

COLLEGE OF ENGINEERING



Changes to Note

The USF Graduate Council approved the following on the date noted

Degree Program Termination

Engineering Science	Ph.D.	CIP #14.0101/Major EGC	10/16/17
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Major Termination

Mechanical Engineering	M.M.E.	Partial CIP #14.1901/Major EME	4/2/18
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Accelerated Majors

Civil Eng (BSCE) to Civil Eng (MCE)		sharing 6 hours (total: 155)	11/13/17
Civil Eng (BSCE) to Civil Eng (MSCE)		Sharing 6 hours (total: 155)	11/13/17
Civil Eng (BSCE) to Env. Eng (MSEV)		Sharing 6 hours (total: 155)	11/13/17
Civil Eng (BSCE) to Env Eng. (MEVE)		Sharing 6 hours (total: 155)	11/13/17
Civil Eng (BSCE) to Materials Science and Eng (MSMSE)		Sharing 6 hours (Total: 155)	11/13/17
Civil Eng. (BSCE) to Eng Mgmt (MSEM)		Sharing 6 hours (total: 155)	11/13/17
Elect Eng (BSEE) to Eng Mgmt (MSEM)		Sharing 6 hours (total: 152)	11/13/17
Elect Eng (BSEE) to Elect Eng (MSEE)		Sharing 6 hours (Total: 152)	11/13/17
Elect Eng (BSEE) to Materials Science and Eng (MSMSE)		Sharing 6 hours (Total: 152)	11/13/17
Info Tech (BSIT) to Information Technology (MSIT)		Sharing 6 hours (total: 144)*	12/04/17

Majors

Civil Engineering	M.C.E.	Change to previous requirements with concentrations	4/16/18
Civil Engineering	M.S.C.E.	Change to previous requirements with concentrations	4/16/18
Civil Engineering	Ph.D.	Change to previous requirements with concentrations	4/16/18
Computer Engineering	M.S.C.S.	Non-Sub: update course listing for non-thesis	3/05/18
Computer Science	M.S.C.P.	Non-Sub: update course listing for non-thesis	3/05/18
Environmental Engineering	Ph.D.	Course update	3/05/18
Environmental Engineering	Ph.D.	Change curriculum; minor course update	4/16/18
Materials Science and Engineering	M.S.M.S.E.	Change curriculum; update core, comp exam	3/05/18
Mechanical Engineering	M.S.M.E.	Change curriculum; update thesis/non-thesis	4/02/18

**approved for less than the required 150 hours*

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College Dean: Robert H. Bishop, Ph.D.

Associate Dean: Jose Zayas-Castro, Ph.D.

MISSION STATEMENT

The mission of the USF College of Engineering is to improve the quality of life in our community by providing a high quality education for our engineering graduates and practicing professionals; by creating new knowledge and solving real world problems via innovative research; and by engaging in effective community service and outreach.

WHAT WE DO

At the graduate level students work in close collaboration with faculty, pursuing advanced topics within their disciplines, which will result in advancements in their fields and society-at-large.

Utilizing the expertise of its individual and collective faculty, the College is dedicated to the development of new fundamental knowledge and processes or procedures, which will benefit all humanity. The College promotes multi-disciplinary approaches, commitment to life-long learning and awareness of societal issues, which are requisite for meeting technological challenges.

The College provides technical assistance and technology transfer to the region, state and nation. In all facets of teaching, research and service, the College emphasizes close liaisons with industry and government to provide students and faculty with the skills and perspectives needed to ensure effective technological leadership.

Degrees, Majors, Concentrations:

See individual listings for current active status

Master of Civil Engineering (M.C.E.)

Civil Engineering (ECE)
Geotechnical (GTL)
Materials (MTL)
Structures (STR)
Transportation (TPT)
Water Resources (WRS)

Master of Environmental Engineering (M.E.V.E.)

Environmental Engineering (EVE)

Master of Science in Biomedical Engineering (M.S.B.E.)

Biomedical Engineering (EBI)
Pharmacy (PRMY)

Master of Science in Chemical Engineering (M.S.C.H.)

Chemical Engineering (ECH)

Master of Science in Civil Engineering (M.S.C.E.)

Civil Engineering (ECE)
Engineering for International Development (EFD)
Geotechnical (GTL)
Materials (MTL)
Structures (STR)
Transportation (TPT)
Water Resources (WRS)

Master of Science in Computer Engineering (M.S.C.P.)

Computer Engineering (ECP)

Master of Science in Computer Science (M.S.C.S.)

Computer Science (ECC)

Master of Science in Electrical Engineering (M.S.E.E.)

Electrical Engineering (EEL)

Master of Science in Engineering Management (M.S.E.M.)

Engineering Management (EMA)

Master of Science in Environmental Engineering (M.S.E.V.)

Environmental Engineering (EVE)
Engineering for International Development (EFD)

Master of Science in Industrial Engineering (M.S.I.E.)

Industrial Engineering (EIE)

Master of Science in Information Technology (M.S.I.T.)

Information Technology (ITC)

Master of Science in Materials Science and Engineering (M.S.M.S.E.)

Materials Science and Engineering (MSE)

Master of Science in Mechanical Engineering (M.S.M.E.)

Mechanical Engineering (EME)

Doctor of Philosophy (Ph.D.)

Biomedical Engineering (EBI)

Chemical Engineering (ECH)

Civil Engineering

Engineering for International Development (EFD)

Environmental Engineering (ENV)

Geotechnical (GTL)

Materials (MTL)

Structures (STR)

Transportation (TPT)

Water Resources (WRS)

Computer Science and Engineering (CSE)

Electrical Engineering (EEL)

Environmental Engineering (EVE)

Engineering for International Development (EFD)

Industrial Engineering (EIE)

Mechanical Engineering (EGR)

Accelerated Majors

Note: Accelerated Majors must total 150 hours after sharing credits, unless otherwise approved as noted.

BSCH – Chemical Engineering / MSBE – Biomedical Engineering

BSCH – Chemical Engineering / MSCH – Chemical Engineering

BSCH – Chemical Engineering / MSEM – Engineering Management

BSCH – Chemical Engineering / MSMSE – Materials Science and Engineering

BS – Chemistry / MSBE – Biomedical Engineering

BSCE – Civil Engineering / MSCE – Civil Engineering

BSCE – Civil Engineering / MCE – Civil Engineering

BSCE – Civil Engineering / MSEV – Environmental Engineering

BSCE – Civil Engineering / MEVE – Environmental Engineering

BSCE – Civil Engineering / MSMSE – Materials Science and Engineering

BSCE – Civil Engineering / MSEM – Engineering Management

BSCP – Computer Engineering / MSCP – Computer Engineering*

BSCP – Computer Engineering / MSCS – Computer Science*

BSCP – Computer Engineering / MSIT – Information Technology*

BSEE – Electrical Engineering / MSEM – Engineering Management

BSEE – Electrical Engineering / MSEE – Electrical Engineering

BSEE – Electrical Engineering / MSEM – Materials Science and Engineering

BSIE – Industrial Engineering / MSBME – Biomedical Engineering

BSIE – Industrial Engineering / MSEM – Engineering Management

BSIT – Information Technology / MSIT – Information Technology

BSME – Mechanical Engineering / MSBME – Biomedical Engineering

BSME – Mechanical Engineering / MSEM – Engineering Management

BSME – Mechanical Engineering / MSMSE – Materials Science and Engineering

BSME – Mechanical Engineering / MSME – Mechanical Engineering

**approved for less than 150 total combined hours*

Concurrent Degrees:

Note: Concurrent Degrees must total 60 hours combined unless otherwise approved.

Biomedical Engineering (Ph.D.) and Medicine (M.D.)

Biomedical Engineering (M.S.B.E.) and Entrepreneurship in Applied Technologies (M.S.)

Graduate Certificates Offered: See Graduate Certificates

COLLEGE REQUIREMENTS

General Major Requirements

The requirements for graduate degrees from the College of Engineering consist of University requirements, College requirements, and Major requirements. For University requirements refer to the Office of Graduate Studies Policies and Procedures. College requirements are listed below. Refer to the degree sections for other requirements.

Master's Degree Programs

The Master's degree is awarded for advanced study beyond the baccalaureate degree within an area of specialty. The College of Engineering offers several majors leading to degrees at the master's level.

Master of Science in Designated Engineering Field - This degree is normally awarded to a Master's graduate who holds a Bachelor's degree in the designated field. Some majors offer this degree in two options: (1) thesis option (30 credits), and (2) non-thesis option (30 credits).

Master of Designated Discipline - This degree is normally awarded to a Master's graduate who has an undergraduate degree in the discipline and who follows an all coursework major or a project major.

College of Engineering Requirements for Master's Degree

1. A thesis major must contain a minimum of 24 credit hours of coursework and a minimum of 6 credit hours of thesis. (If a student transfers from a thesis major to an all coursework major, no thesis hours may be transferred, converted or counted toward the degree.)
2. Non-thesis major requirements vary according to department but must contain a minimum of 30 credits of approved coursework.
3. Students must maintain an overall grade point average of 3.00. No grade below "C" will be accepted in a graduate major. If a student's average falls below 3.00, the student will be placed on probation.
4. Most majors require students to pass a final oral or written comprehensive examination prior to receiving the degree. These examinations are arranged and administered by the student's department.

Accelerated Majors Leading to Accelerated Bachelor's and Master's Degrees

Students who are clearly interested in graduate study are invited to pursue an accelerated major leading to a Bachelor's Degree and Master's degree in the College of Engineering. Students in the Accelerated Major may apply up to 12 credit hours of graduate level coursework, which must be approved by the Graduate Coordinator, to count towards both degrees.

Students apply for admission to this major through their advisors, who should be consulted regarding additional requirements. Several factors, which vary by academic department, are considered for admission. However, all applicants must have a minimum GPA of at least 3.00.

Doctoral Degree Majors

The Doctor of Philosophy degree is awarded in recognition of demonstrated scholarly competence and ability to conduct and report original and significant research. Unlike the baccalaureate and Master's degrees, the Ph.D. degree cannot be earned by an accumulation of course credits over a period of residence alone. After adequate fundamental preparation to gain competence, the student must demonstrate research capability through completion of an authoritative investigation in the chosen engineering field, culminating in a written dissertation. The dissertation must demonstrate that the student possesses the ability to reason logically, the talent for engaging in significant and original research, and the ability to organize and present conclusions in a professional manner.

Doctor of Philosophy in Designated Engineering Field - This degree is awarded to students pursuing a major in one of the following Engineering disciplines: Biomedical Engineering, Chemical Engineering, Civil Engineering, Computer Science and Engineering, Electrical Engineering, Environmental Engineering, Industrial Engineering, and Mechanical Engineering. Students receiving this degree must demonstrate a thorough foundation in the designated discipline.

College of Engineering Requirements for Doctoral Degrees

1. Supervisory Committee. An advisor will be appointed by the chair of the appropriate department or major for each student during the first semester of registration at the University of South Florida. The advisor will help determine the student's area of research interest and will delineate preliminary course assignments. At the earliest possible date, a major professor will be appointed and a supervisory committee formed. This committee will monitor the student's program of studies and has full responsibility for conducting the student's qualifying examination. The Supervisory Committee consists of a minimum of five members. One member of the committee must be outside the College of Engineering. (The requirement may be waived if special reasons exist and prior approval is obtained from the Engineering Associate Dean for Academic Affairs.) A majority of the committee will be from the College of Engineering, with at least two departments of the College represented.
2. Credit Hours. A minimum of 72 hours beyond the baccalaureate degree, including a minimum of 20 hours of dissertation, and a minimum of 30 hours of coursework (excluding independent study and directed research) is required by the College. Further requirements may be imposed by the candidate's doctoral major and supervisory committee. See individual majors for specific requirements.
3. Learning Focus. Throughout the student's program of study, independent learning will be emphasized. For the first time in the participant's career, in most cases, the student will be responsible for mastering a new domain of knowledge without the aid of organized lectures and textbooks. The principal information source will be current literature. Such experience is a necessary preparation for a meaningful career in engineering and other fields where the professional must keep pace with a large, ever-changing body of knowledge.
4. Qualifying Examination. A written and oral qualifying examination, conducted by the supervisory committee, will be taken by each Ph.D. student as soon as a substantial majority of coursework is completed.

5. Admission to Candidacy. Students must be admitted to candidacy before they register for dissertation. Before admission to candidacy, students must have officially formed a Ph.D. Supervisory Committee and passed the qualifying examination of paragraph 4. Once admitted to candidacy students must enroll for a minimum of 2 credit hours each semester of the academic year until completion of major.
6. Dissertation Research. The student must carry out an investigation resulting in an original and significant contribution to the knowledge in the field of research. The requirement of uniqueness means that the dissertation research will provide an important creative experience for the student. As the final stage of the student's major, the candidate must prepare a written dissertation covering the research. Students in the Ph.D. major must take an appropriate number of doctoral dissertation credits, but not less than 20 hours; the exact number is determined by department and/or individual requirements. The defense of the dissertation will conform to Office of Graduate Studies general rules.
7. Residency. Minimum residency requirements may be satisfied by completing the University's minimal requirement at the University of South Florida. Any graduate work counted toward the fulfillment of the requirement for the Ph.D. degree after admission to candidacy must be accomplished within 5 calendar years.

Collaboration with Other Colleges and Departments

Advanced study and research challenges exist at the interfaces between engineering and other academic disciplines. Examples include surface physics and chemistry applied to semiconductor processing technology; semiconductor physics applied to VLSI and analog integrated circuit design, manufacture and quality control; chemical processing and its relation to chemical principles; environmental engineering and chemical identification of minute impurities; environmental and transportation engineering and its relation to public health and public administration; water resources engineering and geo-hydrology; and biomedical engineering, to name only a few. The College collaborates with other academic units of the University in research activities and selectively educates students to become proficient in such interdisciplinary fields.

BIOMEDICAL ENGINEERING

Master of Science in Biomedical Engineering (M.S.B.E.) Degree

DEGREE INFORMATION

Priority Admission Application Deadlines:

Fall:	February 15
Spring:	October 15
Summer:	February 15

International applicant deadlines:

<http://www.grad.usf.edu/majors>

Minimum Total Hours:	30
Level:	Masters
CIP Code:	14.0501
Dept. Code:	DEA
Major/College Codes:	EBI EN
Approved:	1999

Concentrations:

Pharmacy (PRMY)

Also offered as an Accelerated Major:

Chemistry (BS) / Biomedical Engineering (M.S.B.E.)*
 Chemistry (BSCH) / Biomedical Engineering (MSBE)
 Industrial Engineering (BSIE)/Biomedical Engineering (MSBE)
 Mechanical Engineering (BSME)/Biomedical Engineering (MSBE)
**pending SACSCOC approval*

Also offered as a Concurrent Degree

Biomedical Engineering (MSBE) / Entrepreneurship in Applied Technologies (MS)

CONTACT INFORMATION

College:	Engineering
Department:	Medical Engineering
Contact Information:	www.grad.usf.edu

Biomedical Engineering is a highly interdisciplinary Major that combines engineering and the medical sciences. The student works with an advisor to develop a graduate Major that draws on courses from engineering, medicine, public health, and the life sciences. Current active areas of research include: biomechanics, biomaterials, medical imaging, neuroengineering, tissue engineering, sensors, cellular-level drug delivery, and rehabilitation engineering. In addition to USF Health, participating institutions include the James Haley Veterans Administration Hospital, Florida Orthopedics Institute, and Tampa General Hospital. For more information, please contact the BME Major Advisor.

Major Research Areas: Biomechanics, Biomaterials, Neuroengineering, Photo Sensors, Cellular-level drug discovery and Tissue Engineering

ADMISSION INFORMATION

Must meet University Admission and English Proficiency requirements as well as requirements for admission to the major, listed below.

- GRE with preferred Minimum scores of Quantitative >75% and Analytical Writing 4 or >;
- An undergraduate Bachelor's degree in Engineering or Science;
- Two (2) letters of recommendation; and
- A statement of purpose
- CV

Note: Exceptionally qualified students with bachelor's degrees in other disciplines may be admitted into the BME M.S. Major on a case-by-case evaluation of their credentials.

CURRICULUM REQUIREMENTS

Total Minimum Hours:

30 credit hours

Both the thesis and non-thesis options are available at the M.S. level.

Core Requirements

Currently there are five (5) required courses:

GMS 6440 (3) Basic Medical Physiology OR
BME 6410 (3) Engineering Physiology

GMS 6605 (3) Basic Medical Anatomy

PHC 6051 (3) Biostatistics II

BME 6000 (3) Biomedical Engineering I

BME 6931 (3) Biomedical Engineering II

Students may either opt for the General Track of the Concentration in Pharmacy, completing 15 hours as noted:

General Track Electives – 15 hours

Students select from additional approved courses to complete the 30 hour requirement. A minimum of 16 hours must be at the 6000 level. In addition, all of the elective courses must consist of engineering-prefix courses, although the Thesis Committee (thesis option) or the BME Major Advisor (non-thesis option) may approve courses in relevant areas such as chemistry, physics, pharmacy, communications sciences & disorders, public health or medicine, in their place.

Concentration in Pharmacy (PRMY)– 15 hours

Students may select from the following options, or other pharmacy courses, as approved by their Pharmacy and BME Advisors:

PHA 6140 3 Introduction to Nanotechnology (Online)
PHA 6116 3 Micro-Nano Drug Delivery Systems (Online)
PHA 6118 3 Nanomaterials and BioMEMS (Online)
PHA 6147 3 Nanotechnology and Risk Management (Online)
PHA 6148 3 Nanoformulations and nanopharmaceutics (Online)
PHA 6xxx 3 Selected Topics: Introduction to Personalized medicine (Online)

Thesis Option

Thesis option students can count up to six hours of thesis research towards the elective requirements

Comprehensive Exam

Students in the non-thesis track will complete a comprehensive exam. For students in the thesis track, the thesis and oral defense serve as the comprehensive exam.

Accelerated Majors

Note – Due to accreditation guidelines, Accelerated Majors must total 150 combined credit hours after sharing credit hours. Contact the department for information.

Accelerated B.S. in Chemistry / M.S.B.E. in Biomedical Engineering – *PENDING SACSCOC Approval*

The B.S. requires a total of 120 hours and the M.S.B.E. requires 30 hours. By sharing nine (9) credit hours, the total credit hours earned will be 141 hours.

Refer to each major for specific admission and curriculum requirements. For consideration in the Accelerated Major, students must:

1. Have completed 15 credit hours in the B.S. Chemistry major, upon applying;
2. Have a minimum 3.33 GPA overall;
3. Have a minimum undergraduate 3.5 GPA in the major;
4. Have met with the Undergraduate Advisor and Graduate Director and/or Graduate Advisor to discuss a plan of study

Shared Courses (9 credit hours)

Students choose three (3) of the following five (5) courses to be shared between the two degrees:

BME 6000 Biomedical Engineering I
BME 6931 Biomedical Engineering II
GMS 6440 Basic Medical Physiology or BME 6410 Engineering Physiology
GMS 6605 Basic Medical Anatomy
PHC 6051 Biostatistics II

Accelerated Chemical Engineering (BSCH)/Biomedical Engineering (MSBE)

The B.S.C.H. requires a total of 130 hours and the M.S.B.E. requires 30 hours. By sharing nine (9) credit hours, the total credit hours earned will be 151 hours.

Refer to each major for specific admission and curriculum requirements. For consideration in the Accelerated Major, students must:

1. Have completed 15 hours in the undergraduate major
2. Have a minimum 3.33 GPA overall; and
3. Have a minimum undergraduate 3.50 GPA in the major.

Shared Courses (9 credit hours)

Three (3) of the following five (5) core graduate courses replace nine (9) credit hours of upper-level departmental electives in Chemical Engineering:

BME 6000 Biomedical Engineering I
BME 6931 Biomedical Engineering II
GMS 6440 Basic Medical Physiology or BME 6409 Engineering Physiology
GMS 6605 Basic Medical Anatomy
PHC 6051 Biostatistics II

Accelerated B.S.I.E. in Industrial Engineering and M.S.B.E. in Biomedical Engineering

The B.S.I.E. requires a total of 128 hours and the M.S.B.E. requires 30 hours. By sharing six (6) credit hours, the total credit hours earned will be 152 credit hours.

Refer to each major for specific admission and curriculum requirements. For consideration in the Accelerated Major, students must:

1. Have completed 15 hours in the undergraduate major
2. Have a minimum 3.33 GPA overall; and
3. Have a minimum undergraduate 3.50 GPA in the major.

Shared Courses (6 credit hours)

Two (2) of the following five (5) core graduate courses replace six (6) credit hours of upper-level departmental (Technical) electives:

BME 6000 Biomedical Engineering I
BME 6931 Biomedical Engineering II
GMS 6440 Basic Medical Physiology or BME 6409 Engineering Physiology
GMS 6605 Basic Medical Anatomy
PHC 6051 Biostatistics II

Accelerated B.S.M.E. in Mechanical Engineering and M.S.B.E. in Biomedical Engineering

The B.S.M.E. requires a total of 128 hours and the M.S.B.E. requires 30 hours. By sharing six (6) credit hours, the total credit hours earned will be 152 hours.

Refer to each major for specific admission and curriculum requirements. For consideration in the Accelerated Major, students must:

1. Have completed 15 hours in the undergraduate major
2. Have a minimum 3.33 GPA overall; and
3. Have a minimum undergraduate 3.50 GPA in the major.

Shared Courses (6 credit hours)

Two (2) of the following five (5) core graduate courses replace six (6) credit hours of undergrad technical electives in Mechanical Engineering:

BME 6000 Biomedical Engineering I
BME 6931 Biomedical Engineering II
GMS 6440 Basic Medical Physiology or BME 6409 Engineering Physiology
GMS 6605 Basic Medical Anatomy
PHC 6051 Biostatistics II

Concurrent Degree Options

Students may apply to pursue one of the Concurrent Degree Options. Applicants must meet University Admission and English Proficiency Requirements, as well as the requirements for each major. Refer to the individual listings for each major for admission and curriculum requirements specific to the major. Admission into one major does not guarantee admission in the other major. **Note: Due to accreditation requirements, all Concurrent degrees must total 60 hours after sharing credits.**

Concurrent M.S./M.S.B.E.**M.S. in Entrepreneurship in Applied Technologies – 33 hours****M.S.B.E. in Biomedical Engineering – 30 hours**

The M.S. Biomedical Engineering (BME) And M.S. Entrepreneurship In Applied Technologies (EAT) Concurrent Degrees is designed to prepare students who can effectively function in the complex world of Biotechnology companies (“Biotechs”). The program’s objectives are to provide a strong Biomedical foundation for technical product development and research and development along with the skill set to effectively participate in the entrepreneurship, venture capital, business, and financial aspects of Biotechs. Students will pursue appropriate coursework within both The College of Engineering and The Center For Entrepreneurship, double counting a total of nine credit hours.

Shared Courses – 9 hours*

BME 6000	Biomedical Engineering	(3)
GMS 7930	Principles of Intellectual Property	(3)
EIN 6934	New Product Development	(3)

Total Combined hours after sharing: 54 hours*

All 60 hours of coursework in both programs are required to earn both degrees; there are no electives.

**See note regarding the 60 hours minimum after sharing credits.*

Concurrent M.S.B.E./M.D.**MS.B.E. in Biomedical Engineering – 30 hours****M.D. in Medicine**

The Objectives of the M.D./Ph.D. Concurrent Degree are: 1) Produce Highly Trained Professionals who can work effective in the area of Biomedical Translational Research, more specifically Engineer-Physicians who can conduct research in a Biomedical Engineering Area that addresses a significant clinical problem, and bring that research through to Clinical application; and 2) provide an integrated educational experience leading to both the M.D. degree and the Ph.D.(BME) Degree. In order to accomplish the first objective, advances in health care increasingly involves the application of emerging science and technology (I.E., Engineering) to clinical problems, including problems in diagnostics treatment and the health care system itself. Unlike more basic research that often aims to increase science and technology knowledge in itself, translational research seeks to specifically address the science and technology needed to solve problems with the end product an actual application or product (of course, adding new significant knowledge in the process).

In order to conduct effective biomedical translational research, the investigator must be trained in both clinical science (i.e. the MD Degree) and Engineering (Specifically Biomedical Engineering). This need has been delineated by both academics and industry and is validated by the growing number of MD/PH.D. (BME) majors nationally. USF has the necessary educational components and research infrastructure for this endeavor; both degrees are currently available. The proposed major seeks to provide an integrated experience where the student really feels a part of both the medical/clinical and engineering worlds simultaneously, hence the need for an integrated concurrent degree.

Admissions

Refer to the individual major listings for the specific requirements for each degree. Students apply for the BME degree through the Office of Graduate Studies; Students apply separately for the M.D. Degree through the College of Medicine. Admissions are on the same time schedule as that for general M.D. students. Applicants should contact a major advisor prior to application.

Curriculum

For specific degree requirements, refer to the Ph.D. in Biomedical Engineering major page in the Graduate Catalog and to the curriculum requirements for the M.D. as posted by the College of Medicine.

This is a seven (7) year major. Students initially complete a non-thesis M.S. in Biomedical Engineering. Then proceed to complete the first three (3) years of the Medical School Curriculum. The following two (2) years focus on the Ph.D. requirements, specifically the completion of coursework, qualifying exams, and dissertation research. In the seventh (7th) year, students complete the fourth (4th) year of Medical School and also complete any Ph.D. requirements as needed. Students must have at least one publication in an appropriate peer-reviewed journal prior to graduation.

Other Requirements

Students establish a Graduate Committee immediately after starting the major, with members from both Engineering and Medicine. This committee guides the student through the major until a formal Ph.D. committee is established, typically in year four or five.

COURSES

See <https://www.systemacademics.usf.edu/course-inventory/>

BIOMEDICAL ENGINEERING

Doctor of Philosophy (Ph.D.) Degree

DEGREE INFORMATION

Priority Admission Application Deadlines:

Fall:	February 15
Spring:	October 15
Summer:	February 15

International applicant deadlines:

<http://www.grad.usf.edu/majors>

Minimum Total Hours:	60 post-master's 90 post-bachelor's
Level:	Doctoral
CIP Code:	14.0501
Dept. Code:	ECH
Major/College Codes:	EBI EN
Approved:	2005

CONTACT INFORMATION

College:	Engineering
Department:	Medical Engineering
Contact Information:	www.grad.usf.edu

The Ph.D. in Biomedical Engineering at the University of South Florida prepares individuals to contribute in this highly interdisciplinary field both as individuals and as members of interdisciplinary teams. Graduates are prepared to solve complex problems in areas such as diagnostic instrumentation, artificial organs, prosthetic devices, rehabilitation, and health care system design and operations, biomechanics, biomaterials, imaging, neuroengineering, tissue engineering, sensors, cellular-level drug delivery. The doctoral major capitalizes on USF's strong programs in Engineering and in the Health Sciences as well as the contiguously located H. Lee. Moffitt Cancer Center and Research Institute, and the James Haley Veterans Administration Hospital.

Students in the Major may choose to concentrate in one of several nationally recognized areas of Biomedical Engineering strength at USF including:

- Medical Imaging
- Rehabilitation Engineering
- Biomechanics and Biomaterials
- Molecular, Cellular and Tissue Engineering
- Drug and Gene Delivery
- Neuroengineering
- Photonics and Diagnostic Engineering

The Biomedical Engineering Program at USF provides students with an integrated knowledge of engineering, biomedical science and other appropriate disciplines to allow participation in and advancement of the interdisciplinary field of Biomedical Engineering. The major also facilitates biomedical engineering research at USF through interactions with USF faculty and with industry and other health care institutions and catalyzes the growth of biomedical product companies throughout the region by the development, dissemination, and commercialization of new biomedical technologies. Overall, the major strives to develop and promote technologies and processes that will lead to better health care and improved quality of life.

Major Research Areas: Neuroengineering, biomechanics, biomaterials, medical imaging, sensors, cellular-level drug delivery, and rehabilitation engineering and tissue engineering

ADMISSION INFORMATION

Must meet University Admission and English Proficiency requirements as well as requirements for admission to the major, listed below.

Successful applicants to the Ph.D. degree program in biomedical engineering will typically have presented the following preferred qualifications:

- GRE required with preferred scores: Verbal >50% percentile and Quantitative > 75th percentile and Analytical Writing > 4.0.
- An undergraduate GPA of >3.50 (out of a possible 4.00) based on official transcripts.
- Completion of a Master's degree in biomedical engineering or a related field.
- Evidence of sustained interest in biomedical engineering.
- A statement of purpose and CV.
- Three (3) Letters of recommendation.

Note: Admissions decisions will be made using multiple measures indicated above. We strongly encourage applicants to contact specific faculty conducting research related to the student's interests. Such direct contact with individual faculty members can greatly strengthen an application.

CURRICULUM REQUIREMENTS

Total Minimum Hours:

For students with an *approved* master's degree
For students without a master's degree

90 hours

60 hours minimum post-master's
90 hours minimum post-bachelor's

Core courses – 15 hours

Specialization courses – 15 hours

Additional Electives or Directed Research for students without a master's degree – 30 hours

Dissertation – 30 hours

Core Courses:

A minimum of 15 credits including:

GMS 6440 3 Basic Medical Physiology OR
BME 6410 3 Engineering Physiology

GMS 6605 3 Basic Medical Anatomy
PHC 6051 3 Biostatistics II
BME 6000 3 Biomedical Engineering
6931 3 Selected Topics in Biomedical Engineering: Biomedical Engineering II

Specialization Courses:

A minimum of 15 graduate credit hours selected from one of these areas of specialization. Directed Research courses in these areas can count as a part of these credits:

-*Medical Imaging*
-*Rehabilitation Engineering*
-*Biomechanics and Biomaterials*
-*Cardiovascular Engineering*
-*Neuroengineering*
-*Tissue Engineering*

Qualifying Exam

Ph.D. Qualifying Examination, preferably to be completed by the end of the second year of study. The dissertation committee will evaluate a written dissertation proposal and an oral defense. Poor performance on the qualifying exam based on the judgment of the Committee may result in the student failing the exam. If a student does not pass on the first attempt, he/she may request in writing to repeat the Exam. Students who fail the Qualifying Examination the second time will be dismissed by the Major.

Dissertation (30 hours)

BME 7980 – Ph.D. Dissertation

30 credits of dissertation research are required. 6 hours of Directed Research may be substituted for 6 Dissertation hours. As with other engineering Ph.D. degrees, evidence of the significance of the conducted research is provided by publication in appropriate refereed journals; with a minimum of 1 publication in a peer-reviewed journal, with the student as primary author. The expectation is that Ph.D. students will have 3 or more publications. The required journal publication must be based on your Dissertation research. Presentation at a conference or publication in a proceeding (even if refereed) is not sufficient.

OTHER INFORMATION**Graduate Assistantships and Fellowships**

Financially competitive teaching and research graduate assistantships and fellowships will be offered to incoming students. Of special importance are the research opportunities and support available through affiliated institutions including the H. Lee Moffitt Cancer Center and Research Institute, the James Haley VA Hospital. In addition, particularly outstanding applicants will be nominated for university fellowships including Presidential Fellowships which provide competitive stipends plus tuition, fees and Health Insurance renewable for five years.

Results

Doctoral graduates of this major have been prepared for and are successfully engaged in research careers in Government, Corporate, and University Laboratories. In addition, since much of Biomedical Engineering research translates directly into biomedical devices, drugs, and instrumentation, graduates have also been directly involved in technology transfer, including the establishment of new Biomedical Engineering related businesses.

Graduate Certificates

As a valuable complement to graduate training in Biomedical Engineering, students are encouraged to also consider earning a graduate certificate particularly in the areas of:

- Aging and Neuroscience
- Biochemistry and Molecular Biology
- Bioinformatics
- Biostatistics
- Biotechnology
- Clinical Epidemiology
- Entrepreneurship
- Health Management and Leadership
- Infection Control
- Materials Science & Engineering
- Regulatory Affairs – Medical Devices.
- Technology Management
- Total Quality Management

COURSES

See <https://www.systemacademics.usf.edu/course-inventory/>

CHEMICAL ENGINEERING

Master of Science in Chemical Engineering (M.S.Ch.) Degree

DEGREE INFORMATION

Priority Admission Application Deadlines:

Fall:	February 15
Spring:	October 15
Summer:	February 15

International applicant deadlines:

<http://www.grad.usf.edu/majors>

Minimum Total Hours:	30
Level:	Masters
CIP Code:	14.0701
Dept. Code:	ECH
Major/College Codes:	ECH EN
Approved:	1981

Also offered as an Accelerated Major

Chemical Engineering (BSCH/MSCH)

CONTACT INFORMATION

College:	Engineering
Department:	Chemical & Biomedical Engineering

Contact Information: www.grad.usf.edu

The Master of Science in Chemical Engineering degree is usually awarded to a student who has an undergraduate degree in Chemical Engineering or strong evidence of undergraduate chemical engineering experience.

Major Research Areas:

The Chemical & Biomedical Engineering faculty research and development interests cover a broad range of areas in reacting systems, thermodynamics, transport phenomena, systems engineering and characterization, all fundamental as well as applied in biomedical, materials including microelectronic, and environmental domains. Strong collaboration with the College of Medicine, Center of Microelectronic Research, as well as, Departments of Biology, Chemistry, Industrial Engineering, Civil Engineering, Mechanical Engineering, Electrical Engineering, and Computer Science and Engineering makes most majors in Chemical Engineering truly interdisciplinary.

The Department offers core courses in thermodynamics, transport phenomena, reacting systems, math, and process analysis and modeling. A rich variety of electives are available regularly within the department as well as the University. Chemical & Biomedical Engineering research facilities include modern laboratories for polymer synthesis and characterization, supercritical fluid technology, life sciences, process control, instrumentation, computer aided process design, and phase behavior.

ADMISSION INFORMATION

Must meet University Admission and English Proficiency requirements as well as requirements for admission to the major, listed below.

- GRE required with preferred minimum scores of Verbal >50% percentile, Quantitative > 75th percentile, and Analytical Writing of 3.0 or greater. Applicants who have successfully completed the Fundamentals of Engineering (FE) Exam offered by the Society of Professional Engineers will be exempted from the GRE requirement.
- An undergraduate Bachelor's degree or equivalent in Chemical Engineering;
- Two (2) letters of reference; and
- Statement of research interests.

CURRICULUM REQUIREMENTS

Total Minimum Hours: 30 hours post-bachelors

Core Requirements – 12 hours

Course Requirements – 18 hours

This degree requires an undergraduate degree in Chemical Engineering or strong evidence of undergraduate chemical engineering experience. .

A background with undergraduate chemical engineering courses is needed.

Course Requirements – 12 hours

ECH 6105 3 Advanced Thermodynamics **OR**

ECH 6107 3 Molecular Thermodynamics

ECH 6285 3 Advanced Transport Phenomena **OR**

BME 6634 3 Biotransport Phenomena

ECH 6515 3 Reacting Systems OR

ECH 6506 3 Chemical Engineering Kinetics

ECH 6840 3 Mathematical Methods for Chemical Engineering **OR**

ECH 6412 3 Processes Analysis and Modeling

Additional Course Requirements – 18 hours

Other 5000 or 6000 course or ECH 6907 Individual Study 3

Other 5000 or 6000 course or ECH 6907 Individual Study 3

Other 5000 or 6000 course or ECH 6907 Individual Study 3

Additional approved 5000 or 6000 ECH courses 9

Must have a minimum of 16 hours at 6000 level

Must have a minimum of 12 hours of ECH 6000 level

May include a maximum of 4 hours of independent study

Thesis Option- 6 hours minimum

ECH 6971 6 Thesis: Master's

At least 2 members of the Thesis committee must be from tenured or tenure track Chemical & Biomedical Engineering faculty. All thesis option students are required to present a departmental seminar based on their research as part of their oral examination. The examination must be scheduled after the Thesis Supervisory Committee has approved the Thesis. The Graduate Coordinator should be notified so he can coordinate the seminar scheduling. Students in this major are also required to pass the FE (Fundamentals of Engineering Examination) offered by the Society of Professional Engineers.

Comprehensive Exam

Candidates who have at least one publication in a journal or proceedings or presentation at a conference (based on their M.S. Thesis research) may be exempted from this comprehensive examination requirement.

Students wishing to continue on for a Ph.D. must apply to the Office of Graduate Studies.

Accelerated Major

Note – Due to accreditation guidelines, Accelerated Majors must total 150 combined credit hours after sharing credit hours. Contact the department for information.

Accelerated BSCH in Chemical Engineering to MSCH in Chemical Engineering

The B.S.C.H. requires a total of 131 hours and the M.S.C.H. requires 30 hours. By sharing six (6) credit hours, the total credit hours earned will be 155 hours.

Refer to each major for specific admission and curriculum requirements. For consideration in the Accelerated Major, students must:

1. Have completed 15 hours in the undergraduate major
2. Have a minimum 3.33 GPA overall; and
3. Have a minimum undergraduate 3.50 GPA in the major.

Shared Courses (6 credit hours)

The following courses will satisfy six (6) credit hours of Chemical Engineering elective coursework:
Two (2) ECH courses at the 6000-level to count toward upper-level Chemical Engineering electives.

COURSES

See <https://www.systemacademics.usf.edu/course-inventory/>

CHEMICAL ENGINEERING

Doctor of Philosophy (Ph.D.) Degree

DEGREE INFORMATION

Priority Admission Application Deadlines:
Fall: February 15

Spring: October 15

Summer: February 15

International applicant deadlines:

<http://www.grad.usf.edu/majors>
Minimum Total Hours: 60 post-master's
90 post-bachelor's

Level: Doctoral

CIP Code: 14.0701

Dept. Code: ECH

Major/College Codes: ECH EN

Approved: 1981

CONTACT INFORMATION

College: Engineering

Department: Chemical & Biomedical

Engineering

Contact Information: www.grad.usf.edu

Major Research Areas:

The Chemical & Biomedical Engineering faculty research and development interests cover a broad range of areas in reacting systems, thermodynamics, transport phenomena, systems engineering and characterization, all fundamental as well as applied in biomedical, materials including microelectronic, and environmental domains. Strong collaboration with the College of Medicine, Center of Microelectronic Research, as well as, Departments of Biology, Chemistry, Industrial Engineering, Civil Engineering, Mechanical Engineering, Electrical Engineering, and Computer Science and Engineering makes most majors in Chemical Engineering truly interdisciplinary.

The Department offers core courses in thermodynamics, transport phenomena, reacting systems, math, and process analysis and modeling. A rich variety of electives are available regularly within the department as well as the University. Chemical & Biomedical Engineering research facilities include modern laboratories for polymer synthesis and characterization, supercritical fluid technology, life sciences, process control, instrumentation, computer aided process design, and phase behavior.

ADMISSION INFORMATION

Must meet University Admission and English Proficiency requirements as well as requirements for admission to the major, listed below.

- GRE required with preferred scores: Verbal >50% percentile, Quantitative >75% percentile and Analytical Writing >4.0
- An undergraduate Bachelor's degree or equivalent in Chemical Engineering.
- Three (3) letters of reference.
- Statement of Research Interests.

CURRICULUM REQUIREMENTS

Total Minimum hours:

For students with an *approved* master's degree

60 hours minimum post-master's

For students without a master's degree

90 hours minimum post-bachelor's

Structured Coursework requirements – 45 hours

Electives – 25 hours

Dissertation hours – 20 hours minimum (30 hours maximum)

Requires an undergraduate degree in Chemical Engineering. Complete Background courses in Chemical Engineering as needed.

Structured Coursework Requirements (45 hours):

ECH 6105 Advanced Thermodynamics I OR

3

ECH 6107 Molecular Thermodynamics

ECH 6285 Advanced Transport

3

ECH 6840 Math Methods

3

ECH 6515 Advanced Reaction Engineering OR

3

ECH 6506 Chemical Engineering Kinetics

ECH 6412 Processes Analysis and Modeling

3

ECH6931 Graduate Seminar courses (1 hour each; at least three)

3

Other 5000 or 6000 level Courses

27

(The exact distribution of these hours will be determined by the student, graduate advisor, and the supervisory committee to provide the student with a stimulating educational experience)

Electives (25 hours)

Qualifying Examination

Qualifying Examination preferably to be completed by the end of the second year of study. The dissertation committee will evaluate a written dissertation proposal and an oral defense. Poor performance on the qualifying exam based on the judgment of the Committee may result in the student failing the exam. If a student does not pass on the first attempt, he/she may request in writing to repeat the exam. Students who fail the Qualifying Examination the second time will be dismissed by the Major.

Dissertation – 20 hours minimum

ECH 7980 Dissertation

Additional Requirements

Publication in a refereed journal with the student as the first and primary author. At least 1 is required with the expectation that most Ph.D. students will have 3 or more. The publication must be based on your Dissertation research. Presentation at a conference or publication in a proceeding (even if refereed) is not sufficient.

COURSES

See <https://www.systemacademics.usf.edu/course-inventory/>

CIVIL ENGINEERING

Master of Civil Engineering (M.C.E.) Degree

DEGREE INFORMATION

Priority Admission Application Deadlines:
Fall: February 15

Spring: October 15

Summer: February 15

International applicant deadlines:

<http://www.grad.usf.edu/majors>

Minimum Total Hours: 30
Level: Masters
CIP Code: 14.0801
Dept. Code: EGX
Major/College Codes: ECE EN
Approved: 1983

Concentrations:

Geotechnical (GTL)

Materials (MTL)

Structural (STR)

Transportation (TPT)

Water Resources (WRS)

Also offered as an Accelerated Major

 Civil Engineering (BSCE/MCE)

CONTACT INFORMATION

College: Engineering
Department: Civil and Environmental Engineering

Contact Information: www.grad.usf.edu

The field of Civil Engineering has long been known for its breadth and ability to adapt to the new technological needs of society. The traditional areas of public works, such as highways, bridges, water supply, building design, and wastewater treatment, remain very important. In addition, the modern area of managing the environment has been included in the Civil Engineering domain. Graduates of the majors are prepared for careers with public agencies or private industry and firms involved in planning, design, research and development, or regulation.

The Department has a high bay structures laboratory, which includes an MTS 250 kip testing machine. There are also well-equipped environmental, soils, pavement and hydraulics laboratories. These laboratories include equipment such as an ion chromatograph, atomic absorption spectrometer, environmental chamber, constant rate of stress consolidometer, triaxial units and superpave testing equipment.

The M.C.E. degree provides a student with the opportunity to earn the advanced degree by coursework only. This degree is recommended for part-time students who find it difficult to do thesis research because of their work commitment or for those who wish to complete degree requirements quickly. Many of the department's graduate courses are offered online or on weekday evenings, which permits working students the opportunity to seek a graduate degree.

ADMISSION INFORMATION

Must meet University Admission and English Proficiency requirements as well as requirements for admission to the major, listed below.

- Undergraduate GPA \geq 3.0 preferred.
- GRE with preferred minimum scores of V 145 (25th percentile), Q 155 (60th percentile), AW 3.0 (15th percentile); or valid fundamentals of engineering (FE) or professional engineering (PE) certificate. Verification of FE or PE certification should be obtained from the PE board where the certification was obtained. See the CEE department website for more information: <http://www2.eng.usf.edu/cee/graduate/apply.htm>.
- Two (2) Letters of Reference provided at the time of application.
- Statement of Purpose provided at the time of application
- Resume provided at the time of application.

Pre-requisites – 12 hours

All students must complete the following pre-requisites or equivalent courses:

EGN 3311	3	Statics
EGN 3343	3	Thermodynamics I
EGN 3353	3	Basic Fluid Mechanics
EGN 3615	3	Engineering Economics

Most entering students will have taken these courses (or equivalent versions) prior to admission to the M.C.E. major. Students who have not taken these courses prior to beginning the M.C.E. degree program are encouraged to do so as quickly as possible, as these may be pre-requisites for a number of graduate-level courses in the major.

CURRICULUM REQUIREMENTS

The minimum coursework requirement is 30 credit hours for students with an undergraduate engineering degree. Students without an engineering bachelor's degree will be required to complete undergraduate engineering pre-requisite courses as determined by the Department.

Total Minimum Hours

30 hours

Coursework – 24 hours

(concentration 15 hours minimum; 9 hours electives)

Thesis – 6 hours

The minimum coursework requirement is 30 graduate level credit hours for students with an undergraduate engineering degree. For students pursuing a concentration area (as detailed below), the 30 credit hours will include at least 15 credit hours of concentration course requirements, with remaining credit hours to consist of core coursework and technical electives as approved by the Department. For students pursuing no concentration area, the 30 credit hours will consist wholly of core coursework and technical electives as approved by the Department, but with a minimum of 18 credit hours taken within the Department of Civil and Environmental Engineering. Students without an engineering bachelor's degree will be required to complete undergraduate engineering pre-requisite courses as determined by the Department. Please contact the Graduate Director for more information.

Concentration Requirements - 15 hours minimum

The Department supports M.C.E. concentration areas in Geotechnical Engineering (GTL), Materials Engineering and Science (MTL), Structures Engineering (STR), Transportation Engineering (TPT), and Water Resources (WRS). Students may select from one of these Specializations, or may select no concentration.

Geotechnical

- | | | |
|----------|---|--|
| CEG 5115 | 3 | Foundation Engineering |
| CES 6118 | 3 | Applied Finite Elements |
| | 9 | Additional credit hours of graduate level coursework in Geotechnical engineering or closely related areas. |

Materials

At least 2 courses (6 credit hours) from the following list:

- | | | |
|----------|---|---|
| CGN 6933 | 3 | Selected Topics: Advanced Construction Materials |
| CGN 6720 | 3 | Electrochemical Diagnostic Techniques |
| CGN 6933 | 3 | Selected Topics: Structural Life Prediction |
| EMA 5326 | 3 | Corrosion Control |
| EMA 6510 | 3 | Characterization of Materials |
| | 9 | Additional credit hours of graduate level coursework in Materials Engineering and Science or closely related areas. |

Structures

At least 1 course (3 credit hours) from the following list of design courses:

- | | | |
|-----------|---|------------------------------|
| CES 6706 | 3 | Advanced Concrete |
| CES 6835 | 3 | Design of Masonry Structures |
| CES 5715C | 3 | Pre-stressed Concrete |

At least 1 course (3 credit hours) from the following list of analysis courses:

- | | | |
|----------|---|--|
| CES 6118 | 3 | Applied Finite element |
| CGN 6933 | 3 | Selected Topics: Advanced Structural Mechanics |
| CGN 6933 | 3 | Selected Topics: Advanced Structural Analysis |
| CES 5209 | 3 | Structural Dynamics |
| | 9 | Additional credit hours of graduate level coursework in Structures Engineering or closely related areas. |

Transportation

- | | | |
|----------|---|--|
| TTE 5205 | 3 | Traffic Systems Engineering |
| TTE 5501 | 3 | Transportation Planning and Economics |
| TTE 6507 | 3 | Travel Demand Modeling or CGN 6933 Selected Topics in Civil and Environmental Engineering: Statistical and Econometric Methods |
| | 6 | Additional credit hours of graduate level coursework in Transportation Engineering or closely related areas. |

Water Resources 4 courses (12 credit hours) from the following list:

- | | | |
|----------|-----|---|
| CWR 6235 | 3 | Free Surface Flow |
| CWR 6239 | 3 | Waves and Beach Protection |
| CWR 6305 | 3 | Urban Hydrology |
| CWR 6534 | 3 | Coastal and Estuary Modeling |
| CWR 6535 | 3 | Hydrologic Models |
| CGN 6933 | 1-3 | Vadose Zone Hydrology |
| CGN 6933 | 1-3 | Groundwater Hydraulics |
| CGN 6933 | 1-3 | Advanced Computational Fluid Mechanics |
| CWR 6820 | 3 | Coastal Waves and Structures |
| CWR 6538 | 3 | Advanced Hydrologic Model |
| CGN 6933 | 3 | Selected Topics: Advanced Numerical Methods |
| CGN 6933 | 3 | Selected Topics: Global Water Sustainability |
| CGN 6933 | 3 | Selected Topics: Ecological Engineering |
| | 3 | Additional graduate credit hours in Water Resources engineering or closely related areas. |

Electives – 9 hours

Selected with advice from advisor

Comprehensive Exam

Portfolio and oral interview are used in lieu of a comprehensive exam. The purpose of the portfolio and interview is for students to demonstrate that they have achieved a minimum level of proficiency in stipulated competencies. Specifically, by the time they graduate, students will demonstrate

- an ability to plan, compose, and integrate verbal, written, virtual, and graphical communication of a project to technical and non-technical audiences, and
- an ability to formulate and solve complex problems in Civil Engineering using relevant data and techniques.

Additional details regarding portfolio requirements will be provided to students by the Department.

Other requirements

- A maximum of 12 graduate level credits taken outside the CEE department may be applied to meet the degree requirements.
- A maximum of 6 credits of independent study may be applied to meet the degree requirements.

Accelerated Major

Note – Due to accreditation guidelines, Accelerated Majors must total 150 combined credit hours after sharing credit hours. Contact the department for information.

Accelerated B.S.C.E. in Civil Engineering and M.C.E. in Civil Engineering

The B.S.C.E. requires a total of 131 hours and the M.S. requires 30 hours. By sharing 6 credit hours, the total credit hours earned will be 155 hours.

Refer to each major for specific admission and curriculum requirements. For consideration in the Accelerated Major, students must:

1. Have completed 15 hours in the undergraduate major
2. Have a minimum 3.33 GPA overall; and
3. Have a minimum undergraduate 3.50 GPA in the major.

Shared Courses (6 credit hours)

Students may choose two (2) of the following five (5) 6000-level course options to meet the upper-level undergraduate Technical elective requirement:

- TTE 4005 Transportation Engineering II, satisfied by any 6000-level TTE prefixed course (3 hours)
 CEG 4012 Geotechnical Engineering II, satisfied by any 6000-level CEG prefixed course (3 hours)
 CWR 4812 Capstone Water Resources/Environmental Engineering Design, satisfied by ENV 6564 Environmental Engineering Design.
 Free Technical elective, satisfied by any 6000-level CEG, TTE, CES, CGN or CWR course (3 hours)
 Free Technical elective, satisfied by any 6000-level CEG, TTE, CES, CGN or CWR course (3 hours)

COURSES

See <https://www.systemacademics.usf.edu/course-inventory/>

CIVIL ENGINEERING

Master of Science in Civil Engineering (M.S.C.E.) Degree

DEGREE INFORMATION

Priority Admission Application Deadlines:
Fall: February 15

Spring: October 15

Summer: February 15

International applicant deadlines:

<http://www.grad.usf.edu/majors>
Minimum Total Hours: 30

Level: Masters

CIP Code: 14.0801

Dept. Code: EGX

Major/College Codes: ECE EN

Approved: 1981

Concentrations:

Engineering for International Development (EFD)

Geotechnical (GTL)

Materials (MTL)

Structures (STR)

Transportation (TPT)

Water Resources (WRS)

Also offered as an Accelerated Major

Civil Engineering (BSCE/MSCE)

CONTACT INFORMATION

College: Engineering

Department: Civil and Environmental

Engineering

Contact Information: www.grad.usf.edu

The field of Civil Engineering has long been known for its breadth and ability to adapt to the new technological needs of society. The traditional areas of public works, such as highways, bridges, water supply, building design, and wastewater treatment, remain very important. In addition, the modern area of managing the environment has been included in the Civil Engineering domain. Graduates of the majors are prepared for careers with public agencies or private industry and with firms involved in planning, design, research and development, or regulation.

The Department has a high bay structures laboratory, which includes an MTS 250 kip testing machine. There are also well-equipped environmental, soils, pavement and hydraulics laboratories. These laboratories include equipment such as an ion chromatograph, atomic absorption spectrometer, environmental chamber, constant rate of stress consolidometer, triaxial units, and Superpave testing equipment.

The M.S.C.E. is a research-oriented degree in which the student writes, as a major part of the degree requirements, a thesis that defines, examines, and reports in depth on a subject area relevant to Civil Engineering. The purpose of the thesis is to instill in the student the ability to inspect, evaluate, and report on a subject of interest to the engineering profession.

ADMISSION INFORMATION

Must meet University Admission and English Proficiency requirements as well as requirements for admission to the major, listed below.

- Undergraduate GPA \geq 3.00 preferred.
 - GRE with preferred minimum scores of V 145 (25th percentile), Q 155 (60th percentile), AW 3.0 (15th percentile); or valid Fundamentals of Engineering (FE) or professional engineering (PE) certificate. Verification of FE or PE certification should be obtained from the PE board where the certification was obtained. See the CEE department website for more information: <http://www2.eng.usf.edu/cee/graduate/apply.htm>.
 - Two Letters of Reference provided at the time of application (three required for EFD concentration).
 - Statement of Purpose provided at the time of application.
 - Resume provided at the time of application.
- Exceptions made on a case-by-case basis where warranted

Pre-requisites – 12 hours

All students must complete the following pre-requisites or equivalent courses:

EGN 3311	3	Statics
EGN 3343	3	Thermodynamics I
EGN 3353	3	Basic Fluid Mechanics
EGN 3615	3	Engineering Economics

Most entering students will have taken these courses (or equivalent versions) prior to admission to the M.C.E. major. Students who have not taken these courses prior to beginning the M.C.E. degree program are encouraged to do so as quickly as possible, as these may be pre-requisites for a number of graduate-level courses in the major.

CURRICULUM REQUIREMENTS

Total Minimum Hours

30 hours

Coursework – 24 hours

Thesis – 6 hours

The major consists of a minimum of 24 credit hours of coursework and 6 credit hours of thesis. For students pursuing a concentration area (as detailed below), the 24 credit hours of coursework will include at least 12 credit hours of Concentration Requirements, with remaining credit hours to consist of technical electives as approved by the Department. For students pursuing no concentration area, the 24 credit hours of coursework will consist wholly of core coursework and technical electives as approved by the Department, but with a minimum of 15 credit hours taken within the Department of Civil and Environmental Engineering. Students without an Engineering undergraduate degree will be required to complete undergraduate engineering pre-requisite courses as determined by the Department. Contact the Graduate Director for more information <http://www.usf.edu/engineering/cee/graduate/prerequisites-non-engineers.pdf>.

Concentration Requirements -12 hours minimum

The Department supports M.S.C.E. concentration areas in Engineering for International Development (EFD), Geotechnical Engineering (GTL), Materials Engineering and Science (MTL), Structures Engineering (STR), Transportation Engineering (TPT), and Water Resources (WRS). Students may select from one of these concentrations, or may select no concentration.

Engineering for International Development (EFD)

This concentration acknowledges coursework and international field experience in the area of engineering for international development that considers issues of sustainable development, water, sanitation, and health (WaSH), gender, and society. This graduate concentration requires 1) coursework in global health, applied anthropology (medical, environmental, and development), and Water, Sanitation, Hygiene (WaSH) engineering, 2) a development-focused research component, and 3) a long-term overseas field experience in sustainable development as a WaSH engineer, which in most cases will form the basis of the student's master's thesis. The international field experience allows a student to remain enrolled as a full-time student (with zero tuition/fees) and gain development experience serving with Peace Corps and Non-governmental Development Organizations. Graduates are competitive for employment in the global WaSH development field.

ENV 6510 Sustainable Development Engineering

A minimum of 1 course (3 credits) from the following applied anthropology courses:

ANG 6766 3 Research Methods in Applied Anthropology
 ANG 6730 3 Socio-cultural Aspects of HIV/AIDS
 ANG 6469 3 Selected Topics: Health, Illness and Culture

A minimum of one course (3 credits) from the following global public health courses:

PHC 6764 3 Global Health Principles & Contemporary Issues
 PHC 6761 3 Global Health Assessment Strategies

3 additional graduate level credit hours of coursework in international development engineering or closely related areas.

Students engaged in full-time global training and/or service as part of the EFD concentration (e.g., in the U.S. Peace Corps, with a non-governmental organization, UNESCO-IHE, or equivalent) may register for CST 6990 for 0 credit hours while in their country of service/research.

Geotechnical

CEG 5115 Foundation Engineering
 CES 6118 Applied Finite Elements

6 additional credit hours of coursework in Geotechnical engineering or closely related areas.

Materials

At least 2 courses (6 credit hours) from the following list:

CGN 6933 Selected Topics: Advanced Construction Materials
 CGN 6720 Electrochemical Diagnostic Techniques
 CES 6010 Structural Life Prediction
 EMA 5326 Corrosion Control
 EMA 6510 Characterization of Materials

6 additional credit hours of coursework in Materials Engineering and Science or closely related areas.

Structures

At least 1 course (3 credit hours) from the following list of design courses:

CES 6706 Advanced Concrete
 CES 6835 Design of Masonry Structures
 CES 5715C Pre-Stressed Concrete

At least 1 course (3 credit hours) from the following list of analysis courses:

CES 6118 Applied Finite element
 CES 6230 Advanced Structural Mechanics
 CES 6144 Advanced Structural Analysis
 CES 5209 Structural Dynamics

6 additional credit hours of coursework in Structures Engineering or closely related areas.

Transportation

TTE 5205 Traffic Systems Engineering
 TTE 5501 Transportation Planning and Economics
 TTE 6507 Travel Demand Modeling or CGN 6933 Selected Topics: Statistical and Econometric Methods

3 additional credit hours of coursework in Transportation Engineering or closely related areas.

Water Resources

4 courses (12 credit hours) from the following list:

CWR 6235 Free Surface Flow
 CWR 6239 Waves and Beach Protection
 CWR 6305 Urban Hydrology
 CWR 6534 Coastal and Estuary Modeling
 CWR 6535 Hydrologic Models
 CGN 6933 Selected Topics: Vadose Zone Hydrology
 CGN 6933 Selected Topics: Groundwater Hydraulics

CGN 6933	Selected Topics: Advanced Computational Fluid Mechanics
CWR 6820	Coastal Waves and Structures
CWR 6538	Advanced Hydrologic Model
CGN 6933	Selected Topics: Advanced Numerical Methods
CGN 6933	Selected Topics: Global Sustainability
CGN 6933	Selected Topics: Ecological Engineering

Electives

Electives selected in consultation with advisor.

Comprehensive Exam

The thesis and defense are used in lieu of a comprehensive exam.

Thesis - 6 hours minimum

Students pursuing the M.S.C.E. are required to complete at least six (6) credits of Thesis. Students must conduct a suitable research project under the guidance of their thesis advisor, write an original thesis based upon the results of the research project, and defend the thesis to a committee that must subsequently approve the completed thesis. For students in the EFD concentration, the thesis must be associated with research in a developing-world context.

Other Requirements

- A maximum of 9 graduate level credits taken outside the CEE department may be applied to meet the degree requirements.
- A maximum of 6 credits of independent study may be applied to meet the degree requirements.

Accelerated Major

Note – Due to accreditation guidelines, Accelerated Majors must total 150 combined credit hours after sharing credit hours. Contact the department for information.

Accelerated B.S.C.E. in Civil Engineering and M.S.C.E. in Civil Engineering

The B.S.C.E. requires a total of 131 hours and the M.S. requires 30 hours. By sharing 6 credit hours, the total credit hours earned will be 155 hours.

Refer to each major for specific admission and curriculum requirements. For consideration in the Accelerated Major, students must:

1. Have completed 15 hours in the undergraduate major
2. Have a minimum 3.33 GPA overall; and
3. Have a minimum undergraduate 3.50 GPA in the major.

Shared Courses (6 credit hours)

Students may choose two (2) of the following five (5) 6000-level course options to meet the upper-level undergraduate Technical elective requirement:

TTE 4005 Transportation Engineering II, satisfied by any 6000-level TTE prefixed course (3 hours)

CEG 4012 Geotechnical Engineering II, satisfied by any 6000-level CEG prefixed course (3 hours)

CWR 4812 Capstone Water Resources/Environmental Engineering Design satisfied by ENV 6564 Environmental Engineering Design.

Free Technical elective, satisfied by any 6000-level CEG, TTE, CES, CGN or CWR course (3 hours)

Free Technical elective, satisfied by any 6000-level CEG, TTE, CES, CGN or CWR course (3 hours)

COURSES

See <https://www.systemacademics.usf.edu/course-inventory/>

CIVIL ENGINEERING

Doctor of Philosophy (Ph.D.) Degree

DEGREE INFORMATION

Priority Admission Application Deadlines:

Fall:	February 15
Spring:	October 15
Summer:	February 15

International applicant deadlines:

<http://www.grad.usf.edu/majors>

Minimum Total Hours:	48 post-master's 78 post-bachelor's
Level:	Doctoral
CIP Code:	14.0801
Dept. Code:	EGX
Major/College Codes:	ECE EN
Approved:	1982

Concentrations:

Engineering for International Development (EFD)
 Environmental Engineering (EVE)
 Geotechnical (GTL)
 Materials (MTL)
 Structures (STR)
 Transportation (TPT)
 Water Resources (WRS)

CONTACT INFORMATION

College:	Engineering
Department:	Civil and Environmental Engineering

Contact Information: www.grad.usf.edu

The Ph.D. degree is awarded in recognition of demonstrated scholarly competence and ability to conduct and report original and significant research in Civil Engineering.

The field of Civil Engineering has long been known for its breadth and ability to adapt to the new technological needs of society. The traditional areas of public works, such as highways, bridges, water supply, building design, and wastewater treatment, remain very important. In addition, the modern area of managing the environment, including sustainable development, has been included in the Civil Engineering domain. Graduates of the major are prepared for careers in academia, with public agencies, or with private industry, including firms involved in planning, design, research and development, or regulation.

Ph.D. students may work in any of the areas of Civil Engineering, including Engineering Mechanics, Environmental Engineering, Geotechnical Engineering, Pavement Engineering, Materials Engineering and Science, Structures Engineering, Transportation Engineering and Planning, and Water Resources Engineering.

Major Research Areas:

Civil Engineering, including Engineering Mechanics, Environmental Engineering, Geotechnical Engineering, Pavement Engineering, Materials Engineering and Science, Structures Engineering, Transportation Engineering and Planning, and Water Resources Engineering.

The department has a high bay structures laboratory, which includes an MTS 250 kip testing machine. There are also well-equipped environmental, soils, pavement and hydraulics laboratories. These laboratories include equipment for water and air quality analysis, bench and pilot scale reactor studies, field instrumentation for environmental and water resources studies, constant rate of stress consolidometer, triaxial units, and Superpave testing equipment.

ADMISSION INFORMATION

Must meet University Admission and English Proficiency requirements as well as requirements for admission to the major, listed below.

- Undergraduate GPA ≥ 3.3 preferred
- GRE with preferred minimum scores of V 150 (45th percentile), Q 159 (75th percentile), and AW 4.0 (55th percentile)
- Resume provided at the time of application.
- Three (3) letters of reference provided at the time of application
- Statement of Purpose provided at the time of application
- Exceptions made on a case-by-case basis where warranted.

CURRICULUM REQUIREMENTS

Total Program Hours:

**78 hours minimum post-bachelor's
48 hours minimum post-master's**

Core requirement – 2 hours

Concentration/primary area of study – 15 hours

Electives – 33 hours

Dissertation – 20 hours

Other course requirement – 8 hours

An additional 50 credit hours of coursework are required. The following requirements apply to the 50 credit hours of additional coursework:

- At least 15 credit hours must be in the student's primary area of study (see also Concentration Requirements, below). These 15 credit hours must be structured coursework, i.e., may not include thesis credits or independent study.
- Up to 30 credit hours from a previously completed Master's degree may be applied, pending course-by-course evaluation, approved by the Department, the College, and the Office of Graduate Studies. However, no more than 6 credits of Master's Thesis may be applied to meet the coursework requirement.
- No more than 9 credit hours of Independent Study may be applied to meet the coursework requirement.
- Directed research and/or dissertation credits may not be counted towards the coursework requirement.

Core Requirement 2 hours

CGN 6945 2 Graduate Research Methods

Concentration Requirements - 15 hours minimum

The Department supports Ph.D. concentration areas in

Engineering for International Development (EFD)

Environmental Engineering (ENV)

Geotechnical Engineering (GTL)

Materials Engineering and Science (MTL)

Structures Engineering (STR)

Transportation Engineering (TPT)

Water Resources (WRS).

Students may select from one of these concentrations, or may select no concentration.

Engineering for International Development (EFD) – 15 hours

This concentration acknowledges coursework and international field experience in the area of engineering for international development that considers issues of sustainable development, water, sanitation, and health (WaSH), gender and society. This graduate concentration requires: 2) coursework in global health, applied anthropology (medical, environmental, and development), and Water, Sanitation, Hygiene (WaSH) engineering, 2) a development-focused research component; and 3) a long-term overseas field experience in sustainable development as a WaSH engineer, which in most cases will form part of the basis of the student's dissertation. The international field experience allows a student to remain enrolled as a full-time student (with zero-tuition/fees) and gain development experience serving with the Peace Corps and non-governmental Development Organizations. Graduates are competitive for employment in the global WaSH development field.

ENV 6510 3 Sustainable Development Engineering

A minimum of 1 course (3 credits) from the following applied anthropology courses:

ANG 6766 3 Research Methods in Applied Anthropology

ANG 6730 3 Socio-cultural Aspects of HIV/Aids

ANG 6469 3 Selected Topics: Health, Illness, and Culture

A minimum of 1 course (3 credits) from the following global public health courses:

PHC 6764 3 Global Health Principles and Contemporary Issues

PHC 6761 3 Global Health Assessment Strategies

Additional 6 graduate level credit hours of coursework in Engineering for International Development or closely related areas

Students engaged in full-time global training and/or service as part of the EFD concentration (e.g., in the U.S. Peace Corps, with a non-governmental organization, UNESCO-IHE, or equivalent) may register for CST 6990 for 0 credit hours while in their country of service/research.

ENVIRONMENTAL (EVE) - 15 hours

ENV 6002 3 Physical Chemical Principles of Environmental Engineering

EES 6107 3 Biological Principles of Environmental Engineering

ENV 6666 3 Aquatic Chemistry

At least one course from the following:

ENV 6617 3 Green Engineering for Sustainability

CGN 6933 3 Selected Topics: Resilient Infrastructure

ENV 6510 3 Sustainable Development Engineering

Additional 3 credit hours of coursework in Environmental Engineering

GEOTECHNICAL (GTL) - 15 hours

CEG 5115 3 Foundation Engineering

CES 6118 3 Finite Element Analysis

Additional 9 graduate level credit hours of coursework in Geotechnical Engineering or closely related areas

MATERIALS (MTL) - 15 hours

At least 2 courses (6 credit hours) from the following list:

CGN 6933 3 Selected Topics: Advanced Concrete Construction Materials

CGN 6720 3 Electrochemical Diagnostic Techniques

CES 6010 3 Structural Life Prediction

EMA 5326 3 Corrosion Control

EMA 6510 3 Characterization of Materials

Additional 9 graduate level credit hours of coursework in Materials Engineering and Science or closely related areas

STRUCTURES (STR) - 15 hours

1 course (3 credit hours) from the following list of courses:

CES 6706	3	Advanced Concrete
CES 6835	3	Design of Masonry Structures
CES 5715C	3	Pre-stressed Concrete

1 course (3 credit hours) from the following list:

CES 6118	3	Applied Finite Elements
CES 6230	3	Advanced Structural Mechanics
CES 6144	3	Advanced Structural Analysis
CES 5209	3	Structural Dynamics
EGN 6333	3	Continuum Mechanics

Additional 9 graduate level credit hours of coursework in Structures Engineering or closely related areas

TRANSPORTATION (TPT) - 15 hours

TTE 5205	3	Traffic Systems Engineering
TTE 5501	3	Transportation Planning and Economics
TTE 6507	3	Travel Demand Modelling or CGN 6933 Selected Topics: Statistical and Econometric Methods

Additional 6 graduate level credit hours of coursework in Transportation Engineering or closely related areas

WATER RESOURCES (WRS) - 15 hours

A minimum of 4 courses (12 credit hours) from the following list:

CWR 6235	3	Free Surface Flow
CWR 6239	3	Waves and Beach Protection
CWR 6305	3	Urban Hydrology
CWR 6534	3	Coastal and Estuary Modeling
CWR 6535	3	Hydrologic Models
CWR 6105	3	Vadose Zone Hydrology
CGN 6933	3	Selected Topics: Groundwater Hydraulics
CGN 6933	3	Selected Topics: Advanced Computational Fluid Mechanics
GLY 6836	3	Numerical Modeling of Hydrogeologic Systems
GLY 6827C	4	Advanced Hydrogeology
CWR 6820	3	Coastal Waves and Structures
CWR 6538	3	Advanced Hydrologic Modeling

Additional 3 graduate level credit hours of coursework in Water Resources or closely related areas

Electives - 33 hours

Graduate level electives are selected in consultation with the student's major research advisor and/or advisory committee

Qualifying Exam

Doctoral students are expected to pass a qualifying examination no later than the semester following the completion of 48 credits of coursework beyond a bachelor's degree. At minimum, the exam will include a written dissertation proposal and oral defense by the dissertation committee. A written exam in the area of concentration may also be required. Poor performance on the qualifying exam based on the judgment of the committee may result in the student failing the exam. If a student does not pass on the first attempt, he/she may request in writing to repeat the exam. Students who fail the Qualifying examination the second time will be dismissed by the Major.

Dissertation Requirements - 20 hours minimum

CGN 7980 20 Dissertation

A minimum of 20 credits of dissertation, an approved PhD dissertation, and a dissertation defense are required. Students may not sign up for dissertation credits until they have defended their proposal and advanced to candidacy (see Qualifying Exam, above).

Additional Requirements - 8 hours minimum

Nine (9) credits of additional graduate level coursework, dissertation, or directed research are required.

Publication Requirement

Students must have at least one paper accepted to a peer-reviewed journal or peer-reviewed conference based on their research carried out during their doctoral studies at USF.

COURSES

<https://www.systemacademics.usf.edu/course-inventory/> or

<http://www2.eng.usf.edu/cee/graduate/graduatecourses.htm>

COMPUTER ENGINEERING

Master of Science in Computer Engineering (M.S.C.P.) Degree

DEGREE INFORMATION

Priority Admission Application Deadlines:

Fall:	February 15
Spring:	October 15
Summer:	no admit

International applicant deadlines:

<http://www.grad.usf.edu/majors>

Minimum Total Hours:	30 thesis; 30 non-thesis
Level:	Masters
CIP Code:	14.0901
Dept. Code:	ESB
Major/College Codes:	ECP EN
Approved:	1960

Also offered as an Accelerated Major:

Computer Engineering (BSCP/MSCP)

CONTACT INFORMATION

College:	Engineering
Department:	Computer Science and Engineering

Contact Information: www.grad.usf.edu

The Department of Computer Science and Engineering offers both a thesis and non-thesis option for the degree of Master of Science in Computer Engineering (M.S.C.P.). The thesis option requires students to pursue a more concentrated range of topics, while the non-thesis option allows students to explore various areas of computer engineering. There is considerable freedom in the choice of the courses.

The breadth of subjects that comprise computer engineering together with the immense diversity of its applications, make it imperative that students in the Master's major maintain close contact with the Graduate Director, or, if choosing the thesis option, with their major professor to achieve a coherent plan of study directed towards a specific goal. In particular, selection of courses should only be made with prior consultation and approval of the major professor or the Graduate Director.

Major Research Areas:

An excellent selection of courses and laboratories support graduate studies in algorithms, artificial intelligence, machine learning, data mining, computer architecture, graphics, networks, computer vision, distributed systems, embedded systems, expert systems, formal verification, image processing, pattern recognition, robotics, databases, software engineering, computer security, compilers, programming languages, and VLSI design and CAD.

ADMISSION INFORMATION

Must meet University Admission and English Proficiency requirements as well as requirements for admission to the major, listed below.

- The GRE is required for all Ph.D. and M.S. applicants. The median GRE scores of recently admitted students include 770 on the Quantitative portion and a Verbal Total of 450. For GRE tests taken after August 1, we require a minimum of 161 on the Quantitative portion (81st percentile) and a minimum of 150 (44th percentile) on the Verbal. If a candidate is admitted to the M.S. major and later decides to apply to the Ph.D. major, the GRE requirement must be met by the candidate as part of the application process. The GRE will be waived for M.S. degree applicants with an undergraduate degree from an ABET-accredited United States university.

- Three letters of recommendation
- Statement of purpose
- The applicant must also have mathematical preparation equivalent to that obtained from courses in Calculus through Differential Equations; knowledge of computer science and computer engineering, including logic design, computer architecture, data structure, operating systems and analysis of algorithms. The majority of students accepted to the major possess an undergraduate degree in Computer Science, Computer Engineering, Electrical Engineering, or Mathematics; however, students who hold an undergraduate degree in a related field are encouraged to apply.

CURRICULUM REQUIREMENTS

Total Minimum Hours: **30 hours**

Core Requirements: **9 hours**

Successful completion of three core graduate-level courses is required:

EEL 6764	Principles of Computer Architecture	3
COP 6611	Operating Systems	3
COT 6405	Introduction to the Theory of Algorithms	3

Electives:

Thesis option students must select at least 15 hours and non-thesis students must select at least 21 hours from the list of available graduate elective courses below in consultation with the Graduate Director of individual advisor. Non-thesis students need to take a minimum of 6 credits from the list of electives that are hardware related:

CAP 5400	Digital Image Processing	3
CDA 5416	Computer System Verification	3
CAP 5625	Introduction to Artificial Intelligence	3
CAP 5771	Data Mining	3
EEL 5771	Introduction to Computer Graphics I	3
CNT 6215	Computer Networks	3
CAP 6415	Computer Vision	3
CAP 6455	Advanced Robotic Systems	3
CAP 6615	Neural Networks	3
COP 6621	Programming Languages and Translation	3
EEL 6706	Testing and Fault Tolerance in Digital Systems	3
CAP 6736	Geometric Modeling	3
CIS 6900	Independent Study	1-19
CIS 6930	Special Topics	1-5
CIS 6940	Graduate Instruction Methods	1-4
CIS 6946	Internships/Practicums/Clinical Practice	0-3
CIS 6971	Thesis: Master's	2-19

With prior permission from the Graduate Director, students can take a maximum of 3 hours of Independent Study or Internship, a maximum of 3 hours of one-hour seminar courses, and up to one graduate level course (3 credit hours) outside the department.

Thesis Option:

CIS 6971 Thesis

The thesis option requires completion of 24 credit hours of CSE graduate-level courses (9 credit hours core and 15 hours of electives) and 6 credit hours of thesis in computer engineering related problems, as determined by the Major Professor and documented in the Plan of Work. At least 16 credit hours must be at the 6000 level.

Non-Thesis Option:

The non-thesis option requires 30 credit hours, with 9 credit hours of core courses and 21 hours of graduate level electives. At least 16 credit hours must be at the 6000 level. At least 6 hours of electives should be taken from the list of electives that are hardware related in the following topic areas: CMOS VLSI Design, Digital Circuit Synthesis, Formal Verification, Testing and Fault Tolerance, Low-Power VLSI, Robotics, or Computer Networks, as determined by the Graduate Coordinator and documented in the Plan of Work.

Comprehensive Exam

For students taking the thesis option, the requirement for a comprehensive exam is satisfied by the successful completion of the thesis. For non-thesis option students, the requirement for a comprehensive exam is satisfied by the successful completion of comprehensive exam that students will take in the semester prior to the semester in which the student intends to graduate.

Graduation Requirements:

For the thesis option, students must defend and pass the thesis and have a GPA of 3.0 or better. Non-Thesis Option students must pass the Comprehensive Exam, obtain a letter "B" or better in the core graduate courses and have a GPA of 3.0 or better. No grade below "C" will be accepted in a graduate major. If a student's average falls below 3.00, the student will be placed on probation.

Accelerated Major

Note – Due to accreditation guidelines, Accelerated Majors must total 150 combined credit hours after sharing credit hours. Contact the department for information.

Accelerated B.S.C.P. in Computer Engineering and M.S.C.P. in Computer Engineering

The B.S.C.P. requires a total of 128 hours and the M.S.C.P. requires 30 hours. By sharing six (6) credit hours, the total credit hours earned will be 152 credit hours.

Refer to each major for specific admission and curriculum requirements. For consideration in the Accelerated Major, students must:

1. Have completed 15 hours in the undergraduate major
2. Have a minimum 3.33 GPA overall; and
3. Have a minimum undergraduate 3.50 GPA in the major.

Shared Courses (6 credit hours)

Two (2) of the following three (3) core graduate courses replace six (6) credit hours of upper-level departmental (Technical) electives, including Independent Study and Industry Internship:

EEL 6764 Principles of Computer Architecture
COP 6611 Operating Systems
COT 6405 Introduction to the Theory of Algorithms

COURSES

See <https://www.systemacademics.usf.edu/course-inventory/>

COMPUTER SCIENCE

Master of Science in Computer Science (M.S.C.S.) Degree

DEGREE INFORMATION

Priority Admission Application Deadlines:

Fall:	February 15
Spring:	October 15
Summer:	No admit

International applicant deadlines:

<http://www.grad.usf.edu/majors>

Minimum Total Hours:	30 thesis; 30 non-thesis
Level:	Masters
CIP Code:	11.0701
Dept. Code:	ESB
Major/College Codes:	ECC EN
Approved:	1960

Also offered as an Accelerated Major:

Computer Engineering (BSCP) / Computer Science (MSCS)

CONTACT INFORMATION

College:	Engineering
Department:	Computer Science and Engineering

Contact Information: www.grad.usf.edu

The Department of Computer Science and Engineering offers a thesis and non-thesis option for the degree of Master of Science in Computer Science (M.S.C.S.) The thesis option requires students to pursue a more concentrated range of topics. The non-thesis option offers students some experience in many areas of computer science. There is considerable freedom in the choice of the courses.

The breadth of subjects which are part of computer science together with the immense diversity of its applications, make it imperative that students in the Master's major maintain close contact with the Graduate Director, or, if choosing the thesis option, with their major professor in order to achieve a coherent plan of study directed towards a specific goal. In particular, election of courses should only be made with prior consultation and approval of the Major Professor or the Graduate Director.

Major Research Areas:

An excellent selection of courses and laboratories support graduate studies in algorithms, artificial intelligence, machine learning, data mining, computer architecture, graphics, networks, computer vision, distributed systems, embedded systems, expert systems, formal verification, image processing, pattern recognition, robotics, databases, software engineering, computer security, compilers, programming languages, and VLSI design and CAD.

ADMISSION INFORMATION

Must meet University Admission and English Proficiency requirements as well as requirements for admission to the major, listed below.

- The GRE is required for all Ph.D. and M.S. applicants. The median GRE scores of recently admitted students include 770 on the Quantitative portion and a Verbal Total of 450. For GRE tests taken after August 1, we require a minimum of 161 on the Quantitative portion (81st percentile) and a minimum of 150 (44th percentile) on the Verbal. If a candidate is admitted to the M.S. major and later decides to join the Ph.D. major, the GRE requirement must be met by the candidate as part of the application process. The GRE will be waived for M.S. degree applicants with an undergraduate degree from an ABET-accredited United States university.
- Three letters of recommendation.
- Statement of purpose.
- The applicant must also have mathematical preparation equivalent to that obtained from courses in Calculus through Differential Equations; knowledge of computer science and computer engineering, including logic design, computer architecture, data structure, operating systems and algorithms. The majority of students accepted to the Major possess an undergraduate degree in Computer Science, Computer Engineering, Electrical Engineering, or Mathematics. However, students who hold an undergraduate degree in a related field are encouraged to apply.

CURRICULUM REQUIREMENTS

Total Minimum hours: **30 hours**

Core Requirements: **9 hours**

Successful completion of three core graduate-level courses is required.

COP 6611 Operating Systems	3
EEL 6764 Principles of Computer Architecture	3
COT 6405 Introduction to the Theory of Algorithms	3

Electives:

Thesis option students must select at least 15 hours and non-thesis option students must select at least 21 hours from the list of available graduate elective courses below in consultation with the Graduate Director or individual advisor. . Non-thesis students need to take a minimum of 6a credits from the list of electives that are software related:

CAP 5400	Digital Image Processing	3
CDA 5416	Computer System Verification	3
CAP 5625	Introduction to Artificial Intelligence	3
CAP 5771	Data Mining	3
EEL 5771	Introduction to Computer Graphics I	3
CNT 6215	Computer Networks	3
CAP 6415	Computer Vision	3
CAP 6455	Advanced Robotic Systems	3
CAP 6615	Neural Networks	3
COP 6621	Programming Languages and Translation	3
EEL 6706	Testing and Fault Tolerance in Digital Systems	3
CAP 6736	Geometric Modeling	3
CIS 6930	Special Topics	1-5
CIS 6940	Graduate Instruction Methods	1-4
CIS 6946	Internships/Practicums/Clinical Practice	0-3

With prior permission from the Graduate Director, students can take a maximum of 3 hours of Independent Study or Internship, a maximum of 3 hours of one-hour seminar courses, and up to one graduate level course (3 credit hours) outside of the department.

Thesis Option:

CIS 6971

Thesis: Master's

2-19

The thesis option requires the completion of 24 credit hours of CSE graduate-level courses (9 credit hours of core courses and 15 hours of electives) and 6 credit hours of thesis in computer science related problems, as determined by the Major Professor and documented in the Plan of Work. At least 16 credit hours must be at the 6000 level.

Non-Thesis Option:

The non-thesis option requires 30 credit hours, with 9 credit hours of core courses and 21 hours of graduate level electives. At least 16 credit hours must be at the 6000 level. At least 6 hours of electives should be taken from the list of electives that are software related in the following topic areas: advanced algorithms, compilers, databases, parallel computing and distributed systems, computer security, data mining, machine learning, programming languages, or software engineering, as determined by the Graduate Director and documented in the Plan of Work.

Comprehensive Exam

For students taking the thesis option, the requirement for a comprehensive exam is satisfied by the successful completion of the thesis. For non-thesis option students, the requirement for a comprehensive exam is satisfied by the successful completion of a comprehensive exam that students will take in the semester prior to the semester in which the students intends to graduate.

Graduation Requirements:

For the thesis option, students must defend and pass the thesis and have a GPA of 3.00 or better. Non-Thesis Option students must pass the Comprehensive Exam, obtain a letter "B" or better in the core graduate courses and have a GPA of 3.00 or better. No Grade below "C" will be accepted in a graduate major. If a student's average falls below 3.00, the student will be placed on probation.

Accelerated Major

Note – Due to accreditation guidelines, Accelerated Majors must total 150 combined credit hours after sharing credit hours. Contact the department for information.

Accelerated B.S.C.P. in Computer Engineering and M.S.C.S. in Computer Science

The B.S.C.P. requires a total of 128 hours and the M.S.C.S. requires 30 hours. By sharing six (6) credit hours, the total credit hours earned will be 152 hours.

Refer to each major for specific admission and curriculum requirements. For consideration in the Accelerated Major, students must:

1. Have completed 15 hours in the undergraduate major
2. Have a minimum 3.33 GPA overall; and
3. Have a minimum undergraduate 3.50 GPA in the major.

Shared Courses (6 credit hours)

Two (2) of the following three (3) core graduate courses replace six (6) credit hours of upper-level departmental (Technical) electives, including Independent Study, Supervised Research, and Industry Internship:

EEL 6764 Principles of Computer Architecture
 COP 6611 Operating Systems
 COT 6405 Introduction to the Theory of Algorithms

COURSES

See <https://www.systemacademics.usf.edu/course-inventory/>

COMPUTER SCIENCE AND ENGINEERING

Doctor of Philosophy (Ph.D.) Degree

DEGREE INFORMATION

Priority Admission Application Deadlines:

Fall:	February 15
Spring:	October 15
Summer:	No admit

International applicant deadlines:

<http://www.grad.usf.edu/majors>

Minimum Total Hours:	72 post-bachelors 42 post-master's
Level:	Doctoral
CIP Code:	14.0901
Dept. Code:	ESB
Major/College Codes:	CSE EN
Approved:	1984

CONTACT INFORMATION

College:	Engineering
Department:	Computer Science and Engineering

Contact Information: www.grad.usf.edu

The degree of Doctor of Philosophy is conferred in recognition of a candidate's highest level of scholarly competence and demonstrated capability to independently conduct and report significant research in computer science and engineering. This achievement requires more than an accumulation of course credits over a stated period of residence. Scholarly competence is achieved through systematic study and investigation in the chosen discipline at an advanced level. The major professor and at least two committee members will be from the Computer Science and Engineering department. Research capability is developed during the course of study and is achieved through the completion of significant and independent research. The results of this research must be formally presented in a written dissertation and successfully defended before an examining committee. The dissertation must demonstrate the significance of the research as well as the candidate's ability to organize and present her/his results in a professional manner.

Major Research Areas:

An excellent selection of courses and laboratories support graduate studies in algorithms, artificial intelligence, machine learning, data mining, computer architecture, graphics, networks, computer vision, distributed systems, embedded systems, expert systems, formal verification, image processing, pattern recognition, robotics, databases, software engineering, computer security, compilers, programming languages, VLSI design, and CAD.

ADMISSION INFORMATION

Must meet University Admission and English Proficiency requirements as well as requirements for admission to the major, listed below.

- The GRE is required for all Ph.D. applicants. The median GRE scores of recently admitted students include 770 on the Quantitative portion and a Verbal Total of 450. For GRE tests taken after August 1, we require a minimum of 161 on the Quantitative portion (81 percentile) and a minimum of 150 (44 percentile) on the Verbal.
- If consideration of an assistantship is desired, the speaking score component of the TOEFL must be 26 or above
- Three letters of recommendation
- Statement of purpose

- The applicant must also have mathematical preparation equivalent to that obtained from courses in Calculus through Differential Equations; knowledge of computer science and computer engineering, including logic design, computer architecture, data structures, operating systems, and analysis of algorithms. Students are assumed to have good programming skills. The majority of students accepted to the major possess an undergraduate degree in Computer Science, Computer Engineering, Electrical Engineering, or Mathematics; however, students who hold an undergraduate degree in a related field are encouraged to apply.

CURRICULUM REQUIREMENTS

Total Program hours: 72 minimum (post-bachelor's)
42 minimum (post-master's)

A minimum of 72 semester hours including dissertation hours beyond the baccalaureate degree are required of all Ph.D. students

Post-Bachelor's: 72 hours minimum

Core – 9 credit hours

Coursework – 24 credit hours

Independent Study/Dir Research – Up to 15 hours

Dissertation – At least 20 credit hours

Post-Master's: 42 hours minimum

Core – 9 credit hours

Independent Study/Dir Research – Up to 15 hours

Dissertation – At least 20 credit hours

Core Requirements – 9 credit hours

COP 6611 3 Operating Systems

EEL 6764 3 Principles of Computer Architecture

COT 6405 3 Introduction to the Theory of Algorithms

Coursework – 33 credit hours

At least 33 credit hours in coursework excluding independent study and directed research. The exact distribution of these hours in the Computer Science and Engineering discipline will be determined by the student and the supervisory committee to provide the student with a stimulating educational experience.

Departmental Course Options (examples)

CAP 5400	3	Digital Image Processing
CAP 5625	3	Introduction to Artificial Intelligence
CAP 5771	3	Data Mining
CAP 6415	3	Computer Vision
CAP 6455	3	Advanced Robotic Systems
CAP 6615	3	Neural Networks
CAP 6736	3	Geometric Modeling
CDA 5416	3	Computer System Verification
CNT 6215	3	Computer Networks
COP 6621	3	Programming Languages and Translation
EEL 5771	3	Introduction to Computer Graphics I
EEL 6706	3	Testing and Fault Tolerance in Digital Systems

CIS 6900 1-19 Independent Study

CIS 6930 1-5 Special Topics

CIS 6940 1-4 Graduate Instruction Methods

CIS 6946 0-3 Internships/Practicums/Clinical Practice

CIS 6971 2-19 Thesis: Master's

Independent Study/Directed Research – 1-15 credit hours

Up to 15 credit hours of independent study/directed research.

CIS 6900	1-15	Independent Study
CIS 7910	1-15	Directed Research

Qualifying Examination

Students must pass the Ph.D. Qualifying examinations in Computer Architecture, Operating Systems, and Theory of Algorithms. The qualifying examination is a two-step process. First, students must get a GPA of 3.60 or better in these three courses within one year of enrollment, otherwise they will have to re-take only the necessary course(s) and get a GPA of 3.60 or better using the best three grades. If a student does not meet these requirements by the end of the second year, he or she will be withdrawn from the Ph.D. program. Second, students must take the qualifying exam and pass it. Students are required to take the exam as soon as they meet the requirements of the first step.

Major Research-Area Paper and Future Research Directions

To fulfil this milestone, students are required to write a survey or research paper on his/her area of research as the lead author. A journal or conference paper already published will count towards this requirement. The student is then required to give an oral presentation on the subject to his/her major professor and a doctoral evaluating committee. The oral presentation must also contain a section on future research directions, a draft plan of research activities towards graduation. The presentation will be open to the public. The paper and presentation is to be completed within one year of passing the Qualifying Examinations and will have to be formally approved by his/her major professor the doctoral evaluating committee before applying for Candidacy.

Admission to Candidacy

A student will not be admitted to candidacy until a Doctoral committee has been appointed, and the committee has certified that the student has successfully completed the qualifying examination and the Major Research Area Paper and Future Research Directions presentation, and demonstrated the qualifications necessary to successfully complete the requirements for the degree. The admission to Candidacy form must be approved by the Dean of the college and forwarded to the Dean of Graduate Studies for final approval. The student may elect to enroll in dissertation credits in the semester following approval of the Admission to Candidacy form by Graduate Studies.

The student's progress in the program is monitored by a supervisory doctoral committee, which is usually appointed at an early stage in the student's major. This committee consists of at least five members, one of whom is outside the College of Engineering. The Major Professor will be a member of the Computer Science and Engineering Department. Normally, two more Computer Science and Engineering faculty serve on the committee with a member in another department in the college.

The student must conduct research of sufficient quality that demonstrates an independent and original contribution to the field of computer science and engineering. Students must take at least 20 semester hours of doctoral dissertation credits; the exact number of credits is determined by the candidate's supervisory committee. It is strongly recommended that doctoral students submit journal articles for publication relevant to dissertation research.

Dissertation hours - At least 20 credit hours

CIS 7980	2-19	Dissertation
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Students are required to take at least 20 hours of dissertation hours until they accumulate a minimum number of 72 hours in the major.

Dissertation Defense

A doctoral candidate must defend her/his research before her/his committee. The defense is usually open to the university community and conducted in accordance with the university's general rules and regulations. The defense involves a formal presentation of the dissertation followed by a critical exchange between the candidate and the committee. The committee chairman moderates the proceedings and determines procedure, originality of the research, and contributions made by the candidate.

COURSES

See <https://www.systemacademics.usf.edu/course-inventory/>

ELECTRICAL ENGINEERING

Master of Science in Electrical Engineering (M.S.E.E.) Degree

DEGREE INFORMATION

Priority Admission Application Deadlines:

Fall:	February 15
Spring:	October 15
Summer:	February 15

International applicant deadlines:

<http://www.grad.usf.edu/majors>

Minimum Total Hours:	30
Level:	Masters
CIP Code:	14.1001
Dept. Code:	EGE
Major/College Codes:	EEL EN
Approved:	1981

Also offered as an Accelerated Major

Electrical Engineering (BSEE/MSEE)

CONTACT INFORMATION

College:	Engineering
Department:	Electrical Engineering
Contact Information:	www.grad.usf.edu

The Department of Electrical Engineering offers both doctoral and masters level degrees. The major areas of research and instruction in the Department are: semiconductor materials, microelectronic manufacturing, MEMS, nanotechnology, VLSI design, digital signal processing, communication theory, wireless communications, microwave engineering, power systems and controls, and biomedical materials and imaging. The Department's research efforts are supported by well-equipped laboratories in the areas of silicon processing, compound semiconductors, electro-optics, IC design, thin dielectric films, communications and signal processing, power systems, nanotechnology, MEMS, micro/millimeter waves, biomedical materials and imaging, and bioengineering.

Current and previous Ph.D. dissertations explored the areas of microelectronics (materials and devices of elemental and compound semiconductors, circuit design, modeling, testing, and reliability); communications and signal processing (communication networks, packet switching, satellite communications, communications software, and VLSI for signal processing); systems and controls; solid state material and device processing and characterization; electro-optics, electromagnetic, microwave and millimeter-wave engineering (antennas, devices, systems); and biomedical engineering. Master's majors include options in semiconductor materials and processes, VLSI design, communications and signal processing, power systems and controls, microwave and millimeter-wave engineering, and biomedical engineering.

ADMISSION INFORMATION

Must meet University Admission and English Proficiency requirements as well as requirements for admission to the major, listed below.

- Minimum 3.00 GPA
- Three Letters of Recommendation
- Resume
- Statement of Purpose

CURRICULUM REQUIREMENTS

Thesis Option – 30 hours total

Required Courses (24) hours

Include Major Core below, 18 hours including 6 hours of depth or capstone coursework, and 6 hours of elective coursework

Required Thesis Hours (6 hours)

Course work only – 30 hours total

Required Courses (30 hours)

Include Major Core below, 18 hours including 6 hours of depth or capstone coursework, and 12 hours of elective coursework.

Major Core:**18 hours**

Students must take two of the following applied mathematics courses as part of the degree program:

EGN 5421	Engineering Applications of Vector Analysis	3
EGN 5422	Engineering Applications of Partial Differential Equations	3
EGN 5423	Mathematics for Communications Engineering	3
EGN 5424	Engineering Applications of Complex Analysis	3
EGN 5425	Matrix Theory	3
EEL 6542	Random Processes	3
PHC 6050	Bio-Statistics	3

Students must take two of the following approved in depth sequences as part of their degree program:

EEL-6426	RF/MW Circuits I and EEL-6427 RF/MW Circuits II
EEL-6486C	EM Field Theory and EEL-6487 Adv. EM Field Theory or EEL-6481 Num. Techniques in Electromagnetics
EEL-5462	Antenna Theory and EEL-6463 Adv. Antenna Theory or EEL-6481 Num. Techniques in Electromagnetics
EEL-6935	Monolithic MW Circuits and EEL-6936 Adv. Monolithic MW Circuits
EEL-6534	Digital Communication Systems and EEL-6509 Satellite Comm. or EEL-6593 Mobile and Personal Com.
BME 6000	Intro to Biomedical Eng. and GM-7930 Anatomy for Bio Engineers or EEL-6936 Bio Image Processing
EEL-6935	Bioelectricity and EEL-6273 Chemical and Bio Sensor Microsystems
EEL-6502	DSP-I and EEL-6752 DSP-II or EEL-6586 Speech Signal Processing
EEL-6597	Wireless Network Architecture and Protocols and EEL-6936 Adv. Topics in Wireless Comm.
EEE-5344	Digital CMOS VLSI Design and EEL-6936 VHDL or EEL-6936 Low Power VLSI Design
EEE-5382	Physical Basis of Microelectronics and EEL-6353 Semiconductor Device Theory I
EEE-6353	Semi-Conductor Device Theory I and EEL-6358 Semi-Conductor Device Theory II
EEE 5356	Integrated Circuit Technology and EEL-6936 Adv. Integrated Circuit Technology
EEE-6355	Compound Semiconductor Technology and EEL-6318 Characterization of Semiconductors
EEL-5631	Digital Control Systems and EEL-6613 Modern Control Theory
EEE-6936	VHDL and EEL-6936 Rapid System Prototyping
EEL-5250	Electric Power Systems I and EEL-6935 Electric Power Systems II
EEL-6935	Industrial Power Distribution I and EEL-6936 Industrial Power Distribution II
EEL-5935	Utility Power Distribution I and EEL-6935 Utility Power Distribution II
EEL-6935	Electric Machines and Drives and EEL-6936 Power Electronics
EEL-6425	Intro to Nanotechnology and EEL-6936 Nanotechnology II
EEL-6935	Micro Electro Mechanical Systems I and EEL-6936 Micro Electro Mechanical Systems II

*Other sequence must be approved by the Graduate Director

Electives:

Minimum elective hours:

Thesis – 6 hours

Coursework only – 12 hours

Students may adopt suggested electives from the Department Graduate Handbook, by track or emphasis area of their choice. All courses must be graduate level. Students should refer to university requirements when choosing courses bearing in mind allowed quantities of 5000 and 6000 level coursework. Special selections must be approved by the Coordinator.

Comprehensive Exam

The University requires all Master's students to be assessed by a comprehensive examination. The Department maintains two versions of this exam according to the student pathway to degree, i.e. Thesis or Non-Thesis as follows:

Thesis students:

Student's written thesis and Public Defense of same constitute the comprehensive exam. Student is provided a rubric that they will be assessed by relative to their written document and presentation. The Committee reports this assessment to the Department for final approval.

Non-Thesis Students:

In lieu of the Comprehensive Exam, a portfolio addressing the content from a capstone course in the primary area of study, content from a course in a secondary area of study, and content from a core mathematics course will be submitted upon graduation. The graduate coordinator, chair of the department, and the vice chair of the department will evaluate the submissions according to the overall quality of the writing, the clarity of the explanation of how the outcomes were achieved, and the quality of the examples that are included.

Thesis – 6 hours

EEL 6971 Thesis (6)

Accelerated Major

Note – Due to accreditation guidelines, Accelerated Majors must total 150 combined credit hours after sharing credit hours. Contact the department for information.

Accelerated B.S.E.E. in Electrical Engineering and M.S.E.E. in Electrical Engineering

Refer to each major for specific admission and curriculum requirements. For consideration in the Accelerated Major, students must:

1. Have completed 15 hours in the undergraduate major
2. Have a minimum 3.33 GPA overall; and
3. Have a minimum undergraduate 3.50 GPA in the major.

Shared Courses (6 credit hours):

Upper division EE elective courses (2) typically taken Semesters 7 and 8 will be replaced by EE MS program core courses chosen from the list below:

EGN 5421	Engineering Applications of Vector Analysis	3
EGN 5422	Engineering Applications of Partial Differential Equations	3
EGN 5423	Mathematics for Communications Engineering	3
EGN 5424	Engineering Applications of Complex Analysis	3
EGN 5425	Matrix Theory	3
EEL 6542	Random Processes	3
PHC 6050	Biostatistics	3

COURSES

See <https://www.systemacademics.usf.edu/course-inventory/>

ELECTRICAL ENGINEERING

Doctor of Philosophy (Ph.D.) Degree

DEGREE INFORMATION

Priority Admission Application Deadlines:

Fall:	February 15
Spring:	October 15
Summer:	February 15

International applicant deadlines:

<http://www.grad.usf.edu/majors>

Minimum Total Hours:	72 (Post-bacc) 42 (post-master's)
Level:	Doctoral
CIP Code:	14.1001
Dept. Code:	EGE
Major/College Codes:	EEL EN
Approved:	1982

CONTACT INFORMATION

College:	Engineering
Department:	Electrical Engineering
Contact Information:	www.grad.usf.edu

The Department of Electrical Engineering offers both doctoral and masters level degrees. The major areas of research and instruction in the Department are: semiconductor materials, microelectronic manufacturing, MEMS, nanotechnology, VLSI design, digital signal processing, communication theory, wireless communications, microwave engineering, power systems and controls, and biomedical materials and imaging. The Department's research efforts are supported by well-equipped laboratories in the areas of silicon processing, compound semiconductors, electro-optics, IC design, thin dielectric films, communications and signal processing, power systems, nanotechnology, MEMS, micro/millimeter waves, biomedical materials and imaging, and bioengineering.

Current and previous Ph.D. dissertations explored the areas of microelectronics (materials and devices of elemental and compound semiconductors, circuit design, modeling, testing, and reliability); communications and signal processing (communication networks, packet switching, satellite communications, communications software, and VLSI for signal processing); systems and controls; solid state material and device processing and characterization; electro-optics, electromagnetic, microwave and millimeter-wave engineering (antennas, devices, systems); and biomedical engineering. Master's majors include options in semiconductor materials and processes, VLSI design, communications and signal processing, power systems and controls, microwave and millimeter-wave engineering, and biomedical engineering.

ADMISSION INFORMATION

Must meet University Admission and English Proficiency requirements as well as requirements for admission to the major, listed below.

- GRE (with preferred minimum scores of Q> 155 (61%) , V>146 (28%))
- Three (3) Letters of Reference
- Statement of Purpose

CURRICULUM REQUIREMENTS

Total Minimum Hours:	72 post-bacc 42 post-masters
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The student's supervisory committee is responsible for evaluating his/her overall transcript to ensure that the following distributional requirements are met:

Program of Study

<p>Core Requirements Minimum 30 hours formal regularly scheduled graduate course work in the engineering area of study, or other graduate courses associated with electrical engineering as approved by the Graduate Director. (not necessarily electrical engineering courses)</p>	30 hours
<p>Mathematics and Statistics Minimum 9 hours in graduate level mathematics or statistics courses (not necessarily math department courses).</p>	9 hours
<p>Electives/Directed Research/Independent Study</p>	13 hours
<p>Dissertation EEL 7980 Dissertation Each Professor will have his/her own section for dissertation hours.</p>	20 hours minimum
<p>Total hours:</p>	Minimum 72 hours total beyond B.S. degree.

Note: Students entering the doctoral major with an earned master's degree from another institution, other than USF, must take at least nine (9) credit hours of 6000 level EE courses at USF. The student's supervisory committee is responsible for evaluating his/her overall transcript to ensure that the distributional requirements are met.

Please contact Electrical Engineering for additional information

COURSES

See <https://www.systemacademics.usf.edu/course-inventory/>

ENGINEERING MANAGEMENT

Master of Science in Engineering Management (M.S.E.M.) Degree

DEGREE INFORMATION

Priority Admission Application Deadlines:

Fall:	February 15
Spring:	October 15
Summer:	February 15

International applicant deadlines:

<http://www.grad.usf.edu/majors>

Minimum Total Hours:	30
Level:	Masters
CIP Code:	15.1501
Dept. Code:	EGS
Major/College Codes:	EMA EN
Approved:	1982

Also offered as an Accelerated Major:

Chemical Engineering (BSCH)/ Engineering Management (MSEM)
 Civil Engineering (BSCE) / Engineering Management (MSEM)
 Electrical Engineering (BSEE) / Engineering Management (MSEM)
 Industrial Engineering (BSIE) / Engineering Management (MSEM)
 Mechanical Engineering (BSME)/Engineering Management (MSEM)

CONTACT INFORMATION

College:	Engineering
Department:	Industrial & Management Systems Engineering

Contact Information: www.grad.usf.edu

This major is designed to prepare engineers from various disciplines to make the transition to technical management. Courses in the major involve concepts in engineering management, resource management, strategic planning, and productivity. They combine qualitative approaches with quantitative techniques. Courses are available on campus or through distance learning.

ADMISSION INFORMATION

Must meet University Admission and English Proficiency requirements as well as requirements for admission to the major, listed below.

- BS in Engineering or equivalent.
- GRE may be required
- Letter of recommendation.
- Resume
- Two years professional experience or internship may be required as part of the major

CURRICULUM REQUIREMENTS

A minimum of 30 credits of approved graduate level coursework beyond the bachelor level is required, 18 credits of core work and 12 credits of electives. Up to 6 hours of advanced courses in the student's area of specialty may be taken as electives. A thesis option is available to M.S.E.M. students who are interested in applied research. In the thesis option, 18 credits of core work, 6 credits of electives, and 6 credits of thesis are the minimum required.

The required 18 credits of core work are divided into three components: 12 credits in the general core area, 3 credits in the quantitative core area, and 3 credits in the job design core area. An undergraduate statistics course with a grade of C or higher is a prerequisite for the quantitative core area. Otherwise students must additionally take EGN 3443 Probability & Statistics for Engineers as a prerequisite.

General Core Area: 12 credits

EIN 5182 Principles of Engineering Management
 EIN 6386 Management of Technological Change
 EIN 5350 Technology and Finance
 EIN 6183 Engineering Management Policy & Strategy (Capstone: must be taken after all core work requirements have been fulfilled)

Quantitative Core Area: 3 credits must be selected from the following options, as approved by advisor. The other courses may be taken as electives.

ESI 5306 Operations Research for Engineering Managers
 ESI 5219 Statistical Methods for Engineering Managers
 ESI 6247 Statistical Design Models

Job Design Core Area: 3 credits must be selected from the following options, as approved by advisor. The other course may be taken as an elective.

EIN 6108 Engineering Management: Human Relations
 EIN 6319 Work Design, Motivation & Productivity

Electives: 12 credits minimum must be selected from the following options, as approved by advisor. (Other Graduate Courses may be taken, with approval of the Graduate Director.)

EIN 6179 Advanced TQM Methods: Six Sigma
 EIN 6936 Benchmarking
 ESI 5522 Computer Simulation
 EIN 6217 Construction Safety Engineering
 EIN 5201 Creativity in Technology
 EIN 6275 Design Controls for Medical Devices
 EIN 5452 Engineering a Lean Enterprise
 EIN 6215 Engineering Systems Safety
 ESI 6605 Engineering Data Mining
 EIN 6324 Engineering the Supply Chain
 EIN 6936 Graduate Research Seminar
 EIN 6433 Human Factors Engineering in Medical Devices
 EIN 6112 Information Systems Design for Engineering
 ESI 6448 Integer Programming
 EIN 6934 International Project Management
 EIN 6435 International Regulations for Medical Devices
 EIN 6178 ISO 9000/14000
 ESI 6491 Linear Programming & Network Optimization
 EIN 5510 Manufacturing Systems Analysis
 EIN 6392 New Product Development
 EIN 6420 Non-Linear Programming
 EIN 6216 Occupation Safety Engineering

EIN 6430 Overview of Regulated Industries
EIN 6336 Production Control Systems
EIN 6145 Project Management
EIN 6431 Regulatory Quality Systems & Controls for Medical Devices
EIN 6432 Regulated Product Approval Process
ESI 5236 Reliability Engineering
EIN 6935 Strategic Marketing Assessment
EIN 6936 Strategies in Technical Entrepreneurship
ESI 6213 Stochastic Decision Models I
EIN 6934 Tech Venture Strategy
EIN 6145 Technical Entrepreneurship
EIN 6106 Technology & Law
EIN 6121 Technology & Markets
EIN 5174 Total Quality Management (TQM) Concepts
EIN 6225 Total Quality Management (TQM) Seminar
EIN 6936 Venture Capital & Private Equity
EIN 5275 Work Physics / Biomechanics

Comprehensive Exam

Accelerated Majors

Note – Due to accreditation guidelines, Accelerated Majors must total 150 combined credit hours after sharing credit hours. Contact the department for information.

Accelerated BSCH in Chemical Engineering / MSEM in Engineering Management

The B.S.C.H. requires a total of 131 hours and the M.S.E.M. requires 30 hours. By sharing six (6) credit hours, the total credit hours earned will be 155 hours.

Refer to each major for specific admission and curriculum requirements. For consideration in the Accelerated Major, students must:

1. Have completed 15 hours in the undergraduate major
2. Have a minimum 3.33 GPA overall; and
3. Have a minimum undergraduate 3.50 GPA in the major.

Shared Courses

The following courses will satisfy six (6) credit hours of Industrial Engineering elective coursework:

EIN 5182 Principles of Engineering Management
EIN 6386 Management of Technological Change

Accelerated B.S.C.E. in Civil Engineering and M.S.E.M. in Engineering Management

The B.S.C.E. requires a total of 131 hours and the M.S.E.M. requires 30 hours. By sharing six (6) credit hours, the total credit hours earned will be 155 credit hours.

Refer to each major for specific admission and curriculum requirements. For consideration in the Accelerated Major, students must:

1. Have completed 15 hours in the undergraduate major
2. Have a minimum 3.33 GPA overall; and
3. Have a minimum undergraduate 3.50 GPA in the major.

Shared Courses (6 credit hours)

Students can take two approved EGX-prefixed courses at the 6000-level that meet the upper-level Technical elective requirement.

Accelerated B.S.E.E. in Electrical Engineering and M.S.E.M. in Engineering Management

The B.S.C.E. requires a total of 128 hours and the M.S.E.M. requires 30 hours. By sharing six (6) credit hours, the total credit hours earned will be 152 credit hours.

Refer to each major for specific admission and curriculum requirements. For consideration in the Accelerated Major, students must:

1. Have completed 15 hours in the undergraduate major
2. Have a minimum 3.33 GPA overall; and
3. Have a minimum undergraduate 3.50 GPA in the major.

Shared Courses (6 credit hours)

Students can take two approved EEL-prefixed courses at the 6000-level that meet the upper-level Technical elective requirement.

Accelerated B.S.I.E. in Industrial Engineering and M.S.E.M. in Engineering Management

The B.S.I.E. requires a total of 128 hours and the M.S.E.M. requires 30 hours. By sharing six (6) credit hours, the total credit hours earned will be 152 credit hours.

Refer to each major for specific admission and curriculum requirements. For consideration in the Accelerated Major, students must:

1. Have completed 15 hours in the undergraduate major
2. Have a minimum 3.33 GPA overall; and
3. Have a minimum undergraduate 3.50 GPA in the major.

Shared Courses (6 credit hours)

The following courses will satisfy six (6) credit hours of Industrial Engineering elective coursework:

EIN 5182 Principles of Engineering Management

EIN 6386 Management of Technological Change

Accelerated B.S.M.E. in Mechanical Engineering and M.S.E.M. in Engineering Management

The B.S.M.E. requires a total of 128 hours and the M.M.E. requires 30 hours. By sharing six (6) credit hours, the total credit hours earned will be 152 hours.

Refer to each major for specific admission and curriculum requirements. For consideration in the Accelerated Major, students must:

1. Have completed 15 hours in the undergraduate major
2. Have a minimum 3.33 GPA overall; and
3. Have a minimum undergraduate 3.50 GPA in the major.

Shared Courses (6 credit hours)

The following courses will satisfy six (6) credit hours of Industrial Engineering elective coursework:

EIN 5182 Principles of Engineering Management

EIN 6386 Management of Technological Change

COURSES

See <https://www.systemacademics.usf.edu/course-inventory/>

ENVIRONMENTAL ENGINEERING

Master of Environmental Engineering (M.E.V.E.) Degree

DEGREE INFORMATION

Priority Admission Application Deadlines:

Fall:	February 15
Spring:	October 15
Summer:	February 15

International applicant deadlines:

<http://www.grad.usf.edu/majors>

Minimum Total Hours:	30
Level:	Masters
CIP Code:	14.1401
Dept. Code:	EGX
Major/College Codes:	EVE EN
Approved:	1997

Also offered as an Accelerated Major

Civil Engineering (BSCE) / Environmental Engineering (MEVE)

CONTACT INFORMATION

College:	Engineering
Department:	Civil and Environmental Engineering

Contact Information: www.grad.usf.edu

The M.E.V.E. degree provides a student with the opportunity to earn the advanced degree by coursework only. Students must have an accredited first degree in engineering or complete a list of makeup engineering coursework. Graduates of the major are prepared for careers with governmental agencies, nongovernmental organizations (NGOs), or private industry and firms involved in planning, design, research and development, or policy.

Major Research Areas:

Water quality engineering; air quality engineering; fate and transport of contaminants in the environment; environmental biotechnology and nanotechnology; waste management; sustainability and ecological engineering; surface water hydrology and hydraulics; groundwater hydrology; water reuse; green engineering; renewable energy; fate of emerging contaminants; and humanitarian engineering with a focus on the developing world.

ADMISSION INFORMATION

Must meet University Admission and English Proficiency requirements as well as requirements for admission to the major, listed below.

- Undergraduate GPA \geq 3.0 preferred.
- GRE with preferred minimum scores of V 145 (25th percentile), Q 155 (60th percentile), AW 3.0 (15th percentile); or valid Fundamentals of Engineering (FE) certificate. Verification of FE certification should be obtained from the professional engineering (PE) board where the FE certification was obtained. See the CEE department website for more information: <http://www2.eng.usf.edu/cee/graduate/apply.htm>.
- Two Letters of Reference provided at the time of application.
- Statement of Purpose provided at the time of application.
- Resume provided at the time of application.
- Exceptions made on a case-by-case basis where warranted.

CURRICULUM REQUIREMENTS

Total Major Minimum Hours - 30 hours

The minimum coursework requirement for the Master of Engineering in Environmental Engineering degrees is 30 credit hours. No research thesis is required. All students must take three “principles” courses (Physical/Chemical Principles; Biological Principles; Aquatic Chemistry), at least one “sustainability” course, and at least two environmental engineering “process” elective courses.

Core Courses (required) - 12 hours minimum

ENV 6002	3	Physical & Chemical Principles of Environmental Engineering
EES 6107	3	Biological Principles of Environmental Engineering
ENV 6666	3	Aquatic Chemistry

And at least one of the following:

ENV 66173		Green Engineering for Sustainability <i>or</i>
CGN 6933	3	Selected Topics: Resilient Infrastructure for Sustainable Communities <i>or</i>
ENV 6510	3	Sustainable Development Engineering

Elective Courses-18 hours minimum

(≥18 hours, at least two courses must be from this list)

ENV 6105	3	Air Pollution Fundamentals
ENV 6438	3	Phys & Chemical Processes for Treatment of Drinking Water
ENV 6519	3	Phys & Chemical Processes for Groundwater Remediation
ENV 6564	3	Environmental Engineering Design
ENV 6667	3	Environmental Biotechnology

Comprehensive Exam

Portfolio and oral interview are used in lieu of a comprehensive exam. The purpose of the portfolio and interview is for students to demonstrate that they have achieved a minimum level of proficiency in stipulated competencies. Specifically, by the time they graduate, students will demonstrate:

- an ability to plan, compose, and integrate verbal, written, virtual, and graphical communication of a project to technical and non-technical audiences, and
- an ability to formulate and solve complex problems in Environmental Engineering using relevant data and techniques.

Additional details regarding portfolio requirements will be provided to students by the Department.

Accelerated Major

Note – Due to accreditation guidelines, Accelerated Majors must total 150 combined credit hours after sharing credit hours. Contact the department for information.

Accelerated B.S.C.E in Civil Engineering and M.E.V.E Environmental Engineering

The B.S.C.E. requires a total of 131 hours and the M.S. requires 30 hours. By sharing 6 credit hours, the total credit hours earned will be 155 hours.

Refer to each major for specific admission and curriculum requirements. For consideration in the Accelerated Major, students must:

1. Have completed 15 hours in the undergraduate major
2. Have a minimum 3.33 GPA overall; and
3. Have a minimum undergraduate 3.50 GPA in the major.

Shared Courses (6 credit hours)

Students may choose two (2) of the following three (3) 6000-level course options to meet the upper-level undergraduate Technical elective requirement:

CWR 4812 Capstone Water Resources/Environmental Design, satisfied by ENV 6564 Environmental Eng. Design.

Free Technical elective, satisfied by any (3credit) 6000-level ENV course.

Free Technical elective, satisfied by any (3credit) 6000-level ENV course.

COURSES

See <https://www.systemacademics.usf.edu/course-inventory/>

ENVIRONMENTAL ENGINEERING

Master of Science in Environmental Engineering (M.S.E.V.) Degree

DEGREE INFORMATION

Priority Admission Application Deadlines:

Fall: February 15

Spring: October 15

Summer: February 15

International applicant deadlines:

<http://www.grad.usf.edu/majors>

Minimum Total Hours: 30

Level: Masters

CIP Code: 14.1401

Dept. Code: EGX

Major/College Codes: EVE EN

Approved: 1996

Concentration

Engineering for International Development (EFD)

Also offered as an Accelerated Major:

Civil Engineering B.S.C.E. / Environmental Engineering M.S.E.V.

CONTACT INFORMATION

College: Engineering

Department: Civil and Environmental Engineering

Contact Information: www.grad.usf.edu

The M.S.E.V. degree provides a student with the opportunity to earn the advanced degree with coursework and a required research thesis. Students must have an accredited first degree in engineering or complete a list of makeup engineering coursework. An optional concentration in Engineering for International Development allows students to combine their graduate education and research with engineering service in the Peace Corps. The M.S.E.V. is a research-oriented degree in which the student writes, as a major part of the degree requirements, a thesis that defines, examines, and reports in depth on a subject area relevant to Environmental Engineering.

Major Research Areas:

The field of Environmental Engineering has long been known for its breadth and ability to adapt to the new technological, societal, and global problems facing the environment. Major research areas include water quality engineering; air quality engineering; fate and transport of contaminants in the environment; environmental biotechnology and nanotechnology; waste management; sustainability and ecological engineering; surface water hydrology and hydraulics; groundwater hydrology; water reuse; green engineering; renewable energy; fate of emerging contaminants; and humanitarian engineering with a focus on the developing world. Graduates of the major are prepared for careers in academia, governmental agencies, nongovernmental organizations (NGOs), or private industry and firms involved in planning, design, research and development, or policy.

The environmental engineering laboratories provide state-of-the-art analytical and experimental equipment for chemical and biological research. Equipment includes an ion chromatograph, atomic absorption spectrophotometer, several gas chromatographs (including with mass spectrometry), HPLC, TOC machine, and environmental chambers. Field research sites are available locally and in several international settings that include developing world communities.

ADMISSION INFORMATION

Must meet University Admission and English Proficiency requirements as well as requirements for admission to the major, listed below.

- Undergraduate GPA \geq 3.0 preferred.
- GRE with preferred minimum scores of V 145 (25th percentile), Q 155 (60th percentile), AW 3.0 (15th percentile); or valid Fundamentals of Engineering (FE) certificate. Verification of FE certification should be obtained from the professional engineering (PE) board where the FE certification was obtained. See the CEE department website for more information: <http://www2.eng.usf.edu/cee/graduate/apply.htm>.
- Two (2) Letters of Reference provided at the time of application. EFD students must submit 3 Letters of Reference.
- Statement of Purpose provided at the time of application.
- Resume provided at the time of application.
- Exceptions made on a case-by-case basis where warranted.

CURRICULUM REQUIREMENTS

Total Minimum Hours - 30 hours

Core courses – 12 hours

Concentration/Electives– 12 hours

Thesis – 6 hours

The major consists of a minimum of 24 credit hours of coursework and 6 credit hours of thesis. All students must take three “principles” courses (Physical/Chemical Principles; Biological Principles; Aquatic Chemistry), and at least one “sustainability” course. Students should consult their research advisors for guidance in selecting other coursework.

Core Courses -12 hours minimum

ENV 6002	3	Physical Chemical Principles
EES 6107	3	Biological Principles of Environmental Engineering
ENV 6666	3	Aquatic Chemistry

And at least one of the following:

ENV 6617	3	Green Engineering for Sustainability
CGN 6933	3	Selected Topics: Resilient Infrastructure for Sustainable Communities)
ENV 6510	3	Sustainable Development Engineering

Engineering for International Development (EFD) Concentration (Optional) - 9 hours

This concentration acknowledges coursework and international field experience in the area of engineering for international development that considers issues of sustainable development, water, sanitation, and health (WaSH), gender, and society. This graduate concentration requires: 1) coursework in global health, applied anthropology (medical, environmental, and development), and Water, Sanitation, Hygiene (WaSH) engineering, 2) a development-focused research component, and 3) a long-term overseas field experience in sustainable development as a WaSH engineer, which in most cases will form the basis of the student’s master’s thesis. The international field experience allows a student to remain enrolled as a full-time student (with zero tuition/fees) and gain development experience serving with Peace Corps and Nongovernmental Development Organizations. Graduates are competitive for employment in the global WaSH development field.

ENV 6510	3	Sustainable Development Engineering
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A minimum of 1 course (3 credits) from the following applied anthropology courses:

ANG 6766	3	Research Methods in Applied Anthropology
ANG 6730	3	Selected Topics in Medical Sciences: Socio-cultural Aspects of HIV/AIDS
ANG 6469	3	Health, Illness and Culture

A minimum of 1 course (3 credits) from the following global public health courses:

PHC 6764	3	Global Health Principles & Contemporary Issues
PHC 67613		Global Health Assessment Strategies

Students engaged in full-time global training and service as part of the EFD concentration (e.g., in the U.S. Peace Corps, with a nongovernmental organization, UNESCO-IHE, or equivalent) may register for CST 6990 for 0 credit hours while in their country of service.

Elective Courses - 12 hours minimum

Beyond the core coursework, 12 additional credit hours are required, based on approval of the student's graduate committee. Students in the EFD Concentration complete the concentration requirements and then one elective course.

Thesis - 6 hours minimum

Students pursuing the M.S.E.V. are required to complete at least six (6) credits of Thesis. Students must conduct a suitable research project under the guidance of their thesis advisor, write an original thesis based upon the results of the research project, and defend the thesis to a committee that must subsequently approve the completed thesis. For students in the EFD Concentration, the thesis must be associated with research in a developing-world context.

Comprehensive Exam

The thesis and defense are used in lieu of a comprehensive exam.

Accelerated Major

Note – Due to accreditation guidelines, Accelerated Majors must total 150 combined credit hours after sharing credit hours. Contact the department for information.

Accelerated B.S.C.E. in Civil Engineering and M.S.E.V. Environmental Engineering

The B.S.C.E. requires a total of 131 hours and the M.S. requires 30 hours. By sharing 6 credit hours, the total credit hours earned will be 155 hours.

Refer to each major for specific admission and curriculum requirements. For consideration in the Accelerated Major, students must:

1. Have completed 15 hours in the undergraduate major
2. Have a minimum 3.33 GPA overall; and
3. Have a minimum undergraduate 3.50 GPA in the major.

Shared Courses (6 credit hours)

Students may choose two (2) of the following three (3) 6000-level course options to meet the upper-level undergraduate Technical elective requirement:

1. CWR 4812 Capstone Water Resources/Environmental Design satisfied by ENV 6564 Environmental Engineering Design.
2. Free Technical elective, satisfied by any (3credit) 6000-level ENV course.
3. Free Technical elective, satisfied by any (3credit) 6000-level ENV course.

COURSES

See <https://www.systemacademics.usf.edu/course-inventory/>

ENVIRONMENTAL ENGINEERING

Doctor of Philosophy (Ph.D.) Degree

DEGREE INFORMATION

Priority Admission Application Deadlines:
Fall: February 15

Spring: October 15

Summer: February 15

International applicant deadlines:

<http://www.grad.usf.edu/majors>
Minimum Total Hours: 48/78

Level: Doctoral

CIP Code: 14.1401

Dept. Code: EGX

Major/College Codes: EVE EN

Approved: 2013

Concentration:

Engineering for International Development (EFD)

CONTACT INFORMATION

College: Engineering

Department: Civil and Environmental
Engineering

Contact Information: www.grad.usf.edu

The Ph.D. degree is awarded in recognition of demonstrated scholarly competence and ability to conduct and report original and significant research in Environmental Engineering.

The field of Environmental Engineering has long been known for its breadth and ability to adapt to the new technological, societal, and global problems facing the environment. Major research areas include water quality engineering; air quality engineering; fate and transport of contaminants in the environment; environmental biotechnology and nanotechnology; waste management; sustainability and ecological engineering; surface water hydrology and hydraulics; groundwater hydrology; water reuse; green engineering; renewable energy; fate of emerging contaminants; and humanitarian engineering with a focus on the developing world. Graduates of the major are prepared for careers in academia, governmental agencies, nongovernmental organizations (NGOs), or private industry and firms involved in planning, design, research and development, or policy.

Major Research Areas:

Water quality engineering; air quality engineering; fate and transport of contaminants in the environment; environmental biotechnology and nanotechnology; waste management; sustainability and ecological engineering; surface water hydrology and hydraulics; groundwater hydrology; water reuse; green engineering; renewable energy; fate of emerging contaminants; and humanitarian engineering with a focus on the developing world.

The environmental engineering laboratories provide state-of-the-art analytical and experimental equipment for chemical and biological research. Equipment includes an ion chromatograph, atomic absorption spectrophotometer, several gas chromatographs (including with mass spectrometry), HPLC, TOC machine, and environmental chambers. Field research sites are available locally and in several international settings that include developing world communities.

ADMISSION INFORMATION

Must meet University Admission and English Proficiency requirements as well as requirements for admission to the major, listed below.

- Undergraduate GPA \geq 3.3 preferred;
- GRE with preferred minimum scores of V 150 (45th percentile), Q 159 (75th percentile) AW 4.0 (55th percentile)
- Resume provided at the time of application
- Three (3) letters of reference provided at the time of application
- Statement of Purpose provided at the time of application
- Exceptions made on a case-by-case basis where warranted.

CURRICULUM REQUIREMENTS

**Total Hours: 78 hours minimum post-bachelors
48 hours minimum post-masters**

Core course requirements – 9 credit hours

Additional requirements – 5 credit hours

Concentration- 9 credit hours

Other courses – 36 credit hours minimum

Dissertation - 20 credit hours' minimum

Directed Research/Dissertation/Other – 8 credit hours minimum

Coursework requirements - 50 hours minimum

Core Courses – 9 hours

ENV 6002	3	Physical & Chemical Principles in Environmental Engineering
EES 6107	3	Biological Principles in Environmental Engineering
ENV 6666	3	Aquatic Chemistry

Additional requirements – 5 hours

CGN 6945	2	Graduate Research Methods
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1 course (3 credits) from the following list of sustainability courses:

ENV 6617	3	Green Engineering for Sustainability
CGN 6933	3	Selected Topics: Resilient Infrastructure for Sustainable Communities
ENV 6510	3	Sustainable Development Engineering

Students may opt to complete the concentration, or an additional 9 hours of coursework as noted below.

Concentration Requirements - 9 hours minimum

The Department supports Ph.D. concentration area in Engineering for International Development (EFD)

Engineering for International Development (EFD)

This concentration acknowledges coursework and international field experience in the area of engineering for international development that considers issues of sustainable development, water, sanitation, and health (WaSH), gender, and society. This graduate concentration requires: 1) coursework in global health, applied anthropology (medical, environmental, and development), and Water, Sanitation, Hygiene (WaSH) engineering, 2) a development-focused research component, and 3) a long-term overseas field experience in sustainable development as a WaSH engineer, which in most cases will form part of the basis of the student's dissertation. The international field experience allows a student to remain enrolled as a full-time student (with zero tuition/fees) and gain development experience serving with Peace Corps and Nongovernmental Development Organizations. Graduates are competitive for employment in the global WaSH development field.

ENV 6510 Sustainable Development Engineering

A minimum of 1 course (3 credits) from the following applied anthropology courses:

ANG 6766	3	Research Methods in Applied Anthropology
ANG 6730	3	Socio-cultural Aspects of HIV/AIDS
ANG 6469	3	Health, Illness and Culture

A minimum of 1 course (3 credits) from the following global public health courses:

PHC 6764	3	Global Health Principles & Contemporary Issues
PHC 6761	3	Global Health Assessment Strategies

Students engaged in full-time global training and/or service as part of the EFD concentration (e.g., in the U.S. Peace Corps, with a nongovernmental organization, UNESCO-IHE, or equivalent) may register for CST 6990 for 0 credit hours while in their country of service/research.

Additional Courses – 27- 36 hours

Students complete an additional 27 credits of coursework if in the Concentration, or an additional 36 credits of coursework if not in the Concentration, in Environmental Engineering or related areas, of which at least 3 credits must be structured coursework in Environmental Engineering specifically. These credits may include up to 9 credits of Independent Study and/or 6 units of Master's Thesis, pending the approval of the Department, the College, and the Office of Graduate Studies. Directed research and/or dissertation credits may not be counted towards this coursework requirement.

Qualifying Exam

Doctoral students are expected to pass a qualifying examination no later than the semester following the completion of 48 credits of coursework beyond a bachelor's degree. At minimum, the Exam will include a written dissertation proposal and oral defense by the Dissertation Committee. A written exam in the area of concentration may also be required. Poor performance on the Qualifying Exam based on the judgment of the Committee may result in the student failing the exam. If a student does not pass on the first attempt, he/she may request in writing to repeat the Exam. Students who fail the Qualifying Examination the second time will be dismissed by the Major.

Dissertation Requirements - 20 hours minimum

CGN 7980	20	Dissertation
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A minimum of 20 credits of dissertation, an approved PhD dissertation, and a dissertation defense are required. Students may not sign up for dissertation credits until they have defended their proposal and advanced to candidacy (see Qualifying Exam, above).

Additional Requirements - 8 hours minimum

Eight (8) credits of additional coursework, dissertation, or directed research are required.

Publication Requirement

Students must have at least one paper accepted to a peer-reviewed journal or peer-reviewed conference based on their research carried out during their doctoral studies at USF.

COURSES

See <https://www.systemacademics.usf.edu/course-inventory/>

INDUSTRIAL ENGINEERING

Master of Science in Industrial Engineering (M.S.I.E.) Degree

DEGREE INFORMATION

Priority Admission Application Deadlines:

Fall:	February 15
Spring:	October 15
Summer:	February 15

International applicant deadlines:

<http://www.grad.usf.edu/majors>

Minimum Total Hours:	30
Level:	Masters
CIP Code:	14.3501
Dept. Code:	EGX
Major/College Codes:	EVE EN
Approved:	1981

CONTACT INFORMATION

College:	Engineering
Department:	Industrial and Management Systems Engineering

Contact Information: www.grad.usf.edu

The department participates in the College's M.S.E. majors. The department offers advanced degrees in areas of study pertinent to the design, evaluation, and operation of a variety of industrial systems, ranging from the analysis of public systems, to the service industry, to the operation of manufacturing concerns. Course topics and research opportunities include engineering analytics, production planning, production control, facilities design, applied engineering statistics, quality control and reliability, operations research, engineering economic analysis, human factors engineering, productivity analysis, manufacturing systems, robotics, automation, and computer applications. The department has advanced laboratory facilities that support class projects and research in microcomputer applications, computer-aided design and manufacturing, flexible automation, quality control, and applications in robotics.

ADMISSION INFORMATION

Must meet University Admission and English Proficiency requirements as well as requirements for admission to the major, listed below.

- An undergraduate degree in Industrial Engineering or a related field with a strong background in mathematics with a 3.00/4.00 GPA; non engineering degrees will be required to take supplemental undergraduate courses
- GRE Required
- Three letters of reference
- Statement of purpose including evidence of research potential

CURRICULUM REQUIREMENTS

Total Minimum Hours:

30 credit hours

Thesis option: minimum of 24 credit hours of approved course work, including three core courses and five IE elective courses, and six credit hours of thesis.

Non-thesis option: minimum of 30 credit hours of approved course work, including three core courses, five IE elective courses, and two general elective courses.

Required Core Courses (9 credit hours)

ESI 6410 Optimization in Operations Research	3
ESI 6247 Statistical Design Models	3
ESI 6340 Probabilistic Systems Analysis	3

IE Elective Courses (15 credit hours)

ESI 4333 Production Control	3
ESI 4221 Industrial Statistics & Quality Control	3
EIN 4364 Facilities Design	3
EIN 5350 Technology & Finance	3
ESI 5522 Computer Simulation	3
ESI 5236 Reliability Engineering	3
ESI 5306 OR for Engineering Management	3
EIN 6145 Project Management	3
EIN 6935 Lean Six Sigma	3
ESI 6324 Engineering the Supply Chain	3
EIN 6336 Production Control Systems	3
ESI 6448 Integer Programming	3
EIN 6936 Nonlinear Programming	3
ESI 6447 Large-scale Optimization	3
EIN 6319 Work Design & Productivity	3
EIN 6112 Information Systems Design	3
EIN 6934 Engineering Analytics I	3
EIN 6934 Engineering Analytics II	3
EIN 6608 Advanced Analytics I	3
EIN 6609 Advanced Analytics II	3

General Elective Courses

Any College of Engineering 5000+ level course, including IMSE courses, except for the courses listed as IE elective courses above. Examples include:

EIN 5182 Principles of Engineering Management	3
EIN 6386 Management of Technological Change	3
EIN 6934 Systems Integration	3
EIN 6936 Advanced Lean Six Sigma	3
EIN 6178 ISO 9000/14000	3
EIN 6179 Advanced TQM Methods.	3

In addition, students can choose electives from other department and/or non-departmental courses, with the approval of major advisor or graduate director. Contact the department for information. Also visit <http://imse.eng.usf.edu>

Comprehensive Exam

Thesis (6 credit hours)

COURSES - See <https://www.systemacademics.usf.edu/course-inventory/>

INDUSTRIAL ENGINEERING

Doctor of Philosophy (Ph.D.) Degree

DEGREE INFORMATION

Priority Admission Application Deadlines:

Fall:	February 15
Spring:	October 15
Summer:	February 15

International applicant deadlines:

<http://www.grad.usf.edu/majors>

Minimum Total Hours:	90
Level:	Doctoral
CIP Code:	14.3501
Dept. Code:	EGS
Major/College Codes:	EIE EN
Approved:	1983

CONTACT INFORMATION

College:	Engineering
Department:	Industrial and Management Systems Engineering

Contact Information: www.grad.usf.edu

ADMISSION INFORMATION

Must meet University Admission and English Proficiency requirements as well as requirements for admission to the major, listed below.

Although USF only requires Ph.D. students to complete two consecutive semesters as full-time students, the IMSE Dept. policy is for Ph.D. students to complete their total doctoral major as full-time Tampa campus students. Other requirements include:

- GRE Required
- Three letters of reference
- Statement of Purpose including evidence of research potential

CURRICULUM REQUIREMENTS

Total Minimum Hours

90 hours post bachelor's

Minimum of 90 credit hours beyond BS degree. Minimum of 60 credit hours of approved course work and 20 credit hours of dissertation research. Total hours of credit must equal or exceed 90 hours. Contact the department for additional information.

Must have 2 (at least one accepted, the other submitted) referred journal publications before graduation.

Must take the following 4 core courses:

Required Core Courses	12 hours minimum
ESI 6213 Stochastic Decision Models I	3
EIN 6935 Systems Modeling and Performance Analysis	3
ESI 6245 Advanced Statistical Design Models	3
ESI 6491 Linear Programming and Network Optimization	3

In addition a minimum of 8 hours of mathematics or statistics is required (the choice of such courses must be approved by the student's doctoral committee). Further requirements may be imposed by the candidate's committee.

Elective Courses	40 hours minimum
ESI 5522 Computer Simulation	3
EIN 6119 Decision Support Systems	3
ESI 6324 Engineering the Supply Chain	3
EIN 6433 Human Factors in Engineering Medical Devices	3
EIN 6112 Information Systems Design	3
ESI 6448 Integer Programming	3
EIN 6435 International Regs for Med Devices	3
EIN 6386 Management of Technology Change	3
EIN 6420 Non-Linear Programming	3
EIN 6336 Production Control Systems	3
EIN 6145 Project Management	3
ESI 5236 Reliability Engineering	3
EIN 6319 Work Design and Productivity	3
EIN 6608 Advanced Analytics I	3
EIN 6609 Advanced Analytics II	3

Directed Research **9 hours**

Dissertation **11 hours**

In addition, students may choose electives from other department and/or non-departmental courses, with the approval of major advisor or graduate director. Contact the department for information. Also visit <http://imse.eng.usf.edu>

COURSES

See <https://www.systemacademics.usf.edu/course-inventory/>

INFORMATION TECHNOLOGY

Master of Science in Information Technology (M.S.I.T.) Degree

DEGREE INFORMATION

Priority Admission Application Deadlines:
Fall Semester: February 15

Spring Semester: October 15

Summer: No admit

International applicant deadlines:

<http://www.grad.usf.edu/majors>
Minimum Total Hours: 30 (non-thesis)

Level: Masters

CIP Code: 11.0103

Dept Code: EIT

Major/College Codes: ITC / EN

Approved: Spring 2014

Also offered as an Accelerated Major:

Computer Engineering (BSCP) / Information Technology (MSIT)

Information Technology (BSIT) / Information Technology (MSIT)

CONTACT INFORMATION

College: Engineering

Department: Computer Science and
Engineering

Contact Information: www.grad.usf.edu

The Department of Computer Science and Engineering offers a non-thesis option for the degree of Master of Science in Information Technology (M.S.I.T.). The MSIT graduate will demonstrate strong information technology skills as well as problem solving skills needed for the deployment of technology solutions to achieve business and organizational goals. The degree is available in an hybrid mode (online and face to face), and provides students with a broad and integrative understanding of both technology and operational and strategic business and organizational applications. There is considerable freedom in the choice of the courses.

The breadth of subjects which are part of information technology together with the immense diversity of its applications, make it imperative that students in the Master's major maintain close contact with the Graduate Director, in order to achieve a coherent plan of study directed towards a specific goal. In particular, election of courses should only be made with prior consultation and approval of the Major Professor or the Graduate Director.

ADMISSIONS INFORMATION

Must meet University Admission and English Proficiency requirements as well as requirements for admission to the major, listed below.

- The GRE is required for all MSIT applicants. For GRE tests taken after August 1, 2011, we require a minimum of 161 on the Quantitative portion (81 percentile) and a minimum of 150 (44 percentile) on the Verbal. The GRE will be waived for M.S. degree applicants with an undergraduate degree from an ABET-accredited United States university or for those applicants that show a minimum of 3 years of relevant and recent full-time professional experience in the U.S.
- Minimum grade point average (GPA) of "B" (or equivalent) for all coursework completed during the last two years of undergraduate major.
- If consideration of an assistantship is desired, the speaking score component of the TOEFL must be 26 or above.
- Three letters of recommendation.
- Statement of purpose.

- Bachelor' Degree in Information Technology, Computer Science, or a closely related field; or a bachelor's degree in another field, plus satisfactory completion of the courses listed below under "Undergraduate Prerequisites."
- Evidence of completion of a defined subset of the required core courses found in the University of South Florida's Bachelor of Science in Information Technology degree program or their equivalent (see "Undergraduate Prerequisites" below).

Undergraduate Prerequisites

To be successful in this major, an applicant should have certain base knowledge in the discipline demonstrated from undergraduate-level pre-requisite courses including:

- COP2513 Object-Oriented Programming for Information Technology
- COP2512 Programming Fundamentals for Information Technology
- COP 3515 Programming Design for Information Technology
- CEN 4031 Software Engineering Concepts for Information Technology
- COP 4703 Database Systems for Information Technology
- EEL 4854/4935 Selected Topics: IT Data Structures & Algorithms for Information Technology

The student should have taken these courses or their equivalent prior to beginning graduate coursework. All prerequisite courses are available online. Professional experience in information technology is typically focused on specific projects or systems, and is not as broad as the treatment of a topic one receives in a course. Therefore, except in unusual circumstances, professional experience cannot substitute for any of the above prerequisite courses.

CURRICULUM REQUIREMENTS

Total Minimum Hours:

30 hours

Core Requirements – 9 hours

CIS 6930	3	Selected Topics: Ethical Hacking for IT
ISM 6218	3	Advanced Database Administration
CEN 6084	3	Advances in Object Oriented Programming for Information Technology

Elective Courses – 21 hours

Select six of the following courses, or other graduate course as approved by the Graduate Director:

CIS 6930	3	Selected Topics: Human Computer Interaction
CTS 6716	3	Network Programming for Information Technology
CIS 6930	3	Selected Topics: Cloud Computing for Information Technology
CIS 6930	3	Selected Topics: Practical Cybersecurity
CIS 6930	3	Selected Topics: Networks II
CIS 6930	3	Selected Topics: Introduction to Hadoop and Big Data
CIS 6930	3	Selected Topics: Software Development for Mobile Devices
ISM 6136	3	Data Mining
ISM 6137	3	Statistical Data Mining
ISM 6145	3	Seminar on Software Testing
ISM 6155	3	Enterprise Information Systems Management
ISM 6266	3	Software Architecture
CAP 6663	3	IT Robotics Applications
CGS 6842	3	IT & Systems for E-Business
CIS 6900	1-19	Independent Study
CIS 6946	0-3	Internships/Practicums/Clinical Practice

With prior permission from the Graduate Director, students can take a maximum of 3 hours of Independent Study or Internship and up to twelve credit hours outside of the major, as follows: three credit hours from the MSCS/MSCE majors; three credit hours outside of the department (e.g. EE, IE, Math); three credit hours on business practice, project management, leadership, entrepreneurship, or similar; three credit hours on big data, data analytics, data mining or similar.

Note: ISM prefix courses are offered by the Department of Information Systems / Decision Sciences (College of Business).

Comprehensive Exam

The requirement for a comprehensive exam is satisfied by the successful completion of the comprehensive exam, an exam that students will take in the semester prior to the semester in which they intend to graduate.

Thesis / Non-Thesis

This is a non-thesis major.

Graduation Requirements

Students must obtain a letter "B" or better in the core graduate courses, have a GPA of 3.00 or better, and pass the comprehensive exam.

Accelerated Majors

Note – Due to accreditation guidelines, Accelerated Majors must total 150 combined credit hours after sharing credit hours. Contact the department for information.

Accelerated B.S.C.P. in Computer Engineering and M.S.I.T. in Information Technology

The B.S.C.P. requires a total of 128 hours and the M.S.I.T. requires 30 hours. By sharing six (6) credit hours, the total credit hours earned will be 152 hours.

Refer to each major for specific admission and curriculum requirements. For consideration in the Accelerated Major, students must:

1. Have completed 15 hours in the undergraduate major
2. Have a minimum 3.33 GPA overall; and
3. Have a minimum undergraduate 3.50 GPA in the major.

Shared Courses (6 credit hours)

Two (2) of the following three (3) core graduate courses replace six (6) credit hours of upper-level departmental (Technical) electives, including Independent Study and Industry Internship:

CEN 6084	Advances in Object Oriented Programming for Information Technology
CIS 6930	Selected Topics: Ethical Hacking for IT
ISM 6218	Advanced Database Administration

Accelerated B.S.I.T. in Information Technology and M.S.I.T. in Information Technology

The B.S.I.T. requires a total of 120 hours and the M.S.I.T. requires 30 hours. By sharing six (6) credit hours, the total credit hours earned will be 144 hours.

Refer to each major for specific admission and curriculum requirements. For consideration in the Accelerated Major, students must:

4. Have completed 15 hours in the undergraduate major
5. Have a minimum 3.33 GPA overall; and
6. Have a minimum undergraduate 3.50 GPA in the major.

Shared Courses (6 credit hours):

Students can take two approved courses at the 6000-level that meet the upper level Technical elective requirement.

COURSES

See <http://www.systemacademics.usf.edu/course-inventory/>

MATERIALS SCIENCE AND ENGINEERING

Master of Science in Materials Science and Engineering (M.S.M.S.E.) Degree

DEGREE INFORMATION

Priority Admission Application Deadlines:

Fall:	February 15
Spring:	October 15
Summer:	February 15

International applicant deadlines:

<http://www.grad.usf.edu/majors>

Minimum Total Hours:	30
Level:	Masters
CIP Code:	14.1801
Dept. Code:	All Engineering Depts. except Computer Science and Engineering
Major/College Codes:	MSE EN
Approved:	2001

Also offered as an Accelerated Major

Chemical Engineering (BSCH)/Materials Science and Engineering (MSMSE)
 Civil Engineering (BSCE) / Materials Science and Engineering (MSMSE)
 Electrical Engineering (BSEE) / Materials Science and Engineering (MSMSE)
 Mechanical Engineering (BSME) / Materials Science and Engineering (MSMSE)

CONTACT INFORMATION

Colleges:	Engineering
Departments:	Chemical & Biomedical Eng Civil Engineering Electrical Engineering Industrial Engineering Mechanical Engineering

Contact Information: www.grad.usf.edu

The field of Materials Science and Engineering (MSE) applies the fundamental principles of physics and chemistry to engineering materials, with a focus on the interrelationship between material structure, their properties, and the means by which they are processed. MSE impacts multiple facets of our economy, such as aerospace, electronics, transportation, communication, construction, recreation, entertainment, environment and energy. It is, by its very nature, an interdisciplinary field. The goal of the M.S.M.S.E. major in Materials Science and Engineering is to provide a route for well-qualified undergraduate students who desire in-depth graduate-level work including structured courses and research experience, in preparation for work in industry or for entrance into a relevant science or engineering Ph.D. major.

ADMISSION INFORMATION

Must meet University Admission and English Proficiency requirements as well as requirements for admission to the major, listed below.

- Bachelor's degree in Engineering (Chemical, Mechanical, Industrial, Civil, Materials Science, Ceramic, Metallurgy, Manufacturing, Polymer and other related engineering disciplines) or Natural Sciences (Physics, Chemistry or Biology) from a regionally accredited institution.
- GRE with preferred minimum scores of V 50%, Q 50% and AW 50%.
- Three letters of recommendation
- Statement of purpose

CURRICULUM REQUIREMENTS

Total Minimum Hours: 30 credit hours

Core Requirements - 5 credit hours

EMA 6510	Characterization of Materials	3
ECH 6931	Graduate Seminar	2

Electives - 19 credit hours minimum

Students will select electives in consultation with the Graduate Director.

Comprehensive Exam

Students in the non-thesis track will complete a comprehensive exam. For students in the thesis track, the thesis and oral defense serve as the comprehensive exam.

Non-Thesis Option - 6 credit hours

At least 26 hours must be at the 6000 level with a maximum of 2 hours of Independent Study. For Non-thesis Option six additional credit hours of elective courses is required in lieu of thesis hours.

Thesis Option - 6 credit hours

At least 16 credit hours must be at 6000 level with a maximum of 2 hours of Independent Study.

ECH 6971 Thesis

Accelerated Majors

Note – Due to accreditation guidelines, Accelerated Majors must total 150 combined credit hours after sharing credit hours. Contact the department for information.

Chemical Engineering (BSCH) / Materials Science and Engineering (MSMSE)

The B.S.C.H. requires a total of 131 hours and the M.S.M.S.E. requires 30 hours. By sharing six (6) credit hours, the total credit hours earned will be 155 hours.

Refer to each major for specific admission and curriculum requirements. For consideration in the Accelerated Major, students must:

1. Have completed 15 hours in the undergraduate major
2. Have a minimum 3.33 GPA overall; and
3. Have a minimum undergraduate 3.50 GPA in the major.

Shared Courses (6 credit hours)

The following courses will satisfy six (6) credit hours of Chemical Engineering undergraduate elective coursework:

EML 6105
EML 6713

Accelerated Civil Engineering (BSCE) / Materials Science and Engineering (MSMSE)

The B.S.C.E. requires a total of 131 hours and the M.S.M.S.E. requires 30 hours. By sharing six (6) credit hours, the total credit hours earned will be 155 hours.

Refer to each major for specific admission and curriculum requirements. For consideration in the Accelerated Major, students must:

1. Have completed 15 hours in the undergraduate major
2. Have a minimum 3.33 GPA overall; and
3. Have a minimum undergraduate 3.50 GPA in the major.

Shared Courses (6 credit hours):

Students can take two approved ECE-prefixed courses at the 6000-level that meet the upper-level Technical elective requirement.

Accelerated Electrical Engineering (BSEE) / Materials Science and Engineering (MSMSE)

The B.S.E.E. requires a total of 128 hours and the M.S.M.S.E. requires 30 hours. By sharing six (6) credit hours, the total credit hours earned will be 152 hours.

Refer to each major for specific admission and curriculum requirements. For consideration in the Accelerated Major, students must:

1. Have completed 15 hours in the undergraduate major
2. Have a minimum 3.33 GPA overall; and
3. Have a minimum undergraduate 3.50 GPA in the major.

Shared Courses (6 credit hours):

Students can take approved EEL-prefixed courses at the 6000-level that meet the upper-level Technical elective requirement.

Accelerated Mechanical Engineering (BSME) / Materials Science and Engineering (MSMSE)

The B.S.M.E. requires a total of 128 hours and the M.S.M.S.E. requires 30 hours. By sharing six (6) credit hours, the total credit hours earned will be 152 hours.

Refer to each major for specific admission and curriculum requirements. For consideration in the Accelerated Major, students must:

1. Have completed 15 hours in the undergraduate major
2. Have a minimum 3.33 GPA overall; and
3. Have a minimum undergraduate 3.50 GPA in the major.

Shared Courses (6 credit hours):

EML 6105	Advanced Thermodynamics and Statistical Mechanics	3
EML 6713	Advanced Fluid Mechanics	3

Courses

See <http://ugs.usf.edu/course-inventory>

MECHANICAL ENGINEERING

Master of Science in Mechanical Engineering (M.S.M.E.) Degree

DEGREE INFORMATION

Priority Admission Application Deadlines:

Fall:	February 15
Spring:	October 15
Summer:	February 15

International applicant deadlines:

<http://www.grad.usf.edu/majors>

Minimum Total Hours:	30
Level:	Masters
CIP Code:	14.1901
Dept. Code:	EGR
Major/College Codes:	EME EN
Approved:	1981

Also offered as an Accelerated Major:

Mechanical Engineering (BSME) / Mechanical Engineering (MSME)

CONTACT INFORMATION

College:	Engineering
Department:	Mechanical Engineering
Contact Information:	www.grad.usf.edu

The Department offers graduate majors leading to the M.S.M.E. and Ph.D. in Mechanical Engineering.

Research opportunities are available in the following areas: Mechanism Design, Kinematics, System Dynamics and Vibrations, Mechanical Controls, Tribology, Mechanical Design, Robotics, Rehabilitation Engineering, Composite Materials, Solid Mechanics, Fluid Dynamics, Thermal Energy Systems, Microelectronic Device Thermal Management, Clean and Renewable Energy Systems, Micro and Nano scale materials and systems, MEMS, Biosensors, Biofluids, Biomedical Engineering, and Engineering Education.

Department facilities include the following laboratories: Computational Fluid Dynamics, Computational Solid Mechanics, Computer-Aided Design, Dynamic Systems, Hydraulics, Rehabilitation Engineering, Robotics, Biofuel cells and Biomimetics, Nanomaterials and Thin Films, Advanced Materials Processing and Characterization, Biofluids and Biosensors, Microelectronic Thermal Management and Heat Transfer, and Compliant Mechanisms.

ADMISSION INFORMATION

Must meet University Admission and English Proficiency requirements as well as requirements for admission to the major, listed below.

- As a rule, only students with a B.S. in Mechanical Engineering or a closely related field from an accredited engineering major will be considered for admission.
- All applicants must take the GRE.
- GRE required, with minimum percentile rank of 50% on the quantitative portion and a minimum average percentile rank of 50% in verbal and quantitative and the student must have a grade point average (GPA) of 3.00/4.00 for the last two years of coursework from an ABET accredited engineering major for admission to the Master's Major. Graduates of non-ABET accredited majors are evaluated on a case-by-case basis.
- A one-page Statement of Purpose/Research Interest must also be included in the application package.

CURRICULUM REQUIREMENTS

Total Minimum Hours:

30 credit hours

Core – 12 credit hours

Additional courses – 18 credit hours

Core Requirements – 12 credit hours

Specialization – 9 hours

All Master's Major students must complete a total of 9 core credit hours from two categories. Students should choose 3 credit hours of course work from each of the following specialization areas:

Fluid and Thermal Science - 3 credit hours

EML 6105:	Advanced Thermodynamics and Statistical Mechanics
EML 6154:	Advanced Conduction Analysis
EML 6713:	Advanced Fluid Mechanics
EML 6930:	Special Problems I: Convection Heat Transfer

Mechanics, Manufacturing, and Materials -3 credit hours

EML 6653:	Applied Elasticity
EML 6930:	Special Problems I: Advanced Manufacturing
EML 6930:	Special Problems I: Advanced Materials
EML 6570:	Fracture Mechanics
EML 6290:	Micro and Nano Manufacturing

Dynamical Systems and Controls - 3 credit hours

EML 6273:	Advanced Dynamics of Machinery
EML 6930:	Special Problems I: Advanced Controls
EML 6930:	Special Problems I: Advanced Vibrations
EML 6801:	Robotic Systems

All students must also complete either

EML 6931: Special Problems II: Advanced Mathematics or

EML 6930: Special Problems I: Advanced Mathematics II in order to satisfy core requirements.

Additional Coursework - 18 credit hours

In addition to these 12 credit hours, the non-thesis option MSME degree requires a minimum of 18 credit hours of approved graduate level coursework, for a total of 30 semester hours. Thesis option M.S.M.E. degree requires 12 credit hours of approved graduate level coursework and a minimum of 6 thesis hours for a total of 30 semester hours.

Comprehensive Exam

For the thesis option, successful defense of the thesis satisfies the comprehensive exam requirement.

For the non-thesis option, in lieu of the comprehensive exam, a portfolio containing project reports submitted as part of the coursework requirement for two out of three specialization areas will be submitted to the Department upon application of graduation. The Graduate Coordinator and Graduate Committee members of the Department will evaluate and approve the portfolio. The portfolio must be successfully completed and approved to satisfy the comprehensive exam requirement for graduation.

Thesis Option- 6 credit hours

EML 6971 Thesis: Master's

Thesis option M.S.M.E. degree requires a minimum of 6 thesis hours. Thesis option MSME students must present a typed final draft to the Supervisory Committee and Graduate Advisor one week before the final oral examination.

The Department of Mechanical Engineering has available, on request, the Mechanical Engineering Graduate Handbook, which delineates the Department's entrance requirements, programs of study, supervisory committee formation, and major completion requirements.

Accelerated Major

Note – Due to accreditation guidelines, Accelerated Majors must total 150 combined credit hours after sharing credit hours. Contact the department for information.

Accelerated B.S.M.E. in Mechanical Engineering and M.S.M.E. in Mechanical Engineering

The B.S.M.E. requires a total of 128 hours and the M.S.M.E. requires 30 hours. By sharing six (6) credit hours, the total credit hours earned will be 152 hours.

Refer to each major for specific admission and curriculum requirements. For consideration in the Accelerated Major, students must:

1. Have completed 15 hours in the undergraduate major
2. Have a minimum 3.33 GPA overall; and
3. Have a minimum undergraduate 3.50 GPA in the major.

Shared Courses (6 credit hours)

The following courses will satisfy six (6) credit hours of Mechanical Engineering elective coursework:

EML 6653 Applied Elasticity

EML 6713 Advanced Fluid Mechanics

COURSES

See <https://www.systemacademics.usf.edu/course-inventory/>

MECHANICAL ENGINEERING

Doctor of Philosophy (Ph.D.) Degree

DEGREE INFORMATION

Priority Admission Application Deadlines:

Fall:	February 15
Spring:	October 15
Summer:	February 15

International applicant deadlines:

<http://www.grad.usf.edu/majors>

Minimum Total Hours:	72
Level:	Doctoral
CIP Code:	14.1901
Dept. Code:	EGR
Major/College Codes:	EME EN
Approved:	1982

CONTACT INFORMATION

College:	Engineering
Department:	Mechanical Engineering
Contact Information:	www.grad.usf.edu

The Department offers graduate majors leading to the M.S. and Ph.D. in Mechanical Engineering.

Research opportunities are available in the following areas: Mechanism Design, Kinematics, System Dynamics and Vibrations, Mechanical Controls, Tribology, Mechanical Design, Robotics, Rehabilitation Engineering, Composite Materials, Solid Mechanics, Fluid Dynamics, Thermal Energy Systems, Microelectronic Device Thermal Management, Clean and Renewable Energy Systems, Micro and Nano scale materials and systems, MEMS, Biosensors, Biofluids, Biomedical Engineering, and Engineering Education.

Department facilities include the following laboratories: Computational Fluid Dynamics, Computational Solid Mechanics, Computer-Aided Design, Dynamic Systems, Hydraulics, Rehabilitation Engineering, Robotics, Biofuel cells and Biomimetics, Nanomaterials and Thin Films, Advanced Materials Processing and Characterization, Biofluids and Biosensors, Microelectronic Thermal Management and Heat Transfer, and Compliant Mechanisms.

ADMISSION INFORMATION

Must meet University Admission and English Proficiency requirements as well as requirements for admission to the major, listed below.

- As a rule only students with an M.S. in Mechanical Engineering or a closely related field will be admitted into the Ph.D. Major.
- Students without an M.S. in Mechanical Engineering may also be admitted but will be required to take
 - a minimum of 6 credit hours from the Fluid and Thermal Sciences area and
 - a minimum of 6 credit hours from the Mechanics and Systems area.
- GRE required, with minimum percentile rank of 60% on the quantitative portion and a minimum average percentile rank of 60% in verbal and quantitative and the student must have a grade point average (GPA) of 3.00/4.00 for the last two years of coursework from an ABET accredited engineering major for admission to the PhD Major. Graduates of non-ABET accredited majors are evaluated on a case-by-case basis.
- A one-page Statement of Purpose/Research Interest must also be included in the application package.

CURRICULUM REQUIREMENTS

Total Minimum Hours:

**72 credit hours (post-bacc)
48 credit hours (post-masters)**

Core – 9 credit hours
Math req – 6 credit hours
Coursework – 21 credit hours
Dissertation – 20 credit hours
Additional coursework or dissertation – 16 credit hours

A minimum of 72 credit hours beyond the baccalaureate degree, of which there must be a minimum of 36 hours of coursework at the 6000 level without counting Independent Study or Special Topics courses and a minimum of 20 hours of dissertation. A minimum of 21 hours of graduate level coursework is required in the student's area of specialization and there must be at least 6 hours of mathematics or statistics and 6 hours of graduate level coursework outside the major area of specialization. All students are required to fulfill the 9 credit hours of core course requirements as outlined below. Courses completed for a Master's degree from another institution may count towards a maximum of 24 credit hours of coursework for the Ph.D. degree only if the transcript shows that the degree requirements were similar to USF and the student did not already get credit for the identical courses at USF. A qualifying examination must be passed before admission to doctoral candidacy.

Core Requirements - 9 credit hours

All Ph.D. Major students must complete a total of 9 core credit hours from each of the following specialization areas.

Fluid and Thermal Science - 3 credit hours

EML 6105: Advanced Thermodynamics and Statistical Mechanics
EML 6154: Advanced Conduction Analysis
EML 6713: Advanced Fluid Mechanics
EML 6930: Special Problems I: Convection Heat Transfer

Mechanics, Manufacturing, and Materials - 3 credit hours

EML 6653: Applied Elasticity
EML 6930: Advanced Manufacturing
EML 6930: Special Problems I: Advanced Materials
EML 6570: Principles of Fracture Mechanics
EML 6290: Micro and Nano Manufacturing

Dynamical Systems and Controls - 3 credit hours

EML 6273: Advanced Dynamics of Machinery
EML 6930: Special Problems I: Advanced Controls
EML 6930: Special Problems I: Advanced Vibrations
EML 6801: Robotic Systems

Mathematics Requirement - 6 credit hours

EML 6931: Special Problems II: Advanced Mathematics
EML 6930: Special Problems I: Advanced Mathematics II

Additional Graduate Level Coursework - 21 credit hours minimum

Qualifying Examination

The purpose of the Qualifying Examination is to determine if the student has acquired sufficient mastery of the subject matter in all relevant fields on his/her program of study to warrant admission to candidacy for the Ph. D. degree. It should be taken as soon as a student has completed a major portion of the coursework requirements. Students must apply to take the qualifying examination no later than the fourth semester after admission into the doctoral major. In order to take the qualifying examination a doctoral student must satisfy the following requirements:

1. Satisfactorily complete (C or better) in departmental coursework on Mathematics and two other areas of specialization (1 major and 1 minor) as described below.
 - a) Mathematics:
 - a. EML 6069: Advanced Mathematics,
 - b. EML 6930: Advanced Mathematics II
 - b) Heat Transfer:
 - a. EML 6154: Advanced Conduction Analysis
 - b. EML 6930: Convection Heat Transfer
 - c) Fluid Mechanics:
 - a. EML6713: Advanced Fluid Mechanics
 - d) Thermodynamics:
 - a. EML6105: Advanced Thermodynamics and Statistical Mechanics
 - e) Dynamics:
 - a. EML6273: Advanced Dynamics of Machinery
 - b. EML6223: Synthesis of Vibrating Systems
 - f) Solid Mechanics:
 - a. EML6653: Applied Elasticity
 - g) Materials:
 - a. EML 6930: Advanced Materials
 - h) Controls:
 - a. EML6930: Advanced Controls
2. Apply in writing to the Graduate Coordinator for permission to take the examination. The application must include a detailed statement of the courses taken, major and minor areas of specialization and must be submitted before October 15th.
3. Students may request an exemption from any required coursework if they have satisfactorily completed (B or better) equivalent coursework at an accredited institution other than USF.

No student will be allowed to take the examination if the cumulative GPA of all courses taken at USF is below 3.0, have not chosen a major professor and formed a supervisory committee, or is holding conditional or provisional admission status in the major.

The examination will be administered by a Departmental Qualifying Examination Committee once a year (in the first two weeks of February), as needed.

1. Written Examination
 - a. Examinations will be given on Mathematics, and student's chosen major and minor areas of specialization. Examinations will be prepared by the qualifying examination committee and will be administered by the graduate coordinator. Composition of the committee will be rotated among all faculty members and determined by the exam areas to be offered. If at all possible, a Ph.D. advisor will not be involved in the evaluation of her/his students. The length of each examination will be approximately three hours of duration.
 - b. The type of written examination, i.e., open book etc., is at the discretion of the assessor.
2. Passing and Advancement to Candidacy
 - a. A student is required to pass the written examination in all 3 areas (Mathematics, major area of specialization, minor area of specialization) for advancement to candidacy.
 - b. In case a student passes in 2 areas and fails in 1 area, a make-up written or oral examination may be requested by the student. The make-up examination will be given during the last two weeks of March.
 - c. In case a student fails the written examination in more than one area or fails the written or oral make-up examination, he or she will need to re-take the entire qualifying examination in the following year.
 - d. Students will be given a maximum of two attempts to pass the qualifying examination. Failure in the second year will result in being dropped from the doctoral major.

Dissertation - 20 credit hours minimum

Additional Coursework or Dissertation - 16 credit hours

Students will select additional coursework or Dissertation hours to complete the remaining 16 credit hours.

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