MECHANICAL ENGINEERING GRADUATE PROGRAM HANDBOOK

FOR STUDENTS WHO STARTED THEIR PROGRAM
FALL 2024

UNIVERSITY OF SOUTH FLORIDA

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PREFACE

This handbook outlines the various departmental requirements and procedures applicable to all graduate students in the Mechanical Engineering Department and is subject to modification. **This booklet's contents are supplementary to the rules and regulations of the Office of Graduate Studies (OGS) 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 the Graduate School website (https://www.usf.edu/graduate-studies/)

ENTRANCE REQUIREMENTS

Students entering the graduate programs must have completed the following courses in their undergraduate Mechanical Engineering curriculum: Calculus I, II, III, Differential Equations, Thermodynamics, Heat Transfer, Fluid Mechanics, Dynamics, and Solid Mechanics. Students entering from disciplines other than Mechanical Engineering will be required to make up for any deficiencies before starting their graduate coursework.

MASTERS DEGREE: Only students with a B.S. in Mechanical Engineering or a closely related field from an accredited engineering program will be considered for admission. 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. Graduates of non-ABET accredited programs are evaluated on a case-by-case basis. International students must also meet the University Admission and English Proficiency requirements. GRE scores are not required but may be submitted for consideration.

Ph.D. DEGREE: Students with a B.S. or M.S. in Mechanical Engineering or a closely related field from an accredited engineering program may be admitted into the Ph.D. Program. Students with a B.S. or M.S. degree 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 GPA of 3.0/4.0 in the M.S. or for the last two years of an ABET-accredited B.S. program. Additionally, a minimum percentile rank of 60% on the quantitative portion and a minimum average percentile rank of 60% in the quantitative and verbal components of the GRE is required for admission to the Ph.D. Program. Exceptions may be considered concerning GPA or GRE with a written recommendation by a current USF Mechanical Engineering faculty member. Graduates of non-ABET accredited programs are evaluated on a case-by-case basis. International students must also meet the University Admission and English Proficiency requirements.

PROGRAM OF STUDY

MASTERS DEGREES: The department offers two Master's degree programs: (1) Master of Science in Mechanical Engineering (MSME) without thesis, and (2) Master of Science in Mechanical Engineering (MSME) with thesis. All MSME Program students must successfully complete 30 credit hours of graduate coursework and meet the following requirements:

MSME degree requirements (30 credit hours total)

Required courses
EML6105: Advanced Thermodynamics and Statistical Mechanics
EML6653: Applied Elasticity
EML6069: Advanced Mathematics I OR EML6060: Advanced Mathematics II
Minimum additional EML coursework
9 credit hours of Mechanical Engineering coursework (EML6xxx)[1,2]
Maximum allowed
6 credit hours of approved coursework outside Mechanical Engineering
3 credit hours of Independent Study or Graduate Internship
Without Thesis
Minimum 27 credit hours of coursework[2]
With Thesis
Minimum 21 credit hours of coursework[2]
Maximum 6 credit hours of Thesis

MSME degree with thesis option candidates must also successfully defend an original thesis presented to a MS Thesis Committee to graduate. Undergraduate courses cannot be counted towards any graduate degree.

A GPA of 3.0 or higher is required for graduation. Any grade below a "C" will be calculated in the GPA but will not satisfy the credit hours applied towards graduation. Failure to maintain a 3.0 cumulative GPA at anytime will result in Probationary Status and may result in suspension of Graduate Assistantships or dismissal from the program. Students should be aware that only courses approved by the Graduate Program Director will count towards graduation, and students who select the MSME degree without the thesis option will not be eligible for Departmental Graduate Assistantships.

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 5XXX or 6XXX level coursework, without counting Directed Research, Independent Study or Graduate Internship, and a minimum of 20 hours of Dissertation. Courses completed for a Master's degree (post-M.S.) may count towards a maximum of 30 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 same courses at USF.

All Ph.D. students must successfully complete:
1) EML6105: Advanced Thermodynamics and Statistical Mechanics;
2) EML6653: Applied Elasticity; and
3) EML6060 or EML6069: Advanced Mathematics I or II

A minimum of 18 hours of coursework is required in the student's area of concentration,

1 EMA6510 Characterization of Materials is also considered a Mechanical Engineering course
2 Independent Study and Graduate Internship courses are excluded

and there must be at least 6 hours of mathematics or statistics and 6 hours of coursework outside the primary area of concentration. Undergraduate courses will not count towards your graduate degree. A GPA of 3.0 or higher is required for graduation, and no grade below a "C" can be applied towards graduation. Failure to maintain a 3.0 cumulative GPA at anytime will result in Probationary Status and may result in suspension of Graduate Assistantships or dismissal from the program. Students should be aware that only courses approved by their graduate advisor and Graduate Program Director will count towards graduation.

Ph.D. Candidacy: The purpose of qualifying for candidacy is to certify that a student possesses the fundamental knowledge and research skills necessary to complete their Ph.D. dissertation. Entrance to doctoral candidacy involves successful completion of the Written and Oral Qualifying Examinations and fulfilment of the Select Course GPA Requirement.

1. Select Course GPA Requirement. In addition to the core course requirements, students must fulfill a GPA requirement by the end of their second year in the Ph.D. program. Students must achieve a cumulative GPA of 3.5 or better for four (4) classes taken from the list of courses below. Students may re-take the classes in which they received a grade of B or below or take additional classes from this set until the required cumulative 3.5 GPA (for the 4 classes) is achieved. If a student re-takes a course, the new course grade may replace the old course grade in this GPA requirement calculation.

Applied Elasticity
Advanced Thermodynamics
Advanced Mathematics I or II
Advanced Controls
Robotics
Advanced Fluids
Advanced Manufacturing
Advanced Materials
Advanced Dynamics of Machinery
Aerodynamics

Students entering the Ph.D. program with a MS degree may use previous equivalent coursework to partially fulfill the requirement. A letter written by the student that includes a syllabus showing course equivalence and a transcript can be used to petition for GPA credit toward this requirement for up to two (2) courses taken toward an M.S. degree at another university.

2. Qualifying Examinations: The Written and Oral Qualifying Examinations test the student's ability to formulate a study that will produce a significant new contribution to knowledge in their field. For the written examination, each student will produce a document that includes a literature review and an original research proposal. For the oral examination, they will defend their proposal in front of their Ph.D. supervisory committee (Ph.D. committee). This proposal is meant to focus the student's research plans and facilitate communication between the student and the Ph.D. committee. In addition, the exam may test knowledge of core ME subjects.

No student will be allowed to take the examination if their cumulative GPA of all graduate courses taken at USF is below 3.0; if they have not chosen a major professor and formed

a supervisory committee; if they are not registered for at least 2 credit hours; or if they are holding conditional or provisional admission status in the program. Students are expected to pass the Qualifying Exam within two years from entry to the Ph.D. program, and a maximum of two attempts to pass the Exam are permitted with committee approval. The Qualifying Exam is graded pass/fail separately for the written and oral examination components. An overall passing grade requires passing both the written and oral examination components. The Ph.D. committee should be updated in a timely manner following any major changes to the research scope or objectives after passing the Research Proposal.

Written Qualifying Examination: Students must write a Research Proposal related to their selected dissertation project following the guidelines below. Students are encouraged to consult with their Ph.D. adviser and Ph.D. committee about the preparation of the document; however, the document must be the work of the student. The document must be given to the Ph.D. committee at least 7 days prior to the oral defense.
The document is graded pass/fail by the Ph.D. committee based on the following criteria:

- *Does the student provide a comprehensive survey of the literature related to their proposed research topic?*
- *Does the student show knowledge in core engineering subjects?*
- *Does the student provide a sound rationale for the proposed research (e.g., objectives, methods, and goals)?*
- *Does the student propose research that would be a significant contribution to their field?*
- *Does the student clearly identify the main contributions of the proposed research?*
- *Does the student demonstrate the ability to communicate scientifically?*

Oral Qualifying Examination: Students must give a short (approximately 30-40 min) oral presentation to their Ph.D. committee based on their written examination document. This seminar-style public presentation is followed by a closed question and answer session with the Ph.D. committee. The committee will evaluate the student's competency in fundamental and applied knowledge related to their research field and the rationale of their proposed dissertation research. The proposal presentation must be announced publicly at least 7 days prior to the oral defense (assisted by department administrators).

Written Qualifying Examination Guidelines
Students should prepare a Research Proposal document according to the following guidelines. These guidelines are highly recommended, but not required by the Ph.D. committee.
Formatting: The Research Proposal document should be prepared following the USF Ph.D. dissertation template, which may be found, along with formatting guidelines, on the USF Graduate School Thesis and Dissertation website: https://www.usf.edu/graduate-studies/students/electronic-thesis-dissertation/etd-formatting-requirements/index.aspx.
The Main Body of the document should be formatted single-sided, double-spaced, with 1-inch margins.
General: The document needs to include a Title Page, Table of Contents, Abstract, Main Body and References. The Main Body should be of sufficient length to satisfy the grading

criteria above and include the following sections:

- Introduction
  This section should include a brief introduction with the motivation, problem statement, and main contributions.
- Review of the Relevant Literature
  This section needs to:
  - provide a comprehensive review of the most relevant and important research papers related to the proposed field of study,
  - reflect understanding of the research methods, equations, and theories reviewed, and
  - highlight gaps in knowledge that need to be addressed with further research (i.e., proposed research studies).
- Research Proposal
  This section should include a description of:
  - research goals, specific aims and/or tasks to complete,
  - major tools and techniques that will be used to achieve research goals,
  - preliminary findings and/or completed studies,
  - potential problems and alternative approaches,
  - timeline to completion, and
  - novelty and impact of the proposed research (e.g., new scientific understanding, new properties, and/or societal or economic benefits).

Passing and Advancement to Candidacy

a. A student is required to pass the written and oral examination components to satisfy this requirement.
b. The Ph.D. committee may allow a second attempt for an unsatisfactory qualifying examination. Failure in the second attempt will result in dismissal from the doctoral program.
c. As part of their supervisory role, the Ph.D. committee may require additional course work or training, or recommend changes to the research plan, independent of their examination pass/fail decision.
d. The qualifying exam must be passed by the end of the third year in the Ph.D. program and the student must enter into candidacy at least one year prior to graduation.
e. The GPA requirement must be satisfied with student identified coursework from the approved list.
f. The student must be registered for a minimum of 2 credit hours in the semester that they apply for candidacy.

MAJOR PROFESSOR AND SUPERVISORY COMMITTEE

The Course of Study for all graduate students pursuing a thesis or dissertation must be approved by their major professor. Consequently, all graduate students need to meet the faculty, determine their fields of interest, and select one faculty member as a major professor and additional faculty as supervisory committee members. The committee must be approved and appointed by the Graduate Program Director. For the

Master's degree with a 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 outside the College of Engineering. The formation of the supervisory committee must be completed during the first two academic years 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.

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 register 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 the consent of the course instructor and Graduate Program Director. Students must meet the pre-requisites of courses in which they wish to enroll. A maximum 15 hours of credit earned as a non-degree student may be applied to satisfy MSME degree requirements. To transfer these credits into the degree program, students must earn a grade of B or better, and the course must be suitable for the program. This track for entering graduate study has been found especially helpful to students in industry who seek specialized 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 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 two weeks before 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. The successful thesis defense satisfies the graduate degree requirement for a comprehensive exam.

- MSME without thesis track students must submit two project reports completed as part of the EML coursework requirement to the Graduate Program Director during the semester of graduation for evaluation and assessment. This project portfolio satisfies the graduate degree requirement for a comprehensive exam. Failure to submit will delay graduation certification.

- All work applicable to the Master's degree requirements must be completed within five years from the time the student is first admitted into his/her program.

Ph.D. DEGREE

- The student must conduct an investigation that results in an original and significant contribution to the chosen field of research.

- Students must be admitted to candidacy before they register for dissertation hours. 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

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