**Mechanical Engineering program**

**Doctor of Philosophy (Ph.D.) Degree**

**DEGREE INFORMATION**

**Program Admission Deadlines:**

**Fall:** February 15

**Spring:**  October 15

**Summer:** February 15

**Minimum Total Hours:** 72

**Program Level:** Doctoral

**CIP Code:** 14.1901

**Dept. Code:** EGR

**Program (Major/College):** EME EN

**Approved:** 1982

**Concentrations:**

None

**CONTACT INFORMATION**

**College:** Engineering

**Department:** Mechanical Engineering

**Contact Information:** [www.grad.usf.edu](http://www.grad.usf.edu/)

**PROGRAM INFORMATION**

The Department offers graduate programs 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.

**Accreditation:**

Accredited by the Commission on Colleges of the Southern Association of College and Schools.

**ADMISSION INFORMATION**

Must meet University requirements (see Graduate Admissions) as well as requirements listed below.

**Program Admission Requirements**

* As a rule only students with an M.S. in Mechanical Engineering or a closely related field will be admitted into the Ph.D. Program.
* 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 minmum 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 program for admission to the PhD Program. Graduates of non-ABET accredited programs are evaluated on a case-by-case basis.
* International students must score a minimum of 550 on the TOEFL paper-based examination, 79 on the internet-based test, or 213 on the computer-based test.
* A one-page Statement of Purpose/Research Interest must also be included in the application package.

**DEGREE PROGRAM REQUIREMENTS**

**Total Minimum Program 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 redit 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 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 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. Program students must complete a total of9 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 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 program.

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.

1. Mathematics:
   1. EML 6069: Advanced Mathematics,
   2. EML 6930: Advanced Mathematics II
2. Heat Transfer:
   1. EML 6154: Advanced Conduction Analysis
   2. EML 6930: Convection Heat Transfer
3. Fluid Mechanics:
   1. EML6713: Advanced Fluid Mechanics
4. Thermodynamics:
   1. EML6105: Advanced Thermodynamics and Statistical Mechanics
5. Dynamics:
   1. EML6273: Advanced Dynamics of Machinery
   2. EML6223: Synthesis of Vibrating Systems
6. Solid Mechanics:
   1. EML6653: Applied Elasticity
7. Materials:
   1. EML 6930: Advanced Materials
8. Controls:
   1. 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 program.

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

1. 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.
2. The type of written examination, i.e., open book etc., is at the discretion of the assessor.

2. Passing and Advancement to Candidacy

1. 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.
2. 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.
3. 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.
4. 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 program.

**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.

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

**COURSES**

See [http://ugs.usf.edu/course-inventory](http://www.ugs.usf.edu/sab/sabs.cfm)