Bachelor of Science in Mechanical Engineering

Mechanical Engineering (BSME)

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The mechanical engineering program is among the most basic of all engineering programs, with a curriculum that embraces the major areas of power, design, and fluid or solid mechanics. Seniors may select a number of elective classes, approved by their advisor, providing a focus on specialties such as:

1. Power/energy conversion
2. Mechanical systems/design
3. Aerospace engineering
4. Other

The program is designed to prepare its graduates for professional practice in many facets of engineering, such as research, development, design, planning, testing, management, and consulting. The graduate is prepared to undertake challenging and creative engineering work in almost any industry, government agency, research organization, or consulting firm. The program also provides an excellent preparation for graduate school and the Fundamentals of Engineering (FE) Exam.

An undergraduate student handbook providing rules and a detailed semester-by-semester plan for the program is available on the department's web site. Courses are routinely scheduled in the late afternoon and evening to accommodate students with current employment.

Outcomes

The Mechanical and Aerospace Engineering Department has adopted, after deliberations by its constituents, 7 outcomes for the BSME program. These outcomes are listed below. The students who qualify for graduation will have:

1. Proficiency in mathematics, calculus-based physics, and engineering science, and an ability to apply knowledge in these areas to identify, formulate, and solve mechanical engineering problems.
2. An ability to design an engineering system, component, or process to meet specified needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
3. An ability to present ideas and technical material to diverse audiences visually, verbally, and in writing.
4. An ability to recognize professional and ethical responsibilities and professional practice issues and to acquire the broad education necessary to make informed judgments, which must consider the impact of engineering solutions in a global, economic, environmental, and societal context.
5. An ability to function effectively as a member or a leader of a team that establishes goals, plans tasks, meets deadlines, and creates a collaborative and inclusive environment.
6. An ability to design and conduct experiments and to critically analyze and interpret data in various mechanical engineering areas.
7. An ability to recognize the ongoing need to acquire and apply new knowledge.

Mechanical Engineering Objectives

The program's educational objectives describe the career and professional accomplishments that the program is preparing graduates to attain within a few years after graduation. The educational objectives of the mechanical engineering program, established with participation of all constituencies, are consistent with the mission of Old Dominion University and the Department of Mechanical and Aerospace Engineering.

The objectives of the mechanical engineering undergraduate program at Old Dominion University are that our graduates should accomplish the following:

1. To establish themselves as successful professionals in the general areas of thermal/fluid systems, mechanical systems and design, and materials and manufacturing in industry and government settings by demonstrating their ability to:
   a. Conduct themselves consistently in a responsible, professional and ethical manner.
   b. Participate in continuing education, research and development, and in other lifelong creative efforts in science and technology.
   c. Lead others in support of activities that promote service to, and economic development of, the community, the region, state and nation.
2. To successfully pursue and complete graduate programs in mechanical engineering, aerospace engineering or a related field if they so desire.

Accreditation

The Bachelor of Science in Mechanical Engineering is accredited by the Engineering Accreditation Commission of ABET www.abet.org. (http://www.abet.org)

Requirements

Lower-Division General Education

Written Communication (http://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#written)	6
Oral Communication (http://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#oral)	3
Mathematics (http://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#math)	3
Language and Culture (http://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#language)	0-6
Information Literacy and Research (http://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#information)	3
Human Behavior (http://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#behavior)	3
Human Creativity (http://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#creativity)	3
Interpreting the Past (http://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#interpret)	3
Literature (http://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#literature)	3
Philosophy and Ethics (http://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#philosophy)	3
The Nature of Science (http://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#nature)	8
Impact of Technology (http://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#impact)	3

General Education requirements in information literacy and research and impact of technology are met through the major. For additional information consult the department undergraduate handbook.

Upper-Division General Education

- Option A. Approved Minor, 12-24 credit hours; also second degree or second major
- Option B. Interdisciplinary Minor; 12 credit hours, (3 credit hours may be in the major area of study)
- Option C. An approved certification program such as teaching licensure (hours vary)

- Option D. Two Upper-Division Courses (6 credit hours) from outside the College of Engineering and Technology which are not required by the major.

Requirements for Graduation

Requirements for graduation include the following:

- Minimum of 120 credit hours.
- Minimum of 30 credit hours overall and 12 credit hours of upper-level courses in the major program from Old Dominion University.
- Minimum overall cumulative grade point average of C (2.00) in all courses taken.
- Minimum overall cumulative grade point average of C (2.00) in all courses taken toward the major.
- Minimum overall cumulative grade point average of C (2.00) in all courses taken toward a minor.
- Completion of ENGL 110C, ENGL 211C or ENGL 231C, and the writing intensive (W) course in the major with a grade of C or better. The W course must be taken at Old Dominion University.
- Completion of Senior Assessment.

Mechanical Engineering Grade Requirements

Mechanical engineering majors must earn a grade of C or better in the following courses in order to continue to progress through the program:

ENGL 110C	English Composition	3
MATH 211	Calculus I	4
ENGL 211C	Writing, Rhetoric, and Research	3
or ENGL 231C	Writing, Rhetoric, and Research: Special Topics	
MATH 212	Calculus II	4
CHEM 121N	Foundations of Chemistry I Lecture	3
PHYS 231N	University Physics I	4
MAE 201	Materials Science	3
MAE 204	Engineering Mechanics I - Statics	3
MAE 205	Dynamics	3
MAE 220	Engineering Mechanics II - Solid Mechanics	3
MAE 303	Mechanics of Fluids	3
MAE 311	Thermodynamics I	3
MAE 332	Mechanical Engineering Design I	3
MAE 434W	Project Design and Management I	3

Mechanical Engineering Major

General Education	
Complete lower-division requirements	36-42
Complete upper-division requirements (minimum of 6 credit hours)	6
Mechanical Engineering Major	
Complete mechanical engineering departmental and major requirements as shown on the degree program guide	82
Total Credit Hours	**124-130**

Additional Requirements and Information

Continuance Regulations

It is the policy of the Department of Mechanical and Aerospace Engineering to deny a student eligibility to enroll in program courses after it becomes evident that he or she is either unable or unwilling to maintain reasonable standards of academic achievement. Required courses are all those specifically listed above. Major GPA is calculated based on courses with an MAE prefix.

1. Warning. A student will be placed on departmental academic warning if their major grade point average falls below 2.0 after six or more hours have been attempted in the major. Students on academic warning are expected to consult with their departmental advisors and to take immediate steps to improve their major GPA.
2. A student will be placed on departmental academic probation whenever their major grade point average falls below 2.0 for two consecutive semesters of enrollment. Students on academic probation are expected to improve their major GPA to 2.0 or above in no more than one additional regular semester (Fall or Spring). University rules for grade forgiveness will apply.
3. A student is subject to termination from the program if their major GPA remains below 2.0 after the additional regular semester on probation.
4. Students are expected to achieve the required grade (i.e. pass or C) in all required classes in no more than three completed attempts. Failure to do so renders the student subject to immediate termination from the program.

Appeals of termination from the program are in order if extenuating circumstances warrant. Appeals are to be made in writing to the chair of the department. Once the appeal is submitted, it is considered by the faculty of the department.

Degree Program Guide*

The Degree Program Guide is a suggested curriculum to complete this degree program in four years. It is just one of several plans that will work and is presented only as broad guidance to students. Each student is strongly encouraged to develop a customized plan in consultation with their academic advisor. Additional information can also be found in Degree Works.

Course	Title	Credit Hours
Freshman		
Fall		
MATH 211	Calculus I (grade of C or better required)	4
CHEM 121N	Foundations of Chemistry I Lecture (grade of C or better required)	3
CHEM 122N	Foundations of Chemistry I Laboratory	1
ENGL 110C	English Composition (grade of C or better required)	3
ENGN 121	Introduction to Engineering and Technology	4
	Credit Hours	**15**
Spring		
MATH 212	Calculus II (grade of C or better required)	4
PHYS 231N	University Physics I (grade of C or better required)	4
ENGN 122	Computer Programming for Engineering	4
COMM 101R	Public Speaking	3
	Credit Hours	**15**
Sophomore		
Fall		
PHYS 232N	University Physics II	4
MATH 312 or MATH 285	Calculus III or Transfer Credit for Calculus III	4
MAE 204	Engineering Mechanics I - Statics (grade of C or better required)	3
MAE 201	Materials Science (grade of C or better required)	3

MAE 203	Mechanical Engineering Laboratory I - Materials Science	1
MAE 230	Engineering Graphics and Computer Solid Modeling	2
	Credit Hours	**17**
Spring		
MAE 205	Dynamics (grade of C or better required)	3
MAE 220	Engineering Mechanics II - Solid Mechanics (grade of C or better required)	3
MAE 225	Mechanical Engineering Laboratory II - Solid Mechanics	1
MATH 307 or MATH 280	Ordinary Differential Equations or Transfer Credit for Ordinary Differential Equations	3
Interpreting the Past		3
ENGL 211C or ENGL 231C	Writing, Rhetoric, and Research (grade of C or better required) or Writing, Rhetoric, and Research: Special Topics	3
	Credit Hours	**16**
Junior		
Fall		
MAE 303	Mechanics of Fluids (grade of C or better required)	3
MAE 305	Mechanical Engineering Laboratory III - Thermo/Fluids	1
MAE 311	Thermodynamics I (grade of C or better required)	3
MAE 340	Computational Methods in Mechanical Engineering	3
Literature		3
Human Creativity		3
	Credit Hours	**16**
Spring		
MAE 332	Mechanical Engineering Design I (grade of C or better required)	3
MAE 315	Heat and Mass Transfer	3
MAE 336	Electromechanical Systems	3
Philosophy and Ethics **		3
Human Behavior		3
	Credit Hours	**15**
Senior		
Fall		
MAE 433	Mechanical Engineering Design II	3
MAE 434W	Project Design and Management I (grade of C or better required)	3
MAE 436	Dynamic Systems and Control	3
MAE Option Course		3
STAT 330	An Introduction to Probability and Statistics	3
	Credit Hours	**15**
Spring		
MAE 435	Project Design and Management II	3
MAE Option Course		3
MAE Option Course		3
Upper-Division General Education courses		6
	Credit Hours	**15**
	Total Credit Hours	**124**

* Does not include the University's General Education language and culture requirement. Additional hours may be required.

** ENMA 480 is preferred.

Senior Electives

In the senior year, students should select their three elective courses to support a chosen specialty area. Examples include:

1. Power/energy: three courses from MAE 312, MAE 411, MAE 412, MAE 413, MAE 414, MAE 417, MAE 438, MAE 440
2. Mechanical systems design: three courses from MAE 404, MAE 422, MAE 431, MAE 438, MAE 440, MAE 441
3. Aerospace: three courses from MAE 403, MAE 406, MAE 417, MAE 420 (or MAE 440), MAE 438, MAE 460
4. Alternative combinations may be selected with advisor approval.

Linked Bachelor's/Master's Degree Programs

These are designed to allow qualified students to secure a space in a master's program available in the Frank Batten College of Engineering and Technology while they are still pursuing their undergraduate degrees. An eligible student can choose a master's program in the same discipline as his/her bachelor's program or in a complementary discipline. Subject to the approval of the undergraduate and graduate program directors, a student enrolled in a linked program can count up to six credit hours of course work towards both the undergraduate and the graduate degrees. Full-time students may be able to complete the requirements for the bachelor's degree in four years and the master's degree in one additional year. Students in linked programs must earn a minimum of 150 credit hours (120 discrete credit hours for the undergraduate degree and 30 discrete credit hours for the graduate degree).

Students who are matriculated in an undergraduate major in the Frank Batten College of Engineering and Technology with a GPA of at least 3.00 overall and 3.00 in the major are eligible to apply for admission to a linked bachelor's/master's program. Transfer students who desire to be admitted to a linked program at the time they join an undergraduate major at Old Dominion University are eligible to apply if their overall GPA at their previous institution is 3.25 or higher. Prerequisite courses may be required for engineering technology majors to pursue a master's degree in engineering.

Continuance in a linked bachelor's/master's program requires maintenance of a GPA of 3.00 or higher overall and in the major.

Bachelor-to-PhD Programs

For a select number of exceptionally well-qualified students, the college has established a linked doctoral program that enables students to be admitted directly into the PhD program upon completion of the baccalaureate degree. A select number of exceptionally well-qualified students can be admitted to the Bachelor/PhD program in their junior year while they are pursuing one of the undergraduate programs at Old Dominion University. This program encourages admitted students to work closely with faculty members and pursue a research experience. Just as in the linked Bachelor/MS program, six credit hours of graduate course work may again be counted towards the undergraduate degree and doctoral course work mentioned above for

the Bachelor/PhD program. For linked bachelor's to doctoral programs, students must earn a minimum of 198 credit hours (120 discrete credit hours for the undergraduate degree and 78 discrete credit hours for the graduate degree). Students in these programs must maintain a GPA of 3.50 or better throughout their bachelor's and doctoral studies.

The student may opt to obtain the master's degree along the way to the doctorate. To obtain the master's degree, the student must utilize the six graduate credits obtained as part of their undergraduate program, use 18 credits of the graduate course work that is part of the PhD, and work with the Graduate Program Director to plan the final 6 credits.