MECHANICAL ENGINEERING

Program Information

The Department of Mechanical and Aerospace Engineering offers the degrees of Master of Science (thesis or non-thesis), Master of Engineering (thesis or non-thesis), and Doctor of Philosophy in Mechanical Engineering. Official minimum requirements for these degrees are given in the Graduate Degrees (http://gradcatalog.ufl.edu/graduate/degrees/) section of this catalog.

Master of Science & Master of Engineering

Any Master’s degree candidate will pursue the Master of Science degree (M.S.), however only those holding ABET-accredited baccalaureate degrees in engineering may choose the Master of Engineering degree (M.E.). All other degree requirements remain the same. A Master’s degree candidate should establish a Plan of Study by the end of the second term of enrollment. As the candidate progresses toward their degree, any deviations in their program from an approved Plan of Study should be recorded by the submission of a revised Plan of Study. A Master’s degree candidate seeking a thesis option must form a supervisory committee by the end of the second term of enrollment and the supervisory committee must approve the Plan of Study. A Master’s degree candidate seeking a non-thesis option submits a self-guided Plan of Study.

A total of 30 credit hours is required for the Master’s degree. Of this total, at least 18 credits of coursework (excluding S/U courses) must be in the student’s major field of study. Technical courses from other fields may be used to satisfy remaining credits, so long as they are graduate level courses (5000 and above, excluding S/U courses).

The Master’s degree, with thesis option, includes a minimum of 24 graded credit hours of coursework (excluding S/U courses), up to 6 credit hours of EAS5971 Research for Master’s Thesis, and up to 3 credit hours of EGN5949 Practicum/ Internship/ Cooperative Work Experience. For a Master’s degree candidate pursuing the non-thesis degree option, a minimum of 27 graded credit hours (excluding S/U courses) is required, and up to 3 credit hours of EGN5949 Practicum/ Internship/ Cooperative Work Experience may be used.

For both the thesis and non-thesis degrees, up to 6 credit hours of out of department coursework at the 3000 or 4000 level (excluding EGN courses and S/U courses) may be completed to satisfy degree requirements, as long as the coursework completed is included in an approved Plan of Study.

A comprehensive final examination is required by the Graduate School for a master’s student taking the non-thesis option for the M.S. degree. The exam may not be scheduled earlier than the term in which the degree is to be conferred. The non-thesis option M.S. degree program students who apply for degree certification will be automatically enrolled in the final examination. Students should select an examination based on any three core courses, that are listed in Plan of Study worksheet. NOTE: If the expected graduation term is extended more than one semester beyond when the student applied for graduation, then the exam will need to be retaken.

Doctor of Philosophy

The Doctor of Philosophy (Ph.D.) is a research intensive degree requiring independent mastery of a field of knowledge. As such, considerable flexibility is allowed by the Graduate School and by MAE in the tailoring of individual programs.

All Ph.D. students must take a minimum of 39 graded credit hours (excludes S/U graded courses) beyond the B.S. degree. Work in the major must be in courses numbered 5000 or above. For work outside the major, 6 credits of courses numbered 3000 or above may be taken if part of an approved plan of study.

Students must form a Ph.D. supervisory committee and must complete a Plan of Study by the end of the third term of enrollment. As the student progresses toward the degree, any significant deviations in their program from the approved Plan of Study should be discussed and approved by the student’s advisor, and recorded in the submission of a revised Plan of Study.

Guidelines for Plan of Study

During the first year of graduate study, each student should complete a minimum of three didactic courses in the Fall and Spring semesters. Generally, core courses are included, as well as an appropriate mix of elective courses. Ph.D. students must include coursework to satisfy Ph.D. Basic Skills course requirements and to prepare for the Ph.D. Candidacy Exam.

For more information, please reference the MAE degree programs and requirements (http://www.mae.ufl.edu/current/graduate/degree-programs-requirements/) (http://www.mae.ufl.edu/current/graduate/degree-programs-requirements/) (http://www.mae.ufl.edu/current/graduate/degree-programs-requirements/) (http://www.mae.ufl.edu/current/graduate/degree-programs-requirements/) (http://www.mae.ufl.edu/current/graduate/degree-programs-requirements/) (http://www.mae.ufl.edu/current/graduate/degree-programs-requirements/) (http://www.mae.ufl.edu/current/graduate/degree-programs-requirements/) (http://www.mae.ufl.edu/current/graduate/degree-programs-requirements/) (http://www.mae.ufl.edu/current/graduate/degree-programs-requirements/).

Degrees Offered

Degrees Offered with a Major in Mechanical Engineering

- Doctor of Philosophy
  - without a concentration
  - concentration in Clinical and Translational Science
- Master of Science

Requirements for these degrees are given in the Graduate Degrees (http://gradcatalog.ufl.edu/graduate/degrees/) section of this catalog.

Courses

Mechanical and Aerospace Engineering

Departmental Courses

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<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
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<tbody>
<tr>
<td>BME 5580</td>
<td>Introduction to Microfluidics and BioMEMS</td>
<td>3</td>
</tr>
<tr>
<td>EAS 5242</td>
<td>Mechanics of Composite Materials</td>
<td>3</td>
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EAS 5938 Special Topics in Aerospace Engineering 1-4
EAS 6138 Gasdynamics 3
EAS 6242 Advanced Structural Composites 3
EAS 6403 Spacecraft Attitude Dynamics 3
EAS 6413C Spacecraft Attitude Estimation and Control 3
EAS 6415 Guidance and Control of Aerospace Vehicles 3
EAS 6416 Robust and Adaptive Control for Aerospace Systems 3
EAS 6905 Individual Projects in Aerospace Engineering 1-3
EAS 6910 Supervised Research 1-5
EAS 6939 Special Topics in Aerospace Engineering 1-6
EAS 6940 Supervised Teaching 1-3
EAS 6971 Research for Master’s Thesis 1-15
EAS 7979 Advanced Research 1-12
EAS 7980 Research for Doctoral Dissertation 1-15
EGM 5111L Experimental Stress Analysis 3
EGM 5121C Data Measurement and Analysis 3
EGM 5423 High Strain Rate Behavior of Materials 3
EGM 5533 Applied Elasticity and Advanced Mechanics of Solids 3
EGM 5584 Biomechanics of Soft Tissue 3
EGM 5586 Modeling and Control of Biomolecular Machines 3
EGM 5816 Intermediate Fluid Dynamics 3
EGM 6321 Principles of Engineering Analysis I 3
EGM 6322 Principles of Engineering Analysis II 3
EGM 6341 Numerical Methods of Engineering Analysis I 3
EGM 6342 Fundamentals of Computational Fluid Dynamics 3
EGM 6352 Advanced Finite Element Methods 3
EGM 6355 Structural Optimization 3
EGM 6370 Principles of Fracture Mechanics 3
EGM 6611 Continuum Mechanics 3
EGM 6671 Inelastic Materials 3
EGM 6812 Fluid Mechanics I 3
EGM 6813 Fluid Mechanics II 3
EGM 6855 Bio-Fluid Mechanics and Bio-Heat Transfer 3
EGM 6905 Individual Study 1-6
EGM 6934 Special Topics in Engineering Mechanics 1-6
EGM 6936 Graduate Seminar 1
EGM 7819 Computational Fluid Dynamics 3
EGM 7845 Turbulent Fluid Flow 3
EGM 7979 Advanced Research 1-12
EGM 7980 Research for Doctoral Dissertation 1-15
EGN 5949 Practicum/Internship/Cooperative Work 1-6
EGN 6640 Entrepreneurship for Engineers 3
EGN 6693 Engineering Graduate Research 0-3
EGN 6695 Engineering Capstone 3
EML 5045 Computational Methods for Design and Manufacturing 3
EML 5104 Classical and Statistical Thermodynamics 3
EML 5131 Combustion 3
EML 5215 Analytical Dynamics I 3
EML 5223 Structural Dynamics 3
EML 5224 Acoustics 3
EML 5233 Failure of Materials in Mechanical Design 3
EML 5311 Control System Theory 3
EML 5318 Computer Control of Machines and Processes 3
EML 5465 Energy Management for Mechanical Engineers 3

College of Engineering Courses

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<tr>
<th>Code</th>
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<tr>
<td>EEE 534L</td>
<td>Semiconductor Device Fabrication Laboratory</td>
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<td>EEE 5776</td>
<td>Applied Machine Learning</td>
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<tr>
<td>EEE 6778</td>
<td>Applied Machine Learning II</td>
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<td>EGN 5215</td>
<td>Machine Learning Applications in Civil Engineering</td>
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<tr>
<td>EGN 5216</td>
<td>Machine Learning for Artificial Intelligence Systems</td>
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<tr>
<td>EGN 5442</td>
<td>Programming for Applied Data Science</td>
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<td>EGG 6216</td>
<td>Artificial Intelligence Systems</td>
<td>3</td>
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<td>EGG 6217</td>
<td>Applied Deep Learning</td>
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<td>EGG 6446</td>
<td>Mathematical Foundations for Applied Data Science</td>
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<td>EGG 6640</td>
<td>Entrepreneurship for Engineers</td>
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<td>Engineering Innovation</td>
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<td>Engineering Graduate Research</td>
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<td>EGG 6933</td>
<td>Special Topics</td>
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<td>EGG 6937</td>
<td>Engineering Fellowship Preparation</td>
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<td>EGS 6012</td>
<td>Research Methods in Engineering Education</td>
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<td>EGS 6020</td>
<td>Research Design in Engineering Education</td>
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<td>EGS 6039</td>
<td>Engineering Leadership</td>
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<tr>
<td>EGS 6050</td>
<td>Foundations in Engineering Education</td>
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EGS 6051 Instructional Design in Engineering Education 3
EGS 6054 Cognition, Learning, and Pedagogy in Engineering Education 3
EGS 6056 Learning and Teaching in Engineering 1
EGS 6085 Advanced Engineering Educational Technology 3
EGS 6101 Divergent Thinking 3
EGS 6626 Fundamentals of Engineering Project Management 3
EGS 6628 Advanced Practices in Engineering Project Management 3
EGS 6629 Agile Project Management for Engineers and Scientists 3
EGS 6681 Advanced Engineering Leadership 3
EGS 6930 Engineering Education Seminar 1
EGS 6940 Foundations of Research to Practice in Engineering Education 1
EGS 6949 Research to Practice Experience in Engineering Education 1-3
EGS 6971 Research for Master’s Thesis 1-12
EGS 7979 Advanced Research 1-12
EGS 7980 Research for Doctoral Dissertation 1-12
ESI 6900 Principles of Engineering Practice 1-4

**Student Learning Outcomes**

**mechanical engineering (Ph.D.)**

**SLO 1** Knowledge
Ability to identify, formulate, and solve engineering problems. Ability to critically read and integrate engineering research literature

**SLO 2** Skills
Ability to use applied mathematical and/or modern experimental techniques. Ability to use modern engineering tools for practice at an advanced level

**SLO 3** Professional Behavior
Ability to communicate effectively

**Mechanical Engineering (M.e. & M.s.)**

**SLO 1** Knowledge
Ability to identify, formulate, and solve engineering problems

**SLO 2** Skills
Ability to use applied mathematical techniques. Ability to use modern engineering tools for practice at an advanced level

**SLO1** Comprehensive Knowledge
Describe knowledge of the normal structure and physiologic function of the human body and how the failure of normal function is associated with disease