What can I do with a major in...

Materials science and engineering

ACTIVITIES MATERIALS SCIENCE AND ENGINEERING MAJORS DO:
Materials engineers are involved in the extraction, development, processing, and testing of the materials used to create a diversity of products. Innovations in engineering materials are at the core of every major advancement in technology. For example, high strength steel paved the way for the industrial revolution, high purity silicon propelled the age of miniaturized circuits and computers, and optical fibers have enabled high speed communications in the information age. Over the last decades, materials scientists and engineers have made vast progress in discovering the fundamentals of processing, structure, and properties of materials. They work with metals, ceramics, plastics, semiconductors, and combinations of materials called composites to create new materials that meet certain mechanical, electrical, and chemical requirements. Materials engineers evaluate economic factors and use their knowledge to develop materials that can be used, for example, to reduce weight but not strength. Materials engineers have developed the ability to create and study materials at an atomic level using advanced processes, electrons, neutrons, or x-rays, and to replicate the characteristics of materials and their components with computers. Development of new materials is a primary objective of materials scientists, and they are largely responsible for the composite materials on stealth aircraft and other cutting-edge systems.

Today, materials engineers are developing materials for the next wave of technological advances: Nanomaterials for electronic devices; biomaterials for implants; new materials for high performance batteries and solar cells; organic semiconductors for flexible electronics; and high performance plastics and composites for automotive applications. Materials scientists and engineers develop and fabricate new materials, characterize their structure, properties and performance, and understand how structure influences properties. At the core of materials science is the concept that advanced materials drive technology.

INDUSTRIES MATERIALS SCIENCE AND ENGINEERING MAJORS WORK IN (SAMPLE LISTING):

<table>
<thead>
<tr>
<th>Chemical products</th>
<th>Consulting</th>
<th>Electronics</th>
<th>Optical devices/coatings</th>
<th>Automotive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Packaging engineering</td>
<td>Petroleum</td>
<td>Polymer resins</td>
<td>Government agencies/labs</td>
<td>Energy</td>
</tr>
<tr>
<td>Semiconductors</td>
<td>Biomedical devices</td>
<td>Aerospace</td>
<td>Telecommunications</td>
<td>Quality control</td>
</tr>
<tr>
<td>Microelectronics</td>
<td>Failure analysis</td>
<td>Polymers/plastics</td>
<td>Materials processing</td>
<td>Healthcare</td>
</tr>
</tbody>
</table>

EMPLOYERS WHO HIRE MATERIALS SCIENCE AND ENGINEERING MAJORS (SAMPLE LISTING):

| 3M | Pentair Inc. | General Electric | Stratasys | Micron |
| Boston Scientific | General Mills | ExxonMobil | U.S. Department of Energy | Intel |
| Ecolab | Ford Motor Company | Medtronic | Seagate Technology | Imation |
| Valspar | Cargill | Honeywell | St. Jude Medical | Boeing |
| Applied Materials Inc. | Anderson Corporation | Guidant | The Dow Chemical Company |

TYPES OF POSITIONS FOR MATERIALS SCIENCE AND ENGINEERING MAJORS (SAMPLE LISTING):

- **Materials engineer**: Works on the structure, processing, properties and performance of engineering materials.
- **Research and development scientist/engineer (R&D)**: Researches structure, processing, properties and performance of materials for the development and use of applications in technology.
- **Process engineer**: Develops and maintains the processes required to synthesize, purify, process, shape, and control materials.
- **Materials testing**: Tests materials properties and performance in applications; can involve mechanical, electrical, optical, magnetic, structural properties, etc.
- **Failure analysis/quality and reliability**: Tests and predicts mechanical/electrical/chemical failure; assessment of performance and statistical variability of products.
TYPES OF POSITIONS FOR MATERIALS SCIENCE AND ENGINEERING MAJORS (Continued):

- **Operations engineer:** Works "on site," spending time ensuring that the plant is producing the right amount of product to the correct specification.
- **Materials consultant:** Serves as expert in one area of materials and is familiar with past experiments and theories related to the hiring firm's proposed project.
- **Product engineer:** Follows the production cycle of a particular product to ensure it is meeting specification. Product engineers may work with marketing and R&D to ensure that a product will meet the needs of customers, then sees the product through production. They may work on new products or variations of existing products.
- **Sales and marketing engineer:** Assists customers in solving production and process problems by providing products and services to meet their specific needs. Chemical engineers in sales use their technical knowledge to sell chemicals, equipment, and other products, and they provide follow-up services and training where needed.

**Some of these positions may require an advanced degree.**

USEFUL WEBSITES FOR MATERIALS SCIENCE AND ENGINEERING MAJORS:

- Department of Chemical Engineering and Materials Science [cems.umn.edu](http://cems.umn.edu)
- Career Cornerstone Materials Science and Engineering [careercornerstone.org](http://careercornerstone.org)
- Materials Jobs [materialsjobs.com](http://materialsjobs.com)
- Material Advantage [materialadvantage.org](http://materialadvantage.org)
- Chemical Engineering Jobs [chemicalengineer.com](http://chemicalengineer.com)

USEFUL WEBSITES FOR ENGINEERING MAJORS:

- Engineer.net [engineer.net](http://engineer.net)
- Engineer Jobs [engineerjobs.com](http://engineerjobs.com)
- Engineering Central [engcen.com](http://engcen.com)
- Graduating Engineer [graduatingengineer.com](http://graduatingengineer.com)
- ThinkJobs.com [thinkjobs.com](http://thinkjobs.com)
- Engineering.com [engineering.com](http://engineering.com)
- Engineer Info [engineer.info](http://engineer.info)

PROFESSIONAL ORGANIZATIONS:

- American Institute of Mining, Metallurgical and Petroleum Engineers [aimehq.org](http://aimehq.org)
- American Society for Testing and Materials [astm.org](http://astm.org)
- Society for Mining, Metallurgy, and Exploration [smenet.org](http://smenet.org)
- Association for Iron and Steel Technology [aist.org](http://aist.org)
- American Institute of Chemical Engineers [aiche.org](http://aiche.org)
- Society of Petroleum Engineers [spe.org](http://spe.org)
- Society of Plastics Engineers [4spe.org](http://4spe.org)
- Institute of Materials, Minerals, and Mining [iom3.org](http://iom3.org)
- Materials Research Society [mrs.org](http://mrs.org)
- American Council of Engineering Companies-MN chapter [acecmn.org](http://acecmn.org)
- National Society of Professional Engineers [nspe.org](http://nspe.org)
- Minnesota Society of Professional Engineers [mnspe.org](http://mnspe.org)
- Society of Women Engineers [swe.org](http://swe.org)

*Additional job/internship search websites and resources can be found at cse.umn.edu/career.*

Information on this page was compiled from the Occupational Outlook Handbook, the Encyclopedia of Careers and Vocational Guidance, University of Minnesota departmental websites, and student-reported data.