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 entering the workforce 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 refreshing 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.

Interested students should contact the Academic Advising Office (813/974-2884) for more information about the Bachelor of Science program.

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 select the strongest academic program that is available while in high school, including four years 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 validate 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 (813/974-2884) for more information about the Bachelor of Science program.

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
COLLEGE OF ENGINEERING

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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
   MACX283 Engineering Calculus III (4)
   or MAC 2281, MAC 2282, MAC 2283
   MAPX302 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:
   Humanities 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 of 3.0 or higher 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 record 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 of Chemical Engineering (M.C.H.E.)
   Master of Engineering (M.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, chemical reaction engineering, 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 program 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 science, and environmental engineering.

Students completing the program may enter the profession as engineers in the civil, structural, geotechnical, transportation, water resources, environmental, hydraulic, 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 deal with 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 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, electronics, electronics, 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 product 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:

<table>
<thead>
<tr>
<th>General Education Requirements*</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>English Composition</td>
<td>6</td>
</tr>
<tr>
<td>Quantitative Methods</td>
<td>6</td>
</tr>
</tbody>
</table>

Natural Sciences 6
Social Sciences 6
Historical Perspectives 6
Fine Arts 3
African, Latin American, Middle Eastern or Asian Perspectives 3

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 sci-
ences 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
environmentally friendly, safe processes involving transforma-
tions 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, thermo-
dynamics, fluids, heat, and mass transfer, separation pro-
cesses, reacting systems, instrumentation, and control. Students
must also satisfactorily complete a design project as part of
their program. Students seeking the biotechnology/biomed-
ic 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 enter-
prises. 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, fertilizer,
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 Funda-
amentals 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 Gen-
eral 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: Humanities Courses (6) |
| Social Science Courses (6) |
| Humanities or Social Science Courses (3) |
| Mathematics: USF MAC 2281 C/C MAC 2311* (4) |

| 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 |
| 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 4414: 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 special 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:
Humanities 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)
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<td>ENC 4101</td>
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<td>CEG 4561</td>
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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

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## 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

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## 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 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:**
- Humanities Courses (6)
- Social Science Courses (6)
- Humanities or Social Sciences (3)

**Mathematics:**
- MAC 2281 Calculus I
- MAC 2282 Calculus II
- MAC 2283 Calculus III
- MAP 2302 Differential Equations

**Natural Sciences:**
- CHM 2045 General Chemistry I
- CHM 2045L General Chemistry I Lab
- PHY 2048 Calculus-based Physics I

**Computer Science:**
- MAC 2281 Engineering Calculus I
- ENC 1101 Freshman English I
- EGN 3000 Fundamentals of Eng

**Science Elective:**
- Total 3

**Social Science Elective:**
- Total 3

#### Semester I
- MAC 2281 Engineering Calculus I
- MAC 2282 Engineering Calculus II
- PHY 2048 Eng. Physics I
- PHY 2048L Eng. Physics I Lab
- ENC 1102 Freshman English II
- COP 2510 Programming Concepts
- Total 14

#### Semester II
- MAC 2283 Engineering Calculus III
- PHY 2049 Eng. Physics II
- PHY 2049L Eng. Physics II Lab
- Historical Perspectives Elect
- Total 11

#### Semester III
- CDA 3100 Computer Organization
- COT 3100 Intro Discrete Str
- COP 3514 Program Design
- Historical Perspectives Elect
- Total 12

#### Semester IV
- EEL 4851 Data Structures
- CDA 3201 Computer Logic Design
- CDA 3201L Computer Logic Design Lab
- EGN 4450 Linear Systems
- STA 4442 Intro to Probability
- Fine Arts Elective
- Total 15

#### Semester V
- CDA 4205 Computer Architecture
- COP 4600 Operating Systems
- CS&E Theory Elective
- Science Elective
- Social Science Elective
- Total 15

#### Semester VI
- CS&E Theory Elective
- CS&E Software Elective
- CS&E Elective
- Total 6

#### Semester VII
- ENC 3211 Engr. Communications
- ALAMEA Elective
- ALAMEA Elective
- Total 3
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.

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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:
- Humanities Courses (6)
- Social Science Courses (6)
- Humanities or Social Sciences (3)

Mathematics:
- USF
  - MAC 2281
  - MAC 2282
  - MAC 2283
  - MAP 2302
  - *or MAC 2281, MAC 2282, MAC 2283

Natural Sciences:
- USF
  - CHM 2045
  - CHM 2045L
  - PHY 2048
  - PHY 2049
  - PHY 2049L
  - *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

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 2041 General Chemistry I 3
- CHM 2041L General Chemistry Lab 1

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

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

Semester V
- CDA 4205 Computer Architecture 3
- EGN 3613 Eng. Econ. with Social & Global Implications 3
- ALAMEA Elective 3
- EGNXXX Eng. Electronic Materials 3
- CS&E Hardware Elective 4

Semester VI
- COP 4600 Operating Systems 3
- CS&E Theory Elective 3
- CS&E Hardware Elective 3
- Science Elective 3
- Fine Arts Elective 3

Semester VII
- ENC 3211 Comm. For Engineers 3
- Historical Perspectives Elect. 3
- CS&E Elective 6

Semester VIII
- CIS 4910 Senior Project 2
- CIS 4250 Ethical Issues 3
- CS&E Elective 9

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

Mathematics:
USF
MAC 2281, MAC 2282, MAC 2283
MAP 2302, MAC 2283

*C or MAC 2281, MAC 2282, MAC 2283

Natural Sciences:
USF
CHM 2045, CHM 2045L
PHY 2048, PHY 2048L
PHY 2049, PHY 2049L

*or CHS 1440 Chemistry for Engineers

Strongly recommended:
Business Courses
USF
ACG 2001

Economics
ECO 2013, ECO 2023
Programming Concepts
ECO 2013

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
AGG 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 XXX, Engineering Econ. with Social and Global Implications 3
EGN 4450, Linear Systems 3
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 3
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 emphasize 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, 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:
Humanities Courses (6)
business organizations, service delivery systems, and governmen-
tal 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 XXX 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
80 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 Gen-
eral Education Requirements thereby transferring maximum
hours to the university.

Communications:

- ENC 1101/1102 English I and II (6)

Humanities & Social Sciences:

- History Courses (6)
- Social Science Courses (6)
- Humanities or Social Sciences (3)

Mathematics:

USF

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Natural Sciences:

USF

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*or CHS 1440 Chemistry for Engineers

This is a limited access program involving special admis-
sions requirements. Please be aware of the immunization,
foreign language, continuous enrollment policies of the univer-
sity, 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

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<td>Freshman English I</td>
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<td>MAC 2282</td>
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<td>PHY 2048</td>
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<td>PHY 2049L</td>
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<td>Historical Perspectives</td>
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<td>Statics</td>
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<td>EGN 3373</td>
<td>Electrical Systems Engineering I</td>
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<td>EGN 4450</td>
<td>Linear Systems</td>
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<td>EGN 3xx</td>
<td>Engineering Econ. with Social and Global Implications</td>
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<td>ALAMEA Elective</td>
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### Semester V

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<td>COP 2510</td>
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<td>EGN 3365</td>
<td>Materials Engineering I</td>
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<td>EIN 4312</td>
<td>Work Analysis</td>
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<td>EIN 4411</td>
<td>Manufacturing Processes</td>
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### Semester VI

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<td>Thermodynamics</td>
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<td>EIN 4333</td>
<td>Production Control</td>
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<td>EIN 4601</td>
<td>Automation/Robotics</td>
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<td>Tech Elective - Engineering Science</td>
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### Semester VII

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<td>EIN 4933</td>
<td>Management Cost</td>
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<td>ESI 4244</td>
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<td>ESI 4523</td>
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### Semester VIII

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<td>Human Factors</td>
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<td>EIN 4365</td>
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<td>ESI 4221</td>
<td>Industrial Statistics/Quality</td>
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<td>ENC 3211</td>
<td>Communication for Engineers</td>
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<td><strong>Total</strong></td>
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### 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:
- Humanities Courses (6)
- Social Science Courses (6)
- Humanities or Social Sciences (3)

### Mathematics:

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*or MAC 2281, MAC 2282, MAC 2283

### Natural Sciences:

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*or CHS 1440 Chemistry for Engineers

### Strongly recommended:

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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

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<td>CHM 2045</td>
<td>General Chemistry I 3</td>
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<td>Intro. to Design Graphics 3</td>
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<td>EGN 3000</td>
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<tr>
<th>Course</th>
<th>Credits</th>
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<tr>
<td>ENC 1102</td>
<td>Freshman English II 3</td>
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<tr>
<td>MAC 2282</td>
<td>Engineering Calculus II 4</td>
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<tr>
<td>PHY 2048</td>
<td>General Physics I 3</td>
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<tr>
<td>PHY 2048L</td>
<td>General Physics I Lab 1</td>
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<tr>
<td>Fine Arts Elective</td>
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### Semester III

<table>
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<tr>
<td>PHY 2049</td>
<td>General Physics II 3</td>
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<td>PHY 2049L</td>
<td>General Physics II Lab 1</td>
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<tr>
<td>EGN 3311</td>
<td>Statics 3</td>
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<tr>
<td>Social Science Elective</td>
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### Semester IV

<table>
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<tr>
<th>Course</th>
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<tbody>
<tr>
<td>MAP 2302</td>
<td>Differential Equations 3</td>
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### 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 2.0. 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 check with the college 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 (ABCD). Exceptions require written approval of the department prior to registration.

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

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 Fundamentals 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 431L Human Factors
EIN 5245/65/75 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 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 0.501,000 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 asynchronous 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 class-room 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 parallel 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


CIVIL AND ENVIRONMENTAL ENGINEERING


COMPUTER SCIENCE AND ENGINEERING


ELECTRICAL ENGINEERING


INDUSTRIAL AND MANAGEMENT SYSTEMS


MECHANICAL ENGINEERING


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 (3)
EGN 3000L Foundations of Engineering Laboratory (2)
EGN 3311 Statics (3)
EGN 3321 Dynamics (3)
EGN 3311 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 4450 Numerical Methods of Analysis (3)
EGN 4450 Introduction to Linear Systems (2)
EGN 4831 Technology and Society -MW (3)
EGN 4905 Independent Study (1-5)
EGN 5313 Special Topics in Engineering (3)
EGN 5421 Engineering Applications for Vector Analysis (3)
EGN 5422 Engineering Applications of Partial Differential Equations (3)
EGN 5533 Natural Networks and Mathematical Communication (3)
EGN 5424 Engineering Applications of Complex Analysis (3)
EGN 5425 Engineering Applications of Advanced Matrix Computations (3)
EGR 1133 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 41230 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 4805C 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 4912 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 Pharmacological Engineering (2)
ECH 5746 Introduction to Biomedical Engineering (3)
ECH 5747C Selected Topics in Chemical Engineering Biotechnology (1-3)
ECH 5757C 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 4021 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)
CE 4414 Matrix Structural Analysis (3)
CE 4561 Computer Aided Structural Design (3)
CEG 4605 Concepts of Steel Design (3)
CEG 4618 Structural Design Steel (3)
CEG 4702 Concepts of Concrete Design (3)
CEG 4704 Structural Design-Concrete (2)
CEG 4720 Capstone Structural/Materials Design (3)
CEG 4740 Capstone Structural/Geotechnical Design -MW (3)
CEG 4742 Concepts of Structural Design (3)
CEG 4820C Timber and Masonry Design (3)
CEG 5105C Advanced Mechanics of Materials I (3)
CCE 5209 Structural Dynamics (3)
CEG 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 4861 Concepts of Materials Engineering (3)
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 4610 Hydraulic Design (2)
CWR 4812 Capstone Water Resources Design -MW (3)
EMA 4324 Corrosion of Engineering Materials I (3)
EMA 5326 Corrosion Control (3)
EN 301 Environmental Engineering (3)
EN 4004L Environmental Engineering Laboratory (1)
EN 4101 Air Pollution Control (3)
EN 4351 Solid Waste Engineering (2)
EN 4400 Chemical Aspects of Environmental Engineering (3)
EN 4417 Water Quality and Treatment (3)
EN 4432 Water Systems Design (3)
EN 4502 Environmental Unit Operations (3)
EN 4542 Environmental Unit Processes (3)
EN 4891 Capstone Environmental Design -MW (3)
EN 5105 Air Resource Management (3)
EN 5345 Solid And Hazardous Waste Control (3)
EN 560 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 (3)
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 4103 Plant Design and Optimization and Architecture (1)
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)
CE 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 4505 Ethical Issues And Professional Conduct -6A MW (3)
CIS 4510 Introduction To 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 2005L Introduction to Computer Science (3)
COP 2120SC Cobol Programming I (3)
COP 2121SC Cobol Programming II (3)
COP 2200SC Fortran Programming (3)
COP 2403C 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 4773J Introduction to Computer Graphics I (3)
ETG 4931 Special Topics in Technology (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 4103 Linear Systems Analysis (3)
EEL 4163 Computer Aided Design and Analysis (2)
EEL 4305 Electronics II (3)
EEL 4351C Semiconductor Devices (3)
EEL 4411L Fields And Waves II (2)
EEL 4511C Communication Systems (3)
EEL 4512C Introduction to Communication Systems (3)
EEL 4567 Electro-Optics (3)
EEL 4553L Linear Control Systems (3)
EEL 4805 Independent Study (1-5)
EEL 4906 Project -MW (2)
EEL 4935 Special Electrical Topics I (1-4)
EEL 4935C 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 5431 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 4308L 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 4222C 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)