHY 2049L	PHY 2049L (1)

*or CHS 1440 Chemistry for Engineers

Strongly recommended:

Graphics

USF	C/C
EGS 1113	EGS 1111 (3)

This is a limited access program involving special admissions requirements. Please be aware of the immunization, foreign language, continuous enrollment policies of the university, and qualitative standards required.

Engineering Admissions Requirements

Transfer students must have completed the equivalent USF Engineering Calculus sequence with a 2.0 GPA; must have completed one year of equivalent USF General Physics and Chemistry courses with a minimum of 2.0 GPA; must have an overall GPA of 2.0 or better.

Semester I

ENC 1001	Freshman English I	3
MAC 2281	Calculus I	4
CHM 2045	General Chemistry I	3
EGN 3000	Foundations of Engineering	1
EGS 1113	Introduction to Design Graphics	3
Total		14

Semester II

ENC 1102	Freshman English II	3
MAC 2282	Engineering Calculus II	4
CHM 2046	General Chemistry II	3
CHM 2045L	General Chemistry I Lab	1
PHY 2048	General Physics	3
PHY 2048L	General Physics I Lab	1
Total		15

Summer Semester

ALAMEA Perspective Elective		3
Historical Perspective Elective		3
EGN XXXX	Engineering economics with Social and Global Implications	3
Total		9

Semester III

PHY 2049	General Physics II	3
PHY 2049L	General Physics II Lab	1
MAC 2283	Engineering Calculus III	4
EGN 3311	Statics	3
Historical Perspectives Elective		3
ENC 3211	Communication for Engineers	3
Total		17

Semester IV

MAP 2302	Differential equations	3
EGN 3321	Dynamics	3
EGN 3343	Thermodynamics	3
EGN 3443	Engineering Statistics	3
EGN 3365	Materials I	3
Total		15

Semester V

EGN 3353	Fluid Mechanics	3
EGN 3331	Mechanics of Materials	3
EGN 3331L	Mechanics of Materials Lab	1
EGN 3373	Introduction to Electrical Systems	3
TTE 4004	Transportation I	3
CGN 4933	Numerical and Computer Methods	3
Total		16

Semester VI

CES 3102	Structures I	3
CWR 4204	Hydraulics	3
ENV 3001	Environmental Engineering	3
CGN 3021L	Civil Engineering Lab	2
GLY 3850	Geology for Engineers	3
Total		14

Semester VII

CES 4605	Concepts of Steel Design	3
CES 4702	Concepts of Concrete Design	3
CEG 4011	Soil Mechanics	3
CEG 4011L	Soil Mechanics Lab	1
Social Science Elective		3
Technical Elective		3
Total		16

Semester VIII

CGN 4122C	Professional/Ethical Issues in Engineering MW/MI	3
C.E. Capstone Design Requirement MW/MI		3
Technical Elective		3
Social Science Elective		3
Fine Arts Elective		3
Total		15

The Department offers the following Capstone Design Courses

CWR 4812	Capstone Water Resource Design	3
CEG 4850	Capstone Geotechnical/Transportation Design	3
CES 4740	Capstone Structural/Geotechnical/ Materials Design	3
Total		9

CIVIL ENGINEERING CONCENTRATION REQUIREMENTS

(A student must complete a minimum of 9 hours, with at least 2 courses from one group.)

Water Resources

ENV 4502	Environmental Unit Operations	3
ENV 4101	Air Pollution Control	3
CWR 4103	Water Resources Engineering	3

Geotechnical/Transportation

CEG 4012	Soil Mechanics II	3
TTE 4005	Transportation Engineering II	3
CGN 4851	Concrete Construction Materials	3
CES 4141	Matrix Structural Analysis	3
ENV 4101	Air Pollution Control	3

Materials

EGN 4366	Materials Engineering II	3
EMA 4324	Corrosion of Engineering Materials	3
CGN 4851	Concrete Construction Materials	3

Structural

CES 4141	Matrix Structural Analysis	3
CES 4820	Timber & Masonry Design	3
CES 4561	Computer Aided Structural Design	3
CGN 4851	Concrete Construction Materials	3
EMA 4324	Corrosion of Engineering Materials	3
**CES 4720	Capstone Structural/Materials Design	3
**CES 4740	Capstone Structural/Geotechnical Design	3

**If not used to satisfy Capstone Design requirements

CIVIL ENGINEERING CAPSTONE DESIGN REQUIREMENTS

A student must complete the capstone design course in his/her area of concentration.

Water Resources

CWR 4821	Capstone Water Resources Design	3

Geotechnical/Transportation

CEG 4850	Capstone Geotechnical/Transportation Design	3

Materials

CES 4720	Capstone Structural/Materials Design	3

Structural

CES 4740	Capstone Structural/Geotechnical Design	3

Environmental Engineering Concentration Within Civil Engineering

Semester I

ENC 1001	Freshman English I	3
MAC 2281	Calculus I	4
CHM 2045	General Chemistry I	3
EGN 3000	Foundations of Engineering	1
EGS 1113	Introduction to Design Graphics	3
Total		14

Semester II

ENC 1102	Freshman English II	3
MAC 2282	Engineering Calculus II	4
CHM 2046	General Chemistry II	3
CHM 2045L	General Chemistry I Lab	1
PHY 2048	General Physics	3
PHY 2048L	General Physics I Lab	1
Total		15

Summer Semester

ALAMEA Perspective Elective		3
Historical Perspective Elective		3
EGN XXXX	Engineering economics with Social and Global Implications	3
Total		9

Semester III

PHY 2049	General Physics II	3
PHY 2049L	General Physics II Lab	1
MAC 2283	Engineering Calculus III	4
EGN 3311	Statics	3
Historical Perspectives Elective		3
ENC 3211	Communication for Engineers	3
Total		17

Semester IV

MAP 2302	Differential Equations	3
EGN 3321	Dynamics	3
EGN 3343	Thermodynamics	3
EGN 3443	Engineering Statistics	3
EGN 3365	Materials I	3
Total		15

Semester V

EGN 3353	Fluid Mechanics	3
EGN 3331	Mechanics of Materials	3
EGN 3331L	Mechanics of Materials Lab	1
ENV 3001	Environmental Engineering	3
TTE 4004	Transportation I	3
CGN 4933	Numerical and Computer Methods	3
Total		16

Semester VI

CES 3102	Structures I	3
CWR 4204	Hydraulics	3
EGN 3373	Introduction to Electrical Systems	3
ENV 4004L	Civil Engineering Lab	2
ENV 4417	Water Quality and Treatment	3
Total		14

Semester VII

ENV 4552	Environmental Engineering Processes	3
CES 4702	Concepts of Concrete Design	3
CEG 4011	Soil Mechanics	3
CEG 4011L	Geotech Lab	1
CWR 4103	Water Resources	3
Social Science Elective		3
Technical Elective		3
Total		16

Semester VIII

CGN 4122C	Professional/Ethical Issues in Engineering MW/MI	3
Environmental Capstone Design Requirement MW/MI		3
Social Science Elective		3
GLY 3850	Geology for Engineers	3
Fine Arts Elective		3
Total		15

• COMPUTER SCIENCE AND ENGINEERING

Mission Statement

In keeping with the mission of the College of Engineering, the Computer Science & Engineering Department strive for excellence in teaching, research, and public service. Specifically the Department aspires to:

1. Lead the advancement of computer science through internationally recognized research and graduate education, as well as technology transfer to regional industries;
2. Prepare students for full and ethical participation in a diverse society and encourage lifelong learning;
3. To educate undergraduates in the best practices of the field as well as integrate the latest research into the curriculum;
4. Foster the development of problem solving and communication skills as an integral component of the profession;
5. Provide quality learning experiences through small classes, active learning styles of teaching, and opportunities for meaningful interactions between students and faculty.

Objectives

The Computer Science & Engineering Department graduates will:

1. be equipped with the knowledge and skills necessary to allow immediate employment as computer science and engineering professionals or to secure admission to graduate programs.
2. be prepared to function ethically and responsibly as full participants in our profession and our society.
3. have a thorough knowledge of the basic principles and practices of computing grounded upon the solid foundation of the principles of mathematics and science.
4. have a thorough knowledge of the basic principles and practices of engineering based upon a solid foundation of mathematics and science and an ability to apply these principles in the computing domain.

Three undergraduate degree tracks are offered within Computer Science and Engineering. These tracks are Computer Engineering, Computer Science and Information Systems, which lead to the Bachelor of Science in Computer Engineering, in Computer Science and in Information Systems respectively.

The Computer Engineering track emphasizes the application of engineering principles to the design of computer hardware and software. While all department tracks provide coverage of both computer hardware and software, this track allocates additional time to issues of computer architecture and hardware design. Students in this program also acquire a broad background in engineering science through the study of the engineering core.

The Computer Science track focuses on the theory of computation and computer organization. Additional course

work in programming languages, algorithms, software engineering, and a wide range of electives supplement the core coverage of hardware and software.

The Information Systems track combines a basic coverage of hardware and software with a core of business related courses and additional course work in areas such as networks and database. The emphasis in this track is on the application of computing.

Graduates from these programs follow fruitful careers developing either scientific or business application's of computers, as well as in the design of computer systems. They are often involved in the systems level definition of information processing complexes for both manufacturers of computers and for users. A wide and expanding variety of design and applications opportunities characterize this field. The rapid growth and continual change within this field makes it essential for students to acquire a broad foundation in applied mathematics and the physical sciences, and to develop communication skills and to become familiar with the domains of potential computer application in the Humanities and Social Sciences. Research and development opportunities as a computer scientist and engineer, often following graduate education, are present in the areas of computer architecture and VSLI design, artificial intelligence, software engineering, digital data communications, multimedia, robotics, database, networks, user interface, fault-tolerant computing and testing, computer graphics, image processing and computer vision, and simulation.

The schedules which follow indicate how a serious, well prepared student who can devote full time to coursework can satisfy degree requirements in four academic years. Students without a solid foundation and those who cannot devote full time to academics should plan on a slower pace.

Four-Year Curriculum in Computer Science

In addition to the College's graduation requirements, the department has the policy of not accepting any D grade in department courses.

Prerequisites (State Mandated Common Prerequisites) for Students Transferring from a Community College: If a student wishes to transfer without an A.A. degree and has fewer than 60 semester hours of acceptable credit, the student must meet the university's entering freshman requirements including ACT or SAT test scores, GPA, and course requirements.

Students should complete the following **prerequisite courses** listed below at the lower level prior to entering the University. If these courses are not taken at the community college, they must be completed before the degree is granted. Unless stated otherwise, a grade of "C" is the minimum acceptable grade.

Some courses required for the major may also meet General Education Requirements thereby transferring maximum hours to the university.

Communications:
ENC 1101/1102 English I and II (6)

Humanities & Social Sciences:
Humaniteis Courses (6)
Social Science Courses (6)
Humanities or Social Sciences (3)

Mathematics:

USF	C/C
MAC 2281	MAC 2311* (4)
MAC 2282	MAC 2312* (4)
MAC 2283	MAC 2313* (4)
MAP 2302	MAP 2302 (3)

*or MAC 2281, MAC 2282, MAC 2283

Natural Sciences:

USF	C/C
CHM 2045	CHM 1045* (3)
CHM 2045L	CHM 1045L* (1)
PHY 2048	PHY 2048 (3)
PHY 2048L	PHY 2048L (1)
PHY 2049	PHY 2049 (3)
PHY 2049L	PHY 2049L (1)

*or CHS 1440 Chemistry for Engineers

This is a limited access program involving special admissions requirements. Please be aware of the immunization, foreign language, continuous enrollment policies of the university, and qualitative standards required.

Engineering Admissions Requirements

Transfer students must have completed the equivalent USF Engineering Calculus sequence with a 2.0 GPA; must have completed one year of equivalent USF General Physics and Chemistry courses with a minimum of 2.0 GPA; must have an overall GPA of 2.0 or better. Additional restrictions apply to admission to the Department of Computer Science and Engineering.

Semester I

MAC 2281	Engineering Calculus I	4
ENC 1101	Freshman English I	3
EGN 3000	Fundamentals of Eng	1
Science Elective		3
Social Science Elective		3
Total		14

Semester II

MAC 2282	Engineering Calculus II	4
PHY 2048	Eng. Physics I	3
PHY 2048L	Eng. Physics I Lab	1
ENC 1102	Freshman English II	3
COP 2510	Programming Concepts	3
Total		14

Summer Semester

MAC 2283	Engineering Calculus III	4
PHY 2049	Eng. Physics II	3
PHY 2049L	Eng. Physics II Lab	1
Historical Perspectives Elect		3
Total		11

Semester III

CDA 3100	Computer Organization	3
COT 3100	Intro Discrete Str	3
COP 3514	Program Design	3
Historical Perspectives Elect		3
Total		12

Semester IV

EEL 4851	Data Structures	3
CDA 3201	Computer Logic Design	3
CDA 3201L	Computer Logic Design Lab	1
EGN 4450	Linear Systems	2
STA 4442	Intro to Probability	3
Fine Arts Elective		3
Total		15

Semester V

CDA 4205	Computer Architecture	3
COP 4600	Operating Systems	3
CS&E Theory Elective		3
Science Elective		3
Social Science Elective		3
Total		15

Semester VI

CS&E Theory Elective	3
CS&E Software Elective	6
CS&E Elective	6
Total	15

Semester VII

ENC 3211	Engr. Communications	3
ALAMEA Elective		3

CS&E Elective	6
Total	12

Semester VIII

CIS 4250	Ethical Issues	3
Humanities, Social Science or Art Elective		3
CS&E Elective		6
Total		12

Four-Year Curriculum in Computer Engineering

Courses indicated with XXXX had not yet been assigned a number when the catalog went to print. See your academic advisor for additional information.

In addition to the College's graduation requirements, the department has the policy of not accepting any D grade in department courses.

Prerequisites (State Mandated Common Prerequisites) for Students Transferring from a Community College: If a student wishes to transfer without an A.A. degree and has fewer than 60 semester hours of acceptable credit, the student must meet the university's entering freshman requirements including ACT or SAT test scores, GPA, and course requirements.

Students should complete the following **prerequisite courses** listed below at the lower level prior to entering the University. If these courses are not taken at the community college, they must be completed before the degree is granted. Unless stated otherwise, a grade of "C" is the minimum acceptable grade.

Some courses required for the major may also meet General Education Requirements thereby transferring maximum hours to the university.

Communications:

ENC 1101/1102 English I and II (6)

Humanities & Social Sciences:

Humaniteis Courses (6)
Social Science Courses (6)
Humanities or Social Sciences (3)

Mathematics:

USF	C/C
MAC 2281	MAC 2311* (4)
MAC 2282	MAC 2312* (4)
MAC 2283	MAC 2313* (4)
MAP 2302	MAP 2302 (3)

*or MAC 2281, MAC 2282, MAC 2283

Natural Sciences:

USF	C/C
CHM 2045	CHM 1045* (3)
CHM 2045L	CHM 1045L* (1)
PHY 2048	PHY 2048 (3)
PHY 2048L	PHY 2048L (1)
PHY 2049	PHY 2049 (3)
PHY 2049L	PHY 2049L (1)

*or CHS 1440 Chemistry for Engineers

This is a limited access program involving special admissions requirements. Please be aware of the immunization, foreign language, continuous enrollment policies of the university, and qualitative standards required.

Engineering Admissions Requirements

Transfer students must have completed the equivalent USF Engineering Calculus sequence with a 2.0 GPA; must have completed one year of equivalent USF General Physics and Chemistry courses with a minimum of 2.0 GPA; must have an overall GPA of 2.0 or better. Additional restrictions apply for admission to the Department of Computer Science and Engineering.

Semester I

MAC 2281	Engineering Calculus I	4
ENC 1101	Freshman English I	3
EGN 3000	Fundamentals of Engineering	1
Social Science Elective		3
Historical Perspectives Elect.		3
Total		14

Semester II

MAC 2282	Engineering Calculus II	4
ENC 1102	Freshman English II	3
PHY 2048	Eng. Physics I	3
PHY 2048L	Eng. Physics I Lab	1
CHM 2045	General Chemistry I	3
CHM 2045L	General Chemistry Lab	1
Total		15

Summer Semester

MAC 2283	Engineering Calculus III	4
PHY 2049	Eng. Physics II	3
PHY 2049L	Eng. Physics II Lab	1
COP 2510	Programming Concepts	3
Total		11

Semester III

CDA 3100	Computer Organization	3
COT 3100	Intro Discrete Str	3
COP 3514	Program Design	3
*Social Science Elective		3
MAP 4302	Differential Equations	3
Total		15

Semester IV

EEL 4851	Data Structures	3
CDA 3201	Computer Logic Design	3
CDA 3201L	Computer Logic Design Lab	1
EGN 3443	Engineering Statistics	3
EGN 3373	Electrical Sys. I	3
EGN 4450	Linear Systems	2
Total		16

Semester V

CDA 4205	Computer Architecture	3
EGN 3613	Eng. Econ. with Social & Global Implications	3
ALAMEA Elective		3
EGNXXXX	Eng. Electronic Materials	3
CS&E Hardware Elective		4
Total		16

Semester VI

COP 4600	Operating Systems	3
CS&E Theory Elective		3
CS&E Hardware Elective		3
Science Elective		3
Fine Arts Elective		3
Total		15

Semester VII

ENC 3211	Comm. For Engineers	3
Historical Perspectives Elect.		3
CS&E Elective		6
Total		12

Semester VIII

CIS 4910	Senior Project	2
CIS 4250	Ethical Issues	3
CS&E Elective		9
Total		14

Four-Year Curriculum in Information Systems

Courses indicated with XXXX had not yet been assigned a number when the catalog went to print. See your academic advisor for additional information.

In addition to the College's graduation requirements, the department has the policy of not accepting any D grade in department courses.

Prerequisites (State Mandated Common Prerequisites) for Students Transferring from a Community College: If a student wishes to transfer without an A.A. degree and has fewer than 60 semester hours of acceptable credit, the student must meet the university's entering freshman requirements including ACT or SAT test scores, GPA, and course requirements.

Students should complete the following **prerequisite courses** listed below at the lower level prior to entering the University. If these courses are not taken at the community college, they must be completed before the degree is granted. Unless stated otherwise, a grade of "C" is the minimum acceptable grade.

Some courses required for the major may also meet General Education Requirements thereby transferring maximum hours to the university.

Communications:
ENC 1101/1102 English I and II (6)

Humanities & Social Sciences:
Humaniteis Courses (6)
Social Science Courses (6)
Humanities or Social Sciences (3)

Mathematics:

USF	C/C
MAC 2281	MAC 2311* (4)
MAC 2282	MAC 2312* (4)
MAC 2283	MAC 2313* (4)
MAP 2302	MAP 2302 (3)

*or MAC 2281, MAC 2282, MAC 2283

Natural Sciences:

USF	C/C
CHM 2045	CHM 1045* (3)
CHM 2045L	CHM 1045L* (1)
PHY 2048	PHY 2048 (3)
PHY 2048L	PHY 2048L (1)
PHY 2049	PHY 2049 (3)
PHY 2049L	PHY 2049L (1)

*or CHS 1440 Chemistry for Engineers

Strongly recommended:

Business Courses

USF	C/C
ACG 2001	ACG 2001 (3)

Economics

ECO 2013	ECO 2013 (3)
ECO 2023	ECO 2023 (3)

Programming Concepts

EGN 2510	COP 2202 (3)

Cobol

COP 2120	COP 2120 (3)

This is a limited access program involving special admissions requirements. Please be aware of the immunization, foreign language, continuous enrollment policies of the university, and qualitative standards required.

Engineering Admissions Requirements

Transfer students must have completed the equivalent USF Engineering Calculus sequence with a 2.0 GPA; must have completed one year of equivalent USF General Physics and Chemistry courses with a minimum of 2.0 GPA; must have an overall GPA of 2.0 or better.

Semester I

MAC 2281/2233	Calculus I	4
ENC 1101	Freshman English I	3
AGC 2021	Principles of Accounting I	3
Social Science Elective		3
Total		13

Semester II

MAC 2282/2234	Calculus II	4
ENC 1102	Freshman English II	3
PHY 2048/2053	Physics I	3
PHY 2048L/2053L	Physics I Lab	1
COP 2510	Programming Concepts	3
Total		14

Summer Semester

PHY 2049/2054	Physics II	3
PHY 2049L/2054L	Physics II Lab	1
ECO 2013	Macroeconomics	3
STA 2023	Intro to Statistics	3
Total		10

Semester III

CDA 3100	Computer Organization	3
COT 3100	Intro Discrete Str	3
COP 3514	Program Design	3
ECO 2023	Microeconomics	3
Historical Perspectives Elect		3
Total		15

Semester IV

EEL 4851	Data Structures	3
MAN 3023	Principles of Management	3
ALAMEA Elective		3
Science Elective		3
Social Science Elective		3
Total		15

Semester V

COP 4600	Operating Systems	3
EGN XXXX	Engineering Econ. with Social and Global Implications	3
EGN 4450	Linear Systems	2
ENC 3211	Comm. For Engineers	3
CS&E Software Elective		3
Total		14

Semester VI

CEN 4020	Software Engineering	3
Fine Arts Elective		3
CS&E Software Elective		3
CS&E Elective		6
Total		15

Semester VII

Historical Perspectives Elect		3
CS&E Theory Elective		3
CS&E Software Elective		3
CS&E Elective		3
Science Elective		3
Total		15

Semester VIII

CEN 4022	Software System Development	3
CIS 4250	Ethical Issues	3
CS&E Elective		3
Total		12

• ELECTRICAL ENGINEERING

Mission Statement

The mission of the Electrical Engineering Department at the University of South Florida is to provide internationally recognized educational programs for students seeking a career in the Electrical Engineering profession and related fields; to conduct internationally recognized research which benefits humanity and to widely disseminate these findings; to utilize the resources of the program to provide service to society; and to empasize to students the need for lifelong learning, ethical conduct and an understanding of the diverse social context in which engineering is practiced.

Objectives

The Department objectives are to produce graduates

1. with a sound background in mathematics, science and modern Electrical Engineering principles/tools in order to develop technical skills necessary for Electrical Engineering practice. Also, produce graduates who can pursue advanced topics through graduate or professional studies.
2. who can apply the knowledge of electrical engineering principles to the design, evaluation and optimization of devices, components and systems that meet performance criteria including safety, economic and environmental concerns.
3. with effective communication, interpersonal and problem solving skills that will enable them to practice electrical engineering successfully as individuals or as members of multidisciplinary teams, and instill in them the need for high ethical standards as well as the need to continue their professional development throughout their entire careers.
4. with an appreciation of contemporary issues facing society including cultural and societal values for successful personal/professional lives.

Students pursuing the Bachelor of Science in Electrical Engineering program take designated coursework in network analysis, electronics, communications, electromagnetic theory, control systems, microelectronics and microprocessors. This coursework is supplemented by electives in many specialized areas of electrical engineering.

Students completing this program normally pursue industrial careers in the power, electrical, electronic, or information industries or in related governmental laboratories and public service agencies. The electrical graduate may apply his/her knowledge to such diverse areas as television, communications, remote guidance, sensing (of people, vehicles, weather, crops, etc.), automation, computer and information systems, electric power generation and transmission, electrically propelled transportation, etc. The graduate may do this by performing needed engineering functions related to research and development (often requires an advanced degree), design, production, operation, sales, or management of these products/services.

The schedule which follows indicates how a serious, well prepared student who can devote full time to coursework can satisfy degree requirements in four academic years. Students without a solid foundation and those who cannot devote full time to academics should plan on a slower pace. A minimum departmental GPA of 2.0 is required for graduation.

Four-Year Curriculum in Electrical Engineering

Courses indicated with XXXX had not yet been assigned a number when the catalog went to print. See your academic advisor for additional information.

Prerequisites (State Mandated Common Prerequisites) for Students Transferring from a Community College: If a student wishes to transfer without an A.A. degree and has fewer than 60 semester hours of acceptable credit, the student must meet the university's entering freshman requirements including ACT or SAT test scores, GPA, and course requirements.

Students should complete the following **prerequisite courses** listed below at the lower level prior to entering the University. If these courses are not taken at the community college, they must be completed before the degree is granted. Unless stated otherwise, a grade of "C" is the minimum acceptable grade.

Some courses required for the major may also meet General Education Requirements thereby transferring maximum hours to the university.

Communications:
ENC 1101/1102 English I and II (6)

Humanities & Social Sciences:
Humaniteis Courses (6)
Social Science Courses (6)
Humanities or Social Sciences (3)

Mathematics:

USF	C/C
MAC 2281	MAC 2311* (4)
MAC 2282	MAC 2312* (4)
MAC 2283	MAC 2313* (4)
MAP 2302	MAP 2302 (3)

*or MAC 2281, MAC 2282, MAC 2283

Natural Sciences:

USF	C/C
CHM 2045	CHM 1045* (3)
CHM 2045L	CHM 1045L* (1)
PHY 2048	PHY 2048 (3)
PHY 2048L	PHY 2048L (1)
PHY 2049	PHY 2049 (3)
PHY 2049L	PHY 2049L (1)

*or CHS 1440 Chemistry for Engineers

This is a limited access program involving special admissions requirements. Please be aware of the immunization, foreign language, continuous enrollment policies of the university, and qualitative standards required.

Engineering Admissions Requirements

Transfer students must have completed the equivalent USF Engineering Calculus sequence with a 2.0 GPA; must have completed one year of equivalent USF General Physics and Chemistry courses with a minimum of 2.0 GPA; must have an overall GPA of 2.0 or better.

Semester 1

ENC 1101	English Comp. I	3
MAC 2281	Eng. Calculus I	4
Social Science Elective		3
Fine Arts Elective		3
EGN 2031	History of Technology	3
Total		16

Semester 2

ENC 1102	English Comp. II	3
MAC 2282	Eng. Calculus II	4
PHY 2048	Physics I	3
PHY 2048L	Physics Lab I	1
CHM 2045	Chemistry I	3
CHM 2045L	Chemistry Lab I	1
EGN 3000	Foundations of Engineering	1
Total		16

Semester 3

MAC 2283	Eng. Calculus III	4
PHY 2049	Physics II	3
PHY 2049L	Physics Lab II	1
EGN 3443	Eng. Prob. and Statistics	3
EGN XXXX	Eng. Econ. with Social and Global Implications	3
Total		14

Semester 4

MAP 2302	Differential Equations	3
EGN XXXX	Engineering Analysis	3
EGN 3373	Electrical Systems I	3
EEL 2161	EE Computing Methods	3
EGN XXXX	Eng. Electronic Materials	3
Total		15

Summer Term

EGN 2081	History of Electrotechnology	3
EEL 4935	SP: Elec. Systems Environments	3
ENC 3211	Comm. for Engineers	3
Total		9

Semester 5

EEL 3100	Network Analysis	3
EEL 4705	Logic Design	3

EEL 4705L	Logic Lab	1
EEL 3301L	Lab I	1
EEL 4472	Intro. to EM*	3
EEL 4351	Semiconductor Devices	3
Total		14

Semester 6

EEL 4102	Linear Systems Anal.	3
EEL 3XXX	Indus. Mach. & Power Appl.	2
EEL 4744	Microprocessors	3
EEL 4744L	Microprocessor Lab	1
EEL 3302	Electronics I	3
EEL XXXX	Wireless Lab	2
Total		14

Semester 7

EEL 4906	Prof. Issues & Eng. Design*	3
EEL 3302L	Lab II	1
EEL 4657	Linear Systems Controls	3
EEL 4657L	Controls Lab	1
EEL 4102	Electronics II	3
EEL 4512	Communication Systems	3
Total		14

*This course fulfills a Major Works/Major Issues Requirement

Semester 8

EEL XXXX	Design Project	3
Tech Elective		3
Tech Elective		3
Tech Elective		4
ALAMEA		3
Total		16

• INDUSTRIAL AND MANAGEMENT SYSTEMS ENGINEERING

Mission Statement

The mission of the IMSE Department is to provide students with a high quality education which integrates the latest research and practices of the field into the curriculum; to pursue excellence in basic and applied research in the field of Industrial and Management Systems Engineering; and to provide service to the profession and to society.

Objectives

The Department's objectives are to provide students

1. with an understanding of general engineering principles, and the underlying mathematical and scientific principles.
2. with a thorough understanding of the principles and practices of industrial and systems engineering and the related mathematical and scientific principles.
3. with an understanding of the basic human and business context in which engineering activities take place.
4. with the ability to think creatively, to communicate effectively, and to work on inter-disciplinary teams.
5. to succeed in engineering employment, graduate studies, and society.

Students pursuing the Bachelor of Science in Industrial Engineering degree program take designated, specialized coursework in industrial processes, work analysis, production control, facilities design, operations research, human factors, computer simulation, quality control, and robotics and automation. This coursework is supplemented by engineering electives and comprehensive industrial engineering design projects.

Students completing this program are prepared for graduate study or for careers in a broad range of industries, business, and public service areas. The strength of industrial engineering lies, in part, in its breadth and the applicability of its common body of knowledge in a wide variety of enterprises. Students may be involved in traditional areas of manufacturing and production, or state-of-the-art functions in automation and robotics. The same engineering principles are also applied to business organizations, service delivery systems, and governmental administration.

The schedule which follows indicates how a serious, well prepared student who can devote full time to coursework can satisfy degree requirements in four academic years. Students without a solid foundation and those who cannot devote full time to academics should plan on a slower pace.

Four-Year Curriculum in Industrial and Management Systems Engineering

Courses indicated with XXXX had not yet been assigned a number when the catalog went to print. See your academic advisor for additional information.

Prerequisites (State Mandated Common Prerequisites) for Students Transferring from a Community College: If a student wishes to transfer without an A.A. degree and has fewer than 60 semester hours of acceptable credit, the student must meet the university's entering freshman requirements including ACT or SAT test scores, GPA, and course requirements.

Students should complete the following **prerequisite courses** listed below at the lower level prior to entering the University. If these courses are not taken at the community college, they must be completed before the degree is granted. Unless stated otherwise, a grade of "C" is the minimum acceptable grade.

Some courses required for the major may also meet General Education Requirements thereby transferring maximum hours to the university.

Communications:

ENC 1101/1102 English I and II (6)

Humanities & Social Sciences:

Humaniteis Courses (6)
Social Science Courses (6)
Humanities or Social Sciences (3)

Mathematics:

USF	C/C
MAC 2281	MAC 2311* (4)
MAC 2282	MAC 2312* (4)
MAC 2283	MAC 2313* (4)
MAP 2302	MAP 2302 (3)

*or MAC 2281, MAC 2282, MAC 2283

Natural Sciences:

USF	C/C
CHM 2045	CHM 1045* (3)
CHM 2045L	CHM 1045L* (1)
PHY 2048	PHY 2048 (3)
PHY 2048L	PHY 2048L (1)
PHY 2049	PHY 2049 (3)
PHY 2049L	PHY 2049L (1)

*or CHS 1440 Chemistry for Engineers

This is a limited access program involving special admissions requirements. Please be aware of the immunization, foreign language, continuous enrollment policies of the university, and qualitative standards required.

Engineering Admissions Requirements

Transfer students must have completed the equivalent USF Engineering Calculus sequence with a 2.0 GPA; must have completed one year of equivalent USF General Physics and Chemistry courses with a minimum of 2.0 GPA; must have an overall GPA of 2.0 or better.

Semester I

CHM 2041	Chemistry I	3
CHM 2045L	Chemistry I Lab	1
EGN 3000	Foundations of Engineering	1
ENC 1101	Freshman English I	4
MAC 2281	Eng. Calculus I	3
Social Science Elective		3
Total		15

Semester II

CHM 2042	Chemistry II	3
EGN 2031	History of Technology	3
ENC 1102	Freshman English	3
MAC 2282	Eng. Calculus II	4
PHY 2048	Physics I	3
PHY 2048L	Physics I Lab	1
Total		17

Semester III

EGN 3443	Engineering Probability Statistics I	3
MAC 2283	Calculus III	4
PHY 2049	Physics II	3
PHY 2049L	Physics II Lab	1
Historical Perspectives		3
Total		14

Semester IV

EGN 3311	Statics	3
EGN 3373	Electrical Systems Engineering I	3
EGN 4450	Linear Systems	2
MAP 2302	Differential Equations	3
Fine Arts Elective		3
Total		14

Summer Term

EGN 1113	Engineering Graphics	3
EGN 3xxx	Engineering Econ. with Social and Global Implications	3
ALAMEA Elective		3
Total		9

Semester V

COP 2510	Programming Concepts	3
EGN 3365	Materials Engineering I	3
EIN 4312	Work Analysis	2
EIN 4312L	Work Analysis Lab	1
EIN 4411	Manufacturing Processes	2
EIN 4411L	Manufacturing Processes Lab	1
ESI 4312	Deterministic OR	3
Total		15

Semester VI

EGN 3343	Thermodynamics	3
EIN 4333	Production Control	3
EIN 4601	Automation/Robotics	2
EIN 4601L	Automation/Robotics Lab	1
ESI 4313	Probabilistic OR	3
Tech Elective	- Engineering Science	3
Total		15

Semester VII

EIN 4364	Facilities Design I	2
EIN 4364L	Facilities Design I Lab	1
EIN 4933	Management Cost	3
ESI 4244	Design of Experiments	3
ESI 4523	Simulation	2
ESI 4523L	Simulation Lab	1
Tech Elective	- Industrial Engineering	3
Total		15

Semester VIII

EIN 4313	Human Factors	2
EIN 4313L	Human Factors Lab	1
EIN 4365	Facilities Design II	3
ESI 4221	Industrial Statistics/Quality	2
ESI 4221L	Industrial Statistics/Quality Lab	1
ENC 3211	Communication for Engineers	3
Tech Elective		2
Total		14

• MECHANICAL ENGINEERING

Mission Statement

The Mission of the Mechanical Engineering Department is:

1. to provide a quality undergraduate and graduate education for students entering the mechanical engineering profession or seeking careers in related fields;
2. to advance scientific knowledge through basic and applied research;
3. to disseminate technical information through scholarly publication, technical conferences and continuing education;
4. to advance the profession through service within the associated professional societies and;
5. to promote activities which serve both domestic and international development.

Objectives

The Objectives of the Undergraduate Program in Mechanical Engineering are:

1. to teach students to understand and to apply concepts of basic science, mathematics, computation, and engineering science essential to professional practice;
2. to train students in the design of experiments, in proper instrumentation methods, in the techniques of modern data acquisition and in methods of data interpretation;
3. to develop those skills essential to the design process, including problem formulation, synthesis, analysis, construction and testing and/or evaluation;
4. to enhance those talents necessary for effective professional interaction including multi-disciplinary collaboration, successful oral communication and effective writing, and;
5. to encourage an understanding of technology within a global/societal context, the need for continued professional development, the importance of professional responsibility and the ethics of professional practice.

Students pursuing the Bachelor of Science in Mechanical Engineering program take coursework in thermodynamics and heat transfer; instrumentation and measurements, energy conversion systems, solid and fluid mechanics, dynamics, machine analysis and design, mechanical design, and controls. This is supplemented by elective coursework in such areas as power plant analysis, refrigeration and air conditioning, mechanical design, advanced mechanics, heat transfer, robotics, propulsion, vibrations, computer-aided design, manufacturing, composite materials, and aerodynamics.

Students completing this program normally enter careers in a wide range of industries which either produce mechanical products or rely on machines, mechanical devices and systems to produce electricity, petroleum products, foods, textiles, building materials, etc. Mechanical Engineering graduates may follow careers in such fields as transportation, power generation, manufacturing, instrumentation, automatic control, machine design, construction, refrigeration, heating and air conditioning, aerospace, defense and all the process industries (foods, textiles, petrochemicals, pharmaceuticals, etc.). There are abundant career opportunities in a wide range of industries because mechanical equipment is required in every aspect of industrial production.

Four-Year Curriculum in Mechanical Engineering

Courses indicated with XXXX had not yet been assigned a number when the catalog went to print. See your academic advisor for additional information.

Prerequisites (State Mandated Common Prerequisites) for Students Transferring from a Community College: If a student wishes to transfer without an A.A. degree and has fewer than 60 semester hours of acceptable credit, the student must meet the university's entering freshman requirements including ACT or SAT test scores, GPA, and course requirements.

Students should complete the following **prerequisite courses** listed below at the lower level prior to entering the University. If these courses are not taken at the community college, they must be completed before the degree is granted. Unless stated otherwise, a grade of "C" is the minimum acceptable grade.

Some courses required for the major may also meet General Education Requirements thereby transferring maximum hours to the university.

Communications:
ENC 1101/1102 English I and II (6)

Humanities & Social Sciences:
Humaniteis Courses (6)
Social Science Courses (6)
Humanities or Social Sciences (3)

Mathematics:

USF	C/C
MAC 2281	MAC 2311* (4)
MAC 2282	MAC 2312* (4)
MAC 2283	MAC 2313* (4)
MAP 2302	MAP 2302 (3)

*or MAC 2281, MAC 2282, MAC 2283

Natural Sciences:

USF	C/C
CHM 2045	CHM 1045* (3)
CHM 2045L	CHM 1045L* (1)
PHY 2048	PHY 2048 (3)
PHY 2048L	PHY 2048L (1)
PHY 2049	PHY 2049 (3)
PHY 2049L	PHY 2049L (1)

*or CHS 1440 Chemistry for Engineers

Strongly recommended:
Graphics

USF	C/C
EGS 1113	EGS 1111 (3)

This is a limited access program involving special admissions requirements. Please be aware of the immunization, foreign language, continuous enrollment policies of the university, and qualitative standards required.

Engineering Admissions Requirements

Transfer students must have completed the equivalent USF Engineering Calculus sequence with a 2.0 GPA; must have completed one year of equivalent USF General Physics and Chemistry courses with a minimum of 2.0 GPA; must have an overall GPA of 2.0 or better.

Semester I

ENC 1101	Freshman English I	3
MAC 2281	Engineering Calculus I	4
CHM 2045	General Chemistry I	3
CHM 2045L	Chemistry Lab I	1
EGS 1113	Intro. to Design Graphics	3
EGN 3000	Foundations of Engineering	1
Total		15

Semester II

ENC 1102	Freshman English II	3
MAC 2282	Engineering Calculus II	4
PHY 2048	General Physics I	3
PHY 2048L	General Physics I Lab	1
Fine Arts Elective		3
Total		15

Semester III

MAC 2283	Engineering Calculus III	4
PHY 2049	General Physics II	3
PHY 2049L	General Physics II Lab	1
EGN 3311	Statics	3
Social Science Elective		3
Total		14

Semester IV

MAP 2302	Differential Equations	3
EGN 3321	Dynamics	3
EGN 3365L	Materials Engineering I	3
EGN 3373	Electrical Systems I	3
Historical Perspectives		3
Total		15

Summer Term

EGN 3443	Eng Statistics & Prob.	3
EGN 3343	Thermodynamics I	3
EML 3500	Mechanics of Solids	3
EGN 2031	History of Technology	3
Total		12

Semester V

EML 3762	Kin. & Dyn. of Machinery	3
EML 4041	Computational Methods	4
EML 3701	Fluid Systems	3
ENC 3211	Comm. for Engineers	3
Mechanics Tech Elective		3
Total		16

Semester VI

EML 4501	Machine Design	3
EML 3303	Mechanical Engineering Lab I	3
EML 4142	Heat Transfer I	3
EML 4106	Thermal Syst.	3
EGN 3613	Eng. Eco. with Social & Global Impl.	3
Total		15

Semester VII

EML XXXX	Mechanical Manufacturing Processes	3
EML 4302	Mechanical Engineering Lab II	3
EML 4220	Vibrations	3
EML 4551	Capstone Design (MWMI)	3
ALAMEA Perspectives Elective		3
Total		15

Semester VIII

EML 4312	Mechanical Controls	3
Social Science Elective		3
Approved Technical/Design Elective		3
Natural Science Elective*		3
Total		12

*Students may substitute a technical/design elective if University natural science requirements are satisfied.

College Regulations

1. GENERAL EDUCATION REQUIREMENTS

While the Engineering undergraduate student is expected to complete certain requirements during the first two years of study which are directed toward the humanities and social sciences, and which are fulfilled by the completion of the General Education requirements of the University, the College of Engineering expects more of its prospective engineering graduates than this minimum. The engineer must not only be a technically competent individual, but must also be a person who can understand, adjust and contribute to the social environment.

Students who transfer from a State of Florida community college with an Associate of Arts degree and who have met that college's General Education Requirement will find their General Education coursework satisfies the University General Education Requirements.

All Engineering students must complete the USF Exit Requirements. The Literature and Writing portion can be met by completing ENC 3211 Communication for Engineers.

2. ENGLISH REQUIREMENT

Students who have been admitted to the College of Engineering may be required to take an examination in order to evaluate their preparedness in the use and understanding of the English language. The faculty of the University's English

program will administer the examination.

Students evidencing an English deficiency will be required to initiate the necessary corrective programs, with the assistance of their advisors. It is recognized that such deficiencies can exist even though a student has met the University's minimum English requirements. Correction of any deficiency must commence the term after a student has been notified and must be completed prior to recommendation of the student for graduation by the faculty of the College.

See *Continuation and Graduation Requirements* below for minimum grade requirements.

3. MATHEMATICS REQUIREMENT

Students who are pursuing an engineering program are expected to acquire a facility for the rapid and accurate solution of problems requiring the use of mathematics. This requirement includes the ability to translate physical situations into mathematical models. Students evidencing a lack of manipulative ability or of the ability to apply mathematics will be required to take remedial coursework in engineering analysis and problem solving that is over and above their regular degree requirements. Faculty of the College who encounter students who are deficient in their mathematical ability will refer such cases to the Advising Office.

4. CONTINUATION AND GRADUATION REQUIREMENTS

To meet graduation requirements all undergraduate students must maintain above the minimum cumulative overall GPA of 2.00. In addition the College of Engineering also requires undergraduate students to maintain a minimum of 2.0 GPA in all engineering courses attempted, as well as 2.0 GPA in all courses attempted in their specialization. In no case will the minimum GPA for a category be less than 2.0. It is the student's responsibility to make sure she/he meets all departmental requirements. In addition to the completion of the coursework and/or project requirements of the respective program of the College, students must be recommended for their degrees by the faculty of the College.

Students who do not maintain the required minimums of the program pursued in each category are ineligible for further registration in the College unless individually designed continuation programs are recommended by the student's academic advisor and approved by the department chairperson and the Engineering Associate Dean for Academic Affairs. All students who are academically dismissed from the University will be denied readmission to the College of Engineering unless they meet admission requirements in effect at the time readmission is sought and are recommended for readmission by the department and the Associate Dean for Academic Affairs.

Students who register for a course three times without receiving a grade "D" or better (i.e., receive grades of W or F) will be denied further enrollment in the College of Engineering unless written permission is obtained from the department chairperson and the College Associate Dean for Academic Affairs.

Students pursuing College of Engineering degree programs are expected to take their courses on a graded basis (ABCDF). Exceptions require written approval of the department advisor prior to registration.

The College of Engineering requires that a student completes the baccalaureate degree within five years after beginning the Engineering specialization courses. Any exceptions require approval of the department and Dean's Office.

Each engineering student is required to complete the *Application for Graduation - Check List* and submit it to the College of Engineering Advising Office by the drop date of the term prior to the semester in which graduation is sought. Completion of this form is a requirement for graduation.

Effective fall of 1987 all students pursuing Bachelor of Science degree programs in Civil or Mechanical Engineering will be required to take the Fundamentals of Engineering Exam of the State Board of Professional Regulation at least one term prior to the term of anticipated graduation. Effective fall of 2000 students pursuing Bachelor of Science in Chemical Engineering will be required to take the discipline oriented Fundamantals of Engineering exam. Engineering students in other disciplines are strongly encouraged to do the same. (See the College Advising Office for applications and information.)

5. TRANSFER CREDIT

The USF College of Engineering will allow transfer credit when appropriate if the transferred course has been passed. In some cases credit for a course *may* be granted, but the hours accepted may be less than the hours earned at another school.

While credit for work at other institutions may be granted subject to the conditions of the previous paragraph, a *minimum* of thirty semester hours of engineering coursework specified by the degree-granting department is required for a baccalaureate degree.

FIVE-YEAR PROGRAMS LEADING TO BACHELORS AND MASTERS DEGREES IN ENGINEERING

Students who, at the beginning of their senior year, are clearly interested in graduate study are invited to pursue a Five-Year Program of study leading simultaneously to the Bachelor of Science in Engineering or Engineering Science and Master of Science in Engineering or Engineering Science degrees. The general basis of the five-year program includes

1. A two-year research program extending through the fourth and fifth year.
2. The opportunity of taking some graduate courses during the fourth year and deferring the taking of some senior courses to the fifth year. The requirements of the combined degrees do not differ from those for the two degrees pursued separately.

Students apply for admission to this program through their advisor, who should be consulted when additional information is needed. Departmental expectations and general admission requirements include

1. Senior standing (90 credits) with at least 16 upper level engineering credits completed at the University of South Florida with a 3.0 GPA.
2. A minimum score of 1000 on the verbal and quantitative portions of the Graduate Records Examination.
3. Above-average performance in the chosen Engineering program.

Certificate Programs

CERTIFICATE IN BIOMEDICAL ENGINEERING

The Certificate in Biomedical Engineering provides students an opportunity to get an introduction to a rapidly developing field of study and to receive recognition for their endeavors. Students in the program must fulfill all the requirements for an Engineering undergraduate degree, such as Bachelor of Science in Chemical Engineering and also meet the additional requirements of the Certificate program.

Chemistry/Biology (10 hours min.)
- BSC 2010 Biology II - Cellular Processes*
- BCH 3023 Biochemistry**

One of the following Organic Chemistry sequences:
- CHM 2210 Organic Chemistry I*
- CHM 2211 Organic Chemistry II*
- CHM 2200 Organic Chemistry***

Other "human sciences" (6 hrs. min.)
- PSY 3044 Experimental Psychology**

One of the following:
- PET 3310 Kinesiology
- PET 3351 Exercise Physiology I

EXP 4104 Sensory Processes
PSB 4013C Neuropsychology
(or approved substitute)

Engineering (9 hrs. min.****)
EEL 4935 Special Electrical Topics
ECH 5746 Intro to Biomedical Engineering
One or more of the following (to achieve 9 hrs. min. in area):
EIN 4313L Human Factors
EIN 5245 Work Physiology & Biomechanics
ECH 5747 Selected Topics in Chemical Engineering Biotechnology
ECH 5748 Selected Topics in Biomedical Engineering
(or other approved Engineering courses)

*These courses are typically required for Medical School admission. Note that there may be other required courses, such as a course in Human Genetics and the Organic Chemistry laboratories.

**These courses are not normally required for Medical School admission, but are often "highly recommended."

***This is a single semester course in Organic Chemistry. This course does not normally satisfy the admission requirements of most medical schools. It also does not count towards the Chemical Engineering degree (students must take the full year sequence).

****It is important to note that these engineering courses are above and beyond the courses necessary to satisfy the 136 hour requirement. That is, these courses will not also qualify as engineering electives towards the B. S. requirements for any of the departmental degree programs.

CERTIFICATE OF ENHANCEMENT

The Certificate of Enhancement in (a designated engineering discipline) provides students an opportunity to gain an enhanced experience in their chosen field while pursuing an engineering degree and to permit them to receive recognition for the same requirements.

Requirements:

1. Enrolled in a Bachelor of Science degree program in a specified engineering discipline.
2. A minimum of 15 hours of additional elective courses, not included as a part of the B. S. degree, from an approved list. Courses must be taken on a letter-grade basis, and a minimum of 9 hours must be in engineering courses.
3. A G.P.A. of 2.0 or greater for the additional hours.
4. The student must receive the engineering degree to receive the Certificate of Enhancement.

Please contact the appropriate department chairperson to be accepted in the program.

Computer Service (SC) Courses

These courses marked SC are specifically designed for the non-engineering student.

Recognizing that the general purpose digital computer has made significant contributions to the advancement of all elements of the academic community and that it will have an ever greater impact in the future, the College of Engineering offers several levels of credit coursework, both undergraduate and graduate, to serve students of all colleges in order that they may be prepared to meet the computer challenge.

Computer-oriented courses are offered in two broad categories: (1) those courses which are concerned with the operation, organization and programming of computers and computer systems from the viewpoint of examining the fundamental principles involved in computer usage; and (2) those courses which are concerned with computer applications to a variety of different disciplines, by means of user-oriented-languages such as FORTRAN, COBOL, BASIC, "C," JAVA, VISUAL BASIC and ADA.

Students in engineering, the physical sciences, and mathematics must consult their advisor for suitable computer courses, since these courses are not acceptable to a number of degree programs.

College Facilities

Each of the departments has several modern well-equipped laboratories that are used for undergraduate teaching. Some examples of specialized equipment available are a scanning electron microscope, a gas chromatograph mass spectrometer, a 250,000 lb. material testing machine, several microprocessor-based control systems, industrial robots, a low turbulence subsonic wind tunnel, computer numerical controlled machinery, metal organic chemical vapor deposition systems, and integrated circuits design workstations.

College Computing Facilities

The College of Engineering Computing Facilities are used to provide support for specialized engineering calculations above and beyond those that are available at the IBM based Central Florida Regional Data Center (CFRDC).

The College of Engineering operates a cluster of file and computer servers for students and faculty within the College. These consist of SUN servers and four Ardent multiprocessors mini-supercomputers. The networks provide access from offices and laboratories, computer rooms and dial-in facilities. All machines are configured for E-mail and access to Internet. Conventional ascynchronous links to the campus central facility will shortly be supplemented with an Ethernet link.

In addition to the network facilities, the College operates open access P.C. labs. Three are available for undergraduate engineering students; a third smaller lab is reserved for graduate students and faculty.

The network facilities provide access either via Ethernet or the ISDN. Connections to offices, laboratories and classrooms are available on request, subject to budget priorities. The FEEDS studies are also networked to provide demonstrations for remote classes.

The College facilities run most of the standard engineering software. Languages include Fortran, Basic, Pascal, C. Ada, and several varieties of LISP and Prolog. Applications software includes mathematical libraries, suites of programs for VLSI design, chemical process design, civil and mechanical engineering design, robotics simulation, and circuit simulation and analysis. There are high-resolution color terminals for use in conjunction with these activities, and for mechanical design there are four multiple display workstations with joysticks and digitizing pads. Similar arrangements are used for VLSI design.

Additionally, the Computer Science and Engineering Department within the College runs other facilities consisting of an Ethernet with SUN and DEC machines, an Intel Hypercube parrallel computer, and extensive microcomputer laboratories.

Cooperative Education Program

A wide variety of industries and government agencies have established cooperative programs for engineering students to provide them the opportunity to become familiar with the practical aspects of industrial operations and engineering careers. Students in the Career Resource Center's Cooperative Education (Co-op) program alternate periods of paid employment in their major field with like periods of study. Students following the Co-op program usually encounter no problems in scheduling their program, since required Social Science and Humanities, Mathematics and Science, and Engineering Common courses are offered every semester. Students normally apply for participation in this program during their sophomore year and pursue actual Co-op employment during their sophomore and junior years. The senior year is generally pursued on a full-time study basis, since many specialization courses are not offered every semester. The students receive a Cooperative Education Certificate upon successful completion of a minimum of two work assignments.

Southern Technology Applications Center (STAC)

The Space Act of 1958 directed NASA "to provide the widest practical and appropriate dissemination of information concerning its activities and results thereof." In order to pursue this mandate NASA established a network of Industrial Applications Centers (IACS) to disseminate and transfer NASA technology, products and processes to the private sector.

In 1977 NASA and the State University System of Florida combined resources to form the Southern Technology Applications Center which operated a regional IAC in the State of Florida. STAC is a not-for-profit 501.C3 Corporation partially supported by NASA and SUS grants and its effective network of experts and resources are located at the colleges of Engineering at six of the SUS universities.

In December 1991 the NASA IAC Network was reorganized to provide comprehensive technology transfer and economic development services. The new program resulted in a network of six Regional Technology Transfer Centers that link NASA Field Centers, Federal laboratories, Universities and other Technology Transfer networks for more efficient technology transfer.

In January 1992 STAC was appointed the Southeast Regional Technology Transfer Center (RTTC) with responsibility for nine Southeastern states.

Since the early days of its existence STAC has built a reputation for successfully identifying, matching, developing and deploying the critical information and technology needed by business, industry, academic institutions and government. In this way, American companies, especially small firms are able to capitalize rapidly on the results of scientific research and technological innovation and realize the increased productivity necessary to compete in the dynamic marketplace.

The cornerstone of STAC's technology transfer success is a professional staff trained and experienced in engineering, physical and biological sciences, medicine, social and behavioral sciences, business planning, marketing, training, library science and government. STAC's Information Research Center accesses an international array of over 2000 databases and 35 document retrieval sources. STAC's hands-on approach enables each client to receive the attention and alternative solutions needed to make the best strategic decisions.

STAC is the connection to access the information technology, inventions, equipment, facilities and expertise that resides within NASA, the other 700+ Federal laboratories and the SUS Universities.

Army & Air Force R.O.T.C. For Engineering Students

The Engineering curriculum, coupled with involvement in the Army or Air Force R.O.T.C. program, requires a minimum of five (5) years to complete the degree requirements. Army and Air Force R.O.T.C. cadets must take 16 additional hours in either military science or aerospace studies. Additionally, Air Force-sponsored summer training camp is scheduled between the sophomore and junior year for Air Force cadets, and Army cadets attend an Army-sponsored summer training program between the junior and senior years.

ENGINEERING FACULTY

CHEMICAL ENGINEERING

Chairperson: L. Garcia-Rubio; *Professors:* J.C. Busot, L. Garcia-Rubio, R. Gilbert, J.A. Llewellyn, C. A. Smith, A. K. Sunol; *Associate Professors:* V.R. Bhethanabotla, S.W. Campbell, W.F. Lee, III; *Instructor:* C. Biver; *Courtesy Faculty:* R. Heller.

CIVIL AND ENVIRONMENTAL ENGINEERING

Chairperson: William C. Carpenter; Professors Emeriti: J.E. Griffith, B.E. Ross; *Professors:* M.W. Anderson(Interim COE Dean), R.P. Carnahan, W.C. Carpenter, W.F. Echelberger, Jr., S.C. Kranc, R.J. Murphy, A.A. Sagues, R. Sen; *Associate Professors:* M. Gunaratne, A. Levine, J.J. Lu, R.M. Pendyala, M.A. Ross, R.I. Stessel, D. Smith, A. Zayed; *Assistant Professors:* A. Ashmawy, J.F. Devine, J.T. Franques, G. Mullins, N. Nachabe; *Instructors:* T.K. Davis, K. Nohra; *Courtesy Faculty:* F.R. Jones, G.L. Brosch, J. Obeysekera, S.E. Polzin, N. Poor, J.B. Rose, R.C. Sheck, F.L. Young.

COMPUTER SCIENCE AND ENGINEERING

Chairperson: A. Kandel; *Professors:* K. Bowyer, L. Hall, A. Kandel, R. Perez, L. Piegl, N. Ranganathan, M. Varanasi; *Associate Professors:* S. Al-Arian, D. Goldgof, P. Maurer, R. Murphy, D. Rundus, S. Sarkar; *Assistant Professors:* K. Christensen, E. Fink, S. Katkoori, W. Mak.

ELECTRICAL ENGINEERING

Chairperson: E. K. Stefanakos; *Dean Emeritus:* G. A. Burdick; *Professors:* J. M. Anthony, Y. Chiou, S. Garrett, R. Henning, V. Jain, M. G. Kovac, D. Morel, R. Sankar, D. Snider, E.K. Stefanakos, T. Wade; *Associate Professors:* K. Buckle, L. Dunleavy, C. Ferekides, D. Hoff W. Moreno, P. Wiley; *Assistant Professors:* T. Weller; *Lecturers:* H. Gordon, F. King, J. Leffew.

INDUSTRIAL AND MANAGEMENT SYSTEMS

Chairperson: P.E. Givens; *Professor Emeritus:* R. J. Wimmert; *Professors:* P. E. Givens, S. K. Khator, O. G. Okogbaa, W. A. Miller; *Associate Professors:* A. L. Callahan, T. K. Das; *Assistant Professors:* M X. Weng; *Lecturers:* S. N. Busansky, D. K. Gooding, P. R. McCright.

MECHANICAL ENGINEERING

Chairperson: R. V. Dubey; *Professors:* R.A. Crane, R.V. Dubey, D.P. Hess, A.K. Kaw, J.L.F. Porteiro, S.J. Ying; *Associate Professors:* G.H. Besterfield, A. Kumar, M.M. Rahman, S. Wilkinson; *Assistant Professors:* T. G. Eason III; *Adjuncts:* R.L. Mann, Ricardo Galdos.

ENGINEERING COURSES

BASIC AND INTERDISCIPLINARY ENGINEERING

EGN 2031 History of Technology *-HP* (3)
EGN 2210 Computer Tools for Engineers (3)
EGN 3000 Foundations of Engineering (1)
EGN 3000L Foundations of Engineering Laboratory (2)
EGN 3311 Statics (3)
EGN 3321 Dynamics (3)
EGN 3331 Mechanics of Materials (3)
EGN 3331L Mechanics of Materials Laboratory (1)
EGN 3343 Thermodynamics I (3)
EGN 3353 Basic Fluid Mechanics (3)
EGN 3365 Materials Engineering I (3)
EGN 3373 Introduction to Electrical Systems I (3)
EGN 3374 Introduction to Electrical Systems II (3)
EGN 3375 Introduction to Electrical Systems III (3)
EGN 3433 System Dynamics (3)
EGN 3443 Engineering Statistics I (3)
EGN 3613C Engineering Economy I (3)
EGN 4366 Materials Engineering II (3)
EGN 4420 Numerical Methods of Analysis (2)
EGN 4450 Introduction to Linear Systems (2)
EGN 4831 Technology and Society *-MW* (3)
EGN 4905 Independent Study (1-5)
EGN 4930 Special Topics in Engineering (1-3)
EGN 5421 Engineering Applications for Vector Analysis (3)
EGN 5422 Engineering Applications of Partial Differential Equations (3)
EGN 5423 Natural Networks and Mathematical Communication (3)
EGN 5424 Engineering Applications of Complex Analysis (3)
EGN 5425 Engineering Applications of Advanced Matrix Computations (3)
EGS 1113 Introduction to Design Graphics (3)
ESI 4161C Computers in Industrial Engineering (3)
ESI 4313 Probabilistic O. R. (3)

CHEMICAL ENGINEERING

ECH 3023 Introduction to Process Engineering (3)
ECH 3264C Transport Processes I (3)
ECH 3702 Instrument Systems I (4)
ECH 4123C Phase and Chemical Equilibria (3)
ECH 4244L Chemical Engineering Laboratory II (2)
ECH 4265C Transport Processes II (3)
ECH 4323C Automatic Control I (4)
ECH 4415C Reacting Systems (3)
ECH 4605 Strategies of Process Engineering (3)
ECH 4615 Plant Design and Optimization *-MW* (3)
ECH 4905 Independent Study (1-4)
ECH 4930 Special Topics in Chemical Engineering I (1-4)
ECH 4931 Special Topics in Chemical Engineering II (1-4)
ECH 5285 Transport Phenomena (3)
ECH 5324 Automatic Process Control II (3)
ECH 5740 Theory and Design of Bioprocesses (4)
ECH 5742 Pharmaceutical Engineering (2)
ECH 5746 Introduction to Biomedical Engineering (3)
ECH 5747C Selected Topics in Chemical Engineering Biotechnology (1-3)
ECH 5748 Selected Topics in Biomedical Engineering (1-3)
ECH 5820 Product Development (2)
ECH 5910 Directed Research in Bioengineering (1-3)
ECH 5930 Special Topics III (1-4)
ECH 5931 Special Topics IV (1-4)

CIVIL AND ENVIRONMENTAL ENGINEERING

CEG 4011 Soil Mechanics I (3)
CEG 4011L Geotechnical Laboratory (1)
CEG 4012 Soil Mechanics II (3)
CEG 4801 Geotechnical Design (2)
CEG 4850 Capstone Geotechnical/Transportation Design *-MW* (3)
CEG 5115 Foundation Engineering (3)
CEG 5205 Laboratory Testing for Geotechnical Engineers (3)
CES 3102 Structures I (3)
CES 4000 Structures and The Urban Environment for Non-Engineers *-6A MW* (3)
CES 4141 Matrix Structural Analysis (3)
CES 4561 Computer Aided Structural Design (3)
CES 4605 Concepts of Steel Design (3)
CES 4618 Structural Design Steel (2)
CES 4702 Concepts of Concrete Design (3)
CES 4704 Structural Design-Concrete (2)
CES 4720 Capstone Structural/Materials Design (3)
CES 4740 Capstone Structural/Geotechnical Design *-MW* (3)
CES 4742 Concepts of Structural Design (3)
CES 4820C Timber and Masonry Design (3)
CES 5105C Advanced Mechanics of Materials I (3)
CES 5209 Structural Dynamics (3)
CES 5715C Prestressed Concrete (3)
CGN 3021L Civil Engineering Laboratory (2)
CGN 4122 Professional and Ethical Issues in Engineering *-MW* (3)
CGN 4851 Concrete Construction Materials (3)
CGN 4905 Independent Study (1-5)
CGN 4911 Research in Civil Engineering and Mechanics (1-4)
CGN 4914 Senior Project (2-5)
CGN 4933 Special Topics in Civil and Environmental Engineering and Mechanics (1-5)
CGN 5933 Special Topics in Civil Engineering and Mechanics (1-5)
CWR 4103 Water Resources Engineering (3)
CWR 4202 Hydraulics (3)
CWR 4810 Hydraulic Design (2)
CWR 4812 Capstone Water Resources Design *-MW* (3)
EMA 4324 Corrosion of Engineering Materials I (3)
EMA 5326 Corrosion Control (3)
ENV 3001 Environmental Engineering (3)
ENV 4004L Environmental Engineering Laboratory (1)
ENV 4101 Air Pollution Control (3)
ENV 4351 Solid Waste Engineering (2)
ENV 4400 Chemical Aspects of Environmental Engineering (3)
ENV 4417 Water Quality and Treatment (3)
ENV 4432 Water Systems Design (2)
ENV 4502 Environmental Unit Operations (3)
ENV 4503 Environmental Unit Processes (3)
ENV 4891 Capstone Environmental Design *-MW* (3)
ENV 5105 Air Resource Management (3)
ENV 5345 Solid And Hazardous Waste Control (3)
ENV 5614 Environmental Risk Analysis (3)
SUR 2101C Engineering Land Surveying (3)
TTE 4004 Transportation Engineering I (3)
TTE 4005 Transportation Engineering II (3)
TTE 4821 Transportation Systems Design (2)
TTE 5205 Traffic Systems Engineering (3)
TTE 5501 Transportation Planning and Economics (3)

COMPUTER SCIENCE AND ENGINEERING

CAP 5400 Digital Image Processing (3)
CAP 5625 Introduction to Artificial Intelligence (3)
CAP 5682 Expert And Intelligent Systems (3)
CDA 3201 Computer Logic Design (3)
CDA 3201L Computer Logic Design Lab (1)
CDA 4100 Computer Organization and Architecture (3)
CDA 4203 Computer System Design (3)
CDA 4203L Computer System Design Lab (1)
CDA 5405 Modeling Computer System Performance I (3)
CDA 5406 Modeling Computer System Performance II (3)
CEN 4020 Software Engineering (3)
CEN 4721 User Interface Design (3)
CGS 2060 SC Introduction to Computers and Programming in Basic *-6A* (3)
CGS 2062 Computers And Society (3)
CGS 2260 SC Mini-Computer Applications (3)
CGS 3462 SC Pascal Programming (3)
CGS 3463 SC GPSS Simulation (3)
CGS 3464 SC Simscript Simulation (3)
CGS 5765 Introduction to Unix and C (3)
CIS 4250 Ethical Issues And Professional Conduct *-6A MW* (3)
CIS 4900 Independent Study In Computer Science (1-5)
CIS 4910 Computer Science Project (2)
CIS 4930 Special Topics in Computer Science I (1-4)
COP 2000L Computer Science Laboratory (1)
COP 2002 Introduction to Computer Science (3)
COP 2120 SC Cobol Programming I (3)
COP 2121 SC Cobol Programming II (3)
COP 2200 SC Fortran Programming (3)
COP 2400 Computer Systems (3)
COP 2510 Programming Concepts (3)
COP 3514 Program Design (3)
COP 4020 Programming Languages (3)
COP 4023 Comparison Of Programming Languages (3)
COP 4600 Operating Systems (3)
COT 3100 Introduction to Discrete Structures (3)
COT 4210 Introduction to Automata Theory and Formal Languages (3)
COT 4400 Analysis Of Algorithms (3)
EEL 4705 Logic Design (3)
EEL 4705L Logic Laboratory (1)
EEL 4743L Microprocessor Laboratory (1)
EEL 4744 Microprocessor Principles and Applications (3)
EEL 4748 Microprocessor-Based System Design and Application (3)
EEL 4756 Signal and Image Processing (3)
EEL 4781C Distributed Processing and Computer Networks (3)
EEL 4851C Data Structures (3)
EEL 4852C Data Base Systems (3)
EEL 5771 Introduction to Computer Graphics I (3)
ETG 4931 Special Topics in Technology I (1-5)
ETG 4932 Special Topics in Technology II (1-5)
ETI 4666 Principles of Industrial Operations II (3)

ELECTRICAL ENGINEERING

EEL 3100 Network Analysis and Design (3)
EEL 3302 Electronics I (3)
EEL 3410 Fields and Waves I (3)
EEL 4102 Linear Systems Analysis (3)
EEL 4163 Computer Aided Design and Analysis (2)
EEL 4305 Electronics II (3)
EEL 4351C Semiconductor Devices (3)
EEL 4411 Fields And Waves II (3)
EEL 4511 Communication Engineering (2)
EEL 4512C Introduction to Communication Systems (3)
EEL 4567 Electro-Optics (3)
EEL 4657 Linear Control Systems (3)
EEL 4905 Independent Study (1-5)
EEL 4906 Design Project *-MW* (2)
EEL 4935 Special Electrical Topics I (1-4)
EEL 4936 Special Electrical Topics II (1-4)
EEL 4937 Special Electrical Topics III (1-4)
EEL 5250 Power System Analysis (3)
EEL 5344C Digital CMOS/VLSI Design (3)
EEL 5356 Integrated Circuit Technology (3)
EEL 5357 Analog CMOS/VLSI Design (3)
EEL 5382 Physical Basis Of Microelectronics (3)
EEL 5437 Microwave Engineering (3)

EEL 5462 Antenna Theory (3)
EEL 5572C Local and Metropolitan Area Networks (3)
EEL 5631 Digital Control Systems (3)
EEL 5754C Microprocessor Based Digital Signal Processing (3)
EEL 5935 Special Electrical Topics I (1-3)
EEL 5936 Special Electrical Topics II (1-3)
EEL 5937 Special Electrical Topics III (1-3)
ELR 3301L Laboratory 1 (1)
ELR 3302L Laboratory 2 (1)
ELR 4306L Laboratory 4 (1)

INDUSTRIAL AND MANAGEMENT SYSTEMS

EIN 4312C Work Analysis (3)
EIN 4313C Human Factors (3)
EIN 4333 Production Control (3)
EIN 4364C Facilities Design I (3)
EIN 4365 Facilities Design II -*MW* (3)
EIN 4411 Manufacturing Processes (3)
EIN 4601L Automation and Robotics (3)
EIN 4933 Special Topics in Industrial Engineering (1-6)
EIN 5245 Work Physiology and Biomechanics (3)
EIN 5322 Principles of Engineering Management (3)
EIN 5357 Engineering Value Analysis (3)
ESI 4221 Industrial Statistics and Quality Control (3)
ESI 4244 Design Of Experiments (3)
ESI 4312 Deterministic O. R. (3)
ESI 4523 Industrial Systems Simulation (3)
ESI 4905 Independent Study (1-5)
ESI 4911 Senior Project (2)
ESI 5219 Statistical Methods For Engineering Managers (3)
ESI 5236 Reliability Engineering (3)
ESI 5306 Operations Research For Engineering Management (3)
ESI 5470 Manufacturing Systems Analysis (3)
ESI 5522 Computer Simulation (3)

MECHANICAL ENGINEERING

EAS 4121 Hydro and Aerodynamics (3)
EML 3041 Computational Methods (3)
EML 3262 Kinematics and Dynamics of Machinery (3)
EML 3303 Mechanical Engineering Lab I (3)
EML 3500 Machine Analysis and Design I (3)
EML 3701 Fluid Systems (3)
EML 4031 Visual Basic for Engineers and Scientists (3)
EML 4106C Thermal Systems and Economics (3)
EML 4142C Heat Transfer I (3)
EML 4220C Vibrations (3)
EML 4302 Mechanical Engineering Laboratory II (3)
EML 4312 Mechanical Controls (3)
EML 4414 Heat Power Engineering (3)
EML 4419C Propulsion I (3)
EML 4501 Machine Design (3)
EML 4551 Capstone Design -*MW* (3)
EML 4552 Senior Mechanical Design (3)
EML 4562 Introduction to Composite Materials (3)
EML 4601 Air Conditioning Design (3)
EML 4905 Independent Study (1-4)
EML 4930 Special Topics in Mechanical Engineering (1-4)
EML 5245 Tribology (3)
EML 5325 Mechanical Manufacturing Processes (3)
EML 5422 Internal Combustion Engines (3)
EML 5930 Special Topics III (1-4)
EML 5931 Special Topics IV (1-4)