What can I do with a major in... 

Materials Science and Engineering

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. 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 scientists and engineers have developed the ability to create and study materials at the atomic level using advanced processes, electrons, neutrons, and 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 of cutting-edge systems.

Today, materials scientists and 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

- Aerospace
- Automotive
- Biomedical devices
- Chemical products
- Consulting
- Electronics/microelectronics
- Energy
- Failure analysis
- Government agencies/labs
- Healthcare
- Materials processing
- Optical devices/coatings
- Packaging engineering
- Petroleum
- Polymer resins/polymer/plastics
- Quality control
- Semiconductors
- Telecommunications

EMPLOYERS

- 3M
- Abbott
- Andersen Corporation
- Appvion, Inc.
- Bostik, Inc.
- Boston Scientific
- Brady Corporation
- Cargill
- Ecolab
- Ford Motor Company
- General Mills
- H.B. Fuller
- Honeywell
- Medtronic
- Micron Technology
- Seagate Technology
- Schlumberger
- Stratasys
- Target Corporation
- Vision-Ease

TECHNICAL SKILLS

- Advanced and Basic Chemistry Laboratory Techniques
- ChemDraw
- Excel
- LoggerPro
- Mathematica
- MATLAB
POSSIBLE POSITIONS

- **Failure analysis/quality and reliability:** Tests and predicts mechanical/electrical/chemical failure; assessment of performance and statistical variability of products.
- **Manufacturing engineer:** Plans the tooling, construction, and assembly of the product as dictated by design specifications.
- **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.
- **Materials engineer:** Works on the structure, processing, properties and performance of engineering materials.
- **Materials testing:** Tests materials properties and performance in applications; can involve mechanical, electrical, optical, magnetic, structural properties, etc.
- **Operations engineer:** Works on-site, spending time ensuring that the plant is producing the right amount of product to the correct specification.
- **Process engineer:** Develops and maintains the processes required to synthesize, purify, process, shape, and control materials.
- **Product engineer:** Follows the production cycle of a new product or variations of existing products to ensure they are meeting specification. May work with marketing and R&D to ensure that a product will meet customer needs.
- **Research and development scientist/engineer (R&D):** Researches structure, processing, properties and performance of materials for the development and use of applications in technology.
- **Sales and marketing engineer:** Assists customers in solving production and process problems by using technical knowledge to provide and sell products and services meet their specific needs, and offer training where needed.
- **Quality engineer:** Supports development and ensures compliance with the company’s quality management system (QMS) in accordance with industry standards and provides technical support to product engineering, marketing, manufacturing, etc.

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

GET INVOLVED

- Active Energy Club
- Alpha Chi Sigma
- CSE K-12 Outreach
- CSE Ambassadors
- CSE International Ambassadors
- Engineers Without Borders
- Material Advantage
- National Society of Black Engineers
- Science and Engineering Student Board
- Society of Asian Scientists and Engineers
- Society of Hispanic Professional Engineers
- Society of Women Engineers
- Solar Vehicle Project
- Tau Beta Pi
- TeslaWorks

RESOURCES

- American Council of Engineering Companies-MN chapter: [acecmn.org](http://acecmn.org)
- American Institute of Mining, Metallurgical and Petroleum Engineers: [aimehq.org](http://aimehq.org)
- American Society for Testing and Materials: [astm.org](http://astm.org)
- Association for Iron and Steel Technology: [aist.org](http://aist.org)
- Department: [cems.umn.edu](http://cems.umn.edu)
- Engineer Info: [engineer.info](http://engineer.info)
- Engineer Jobs: [engineerjobs.com](http://engineerjobs.com)
- Engineer.net: [engineer.net](http://engineer.net)
- Engineering Central: [engcen.com](http://engcen.com)
- Engineering.com: [engineering.com](http://engineering.com)
- Graduating Engineer: [graduatingengineer.com](http://graduatingengineer.com)
- Institute of Materials, Minerals, and Mining: [iom3.org](http://iom3.org)
- Material Advantage: [materialadvantage.org](http://materialadvantage.org)
- Materials Jobs: [materialsjobs.com](http://materialsjobs.com)
- Materials Research Society: [mrs.org](http://mrs.org)
- National Society of Professional Engineers: [nspe.org](http://nspe.org)
- Society for Mining, Metallurgy, and Exploration: [smenet.org](http://smenet.org)
- Society of Petroleum Engineers: [spe.org](http://spe.org)
- Society of Plastics Engineers: [4spe.org](http://4spe.org)
- Society of Women Engineers: [swe.org](http://swe.org)
- ThinkJobs.com: [thinkjobs.com](http://thinkjobs.com)

See the Major Binders available in the CSE Career Center’s Resource Center for more information about this major and career.

*Salary and Career Outcomes gathered from the 2016-2017 CSE Graduation Survey
Post-graduation outcomes reflect the percentage of students who were employed full-time in their field or were enrolled in a graduate program. For detailed starting salary information see the CSE Career Center website.