



Materials Science Program

Graduate Studies Handbook

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Materials Processing and Characterization Thread: Courses introduce students to characterization and processing tools needed to understand and form materials into complex structures and integrated devices.

MSC 407 Solids and Materials Laboratory (ME 462)

MSC 463 NMR Spectroscopy (CHM 423)

Electronic and Optical Properties of Materials Thread: Courses establish fundamental electronic and optical properties of silicon, ceramics, and glasses to motivate advanced applications in optics, alternative energy, and medicine.

MSC 420 Introduction to Condensed Matter (PHY 420)

MSC 423 Semiconductor Devices (ECE 423)

MSC 470 Optical Properties of Materials (OPT 421)

MSC 460 Solar Cells (CHE 460)

MSC 456 Chemical Bonds (CHM 456)

MSC 437 Nanophotonic and Nanomechanical Devices (ECE 436)

Polymers and Biomaterials Thread: Courses emphasize both fundamental and applied concepts of polymer science and biomaterials.

MSC 413 Engineering of Soft Matter (CHE 413)

MSC 454 Interfacial Engineering (CHE 454)

Materials Science Courses:

MSC 421 (BME 420) Biomedical Nanotech

MSC 442 (BME 442) Microbiomechanics

MSC 451 (BME 451) Biomedical Ultrasound

MSC 462 (BME 462) Cell & Tissue Engineering

BME 485 Cell & Membrane Mechanics

MSC 413 (CHE 413) Engineering of Soft Matter

MSC 454 (CHE 454) Interfacial Engineering

MSC 458 (CHE 458) Electrochemical Engineering and Fuel Cells

MSC 460 (CHE 460) Solar Cells

MSC 469 (CHE 469) Biotechnology and Bioengineering

MSC 476 (CHE 476) Polymer Chemistry

MSC 478 (CHE 478) Machine Learning of Molecules and Materials

MSC 416 (CHM 416) X-ray Crystallography

MSC 463 (CHM 423) NMR Spectroscopy

MSC 456 (CHM 456) Chemical Bonds

MSC 423 (ECE 423) Semiconductor Devices

MSC 437 (ECE 436) Nanophotonic and Nanomechanical Devices

MSC 520 (ECE 520) Spin Based Electronics

MSC 432 (ME 432) Opto-mechanical

MSC 407 (ME 462) Solids and Materials Laboratory

MSC 409 (ME 481) Mechanical Properties of Materials

MSC 433 (ME 433) Nanoscale Energy Transport & Conversion

MSC 507 (OPT 407) SEM Practicum

MSC 470 (OPT 421) Optical Properties of Materials

MSC 465 (OPT 465) Principles of Lasers

C. Advising and Committees

Academic and Thesis Advisors

You will be assigned an academic advisor when you arrive at Rochester, but he or she may not be your eventual thesis advisor, whom you should identify during your first year here, usually before taking the preliminary exam. (This exam is discussed below.) It is important that you find a good match between your academic interests and those of your thesis advisor, that your advisor is willing to accept you as a graduate research assistant, and that he/she is able to provide your graduate stipend

academic advisor is typically one member of the committee. The student can select the other member(s) of the committee or they will be chosen by the Materials Science Curriculum Committee if necessary. The student is responsible for checking the availability of the committee members and scheduling the oral exam before June 15th. The student must inform the Graduate Coordinator of the date and time for timely administration of the exam.

At least **one week** before the exam, the student must submit to the Graduate Coordinator an electronic copy of a carefully written document containing three sections of equal importance:

Questions Addressed by the Author(s). The questions addressed in the article and the reasons for examining these questions should be identified.

Critical Appraisal of the Article. The author's contribution to the solution of those questions and its significance should be discussed.

Proposal for Additional Research. Propose in concrete terms research that might be done to extend and (if necessary) improve upon the study addressed in the article.

This document should be no longer than ten pages (12 pt double-

H. Key Milestones

At the end of the first academic year

Choose a research advisor
Complete preliminary examination
Begin Ph.D. thesis research

Second Year

No later than January, submit the names of the thesis advisory committee to the Materials Science Program Office
Complete most remaining course work
Organize thesis proposal

Third Year

Submit final copy of research proposal to Program Office and Advisory Committee Members (two weeks before exam).
Complete qualifying examination (proposal defense) by year-end.

Subsequent Years

Continue research and writing of the thesis under the direction of the thesis advisor and thesis advisory committee. *Note:* the expectation of the program is that students should not take more than five years to successfully complete the Ph.D. University Regulations require that students exceeding a 7 year stay receive approval for an extension both from the

**REQUIREMENTS FOR THE MASTER OF SCIENCE
IN MATERIALS SCIENCE**

A. Program Objective

Materials Science graduate education at Rochester is intended to prepare students for careers as independent scientists and engineers in a wide variety of disciplines that has come to define the field of Materials Science in general. Courses will be offered that stress the interdisciplinary nature of Materials

All Materials Science degree programs require completion of at least one course selected from each of the two categories listed below. Other courses should be selected from the available courses in MSC and

number of credits that bear the MSC designation, as described above.

1) Thermodynamics (must select a minimum of one course from this list)

MSC 405 THERMODYNAMICS OF SOLIDS (Cross-listed as ME 460)

MSC 418 - STATISTICAL MECHANICS (cross-listed as PHY 418)

MSC 425 THERMODYNAMICS I (cross-listed as CHE 425)

CHEM 442- PHYSICAL CHEMISTRY II

2) Structure/ Property Relationships (must select a minimum of one course from this list)

MSC 409 - MECHANICAL PROPERTIES OF MATERIALS (Cross-listed as ME 481)
or MSC 456 - CHEMICAL BONDS- FROM MOLECULES TO MATERIALS (CHM 456)

Materials Science Faculty

<https://www.hajim.rochester.edu/matsci/people/faculty/index.html>

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