MECHEG:MS - Master of Science in Mechanical Engineering

Overview

Degree Offered
MS - Master of Science

Program Title
Mechanical Engineering

The Master of Science (MS) degree in Mechanical Engineering is designed to develop students' skills in the mechanical engineering discipline which, as a major division of the engineering profession, plays a major role in our technologically advanced society. The design and manufacturing of power plants, automobiles, aircrafts, robots to improved methods of transportation and production by industrial robots are but a few important inventions that would not have been realized without the creativity associated with the mechanical engineering profession. The mechanical engineer is a vital ingredient in most industries that require automation, computers, and medical technology, as well as areas as diverse as space exploration, environmental control, and bioengineering. The Mechanical and Materials Engineering Department at FIU takes pride in providing well-educated and technologically competent graduates to serve these industries. The academic program provides a well-balanced curriculum in the following areas of specialization: mechanical systems, mechanics, robotics and mechatronics, thermo/fluid systems, heating-ventilation-and-air-conditioning (HVAC), material characterization, manufacturing and automation systems, materials science and engineering, multidisciplinary design optimization and inverse design, computational analysis and distributed parallel computing, biomechanics, laser and plasma materials processing, nanomaterials, nanotechnology, electronic packaging, optical measurement and diagnostics, waste management, and renewable energy.

For more information, visit the College of Engineering and Computing website.

To explore more about this program, visit the website below:
Program Website

Academic Group
College of Engineering and Computing

Diploma Title
Master of Science in Mechanical Engineering

Total Credits
30

CIP Code
14.1901

Requirements

Simple Requisites

Subplan

No Requirement Level

Admissions Requirements for the Master of Science (MS) in Mechanical Engineering

The following is in addition to the University's graduate admission requirements:

(1) A student seeking admission into the program must have a bachelor's degree in engineering, physical sciences, computer science or mathematics from an accredited institution, or, in the case of foreign students, from an institution recognized in its own country as preparing students for further study at the graduate level.

(2) An applicant must have achieved a "B" average, GPA of 3.0 in upper level undergraduate work.

(3) Applicants who have not satisfied the above will be evaluated for probationary or waiver admission.

(4) In addition to the above criteria, International graduate student applicants whose native language is not English are required to submit a score for the Test of English as a Foreign Language (TOEFL) or for the International English Language Testing System (IELTS). A total score of 80 on the iBT TOEFL (equivalent to 550 on the paper-based version, or 213 on the computer-based version of the Test of English as a Foreign Language) or 6.5 overall on the IELTS is required.

(5) The GPA and TOEFL scores specified above are to be considered minimum requirements for admission. Applicants from science areas other than mechanical engineering will be expected to complete remedial undergraduate courses selected to prepare them for graduate courses in their area of interest. Full admission to the graduate program requires the completion of these background courses with no grades below 'C' and a grade point average of 3.0 or better.

Additional Degree Requirements

The Department of Mechanical and Materials Engineering offers both thesis and non-thesis options for the Master's Degree in Mechanical Engineering. A student seeking the Master's degree with or without thesis is required to pass a comprehensive oral or written examination.

All work counted for the Master's degree must be completed during the six years immediately following the date of admission.

Robotics for Mechanical Engineers Track

Within the Mechanical Engineering Major, students may choose to complete the 24 credits in the Robotics for Mechanical Engineers Track requirements as well as these specific 6 credits from the Mechanical Engineering Major Math Requirement.

Admissions Requirements for the Combined Bachelor of Science (BS) in Mechanical Engineering to MS in Mechanical Engineering Accelerated Degree Pathway

Students, who pursue a BS degree and are in their junior year (completed 75 credits), with at least a 3.20 GPA on both overall and upper division courses may apply to enroll in the combined BS/MS pathway. To be considered for admission to the combined bachelor's/master's degree program, students must have completed at least 75-90 credits in the bachelor's degree program at FIU and meet the admissions criteria for the graduate degree program to which they are applying. Students need only apply once to the combined degree pathway; the application is submitted to Graduate Admissions typically before the student starts the last 30 credits of the bachelor's degree program.

Students interested in the pathway should consult with the undergraduate advisor on their eligibility to the pathway. The students should also meet the graduate advisor to learn about the graduate program and available courses before completing the application form and submitting it to the undergraduate advisor. Applicants will be notified by the department and the University Graduate School of the decision on their applications.

Thesis Option

A student shall complete a minimum of 24 semester credit hours of course work, plus a minimum of 6 semester credit hours of EML6971 Masters Thesis, Master's Thesis Research, and take MME Graduate Seminar.

The course requirements include a minimum of 12 hours of 6000-level course credit including thesis hours. A maximum of 6 credit hours of courses offered by other departments may be included among the 24 course hour minimum. A maximum of three credit hours of approved independent studies, EML6908 Ind Studies, may be counted toward the M.S. thesis degree. A maximum of six graduate credit hours can be transferred from other accredited institutions provided that the courses have not been used for another degree and have a minimum letter grade of 'B' and meet university requirements. Transfer courses must be approved by the advisor and Graduate Coordinator.

Early in the program (before the middle of the second term) the student and advisor will complete a study plan that specifies the courses that will comprise the program.

When the thesis research is completed, the student should schedule a defense with an examining committee appointed through the Graduate School consisting of a least three graduate faculty members (at least two of whom should be from the MME Department). The thesis, with an approval cover letter from the advisor, should be given to the examining committee for review not less than four weeks before the scheduled defense. The candidate should prepare to summarize the thesis in the manner of a technical paper using appropriate visual aids in 40 minutes or less. Following the presentation, the candidate will answer questions related to the work from the audience and/or the committee. At the conclusion of the defense, the committee will agree on the outcome -pass or fail- and report the results to the Graduate School. Following the exam the student will implement the committee's suggestions for improving the draft document. Each committee member must sign the approval form in the final document. Copies of the approved thesis must be provided to the advisor, department, and the library. Students should become familiar with the University Graduate School's regulations and deadlines available on line at http://gradschool.fiu.edu.

Robotics for Mechanical Engineers Track
Type
Completion Requirement

Required Courses: 30 credits

The Robotics track will require 6 credits as common core, 12 credits of track-specific core courses, and 12 credits of track-elective courses from the ECE and MME Departments, for a total of 30 credits.

Fulfill ALL of the following requirements:

Common Core Courses: 6 credits

Choose 2 of 6 math courses

Complete ANY of the following Courses:

- EGM5315 - Intermediate Analysis of Mechanical Systems
- EGM5346 - Computational Engineering Analysis
- EGM5354 - Finite Element Method Applications in Mechanical Engineering
- EGM6355 - Nonlinear Finite Element Analysis
- EGM6422 - Advanced Computational Engineering Analysis

- EML6725 - Comp. Fluid Dynamics

AND

Track-Specific Courses: 12 credits

Complete ALL of the following Courses:

- EML5808 - Control Technology for Robotic Systems
- EML6805 - Advanced Design of Robots
- EEL5669 - Autonomous Systems and Controls
- EEE6767 - Advanced Embedded Programming for IoT Sensing, Network, Control, and Applications

AND

Track-Elective Courses: 12 credits

Complete ANY of the following Courses:

- EML5505 - Smart Machine Design and Development
- EMC5415 - Digital Control of Mechanical Systems
- EML5825 - Sensors and Applied Machine Intelligence
- EML5530 - Intermediate CAD/CAE
- EEE6765 - Advanced Embedded Systems Design and Implementation for IoT Applications
- EEL6821 - Computer Vision
- EEL6825 - Pattern Recognition
- EEL5813 - Neural Networks
- EEL6812 - Adv In Neural Nets
- EEL6681 - Fuzzy Systems Design

Additional Comments:

Degree Program Credits
Type
Completion Requirement

Course Requirements

All MSME degree seeking thesis option students must take two of the following applied/computational mathematics courses offered by MME department plus the MME graduate seminar. Out of 24 semester credit hours of course work a maximum of three credit hours of approved independent studies, may be counted towards the M.S. thesis degree. A minimum of 6 credits of EML6971 Masters Thesis Thesis is also required.

Fulfill ALL of the following requirements:

Applied/Computational Mathematics Courses

Complete at least 2 of the following courses:

- EGM5315 - Intermediate Analysis of Mechanical Systems
- EGM5346 - Computational Engineering Analysis
- EGM5354 - Finite Element Method Applications in Mechanical Engineering
- EGM6355 - Nonlinear Finite Element Analysis
- EGM6422 - Advanced Computational Engineering Analysis
- EML6725 - Comp. Fluid Dynamics

AND

Graduate Seminar

Complete ALL of the following Courses:

- EML6935 - Graduate Seminar

AND

Independent Studies

Complete up to 1 course(s) and earn up to 3 credit(s) from the following:

- EML6908 - Independent Studies

AND

Masters Thesis Requirement

Earn at least 6 credits from the following:

- EML6971 - Masters Thesis

Area of Specialization Course Options

An additional six credit hours of courses must be taken outside the major area of study of the student. The remaining 4 courses should be in the area of the student's specialization or as suggested by the student's major professor and committee.

Fulfill ANY of the following requirements:

Thermo/Fluid

Complete at least 4 of the following courses:

- EAS6721 - Advanced Aerodynamic Shape Design
- EML5103 - Intermediate Thermodynamics
- EML5104 - Classical Thermodynamics
- EML5152 - Intermediate Heat Transfer
- EML5606C - Advanced Refrigeration and Air Conditioning Systems
- EML5615C - Cad - A/C
- EML5708 - Advanced Design of Thermal and Fluid Systems
- EML5709 - Intermediate Fluid Mechanics

- EML6153 - Advanced Heat Transfer
- EML6154 - Conduction Heat Transfer
- EML6155 - Convection Heat Transfer
- EML6157 - Radiation Heat Transfer
- EML6712 - Advanced Fluid Mechanics I
- EML6714 - Advanced Gas Dynamics
- EML6725 - Comp. Fluid Dynamics

OR

Mechanics/Materials

Complete at least 4 of the following courses:

- EAS5221 - Design and Analysis of Aerospace Structures
- EGM5346 - Computational Engineering Analysis
- EGM5354 - Finite Element Method Applications in Mechanical Engineering
- EGM5615 - Synthesis of Engineering Mechanics
- EGM6570 - Fracture Mechanics
- EMA5001 - Physical Properties of Materials
- EMA5106 - Thermodynamics and Kinetics of Materials
- EMA5295 - Principles of Composite Materials
- EMA5507C - Analytical Techniques of Materials Science
- EMA5935 - Advanced Topics in Materials Engineering
- EMA6165C - Polymer Physics and Analytical Techniques
- EML5505 - Smart Machine Design and Development
- EML5509 - Optimization Algorithms
- EML5385 - Identification Techniques of Mechanical Systems
- EML5562 - Advanced Electronic Packaging (Inactive)
- EML6223 - Advanced Mechanical Vibration Analysis
- EML6805 - Advanced Design of Robots

OR

Design and Manufacturing

Complete at least 4 of the following courses:

- EAS5221 - Design and Analysis of Aerospace Structures
- EML5385 - Identification Techniques of Mechanical Systems
- EML5505 - Smart Machine Design and Development
- EML5509 - Optimization Algorithms
- EML5530 - Intermediate CAD/CAE
- EML5562 - Advanced Electronic Packaging (Inactive)
- EGM5615 - Synthesis of Engineering Mechanics
- EML5808 - Control Technology for Robotic Systems
- EML5082 - Advanced Nondestructive Testing and Mechanical Health Monitoring
- EML5825 - Sensors and Applied Machine Intelligence

- EML6223 - Advanced Mechanical Vibration Analysis
- EML6532 - Advanced Computer-Aided Design/ Computer-Aided Engineering
- EGM6570 - Fracture Mechanics
- EML6805 - Advanced Design of Robots

Additional Comments:

Other Curricular Offering: Combined BS in Mechanical Engineering to MS in Mechanical Engineering Accelerated Degree Pathway

A student admitted to the combined degree pathway will be considered to have undergraduate status until the student applies for graduation from their bachelor's degree program. Upon conferral of the bachelor's degree, the student will be granted graduate status and be eligible for graduate assistantships. Only 5000-level or higher courses, and no more than the number of credits specified by the program catalog, may be applied toward both degrees. In addition to the admission requirements of the combined BS/MS pathway, students must meet all the admission requirements of the University Graduate School.

Students enrolled in the pathway may count up to six credit hours of MME graduate courses as credits for both the BS and MS degrees. The combined BS/MS pathway has been designed to be a continuous enrollment pathway. During this combined BS/MS pathway, upon completion of all the requirements of the undergraduate program, students will receive their BS degrees. Students in this pathway have up to three major semesters to complete the master's degree after receipt of the bachelor's degree. Students who fail to meet this three-major-semester post BS requirement or who elect to leave the combined pathway at any time and earn only the BS degree will have the same access requirements to regular graduate programs as any other student, but will not be able to use the six credits in both the bachelor's and master's degrees.

For each of the graduate courses counted as credits for both BS and MS degree, a minimum grade of "B" is required. Students enrolled in the pathway may count up to six credit hours of MME graduate courses toward the elective engineering BS requirements as well as toward the MS degree. Only graduate courses with formal lectures can be counted for both degrees. The students are responsible for confirming the eligibility of each course with the undergraduate advisor.

Non-Thesis Option

A student shall complete a minimum of 30 semester credit hours of graduate course work, and one semester of Graduate Seminar. Non-thesis students are required to do a three-credit project under the independent study course registration. An approved study plan must include at least 9 credits of 6000 level graduate course work, including the project if elected. Up to nine credit hours of graduate course work from other departments may be included among the minimum of 30 credits. A maximum of six graduate credits from other accredited graduate programs completed with a 'B' or better and not counted toward a previous degree may be included in the study plan. Transfer credits must meet university requirements. The advisor and the Graduate Coordinator must approve transfer courses if they are to be included in a study plan. A maximum of three credits of independent study beyond an independent project may be included in a study plan.

Non-thesis students are required to take a final oral comprehensive exam dealing with the objectives of their study plan. If a project has been completed, the student will briefly summarize the project report (20 minutes) as

a part of the exam. The examining committee will include a minimum of three faculty members, at least two of whom should be from the department.

Degree Program Credits
Type
Completion Requirement

Course Requirements

All MSME degree seeking non-thesis option students must take two of the following applied/computational mathematics courses offered by MME department plus the MME graduate seminar. One of those courses must be EML 6908 where the students will present their project work. Out of 30 semester credit hours of course work a maximum of six credit hours of approved independent studies, EML 6908, may be counted towards the M.S.

Fulfill ALL of the following requirements:

Applied/Computational Mathematics Courses

Complete at least 2 of the following courses:

- EGM5315 - Intermediate Analysis of Mechanical Systems
- EGM5346 - Computational Engineering Analysis
- EGM5354 - Finite Element Method Applications in Mechanical Engineering
- EGM6355 - Nonlinear Finite Element Analysis
- EGM6422 - Advanced Computational Engineering Analysis
- EML6725 - Comp. Fluid Dynamics

AND

MME Graduate Seminar

Complete ALL of the following Courses:

- EML6935 - Graduate Seminar

AND

Independent Studies

Complete 1 - 2 course(s) and earn 3 - 6 credit(s) from the following:

- EML6908 - Independent Studies

Area of Specialization Course Options

An additional six credit hours of courses must be taken outside the major area of study of the student. The remaining 6 courses should in the area of the student's specialization or as suggested by the student's project professor; one of those courses must be EML6908 Ind Studies where the students will present their project work.

Fulfill ANY of the following requirements:

Thermo/Fluid

Complete at least 6 of the following courses:

- EAS6721 - Advanced Aerodynamic Shape Design
- EML5103 - Intermediate Thermodynamics
- EML5104 - Classical Thermodynamics
- EML5152 - Intermediate Heat Transfer
- EML5606C - Advanced Refrigeration and Air Conditioning Systems
- EML5615C - Cad - A/C
- EML5708 - Advanced Design of Thermal and Fluid Systems
- EML5709 - Intermediate Fluid Mechanics
- EML6153 - Advanced Heat Transfer
- EML6154 - Conduction Heat Transfer
- EML6155 - Convection Heat Transfer
- EML6157 - Radiation Heat Transfer
- EML6712 - Advanced Fluid Mechanics I
- EML6714 - Advanced Gas Dynamics
- EML6725 - Comp. Fluid Dynamics

OR

Mechanics/Materials

Complete at least 6 of the following courses:

- EAS5221 - Design and Analysis of Aerospace Structures
- EGM5346 - Computational Engineering Analysis
- EGM5354 - Finite Element Method Applications in Mechanical Engineering
- EGM5615 - Synthesis of Engineering Mechanics
- EGM6570 - Fracture Mechanics
- EMA5001 - Physical Properties of Materials
- EMA5106 - Thermodynamics and Kinetics of Materials
- EMA5295 - Principles of Composite Materials
- EMA5507C - Analytical Techniques of Materials Science
- EMA5935 - Advanced Topics in Materials Engineering
- EMA6165C - Polymer Physics and Analytical Techniques
- EML5505 - Smart Machine Design and Development
- EML5509 - Optimization Algorithms
- EML5385 - Identification Techniques of Mechanical Systems
- EML5562 - Advanced Electronic Packaging (Inactive)
- EML6223 - Advanced Mechanical Vibration Analysis
- EML6805 - Advanced Design of Robots

OR

Design and Manufacturing

Complete at least 6 of the following courses:

- EAS5221 - Design and Analysis of Aerospace Structures
- EML5385 - Identification Techniques of Mechanical Systems
- EML5505 - Smart Machine Design and Development
- EML5509 - Optimization Algorithms
- EML5530 - Intermediate CAD/CAE
- EML5562 - Advanced Electronic Packaging (Inactive)
- EGM5615 - Synthesis of Engineering Mechanics
- EML5808 - Control Technology for Robotic Systems
- EML5082 - Advanced Nondestructive Testing and Mechanical Health Monitoring
- EML5825 - Sensors and Applied Machine Intelligence
- EML6223 - Advanced Mechanical Vibration Analysis
- EML6532 - Advanced Computer-Aided Design/ Computer-Aided Engineering
- EGM6570 - Fracture Mechanics
- EML6805 - Advanced Design of Robots

Additional Comments:

Graduation Requirements

The M.Sc. degree will be conferred when the following conditions have been met:

(1) Recommendation of the advisor and faculty of the Department.

(2) Certification provided by the Department Chair, College Dean, and University Graduate School that all degree requirements have been met.

(3) Completion of the two applied/computational mathematics courses offered by the department, two courses outside student's major area and other courses as suggested by the student's major professor and committee.

(4) Completion of undergraduate course deficiencies specified at admission, if any, with no grades below 'C' and a GPA ≥ 3.0.

(5) Thesis option: Successfully completed a minimum of 30 semester hours of graduate course work as specified in an approved study plan containing at least 6 hours of 6000 level courses with a GPA ≥ 3.0 (the minimum successful grade is a 'C'. Not more than six semester hours transferred from another accredited graduate program that was not part of a previously awarded degree may be incorporated in the study plan) plus a minimum of six hours of masters thesis research.

(6) Non-thesis option: Successfully completed a minimum of 30 semester hours of graduate course work as specified in an approved study plan containing at least 9 hours of 6000 level courses with a GPA ≥3.0 (not more than six semester hours transferred from another accredited graduate program that was not part of a previously awarded degree may be incorporated in the study plan).

(7) Thesis option: Successful public oral defense of the thesis. Submission of the approved thesis to the Graduate School.

(8) Non-thesis option: Successful completion of a final oral comprehensive examination covering the general objectives of the study plan.

(9) Students must achieve an overall GPA ≥ 3.0 in all graduate work completed at FIU in their approved study plan.

(10) Students must complete the Graduate Seminar course.

(11) Students must comply with all relevant University policies and regulations.

There are no majors associated with this program.