

# Department of Materials Science and Engineering

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The Materials Science and Engineering (MSE) Department is dedicated to preparing students for a future of innovation and leadership in materials science and engineering, empowering them to address the world's most pressing challenges. Whether it's designing lightweight metals for aerospace, developing high-performance ceramics for energy storage, advancing next-generation batteries for renewable energy, engineering sustainable nanomaterials, manufacturing semiconductors for cutting-edge electronics, creating biomaterials for medical devices, or leveraging computational materials science to accelerate innovation, our program equips students with the skills and knowledge to shape the future of society and industry.

In MSE, student success is our top priority. Our program offers students the opportunity to learn from world-renowned faculty in an intimate classroom setting, gain hands-on experience through state-of-the-art lab courses and mentored undergraduate research, and participate in practical senior design projects that prepare them to tackle real-world challenges. Each student in the MSE program is supported by a dedicated Academic Advisor, who helps them navigate academic requirements, explore career paths, and maximize their educational experience. Beyond the classroom, students have access to enriching experiential learning opportunities, including student leadership roles, research, internships, and study abroad programs.

We're here to help you tackle the world's biggest challenges, make a real impact, and shape the future of materials science and engineering.

## What is Materials Science and Engineering?

Materials Science and Engineering is a foundation of every industry, even if you don't realize it. We create the building blocks for virtually every single consumer product, field, and engineering discipline. From polymers to metals, ceramics to semiconductors, nanomaterials to biomaterials - everything in the engineered world relies on materials. Materials scientists are innovators, crafting new materials that are stronger, lighter, cheaper, more efficient, and increasingly sustainable. Whether it's revolutionizing technology, transforming healthcare, or driving sustainability, Materials Science and Engineering powers the breakthroughs that shape our world.

## Curriculum

At NC State, Materials Science and Engineering students are trained to understand the complexities of all classes of material. Our curriculum begins with core courses in thermodynamics, kinetics, and structure, building a strong foundation before advancing to mechanical, thermal, electrical, magnetic, and optical properties.

Hands-on learning is a cornerstone of the program, with two laboratory courses that immerse students in analytical techniques to characterize materials at all scales and measure their properties. Our program covers cutting-edge technologies like nanomaterials, biomaterials, advanced functional materials, materials forensics, computational modeling, and AI-driven materials optimization.

With five technical electives, students can tailor their education with courses in materials processing, engineering, chemistry, physics, mathematics, statistics, biological sciences, computer science, data science, and beyond. This flexibility allows students to prepare for diverse career paths in industry or pursue graduate studies.

In our two-semester capstone senior design project, students apply their knowledge to solve practical materials challenges with industry partners. Working in teams, you'll tackle hands-on problems and bridge classroom learning with real-world impact.

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

## MSE Program Highlights

- In addition to the B.S. in MSE degree (<https://catalog.ncsu.edu/undergraduate/engineering/materials-science-engineering/materials-science-engineering-bs/>), two concentrations are offered: Nanomaterials (<https://catalog.ncsu.edu/undergraduate/engineering/materials-science-engineering-bs-nanomaterials-concentration/>) and Biomaterials ([https://catalog.ncsu.edu/undergraduate/engineering/materials-science-engineering-bs-biomaterials-concentration/](https://catalog.ncsu.edu/undergraduate/engineering/materials-science-engineering/materials-science-engineering-bs-biomaterials-concentration/))
- New elective courses on design and optimization of materials with AI and machine learning
- 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

3002 Engineering Building 1 (EB1)  
911 Partners Way, Raleigh NC 27695-7907  
919.515.2377

**Website**

## Faculty

### Head

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

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### Associate Head

Franky So, *Associate Head and Walter and Ida Freeman Distinguished Professor*

Yaroslava Yingling, *Associate Head, Director of Undergraduate Programs, Kobe Steel Distinguished Professor*

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### Director of Graduate Programs

Douglas Irving, *Graduate Program Director and Professor*

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### Director of Undergraduate Programs

Yaroslava Yingling, *Associate Head, Director of Undergraduate Programs, Kobe Steel Distinguished Professor*

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### Professors

Aram Amassian, *Professor*

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

Ramón Collazo, *Professor and University Faculty Scholar*

Jerry Cuomo, *Distinguished Research Professor*

Douglas Irving, *Graduate Program Director and Professor*

Jacob Jones, *Kobe Steel Distinguished Professor*

Thomas LaBean, *Professor*

Jagdish Narayan, *John C. Fan Distinguished Professor*

Zlatko Sitar, *Kobe Steel Distinguished Professor*

Richard Spontak, *Professor*

Martin Thuo, *Professor*

Joseph Tracy, *Professor and University Faculty Scholar*

Yaroslava Yingling, *Associate Head, Director of Undergraduate Programs, Kobe Steel Distinguished Professor*

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### Associate Professors

Veronica Augustyn, *Associate Professor, Jake & Jennifer Hooks Distinguished Scholar*

Nina Balke, *Associate Professor*

Rajeev Gupta, *Associate Professor*

Jag Kasichainula, *Associate Professor*

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### Assistant Professors

Bharat Gwalani, *Assistant Professor*

Yin Liu, *Assistant Professor*

Martin Seifrid, *Assistant Professor*

Ruijuan Xu, *Assistant Professor*

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### Teaching Professor

Alexey Gulyuk, *Teaching Professor*

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### Lecturer

Sharon Thorne, *Lecturer*

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### Research Associate Professor

Maude Cuchiara, *STEPS Managing Director and Research Associate Professor*

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### Research Assistant Professor

Albert Kwansa, *Assistant Research Professor*

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### Professor Emeriti

M. Balik

R.F. Davis

E. Dickey

C. Koch

J.P. Maria

K. Moazed

R. Scattergood

Y. Zhu

## 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/>)