MATERIALS SCIENCE AND ENGINEERING

The Materials Science and Engineering Program offers tracks of study in electronic, magnetic and photonics materials, soft materials, structural materials, materials for energy, biomaterials and computational materials science.

Materials science and engineering (MSE) is an interdisciplinary program aimed at providing rigorous education in materials science and engineering and the fundamental physics, engineering, chemistry and biology that underlie this discipline. Educational goals are achieved through both coursework and training in cross-disciplinary research supervised by one or more science and engineering faculty members.

The program offers six unique tracks of study:

- electronic, magnetic, and photonics materials
- soft materials
- structural materials
- materials for energy
- biomaterials
- computational materials science

The MSE program is directed by Professor Bob McLeod of the Department of Electrical, Computer and Energy Engineering. For more information, see the Materials Science & Engineering Program (https://www.colorado.edu/mse) website.

Master’s Degree

- Materials Science and Engineering - Master of Science (MS) (catalog.colorado.edu/graduate/colleges-schools/engineering-applied-science/programs-study/materials-science-engineering/materials-science-engineering-master-science-ms)

Doctoral Degree

- Materials Science and Engineering - Doctor of Philosophy (PhD) (catalog.colorado.edu/graduate/colleges-schools/engineering-applied-science/programs-study/materials-science-engineering/materials-science-engineering-doctor-philosophy-phd)

Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member’s home department.

Anseth, Kristi S. (https://experts.colorado.edu/display/fisid_103471) Distinguished Professor; PhD, University of Colorado Boulder

Betterton, Meredith D. (https://experts.colorado.edu/display/fisid_125396) Associate Professor; PhD, Harvard University

Borden, Mark A. (https://experts.colorado.edu/display/fisid_148514) Associate Professor; PhD, University of California, Davis

Bowman, Christopher N. (https://experts.colorado.edu/display/fisid_102043) Distinguished Professor; PhD, Purdue University

Bryant, Stephanie J. (https://experts.colorado.edu/display/fisid_111810) Professor; PhD, University of Colorado Boulder

Cao, Gang (https://experts.colorado.edu/display/fisid_157991) Professor; PhD, Temple University

Cha, Jennifer N. (https://experts.colorado.edu/display/fisid_151746) Professor; PhD, University of California, Santa Barbara

Clark, Noel A. (https://experts.colorado.edu/display/fisid_101947) Professor; PhD, Massachusetts Institute of Technology

Correll, Nikolaus J. (https://experts.colorado.edu/display/fisid_147555) Associate Professor; PhD, Ecole Polytech Federale de Lausanne (Switzerland)

Dessau, Daniel S. (https://experts.colorado.edu/display/fisid_107532) Professor; PhD, Stanford University

Ding, Yifu (https://experts.colorado.edu/display/fisid_146088) Associate Professor; PhD, University of Akron

Dukovic, Gordana (https://experts.colorado.edu/display/fisid_147414) Associate Professor; PhD, Columbia University

Ferguson, Virginia L. (https://experts.colorado.edu/display/fisid_110131) Associate Professor; PhD, University of Colorado Boulder

George, Steven (https://experts.colorado.edu/display/fisid_103289) Professor; PhD, University of California, Berkeley

Goodwin, Andrew Pratt (https://experts.colorado.edu/display/fisid_151595) Associate Professor; PhD, University of California, Berkeley

Gopinath, Juliet T. (https://experts.colorado.edu/display/fisid_147075) Associate Professor; PhD, Massachusetts Institute of Technology

Heinz, Hendrik (https://experts.colorado.edu/display/fisid_156488) Associate Professor; PhD, ETH Zurich (Switzerland)

Holewinski, Adam P. (https://experts.colorado.edu/display/fisid_155543) Assistant Professor; PhD, University of Michigan Ann Arbor

Huang, Shu-Wei (https://experts.colorado.edu/display/fisid_159847) Assistant Professor; PhD, MIT, Cambridge

Hussein, Mahmoud Ismail (https://experts.colorado.edu/display/fisid_144300) Associate Professor; PhD, University of Michigan Ann Arbor

Jeong, Jae-Woong (https://experts.colorado.edu/display/fisid_155543) Assistant Professor; PhD, Stanford University

Kapteyn, Henry C. (https://experts.colorado.edu/display/fisid_115334) Professor; PhD, University of California, Berkeley

Keplinger, Christoph M. (https://experts.colorado.edu/display/fisid_156421) Assistant Professor; PhD, Johannes Kepler Universität Linz (Austria)
Zunger, Alexander (https://experts.colorado.edu/display/fisd_149868)  
Research Professor; PhD, Tel Aviv Univ (Israel)

Courses

**MSEN 5000 (1-3) Fundamentals of Materials Science and Engineering**  
Discusses fundamental topics in materials science and engineering.  
**Requisites:** Restricted to graduate students only.  
**Grading Basis:** Letter Grade

**MSEN 5064 (3) Soft Machines**  
Introduces soft machines as a new paradigm of engineering that starts to impact healthcare, consumer electronics, renewable energy and collaborative robotics. Prepares students to participate in research on soft machines by starting with fundamentals of soft materials and by covering soft robotics, stretchable electronics, energy harvesting and functional polymers. Includes guest lectures, a literature review and a hands-on lab project.  
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4046 and MCEN 5046  
**Requisites:** Restricted to students with 87-180 credits (Senior, Fifth Year Senior) Mechanical (MCEN) majors or College of Engineering graduate students only.  
**Grading Basis:** Letter Grade

**MSEN 5370 (3) Materials Thermodynamics**  
Reviews thermodynamics fundamentals and applies them to understand the chemical, thermal and mechanical behavior of materials. Examines equations of state, solution theory, equilibrium diagrams and phase changes.  
**Requisites:** Restricted to graduate students only.  
**Grading Basis:** Letter Grade

**MSEN 5840 (1-6) Independent Study**  
Offers an opportunity for students to do independent work. Subject arranged to fit the needs of the student.  
**Repeatable:** Repeatable for up to 30.00 total credit hours.  
**Requisites:** Restricted to MS and PhD students in the Materials Science and Engineering program (MTEN) only.

**MSEN 5919 (1-5) Special Topics in MSE**  
Offers an opportunity for special topics in MSE. Subject arrangement to fit the needs of the program.  
**Repeatable:** Repeatable for up to 10.00 total credit hours. Allows multiple enrollment in term.  
**Requisites:** Restricted to graduate students only.

**MSEN 6950 (1-6) Master's Thesis**  
**Repeatable:** Repeatable for up to 6.00 total credit hours.  
**Requisites:** Restricted to MS students in the Materials Science and Engineering program (MTEN) only.

**MSEN 8990 (1-10) Doctoral Dissertation**  
**Repeatable:** Repeatable for up to 30.00 total credit hours.  
**Requisites:** Restricted to PhD students in the Materials Science and Engineering program (MTEN) only.