

Department of Materials Science and Engineering

Materials Science and Engineering is a student-focused department. We offer high-value research opportunities, smaller class sizes, hands-on labs, world-renowned faculty, and real-world senior design projects.

What is Materials Science and Engineering?

Most of the technological innovations that we enjoy today are driven by the discovery of new materials. The future of our world depends on the discovery of new materials that are environmentally friendly, lightweight, sustainable, and responsive. The design of novel materials will enable vehicles that are lighter and more fuel-efficient due to redesigned frames and tires; cell phones and laptops with ultra-thin damage-resistant glass for displays; biomaterials that repair and replace parts of the human body; soft robots that can safely interact with humans; new bionics; and materials for water purification.

Curriculum

Materials engineers at NC State are trained to understand the wide range of phenomena that occur in all classes of materials: metals, polymers, composites, ceramics, and electronic materials. The MSE curriculum includes fundamental courses in thermodynamics, kinetics, and structure, followed by more applied courses that cover mechanical, thermal, electrical, magnetic, and optical properties of materials.

Two laboratory courses introduce students to analytical methods used to characterize the structure of materials at all length scales and to measure properties of all classes of materials. Cutting-edge technologies in materials science and engineering such as nanotechnology, biomaterials, computer modeling, and forensics (materials degradation and failure analysis) are covered.

Five technical electives are included, which allow students to select from a broad range of courses in materials processing, engineering, chemistry, physics, mathematics, and other disciplines. The flexibility afforded by these technical electives allows students to customize their education to prepare them for careers in industry or for graduate school.

The two-semester capstone senior design sequence provides a bridge between concepts learned in the classroom and the practical application of these concepts in an industrial setting. Teams of students work on real-world materials problems supported by local industrial sponsors.

The Materials Science and Engineering program is accredited by the Engineering Accreditation Commission of ABET, <http://www.abet.org>.

MSE Program Highlights

- Two concentrations are offered: Nanomaterials and Biomaterials
- A 5-year Accelerated Bachelor's/Master's (ABM) program (<https://www.mse.ncsu.edu/undergraduate/abm/>) is available for advanced study and further specialization.

- More than 25 percent of all MSE B.S. degree recipients enroll in a graduate degree program at places such as MIT, UC Berkeley, Penn State, Georgia Tech, Purdue, and NC State.
- We are consistently ranked in the top 20 nationally by US News and World Report

Admission

Students complete the standard set of engineering first-year courses, which include courses in the humanities, chemistry, mathematics, physics, and computing. Students may apply to join the Department of Materials Science and Engineering as degree-seeking students via the CODA process (<https://www.engr.ncsu.edu/academics/undergrad/coda/>).

Program Educational Objectives

With the background knowledge in science, engineering, critical thinking, and teamwork provided by the MSE curriculum, our alumni are fully prepared to achieve one or more of the following within five years of graduation:

- Practice materials engineering in academic, industrial, government or entrepreneurial organizations.
- Earn an advanced degree such as MS, Ph.D., or MBA, leading to a career in academia, research and development, or technical management.
- Be promoted into leadership roles in their chosen career.
- Demonstrate by their participation in technical societies, community service, and professional activities, a high degree of service and ethical responsibility to their professional field and the community.

Contact Information

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Website

Faculty

Head

Donald W. Brenner , *Department Head and Kobe Steel Distinguished Professor*

Associate Head

Franky So and Yaroslava Yingling

Director of Graduate Programs

Lew Reynolds

Director of Undergraduate Programs

Yaroslava G. Yingling, *Professor and Director of Undergraduate Program*

Professors

A. Amassian
C.M. Balik
D. Brenner
J. Cuomo
D. Irving
A. Ivanisevic
J. Jones
C. Koch
T. LaBean
J. Narayan
R.J. Spontak
J. B. Tracy
Y. G. Yingling

Associate Professor

V. Augustyn
N. Balke
R. Collazo
R. Gupta
J. Kasichainula

Assistant Professor

K. Ahadi
W. Gao

Teaching Professor

C.L. Reynolds

Research Associate Professor

M. Cuchiara

Research Assistant Professor

A. Kwanza

Professor Emeriti

K. Bachmann
H. Conrad
R.F. Davis
E. Dickey
K. Havner
J.J. Hren
J.P. Maria
J. Russ
R. Scattergood
Y. Zhu

Associate Member of the Faculty

H. Ade, *(Physics)*
N. Allbritton, *(Biomedical Engineering)*
D. Aspnes, *(Physics)*
S.M. Bedair, *(Electrical and Computer Engineering)*
M. Dickey, *(Chemical and Biomolecular Engineering)*
J. Genzer, *(Chemical and Biomolecular Engineering)*
R. Gorga, *(Textile Engineering)*
C. Hall, *(Chemical and Biomolecular Engineering)*
O. Harrysson, *(Industrial and Systems Engineering)*
A. Hawari, *(Nuclear Engineering)*
J. Jur, *(Textile Engineering)*
J. Krim, *(Physics)*
D. Kumar, *(Physics)*
H. Lamb, *(Chemical and Biomolecular Engineering)*
F. Ligler, *(Biomedical Engineering)*
Y. Liu
J. Martin, *(Chemistry)*
V. Misra, *(Electrical and Computer Engineering)*
K. Murty, *(Nuclear Engineering)*
R. Narayan, *(Biomedical Engineering)*
G. Parsons, *(Chemical and Biomolecular Engineering)*
T. Paskova, *(Electrical and Computer Engineering)*

M. Pasquinelli, (*Forest Biomaterials*)

D. Vashae, (*Electrical and Computer Engineering*)

S. Shannon, (*Nuclear Engineering*)

O. Velev, (*Chemical and Biomolecular Engineering*)

X. Zhang

Y. Zhu

N. Biswas

B. Farmer

M. Fiedler

E. Fuller

R. Kirste

T. Luo

S. Mathaudhu

E. McLamore

A. Melechko

J.T. Prater

P. Russell

O. Shenderova

Plans

- Materials Science and Engineering (BS) (<http://catalog.ncsu.edu/undergraduate/engineering/materials-science-engineering/materials-science-engineering-bs/>)
- Materials Science and Engineering (BS): Biomaterials Concentration (<http://catalog.ncsu.edu/undergraduate/engineering/materials-science-engineering/materials-science-engineering-bs-biomaterials-concentration/>)
- Materials Science and Engineering (BS): Nanomaterials Concentration (<http://catalog.ncsu.edu/undergraduate/engineering/materials-science-engineering/materials-science-engineering-bs-nanomaterials-concentration/>)
- Materials Science and Engineering (Minor) (<http://catalog.ncsu.edu/undergraduate/engineering/materials-science-engineering/materials-science-engineering-minor/>)