

College of Earth and Mineral Sciences
Department of Materials Science and Engineering
The Pennsylvania State University
GRADUATE STUDENT HANDBOOK

Accelerated Master of Science in Materials Science and Engineering
August 2023

The Department of Materials Science and Engineering (MatSE) in the College of Earth and Mineral Sciences is pleased to offer a one-year, residence-based, non-thesis Master of Science degree in Materials Science and Engineering (M.S. MatSE). This rigorous, interdisciplinary program requires 30 credits for completion and culminates in a residential research project, poster presentation, and a scholarly paper.

I. Course Offerings and Schedule

A total of 30 credits is required for the completion of the proposed M.S. MatSE degree.

The complete program is as follows:

Course Abbreviation and Number	Course Title	Number of Credits	Semester Offered
Core classes:			
MATSE 501	Thermodynamics of Materials	3	Fall
MATSE 590	Colloquium	1	Fall
MATSE 590	Colloquium	1	Spring
MATSE 512/ GEOSC 512	Principles of Crystal Chemistry	3	Spring
MATSE 582	Materials Science and Engineering Professional Development	1	Fall
MATSE 596	Individual Studies	1	Fall
MATSE 596	Individual Studies	1	Spring
MATSE 596	Individual Studies	4	Summer
Students must choose one of the following two required electives:			
MATSE 542	Polymeric Materials: The Solid State	3	Fall
MATSE 503	Kinetics of Materials Processes	3	Spring

Elective MatSE classes:

MATSE 506	Interfacial Electrochemical Processes	3	Spring
MATSE 507/BIOE 517	Biomaterials Surface Science	3	Fall
MATSE 510	Surface Characterization of Materials	3	Spring
MATSE 514	Characterization of Materials	3	Fall
MATSE 525	Communicating Topics in Materials Science	3	Fall
MATSE 530	X-Ray Crystallography and Diffraction	3	Spring
MATSE 535	Geometrical Crystallography	3	Fall
MATSE 545/EE 545	Semiconductor Characterization	3	Fall
MATSE 555/PHYS 555	Polymer Physics I	3	Spring
MATSE 556	Polymer and Composite Materials for Additive Manufacturing	3	Fall
MATSE 560/MN PR 507	Hydrometallurgical Processing	3	Spring
MATSE 565	Metals in Electronics	3	Spring
MATSE 400	Crystal Chemistry	3	Fall
MATSE 401	Thermodynamics of Materials	3	Fall
MATSE 402	Materials Process Kinetics	3	Spring
MATSE 403	Biomedical Materials	3	Fall
MATSE 404	Surfaces and the Biological Response to Materials	3	Spring
NUC E 409/ MATSE 409	Nuclear Materials	3	Fall
MATSE 411	Processing of Ceramics	3	Fall
MATSE 412	Thermal Properties of Materials	3	Spring
MATSE 413	Solid State Materials	3	Spring
MATSE 415	Introduction to Glass Science	3	Fall
MATSE 417	Electrical and Magnetic Properties	3	Spring
MATSE 419	Computational Materials Science and Engineering	3	Spring
MATSE 421	Corrosion Engineering	3	Fall
MATSE 422	Thermochemical Processing	3	Spring
MATSE 425	Processing of Metals	3	Fall
MATSE 426	Aqueous Processing	3	Spring
MATSE 427	Microstructure Design of Structural Materials	3	Spring
MATSE 430	Materials Characterization	3	Fall

MATSE 435	Optical Properties of Materials	3	Spring
MATSE 436	Mechanical Properties of Materials	3	Fall
MATSE 440/E MCH 440	Nondestructive Evaluation of Flaws	3	Spring
MATSE 441	Polymeric Materials I	3	Fall
MATSE 445	Thermodynamics, Microstructure, and Characterization of Polymers	3	Fall
MATSE 446	Mechanical and Electrical Properties of Polymers and Composites	3	Fall
MATSE 447	Rheology and Processing of Polymers	3	Spring
MATSE 450	Synthesis and Processing of Electronic and Photonic Materials	3	Fall
MATSE 455	Properties and Characterization of Electronic and Photonic Materials	3	Spring
MATSE 475/ESC 475	Particulate Materials Processing	3	Spring

It is also possible for students to take upper 400 and 500 level courses from other Departments at Penn State in subjects that are relevant to materials science and engineering and the student's research focus.

At least 18 credits must be in 500-level courses and the remaining credits may be at the 400 or 800 level. A professional development course on ethics in research is required in the fall, a 1-credit course of individual study for the development of a research project is required in the fall and spring, and a 4-credit course of individual study for the development of a research project is required in the summer.

Altogether, 15 credits of formal coursework must be from MatSE courses, with the remaining credits coming from formal courses offered by either MatSE or other Departments at Penn State that are relevant to the student's specialization.

A suggested schedule is shown below:

Fall (12 credits)

- MATSE 501 (3)
- MATSE 582 (1)
- MATSE 590 (1)
- MATSE 596 (1)
- MATSE 542 (3) – or a 3-credit elective, if the student chooses to take MATSE 503 (3) instead
- Elective 1 (3)

Spring (14 credits)

- MATSE 512 (3)
- MATSE 596 (1)
- MATSE 590 (1)
- MATSE 503 (3) – or a 3-credit elective, if the student has taken MATSE 542 (3) instead
- Elective 2 (3)
- Elective 3 (3)

Summer 2 (4 credits)

- MATSE 596 (4)

II. Research and Expectations

The culminating research experience takes place under the supervision of faculty within the Department of Materials Science and Engineering. These faculty have the responsibility for technical oversight of the work performed by the students and guide the students as they write the scholarly paper. The students are responsible for working with the supervising faculty on their project and carrying out the proposed research in the fall, spring and summer semesters.

To ensure that the students have a high-quality research experience and may begin to prepare for their research project as soon as possible, a Graduate Adviser, currently Prof. Susan Sinnott, meets with the students at the start of the fall semester, ensures they find supervising faculty for their research projects, and monitors their progress via weekly progress reports that are submitted to both the Graduate Adviser, the MATSE Graduate Program, and the supervising faculty. In addition, the students meet with the Graduate Adviser in monthly in-person meetings.

At the end of the summer semester on **July 26, 2024**, the students present the results of their research projects in a poster session and submit the final drafts of their scholarly papers to both the supervising faculty, Graduate Adviser, and to the MatSE Graduate Program. The entire Department is invited to the poster session to interact with the students and view the posters. Both the posters and papers will be evaluated by the Graduate Adviser and a committee of faculty who will grade their work on a pass/fail basis.

All the scholarly papers are published on Scholars Sphere at Penn State and may additionally be submitted for publication to a peer-reviewed journal. Students who plan to publish their work in a journal will be able to delay access to their papers on Scholars Sphere until after publication. Students who need more time to complete their scholarly paper will be allowed to complete the paper, have it reviewed, and approved after the summer semester has ended. Students will not be required to remain in residence while they complete the scholarly paper. However, extensions granted to students in the program will comply with the Penn State Graduate Council policy on deferred grades.

III. Satisfactory Scholarship

Students enrolled in a graduate degree program must maintain a minimum grade-point average to remain in good academic standing. One or more failing grades or a cumulative grade-point average below 3.00 for any semester or combination of semesters may be considered as evidence of failure to maintain satisfactory scholarship by the degree program. A graduate student who fails to maintain satisfactory scholarship or to make acceptable progress in a degree program may be terminated from the degree program. The ACC MS program is a three-semester program and a students will not be routinely granted permission to extend degree time to achieve a GPA above a 3.0 if their GPA should fall below the required Graduate School 3.0 minimum. Students with a GPA below the minimum 3.0 GPA will meet with Dr. Sinnott and the MatSE Graduate Office to discuss if academic probation for one semester is an option.

IV. Graduate Minor

Accelerated MS students are permitted to declare a Graduate Minor in their second semester. ***A master's minor must require no fewer than 6 credits in a field related to, but different from, that of the student's graduate major program.*** The request must be received at least one semester prior to the semester the student intends to graduate and the student's GPA must be at or above 3.4.

Process for graduate minor:

- Discuss and Approval of Advisor
- Approval of MatSE Graduate Program
- Approval of Minor Program
- [Request to Add Minor Form](#)

V. Graduation

You should activate your intent to Graduate through LionPath between **May 6 through June 14, 2024**.

The summer Graduate School commencement ceremony will be held on Saturday, August 10, in the Bryce Jordan Center. If you plan on participating in this celebratory event you should plan on obtaining regalia (cap, gown, and hood) from the Penn State bookstore for a M.S. degree in engineering with an orange trim. During the ceremony, you will join other graduating students from the **College of Earth and Mineral Sciences**.

VI. Helpful Links

Penn State and MATSE take health and wellness very seriously. This can be physical, mental, emotional, spiritual, social, cultural, or environmental wellness. Below is a listing of links that we encourage you to explore during your time at Penn State:

[Counseling and Psychological Services \(CAPS\)](#) – CAPS goal is to address the psychological needs and personal concerns of students that may interfere with their academic progress, social development, and emotional wellbeing. CAPS services are available in a variety of modalities at this time. Please call to learn more about your options. If there is an emergency situation after hours, contact the 24/7 Penn State Crisis Line at 1-877-229-6400.

[Student Care and Advocacy](#) - College life can be confusing and overwhelming, and sometimes you just need someone to help you sort things out. Student Care and Advocacy is committed to helping students facing unforeseen challenges navigate Penn State's structure in close and careful collaboration with campus and community partners. Their case managers welcome any opportunity to provide consultation and direct you to the resource best equipped to meet your needs.

[University Health Services \(UHS\)](#) - is your comprehensive on-campus health care resource. They specialize in outpatient student health including the treatment of medically urgent problems and ongoing health concerns. They provide preventative care, education, and resources to help students live a healthy lifestyle

[Community and Belonging](#) - Penn State can feel like a large place, but there are many communities to help you connect and thrive. Penn State offers many spaces where students with different racial and ethnic backgrounds, genders, sexual orientations, religions, socioeconomic circumstances, and physical abilities come together to find support and community.

[Lions Pantry](#) - The Lion's Pantry serves as the official on-campus student food pantry at Penn State's University Park campus.

Registrar's Office: <http://registrar.psu.edu/>

Bursars Office: <https://bursar.psu.edu/>

DISSA: <https://global.psu.edu/article/contact-dissa>

Penn State Graduate School: <http://gradschool.psu.edu/>