**Mechanical Engineering**

Mechanical Engineering is the branch of engineering that is most directly and broadly concerned with mechanical systems and their use to control and transform energy for the benefit of humankind. Mechanical engineering embraces the science and art of the generation, transmission and utilization of thermal and mechanical energy and the design, production and application of devices and systems.  
  
The Department of Ocean and Mechanical Engineering offers programs of study leading to the degrees of Bachelor of Science in Mechanical Engineering (B.S.M.E.), Master of Science (M.S.) with a major in Mechanical Engineering and Doctor of Philosophy (Ph.D.) with major in Mechanical Engineering.  
  
To encourage undergraduates to pursue a graduate education, the department also offers combined B.S.M.E. to M.S. degree programs that permit a student to complete both a bachelor's and a master's degree within five years.

**Mission Statement**  
The mission of the Mechanical Engineering program is to provide undergraduate students with the fundamental background necessary for a career in mechanical engineering and for the continuation of their education through postgraduate studies. For graduate students, the department strives to provide the in-depth background necessary for advanced work in mechanical engineering and to continue their education at the doctoral level. All students are prepared to conduct basic and applied research and to provide service to the engineering profession and the community.

**Educational Objectives**   
The faculty has established three educational objectives for graduates as they progress through their careers:  
  
A. *Career Contribution and Advancement:* Through their ability to solve engineering problems, meaningful design and hands-on experiences, critical thinking skills, and training in teamwork and communication, graduates will make significant contributions to their chosen field and advance professionally in mechanical engineering or allied disciplines.   
  
B. *Professionalism:* Graduates will act with both professional and social responsibility in their career field, including a commitment to protect both occupational and public health and safety, and apply ethical standards related to the practice of engineering.   
  
C. *Life-Long Learning:* Graduates will understand that their undergraduate education was just the beginning of their training and will continue to develop their knowledge and skills through progress toward or completion of graduate education, and/or professional development through short courses or seminars, and/or professional certification and/or participation in professional societies.

**Educational Outcomes for Student Performance**   
The program will meet the above objectives by establishing the following educational outcomes for student performance.

At the time of graduation, the students will attain the following:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics;

2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors;

3. an ability to communicate effectively with a range of audiences;

4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts;

5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives;

6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusion;

7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

***Upon graduation, graduate students will be able to:***  
a. Demonstrate an ability to perform research and/or perform advanced engineering analysis in their area of specialty;  
  
b. Formulate and analyze engineering problems and synthesize and develop appropriate solutions based on fundamental and advanced principles;  
  
c. Design mechanical systems to meet desired specifications using advanced engineering tools and techniques.

***Upon graduation, doctoral students will be able to:***  
a. Perform original research in their area of specialty;  
  
b. Demonstrate an advanced level of knowledge in mathematics and engineering fundamentals relevant to their discipline;  
  
c. Effectively communicate an advanced technical concept to their peers.  
  
[Link to Combined Programs](http://www.fau.edu/academic/registrar/PREcatalog/engineering.php#mecomb)  
  
[Link to Master's Programs](http://www.fau.edu/academic/registrar/PREcatalog/engineering.php#memast)  
  
[Link to Doctoral Program](http://www.fau.edu/academic/registrar/PREcatalog/engineering.php#medoc)

**Bachelor's Program**

**Bachelor of Science in Mechanical Engineering**  
*(Requires 128 credits.)*

Mechanical engineering is an extensive field, and it is necessary for every student to attain considerable knowledge in the mechanical, thermal and material sciences. The program allows for special areas of interest through a sufficient number of technical electives in areas such as mechanical design, energy conservation, controls, environmental control, materials science, computer-aided design and others.  
  
To make a significant contribution to society, both as mechanical engineers and as individuals, students must pursue studies in the humanities and social sciences to better understand their relationship and responsibility to society. The student must develop the ability to apply knowledge to the analysis and solution of significant engineering problems through courses in engineering design.  
  
Because mechanical engineering is such a broad field, the program of study forms an excellent background for professional careers in many fields.

**Admission Requirements**  
All students must meet the minimum admission requirements of the University. Please refer to the [Admissions section](http://www.fau.edu/academic/registrar/PREcatalog/admissions.php) of this catalog.  
  
All students must meet the preprofessional requirements listed [above](http://www.fau.edu/academic/registrar/PREcatalog/engineering.php#preprof) in order to be accepted into the Mechanical Engineering program.

**Prerequisite Coursework for Transfer Students**  
Students transferring to Florida Atlantic University must complete both lower-division requirements (including the requirements of the Intellectual Foundations Program) and requirements for the college and major. Lower-division requirements may be completed through the A.A. degree from any Florida public college, university or community college or through equivalent coursework at another regionally accredited institution. Before transferring and to ensure timely progress toward the baccalaureate degree, students must also complete the prerequisite courses for their major as outlined in the [*Transfer Student Manual*](http://www.fau.edu/registrar/registration/transfer.php) and below.

All courses not approved by the Florida Statewide Course Numbering System that will be used to satisfy requirements will be evaluated individually on the basis of content and will require a catalog course description and a copy of the syllabus for assessment.  
  
Transfer students who have an A.A. degree are expected to have completed the following course requirements (deficiencies may be taken at FAU); see the [Degree Requirements section](http://www.fau.edu/academic/registrar/PREcatalog/degreerequirements.php) of this catalog for the required minimum grades.

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| --- | --- |
|  | **Minimum No. of  Subject Credits** |
| English Composition | 6 |
| Social Science | 6 |
| Humanities | 6 |
| Calculus (complete sequence) | 12 |
| General Physics with Calculus (complete sequence with Lab) | 8 |
| Differential Equations | 3 |
| Computer Programming | 3 |
| General Chemistry (with Lab) | 4 |
| Fundamentals of Engineering | 3 |
| Graphics | 3 |
| Electives | 6 |
| **Total** | **60** |

Electives may include a course in health, speech, additional humanities or additional social science. Consult an advisor for assistance in selecting the appropriate course(s).

**General Degree Requirements**  
The Bachelor of Science in Mechanical Engineering degree will be awarded to students who meet the following requirements:

1. Meet all general degree requirements of the University;  
  
2. Attain a grade of "C" or better in each mathematics, science and computers course listed below, in each mechanical engineering core course listed below, in the electrical engineering course listed below, in each Writing Across Curriculum (Gordon Rule) and Gordon Rule computational course and in each of the departmentally approved technical electives below;  
  
3. Satisfy the following specific degree requirements, which total 128 credits.

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| **Specific Degree Requirements** | |
| ***Intellectual Foundations Program\**** | |
| Foundations of Written Communication | 6 |
| Foundations of Society and Human Behavior | 6 |
| Foundations of Global Citizenship | 6 |
| Foundations of Humanities | 6 |

\* Four-year students must meet specific course requirements as outlined in the Baccalaureate Degree Requirements subsection in the [Degree Requirements section](http://www.fau.edu/academic/registrar/PREcatalog/degreerequirements.php) of this catalog.

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| --- | --- | --- |
| ***Mathematics, Science and Computers*** | | |
| Mathematics (through Calculus) |  | 12 |
| General Physics with Calculus  (including Lab) |  | 8 |
| Chemistry (including Lab) |  | 4 |
| Differential Equations |  | 3 |
| Probability & Statistics for Engineers | STA 4032 | 3 |
| Computer Programming\*\* |  | 3 |
| Computer Applications in Mechanical Engineering 2 | EML 4534 | 3 |
| Engineering Graphics | EGN 1111C | 3 |

\*\* Four-year students are to take Computer Applications in Engineering 1, EGN 2213, offered by the Department of Ocean and Mechanical Engineering.

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| ***Mechanical Engineering Core*** | | |
| Electro-Mechanical Devices | EGM 4045 | 3 |
| Fundamentals of Engineering | EGN 1002 | 3 |
| Statics | EGN 3311 | 3 |
| Dynamics | EGN 3321 | 3 |
| Strength of Materials | EGN 3331 | 3 |
| Engineering Thermodynamics | EGN 3343 | 3 |
| Engineering Materials 1 | EGN 3365 | 3 |
| Experimental Methodology | EML 3523C | 3 |
| Fluid Mechanics | EML 3701 | 3 |
| Applied Thermal Fluid Engineering | EML 4127 | 3 |
| Heat Transfer | EML 4142 | 3 |
| ~~Vibration Synthesis and Analysis~~ | ~~EGN 4323~~ | ~~3~~ |
| ~~Machine Design 2~~ | ~~EML 4262~~ | ~~3~~ |
| Intermediate Strength of Materials | EGM 4523C | 3 |
| Finite Element Analysis for Engineering Design | EGM 4350 | 3 |
| Machine Design ~~1~~ | EML 4500 | 3 |
| Engineering Design | EML 4521C | 3 |
| Design Project | EML 4551 | 3 |
| Dynamic Systems | EGN 4432 | 3 |
| Mechanical Engineering Lab | EML 4730L | 3 |
| Fabrication of ME Systems | EML 4263C | 2 |

***Electives***  
9 ~~8~~ credits (minimum) of departmentally approved technical electives. Students are required to have one design credit in the technical electives as identified in the approved list in the advising manual.

Directed independent study (DIS) may be used as credit toward one technical elective in the student's program with approval of the faculty advisor and the department chair. ~~Cooperative education or internships may be counted as credit toward technical electives up to a maximum of 2 credits. Only 1 credit may be earned per semester of co-op or internship and applied toward technical elective credit.  
  
Students are encouraged to take the Fundamentals of Engineering Examination for their professional development. It is recommended that it be taken in the first semester of the senior year. As an incentive to take the exam, students can earn the equivalent of 2 credits of technical elective toward their degree requirements. If they pass the exam, they will register for 2 credits of EML 4905, Directed Independent Study—Professional Registration, in the following semester and will be given pass/fail credit for the course.~~

**Sample Four-Year Program of Study for Bachelor of Science in Mechanical Engineering**

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| --- | --- | --- |
| **First Year, Fall (14 credits)** | | |
| College Writing 1\* | ENC 1101 | 3 |
| Calculus with Analytic Geometry 1 | MAC 2311 | 4 |
| General Chemistry 1 | CHM 2045 | 3 |
| General Chemistry 1 Lab | CHM 2045L | 1 |
| Fundamentals of Engineering | EGN 1002 | 3 |

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| **First Year, Spring (14 credits)** | | |
| College Writing 2\* or equivalent | ENC 1102 | 3 |
| Calculus with Analytic Geometry 2 | MAC 2312 | 4 |
| ~~Engineering Graphics~~ | ~~EGN 1111C~~ | ~~3~~ |
| General Physics for Engineers 1 | PHY 2048 | 3 |
| General Physics 1 Lab | PHY 2048L | 1 |
| Foundations of Society and Human Behavior\*\* |  | 3 |

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| **Second Year, Fall (14 credits)** | | | | |
| Statics | EGN 3311 | | 3 | |
| Calculus with Analytic Geometry 3 | MAC 2313 | | 4 | |
| ~~Introduction to Philosophy (GRW) or equiv.\*\*~~ | | ~~PHI 2010~~ | | ~~3~~ |
| Engineering Graphics | EGN 1111C | | 3 | |
| Physics for Engineers 2 | PHY 2044 | | 3 | |
| General Physics 2 Lab | PHY 2049L | | 1 | |

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| **Second Year, Spring (15 credits)** | | |
| Strength of Materials | EGN 3331 | 3 |
| Engineering Thermodynamics | EGN 3343 | 3 |
| Computer Applications in Engineering 1 | EGN 2213 | 3 |
| Engineering Mathematics 1 | MAP 3305 | 3 |
| Foundations of Global Citizenship\*\* |  | 3 |

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| **Third Year, Fall (15 credits)** | | |
| Electro-Mechanical Devices | EGM 4045 | 3 |
| ~~Dynamics~~ | ~~EGN 3321~~ | ~~3~~ |
| Intermediate Strength of Materials | EGM 4523C | 3 |
| Fluid Mechanics | EML 3701 | 3 |
| Computer Applications in Mechanical Engineering 2 | EML 4534 | 3 |
| ~~History of Civilization 1~~ | ~~WOH 2012~~ | ~~3~~ |
| Foundation of Society and Human Behavior\*\* |  | 3 |

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| **Third Year, Spring (15 credits)** | | |
| Dynamics | EGN 3321 | 3 |
| Heat Transfer | EML 4142 | 3 |
| Experimental Methodology | EML 3523C | 3 |
| Probability and Statistics for Engineers | STA 4032 | 3 |
| Foundations of Global Citizenship\*\* |  | 3 |

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| **Third Year, Summer (12 credits)** | | |
| Applied Thermal Fluid Engineering | EML 4127 | 3 |
| Machine Design | EML 4500 | 3 |
| Engineering Materials 1 | EGN 3365 | 3 |
| Mechanical Engineering Laboratory | EML 4730L | 3 |

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| **Fourth Year, Fall (14 credits)** | | |
| Technical Elective |  | 3 |
| Finite Element Analysis for Engineering Design | EGM 4350 | 3 |
| Fabrication of ME System | EML 4263C | 2 |
| Engineering Design | EML 4521C | 3 |
| Foundations of Humanities |  | 3 |

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| **Fourth Year, Spring (15 credits)** | | |
| Dynamic Systems | EGN 4432 | 3 |
| Design Project | EML 4551 | 3 |
| Technical Electives |  | 6 |
| Foundations of Humanities |  | 3 |
| **Total** |  | **128** |

\* Course meets Writing Across Curriculum (Gordon Rule) requirements.

\*\* Courses may be selected from the appropriate portion of the [Intellectual Foundations Program.](http://www.fau.edu/academic/registrar/PREcatalog/degreerequirements.php#intellectual)

**Cooperative Education**   
Students in the Mechanical Engineering program are encouraged to consider gaining practical experience through participation in Cooperative Education. Three, one-semester periods of Cooperative Education (EML 4949) may be substituted for one program technical elective. For information, contact the FAU Career Center, 561-297-3533 or visit its website at [www.fau.edu/cdc.](http://www.fau.edu/cdc/)