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 EAS6971 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:/ (http://www.mae.ufl.edu/current/graduate/degree-programs-requirements/)/ (http://www.mae.ufl.edu/current/graduate/degree-programs-requirements/)www.mae.u (http://www.mae.ufl.edu/current/graduate/degree-programs-requirements/)fl (http://www.mae.ufl.edu/current/graduate/degree-programs-requirements/).edu/current (http://www.mae.ufl.edu/current/graduate/degree-programs-requirements/) /g (http://www.mae.ufl.edu/current/graduate/degree-programs-requirements/)raduate/de (http://www.mae.ufl.edu/current/graduate/degree-programs-requirements/)g (http://www.mae.ufl.edu/current/graduate/degree-programs-requirements/)ree-pro (http://www.mae.ufl.edu/current/graduate/degree-programs-requirements/)g (http://www.mae.ufl.edu/current/graduate/degree-programs-requirements/)rams-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 Engineering
- 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

Code	Title	Credits
BME 5580	Introduction to Microfluidics and BioMEMS	3
EAS 5242	Mechanics of Composite Materials	3
EAS 5938	Special Topics in Aerospace Engineering	1-4
EAS 6138	Gasdynamics	3
EAS 6242	Advanced Structural Composites	3
EAS 6413C	Spacecraft Attitude Estimation and Control	3
EAS 6415	Guidance and Control of Aerospace Vehicles	3
EAS 6905	Aerospace Research	1-6
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 6365	Structural Optimization	3
EGM 6570	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 Experience	1-6
EGN 6640	Entrepreneurship for Engineers	3
EGN 6913	Engineering Graduate Research	0-3
EGN 6950	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
EML 5515	Gas Turbines and Jet Engines	3
EML 5516	Design of Thermal Systems	3
EML 5526	Finite Element Analysis and Application	3
EML 5598	Orthopedic Biomechanics	3
EML 5605	Advanced Refrigeration	3
EML 5714	Introduction to Compressible Flow	3
EML 6048	Machine Learning and System Control	3
EML 6154	Conduction Heat Transfer	3
EML 6155	Convective Heat Transfer I	3
EML 6156	Multiphase Convection Heat Transfer	3
EML 6157	Radiation Heat Transfer	3
EML 6267	Advanced Manufacturing Processes and Analysis	3
EML 6281	Geometry of Mechanisms and Robots I	3
EML 6282	Geometry of Mechanisms and Robots II	3
EML 6323	Nontraditional Manufacturing	3
EML 6324	Fundamentals of Production Engineering	3
EML 6350	Introduction to Nonlinear Control	3
EML 6351	Nonlinear Control II: Adaptive Control	3
EML 6352	Optimal Estimation and Kalman Filtering	3
EML 6364	Optimal Control	3
EML 6386	Computational Nanomechanics and Nanomaterials	3
EML 6417	Solar Energy Utilization	3
EML 6451	Energy Conversion	3
EML 6466	Industrial Energy Management	3
EML 6573	Nonlinear Programming	3
EML 6577	Verification, Validation, and Uncertainty Quantification	3
EML 6606	Advanced Air Conditioning	3
EML 6905	Individual Projects in Mechanical Engineering	1-3
EML 6934	Special Topics in Mechanical Engineering	1-4
EML 6940	Supervised Teaching	1-3
EML 6971	Research for Master's Thesis	1-15
EML 7979	Advanced Research	1-12
EML 7980	Research for Doctoral Dissertation	1-15

College of Engineering Courses

Code	Title	Credits
EEE 5354L	Semiconductor Device Fabrication Laboratory	3
EEE 5776	Applied Machine Learning	3
EEE 6778	Applied Machine Learning II	3
EGN 5215	Machine Learning Applications in Civil Engineering	3
EGN 5216	Machine Learning for Artificial Intelligence Systems	3
EGN 5442	Programming for Applied Data Science	3
EGN 6216	Artificial Intelligence Systems	3
EGN 6217	Applied Deep Learning	3
EGN 6446	Mathematical Foundations for Applied Data Science	3
EGN 6640	Entrepreneurship for Engineers	3
EGN 6642	Engineering Innovation	3
EGN 6913	Engineering Graduate Research	0-3
EGN 6933	Special Topics	1-3

EGN 6937	Engineering Fellowship Preparation	0-1
EGS 6012	Research Methods in Engineering Education	3
EGS 6020	Research Design in Engineering Education	3
EGS 6039	Engineering Leadership	3
EGS 6050	Foundations in Engineering Education	3
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	Preparation for Engineering Education Practicum	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