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
Betterson, 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
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_155859/) 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 I. (https://experts.colorado.edu/display/fisid_144300/) Professor; PhD, University of Michigan Ann Arbor
Jeong, Jae-Woong (https://experts.colorado.edu/display/fisid_155543/) Assistant Professor; PhD, Stanford University
Keplinger, Christoph M. (https://experts.colorado.edu/display/fisid_156421/) Assistant Professor; PhD, Johannes Kepler Universität Linz (Austria)
Lee, Minhyea (https://experts.colorado.edu/display/fisid_145209/) Assistant Professor; PhD, University of Chicago
Lee, Sehee (https://experts.colorado.edu/display/fisid_144739/) Professor; PhD, Seoul National University (South Korea)
MacLennan, Joseph E. (https://experts.colorado.edu/display/fisid_104854/)  
Professor

Maute, Kurt (https://experts.colorado.edu/display/fisid_113875/)  
Professor; PhD, University of Stuttgart (Germany)

McGehee, Michael D. (https://experts.colorado.edu/display/fisid_163453/)  
Professor; PhD, University of California, Santa Barbara

McLeod, Robert R. (https://experts.colorado.edu/display/fisid_107547/)  
Professor; PhD, University of Colorado Boulder

Medlin, James William (https://experts.colorado.edu/display/fisid_122699/)  
Professor; PhD, University of Delaware

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Associate Professor; PhD, California Institute of Technology

Moddel, Garret (https://experts.colorado.edu/display/fisid_105440/)  
Professor; PhD, Harvard University

Murnane, Margaret (https://experts.colorado.edu/display/fisid_115333/)  
Distinguished Professor; PhD, University of California, Berkeley

Murray, Todd W. (https://experts.colorado.edu/display/fisid_146549/)  
Professor; PhD, Johns Hopkins University

Musgrave, Charles Bruce (https://experts.colorado.edu/display/fisid_144977/)  
Professor; PhD, California Institute of Technology

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Assistant Professor; PhD, University of Minnesota

Nair, Devatha P.  
Assistant Professor; PhD, University of Colorado Boulder

Neogi, Sanghamitra (https://experts.colorado.edu/display/fisid_156773/)  
Assistant Professor; PhD, Pennsylvania State University

Park, Won (https://experts.colorado.edu/display/fisid_122676/)  
Professor; PhD, Georgia Institute of Technology

Pellegrino, John (https://experts.colorado.edu/display/fisid_130902/)  
Research Professor; PhD, University of Colorado Boulder

Perkins, Thomas T. (https://experts.colorado.edu/display/fisid_124578/)  
Associate Professor Adjunct; PhD, Stanford University

Raj, Rishi (https://experts.colorado.edu/display/fisid_108413/)  
Professor; PhD, Harvard University

Regueiro, Richard A. (https://experts.colorado.edu/display/fisid_134705/)  
Associate Professor; PhD, Stanford University

Reznik, Dmitry (https://experts.colorado.edu/display/fisid_147659/)  
Associate Professor; PhD, University of Illinois at Urbana–Champaign

Rogers, Charles (https://experts.colorado.edu/display/fisid_101331/)  
Professor; PhD, Cornell University

Rumbles, Garry (https://experts.colorado.edu/display/fisid_147479/)  
Professor Adjoint; PhD, University of London (England)

Smalyukh, Ivan (https://experts.colorado.edu/display/fisid_144757/)  
Professor; PhD, Kent State University

Song, Jeong-Hoon (https://experts.colorado.edu/display/fisid_154468/)  
Assistant Professor; PhD, Northwestern University

Srubar, Wil V. III (https://experts.colorado.edu/display/fisid_153058/)  
Assistant Professor; PhD, Stanford University

Stansbury, Jeffrey W.  
Associate Dean; PhD, University of Maryland

Stoldt, Conrad R. (https://experts.colorado.edu/display/fisid_126290/)  
Professor; PhD, Iowa State University

Tan, Wei (https://experts.colorado.edu/display/fisid_141464/)  
Associate Professor; PhD, University of Illinois at Chicago

van de Lagemaat, Jao (https://experts.colorado.edu/display/fisid_148357/)  
Assistant Professor

Vernerey, Franck J. (https://experts.colorado.edu/display/fisid_144760/)  
Associate Professor; PhD, Northwestern University

Walba, David M. (https://experts.colorado.edu/display/fisid_105830/)  
Professor; PhD, California Institute of Technology

Weimer, Alan W. (https://experts.colorado.edu/display/fisid_109152/)  
Professor; PhD, University of Colorado Boulder

White, Timothy J. (https://experts.colorado.edu/display/fisid_163899/)  
Professor; PhD, University of Iowa

Whiting, Gregory L. (https://experts.colorado.edu/display/fisid_159727/)  
Associate Professor; PhD, University of Cambridge (England)

Xi, Yunping (https://experts.colorado.edu/display/fisid_110518/)  
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Xiao, Jianliang (https://experts.colorado.edu/display/fisid_149777/)  
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Yang, Ronggui (https://experts.colorado.edu/display/fisid_142640/)  
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Yin, Xiaobo (https://experts.colorado.edu/display/fisid_153484/)  
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Yu, Liping  
Assistant Research Professor

Zhang, Wei (https://experts.colorado.edu/display/fisid_146429/)  
Professor; PhD, University of Illinois at Urbana–Champaign

Zunger, Alexander (https://experts.colorado.edu/display/fisid_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.