

Ph.D. in Materials Science and Engineering

Participating Departments:

Chemistry and Biochemistry, Physics, Chemical and Biological Engineering, Mechanical and Industrial Engineering, and Electrical and Computing Engineering.

Information Contact

Overview

Montana State University and Montana Technological Institute (MTech) participate in the collaborative Ph.D. Materials Science program. At both institutions, faculty, research, and curriculum courses span across multiple departments. The curriculum, in broad strokes, integrates the science and engineering applications of materials that impact energy, health, industry, and the environment. Faculty from both institutions teach the courses each semester either in person or via a virtual platform.

Admission

Admission decisions are holistically determined by review of applicant's transcripts, personal statement, letters of recommendation, research experience, and strength of undergraduate background. There are no spring admissions.

The following criteria should be used as a guide to help you as you apply.

- Undergraduate GPA must be 3.0 or above on a 4.0-point scale.
- GRE scores are NOT required.
- All international students must show English proficiency. You can submit the IELTS or the iBT form of the TOEFL exam and provide a report. A TOEFL total score of 90 is required with a minimum speaking score of 26 to qualify for admission to our programs and for a teaching assistantship. A total minimum score of 7.0 is required on the IELTS exam and a speaking component score of 8.0 to qualify for a teaching assistantship. Duolingo test scores are accepted (130-135). Some exceptions apply for students from different countries (see Graduate School website.)
- Your personal statement should include your short-term academic goals and long-term professional goals and why the PhD program is a good fit for you. Include in your statement, any research experience either as an undergraduate or in your working career and the names of 3 professors in the Materials Science program you would like to conduct research with and why.
- You do not need to contact faculty to apply or be accepted into the program.
- You do not need to hold an MS degree to apply to our PhD programs.
- Review of applications begins in early January and continues until our class is full. Priority is given to early applicants.
- Applicants will be notified about acceptance and financial awards no later than April 1st. Completed applications should be in our office by January 15th. Applications received after January 15th are still eligible for acceptance if space is available, however, no waivers will be provided.

- If accepted into the PhD program, support in the first academic year (Fall + Spring) for a PhD student will be in the form of a Graduate Teaching Assistantship (GTA) and a tuition waiver. Later support will be determined with your research advisor as a GTA or Graduate Research Assistant.

Degree Requirements and Curriculum

To earn a PhD in Materials Science, every student must complete a minimum of 60 credits; 32 credits of coursework and 28 credits of dissertation research. Additional requirements are listed below.

- Complete 32 credits of coursework (20 credits of foundational coursework and 12 credits of technical electives)
- Complete 28 credits of independent research
- Rotations in a minimum of 2 research groups
- Choose an advisor and PhD Committee
- Demonstrate competency in the qualifying exam prior to the start of the 2nd year in the program
- Pass a Comprehensive Exam (written and oral components)
- Participate in annual symposiums
- Hold annual meetings with their PhD committee
- Participate in an optional internship (if available)
- Write and defend a dissertation

Core Courses

- MTSI 501 Material Structure and Bonding
- MTSI 502 Adv Materials Science II
- MTSI 511 Thermodynamics of Materials
- MTSI 512 Kinetics Phase Transformations
- MTSI 551 Adv Materials Characterization/ MTSI 503 Optical, Electronic, and Magnetic Properties of Materials
- MTSI 594 Seminar
- MTSI 690 DISSERTATION RESEARCH

Other Electives

Elective courses will be available, allowing students to deepen their understanding and research skills in the program's focus areas:

1. biomaterials;
2. materials for energy storage, conversion, and conservation;
3. electronic, magnetic, and photonic materials; and
4. materials synthesis, processing, and fabrication.

Some electives will be developed specifically for the MatSci Ph.D. program, others would be graduate courses from other related graduate programs at the three campuses. Courses in mathematics, statistics, and numerical modeling would be recommended for students with special interests in theory and simulation.

