

MECHANICAL ENGINEERING GRADUATE PROGRAM HANDBOOK

FOR STUDENTS STARTED THEIR PROGRAM IN FALL 18 / SPRING19

UNIVERSITY OF SOUTH FLORIDA

**COLLEGE OF ENGINEERING
4202 E. FOWLER AVENUE, ENB 118
TAMPA, FLORIDA 33620-5350**

TEL: (813) 974-2280

FAX: (813)-974-3539

<http://me.eng.usf.edu>

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PREFACE

This booklet outlines the various departmental requirements and procedures that apply to all graduate students in the Mechanical Engineering Department and is subject to modification. **The contents of this booklet are supplementary to the rules and regulations of the Graduate School and the College of Engineering requirements and should be used only in that context.** Detailed information on Graduate School requirements and procedures can be found in the Graduate Catalog and in the Graduate School website (www.grad.usf.edu)

ENTRANCE REQUIREMENTS

MASTERS DEGREES: As a rule, only students with a B.S. in Mechanical Engineering or a closely related field from an accredited engineering program will be considered for admission. All applicants must take the General Test of the Graduate Record Examination (GRE). The student must have a grade point average (GPA) of 3.0/4.0 for the last two years of course work from an ABET accredited engineering program and a minimum percentile rank of 50% on the quantitative portion and a minimum average percentile rank of 50% in verbal and quantitative must be obtained for admission to the Master's Program. Graduates of non-ABET accredited programs are evaluated on a case-by-case basis. For admission to the accelerated Master's degree program (BSME-MSME), students need to have a minimum cumulative GPA of 3.5 at the time of admission. Exceptions can be considered with respect to GPA or/and GRE with written recommendation by any current ME faculty member. International students must score a minimum of 79 on the Test of English as a Foreign Language (TOEFL) examination.

Ph.D DEGREE: As a general rule, only students with a M.S. in Mechanical Engineering or a closely related field from an accredited engineering program will be admitted into the Ph.D. Program. Students without a M.S. or with an M.S. in another field may also be admitted on a case-by-case basis. All applicants must take the General Test of the Graduate Record Examination (GRE). The student must have a grade point average (GPA) of 3.0/4.0 for the last two years of course work from an ABET accredited engineering program and a minimum percentile rank of 60% on the quantitative portion and a minimum average percentile rank of 60% in verbal and quantitative must be obtained for admission to the Ph.D. Program. Graduates of non-ABET accredited programs are evaluated on a case-by-case basis. Exceptions can be considered with respect to GPA or/and GRE with written recommendation by any current ME faculty member. International students must score a minimum of 79 on the Test of English as a Foreign Language (TOEFL) examination.

PROGRAM OF STUDY

MASTERS DEGREES: The department offers two Masters degrees: (1) Master of Science in Mechanical Engineering (MSME), without thesis and (2) Master of Science in Mechanical Engineering (MSME), with thesis. Both thesis and non-thesis options require 30 credit hours of graduate course work.

The MSME degree is awarded to students who have a B.S.M.E., have been accepted by the program and completed the necessary requirements as outlined below.

All Masters Program students must complete a total of 9 core credit hours from three categories. Students must choose 3 credit hours of course work from each of the following specialization areas:

Fluid and Thermal Science

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

Mechanics, Manufacturing and Materials

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

Dynamical Systems and Controls

- EML 6273: Advanced Dynamics
- EML 6930: Advanced Controls
- EML 6223: Synthesis of Vibrating Systems
- EML 6801: Robotic Systems

All Masters Program students must also complete either EML 6069: Advanced Mathematics or EML 6930: Advanced Mathematics II in order to satisfy core requirements.

In addition to these 12 credit hours, the MSME degree without thesis option requires a minimum of 18 credit hours of approved coursework, for a total of 30 semester hours. Students who select the MSME degree without the thesis option will not be eligible for Departmental Graduate Assistantships. The MSME with thesis option requires a minimum of 12 credit hours of approved coursework and a minimum of 6 thesis hours for a total of 30 semester hours.

A minimum of six credit hours of additional coursework is to be chosen from the three categories shown above and/or from any EML class offered by the department. Independent Study is not considered regular class and is not included in this group.

A maximum of six credit hours of Independent Study course offered by the Mechanical Engineering Department and/or 6000-level non-EML coursework may be credited towards a degree. Undergraduate courses will not be eligible for graduate credit.

In order to graduate, MSME degree with thesis option candidates must also successfully defend an original thesis.

A GPA of 3.0 or higher is required for graduation and no grade below a "C" can be applied towards the degree.

Students should be aware that only courses approved by their graduate advisor and Graduate Program Coordinator will count towards their degree. The student's faculty advisor and the Graduate Coordinator must approve the selection of courses.

Ph.D DEGREE: This degree requires 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 18 hours of coursework is required in the student's area of concentration and there must be at least 6 hours of mathematics or statistics and 6 hours of coursework outside the major area of concentration. All students are required to fulfill the 9 credit hours of core course requirements as outlined under the Masters programs. 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.

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.
 - a) Mathematics:
 - a. Graduate courses - Advanced Mathematics, Advanced Mathematics II
 - b) Heat Transfer:
 - a. Undergraduate courses - Heat Transfer
 - b. Graduate courses - Conduction Heat Transfer, Convection Heat Transfer
 - c) Fluid Mechanics:
 - a. Undergraduate courses – Fluid Systems
 - b. Graduate courses - Advanced Fluids
 - d) Thermodynamics:
 - a. Undergraduate courses – Thermo I, Thermal Systems
 - b. Graduate courses - Advanced Thermodynamics
 - e) Dynamics:
 - a. Undergraduate courses – Dynamics, Vibrations, Kinematics and Dynamics of Machinery
 - b. Graduate courses - Advanced Dynamics of Machinery, Synthesis of Vibrating Systems
 - f) Solid Mechanics:
 - a. Undergraduate courses – Mechanics of Solids, Machine Design
 - b. Graduate Courses - Applied Elasticity
 - g) Materials:
 - a. Undergraduate courses – Materials I
 - b. Graduate courses - Advanced Materials
 - h) Controls:
 - a. Undergraduate courses – Controls
 - b. Graduate courses - Advanced Controls
2. Apply in writing to the Graduate Program 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 (typically during 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 Program 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 program.

MAJOR PROFESSOR AND SUPERVISORY COMMITTEE

The course of study for all graduate students must be approved by their major professor. Consequently, it is important for all graduate students to meet the faculty, determine their fields of interest, and select one faculty member as a major professor and others as supervisory committee members. The committee must be approved and appointed by the department chairman or his representative. For the Masters degree with thesis option, a major professor and two committee members are required. For a Ph.D. degree a major professor and a minimum of four additional members are required, one of which must be from a different engineering department and one from another college. All students that chose their major professor outside of the department must have a ME faculty member as a co-major professor.

Formation of the supervisory committee must be completed during the first academic year of study. Failure to comply with this requirement may result in the loss of financial aid. Students may make changes to the supervisory committee up until the semester before the graduation semester.

UNDERGRADUATE COURSE PREREQUISITES

Students entering the Masters and Ph.D. Degree programs must have completed the following courses in their undergraduate Mechanical Engineering curriculum:

a) **Mathematics**: Calculus I, II, III and Differential Equations.

b) **Mechanical Engineering**: Thermodynamics, Heat Transfer, Fluid Mechanics, Machine Design, and Solid Mechanics.

Students entering from disciplines other than Mechanical Engineering will be required to make up any deficiencies before starting their graduate work.

NON-DEGREE SEEKING STUDENTS

Students who are qualified to enroll in specific graduate courses, but who do not intend to work toward a graduate degree may enroll as non-degree seeking students. Non-degree students may enter classes on a space available basis during the first week of each semester by obtaining consent of the course instructor and Graduate Program Coordinator. Students must meet pre-requisites of courses in which they wish to enroll.

NO MORE THAN FIFTEEN HOURS OF CREDIT EARNED AS A NON-DEGREE STUDENT MAY BE APPLIED TO SATISFY GRADUATE DEGREE REQUIREMENTS.

Any application of such credit must be approved by the degree granting college, students must earn a grade of B or better and the course must be suitable to the program. This track for entering graduate study has been found especially helpful to students in industry who seek special training in specified areas of graduate instruction, but are uncertain as to pursuing a degree. Students who miss the deadline for admission to the Graduate Program may also take courses as a non-degree seeking student while their admission to the Graduate Program is being evaluated.

COMPLETION OF THE PROGRAM

All degree seeking graduate students, excluding students admitted to candidacy, must be enrolled in at least one term (Fall, Spring, Summer) during the previous 12 months. Students who have not enrolled in any of the last three terms will be dropped from their degree program and changed to inactive. Students may reapply to the University by submitting a new application. Applicants will be subject to the admission criteria in effect at that time. Students may request exceptions to this policy, for legitimate and valid reasons, through their Department, College, and the Graduate School.

It is the student's responsibility to apply for graduation through the Mechanical Engineering Department by the posted College of Engineering deadline. Students must also submit a defense announcement to the department at least 2 weeks prior to the scheduled defense date. Graduate students must be registered for a minimum of two hours the semester they graduate.

MASTERS DEGREES

- Before graduating, the MSME with thesis track students must prepare a thesis and present it to the Supervisory Committee. **The student must present a typed final draft to the Supervisory Committee and Graduate Advisor one week before the final oral examination.**
- MSME without thesis track students must submit two project reports completed as part of the EML coursework requirement to the Graduate Program Coordinator during the semester of graduation for evaluation and assessment. Failing to respond to request will prevent students from graduation.
- All work applicable to the Masters degree requirements must be completed within five years from the time the student is first admitted into his/her program.

Ph.D DEGREE

- Students must be admitted to candidacy before they register for dissertation hours. See the USF Graduate catalog for requirements for admission to candidacy.
- The student must conduct an investigation resulting in an original and significant contribution to the knowledge in the chosen field of research. Students in the Ph.D. program must take a minimum of 20 hours of doctoral dissertation credits.
- Once admitted to candidacy, students must enroll for a minimum of 2 credit hours each semester of the academic year until completion of the program.
- Before graduating, the Ph.D. students must prepare a dissertation and present it to the Supervisory Committee. **The student must present a typed final draft to the Supervisory Committee and Graduate Advisor two weeks before the final oral examination.**
- All work applicable to the Ph.D. requirements must be completed within seven years from the time the student is first admitted into his/her program.

MECHANICAL ENGINEERING FACULTY AND AREAS OF SPECIALIZATION

Rajiv Dubey (Professor/Chair) Ph.D.; Clemson University, 1986; Rehabilitation Robotics; Prosthetics and Orthotics; Dynamic Systems and Controls; dubey@usf.edu

Jonathan Gaines (Instructor) Ph.D.; Virginia Tech, 2011; Human-Robot Collaborative Systems, Co-Robotics Technology for Non-Traditional Populations, STEM Education, Sensor Perception; gainesj@usf.edu.

Nathan Gallant (Associate Professor) Ph.D.; Georgia Institute of Technology, 2004; Biomaterials and Tissue Engineering; ngallant@usf.edu

Miguel Goni Rodrigo (Instructor) Ph.D.; Boston University, 2018; Nanoscale Heat Transfer and Solid Mechanics; mgonirodrigo@usf.edu

Rasim Guldiken (Associate Professor/Graduate Program Coordinator) Ph.D.; Georgia Institute of Technology, 2008; Microfluidics and Acoustics; guldiken@usf.edu

Daniel P. Hess (Professor) Ph.D.; State University of New York at Buffalo, 1991; Vibrations, Friction, Fasteners; hess@usf.edu

Autar K. Kaw (Professor) Ph.D.; Clemson University, 1987; Engineering Education Research, Mechanics; kaw@usf.edu

Ashok Kumar (Professor) Ph. D.; North Carolina State University, Raleigh 1992; Nanomaterials, Microelectronics, Thin Film Technology; kumar@usf.edu

Craig Lusk (Associate Professor) Ph.D.; Brigham Young University 2005; Compliant Mechanisms and Biomechanics; clusk2@usf.edu

Ajit Mujumdar (Instructor/ Undergraduate Advisor) Ph.D.; New Jersey Institute of Technology, 2003; Powder Technology, Discrete Element Simulations; ajit@usf.edu

David Murphy (Assistant Professor) Ph.D.; Georgia Institute of Technology, 2012; Biofluid Mechanics; davidmurphy@usf.edu

Jose L.F. Porteiro (Professor) Ph.D.; Rutgers University 1980; Fluid Mechanics, Heat Transfer; porteiro@usf.edu

Frank Pyrtle, III (Instructor) Ph.D.; Georgia Institute of Technology 2005; Thermal Management, Heat Transfer; pyrtle@usf.edu

Kyle Reed (Associate Professor) Ph.D.; Northwestern, 2007; Rehabilitation Engineering and Haptics; kylereed@usf.edu

Oscar Rios (Instructor) Ph.D.; University of California, San Diego, 2017; Dynamics, Robotics, and Ocean Wave Energy; rios@usf.edu

Alex A. Volinsky (Associate Professor) Ph.D.; University of Minnesota 2000; Thin Films Processing, Mechanical Properties and Characterization; volinsky@usf.edu

Stuart Wilkinson (Associate Professor) Ph. D.; University of Southampton, 1984; Energy Systems Design, Bionomic Engineering; wilkinso@usf.edu

Gulfem Ipek Yucelen (Instructor) Ph.D.; Georgia Institute of Technology, 2012; Nanoscale Materials; giy@usf.edu

Tansel Yucelen (Assistant Professor) Ph.D.; Georgia Institute of Technology, 2012; Systems and Control; yucelen@usf.edu

Mike Cai Wang (Assistant Professor) Ph.D.; University of Illinois at Urbana-Champaign, 2018; Nano-Science/Nano-Manufacturing, Interfacial/Surface Phenomena; mcwang@usf.edu

IMPORTANT CONTACTS FOR GRADUATE STUDENTS

GRADUATE ADMISSIONS

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ENGINEERING DEAN'S OFFICE

ENB 105
(813) 974-3780

DEPARTMENT OF MECHANICAL ENGINEERING CONTACTS

Dr. Rasim Guldiken
Graduate Program Coordinator
Department of Mechanical Engineering
University of South Florida
4202 E. Fowler Ave. ENB 118
Tampa, FL 33620-5350
(813) 974-5628
guldiken@usf.edu

Dr. Rajiv Dubey
Department Chair
Department of Mechanical Engineering
University of South Florida
4202 E. Fowler Ave. ENB 118
Tampa, FL 33620-5350
(813) 974-5619
dubey@usf.edu