MATERIALS SCIENCE AND ENGINEERING MAJOR

The development, production and use of novel materials has become a major issue in all fields of engineering. Materials which are strong and light at the same time are needed for space structures; faster electro-optical switching materials will result in improved mass communications; and stronger high temperature plastics would improve the efficiency of transportation systems. Students will have the opportunity to work with faculty and industry on complex problems through projects, internships, and research and co-op experiences. A wide variety of careers are open to graduates of this program ranging from production and quality control in the traditional materials industries to the molecular construction of electronic materials in ultra-clean environments, and to the applications of materials in electronic packages. The application of materials to solve environmental, biomedical, energy, and reliability problems are also career options.

Students majoring in Materials Science and Engineering will receive a Bachelor of Science upon successful completion of the program. Courses offered by this department may be found under the acronym ENMA.

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

Program Objectives

The mission of the Materials Science and Engineering Department at the University of Maryland is to provide a quality engineering education, research at the forefront of the field, and leadership to the Materials and Engineering communities. Our educational programs will have the following objectives:

- Produce high quality alumni who will be successful in their chosen careers in industry, government or academia, in the State of Maryland, the nation and the world.
- Produce alumni who demonstrate the ability define and solve engineering and science problems in the field of Materials Science and Engineering throughout their careers.
- Produce alumni who demonstrate the ability to relate basic physics, math, chemistry and engineering principles to the field of Materials Science and Engineering so they can function professionally as materials engineers and scientists.
- Produce alumni who design and engineer materials and materials systems for future generations of products and demonstrate a continuous upgrading their knowledge to address and impact the rapid pace of technological advances.

The Department will support our students with an educational program that has sufficient breadth in both fundamental and specialized engineering topics to insure our graduates meet the current and future needs of society. In the area of research, the Department conducts a range of scientific research programs and establishes partnerships with government and industry, both in Maryland and elsewhere, to accomplish this goal.

Program Learning Outcomes

The overall educational outcomes of the Materials Science and Engineering Program are to provide undergraduate engineering students:

- Ability to apply knowledge of math, engineering and science
- Ability to design and conduct experiments, analyze and interpret data
- Ability to design a system, component or process to meet desired needs
- Ability to function on multi-disciplinary teams
- Ability to identify, formulate and solve engineering problems
- Understanding of professional and ethical responsibility
- Ability to communicate effectively
- Broad education to understand the impact of engineering solutions in a global and societal context
- Recognition of need and ability to engage in life-long learning
- Knowledge of contemporary issues
- Ability to use techniques, skills, and modern engineering tools necessary for practice

Requirements

Requirements for the Materials Science and Engineering major include thorough preparation in mathematics, chemistry, physics, and engineering science as well as the required university general education requirements. All students will be required to select an area of specialization, an upper-class science elective, and two technical electives. A minimum of 122 credits is required for a bachelor’s degree. A sample program follows:

<table>
<thead>
<tr>
<th>Freshman Year</th>
<th>Credits</th>
<th>Second Semester</th>
<th>Credits</th>
</tr>
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<tr>
<td>First Semester</td>
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<tr>
<td>CHEM135</td>
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<td>CHEM231 &amp; CHEM232</td>
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<tr>
<td>MATH206</td>
<td>1</td>
<td>CHEM481</td>
<td></td>
</tr>
<tr>
<td>ENMA301</td>
<td>3</td>
<td>GenED</td>
<td>3</td>
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<td></td>
<td>15</td>
<td>16-17</td>
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<td>Second Semester</td>
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<tr>
<td>ENMA312 (Or Upper Level Science Elective)</td>
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<td>ENMA362</td>
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<td>ENMA465</td>
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<td>ENMA460</td>
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<td>ENMA461</td>
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<td>Scholarship in Practice [2]</td>
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<td>Specialization Elective</td>
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1. Select one of the following: CHEM231 or CHEM232
2. For students preparing for the ASE materials specialization.

(www.abet.org)
Materials Science and Engineering Major

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<th>Specialization Elective</th>
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Senior Year

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<td>Technical Elective (at or above 300 level)</td>
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<td>ENMA471</td>
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<td>ENGL393</td>
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<td>ENMA487</td>
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<td>ENMA490</td>
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<td>Technical Elective (at or above 300 level)</td>
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<tr>
<td>Total Credits</td>
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</table>

Total Credits: 122-123

1 CHEM231/CHEM232 is required for students focusing on polymers.
2 All students must complete two Distributive Studies courses that are approved for I-series courses. The Understanding Plural Societies (UP) and Cultural Competence (CC) courses may also fulfill Distributive Studies categories.

Other Requirements for the Major

Students majoring in Materials Science and Engineering must follow the academic policies developed by the A. James Clark School of Engineering. Students must achieve a "C-" or better on all coursework in their major (including required non-engineering courses such as chemistry and physics). Students must achieve a minimum cumulative GPA of 2.0 and completion of all degree requirements to graduate. Students are encouraged to visit the Department webpage for a curriculum guideline. A multi-year academic plan will be developed in conjunction with their advisor. All Materials Science and Engineering students must be mentored by three different faculty members, preferably during their freshman and sophomore years (once per semester) to assist them in choosing their specialization area and to plan for post graduation.

Four Year Plan

Click here (https://eng.umd.edu/four-year-plans) for roadmaps for four-year plans in the A. James Clark School of Engineering.

Additional information on developing a four-year academic plan can be found on the following pages:

- 4yearplans.umd.edu
- the Student Academic Success-Degree Completion Policy (https://academiccatalog.umd.edu/undergraduate/registration-academic-requirements-regulations/academic-advising) section of this catalog