M.S. in Optics and Photonics Plan A

The M.S. Degree in Optics and Photonics is an interdisciplinary, cooperative program managed by the Optics Program Committee on behalf of the three participating departments: Physics, Electrical and Computer Engineering, and Chemistry and Biochemistry. Students apply directly to the Optics and Photonics Graduate Program and are admitted through one of the participating departments, selected based on advisor affiliation and student interest.

The Optics and Photonics degree is distinct from the other graduate degrees offered by the participating departments because it requires interdisciplinary coursework involving at least two of the departments. The interdisciplinary program of study allows students to emphasize optics theory and applications in more depth than is possible through degrees in the traditional disciplines. Each optics student will be mentored by a graduate advisor from the faculty of one of the three participating departments, and a graduate supervisory committee made up of faculty from at least two of the three departments in the cooperative program.

The M.S. Plan A requires completion of an acceptable research-based Thesis describing independent research performed by the student with guidance from the advisor and graduate supervisory committee. The Thesis involves considerable effort on the part of the student, and must generate results that are of sufficient quality and significance to be reported in a national or international conference paper or presentation. The Master’s Thesis often serves as the basis for a peer-reviewed manuscript for an archival journal or book chapter.

More information on the admission requirements, application process, and degree requirements can be found at:

https://optics.montana.edu/Optics_photonics_MS.html

and at:

M. S. in Optics and Photonics (https://www.montana.edu/academics/optics-photonics-graduate/)

Choose two key courses: 6

PHSX 427 Advanced Optics
PHSX 437 Laser Applications
ELEE 482 Electro-Optical Systems
ELEE 584 Laser Engineering

Choose one specialty course: 3

ELEE 581 Fourier Optics/Imaging Theory
ELEE 582 Optical Design
PHSX 531 Nonlinear Optics/Laser Spectroscopy
CHMY 527 Analytic Optical Spectroscopy
CHMY 560 Symmetry, Orbitals, and Spectroscopy

Optics electives (choose at least 6 credits): 6

ELEE 408 Photovoltaic Systems
ELEE 432 Applied Electromagnetics
ELEE 482 Electro-Optical Systems
ELEE 505 MEMS Sensors and Actuators
ELEE 538 Adv Top Electromagnet & Optics
ELEE 548 Optical Communications Systems
ELEE 581 Fourier Optics/Imaging Theory
ELEE 582 Optical Design

ELEE 583 Remote Sensing Systems
ELEE 584 Laser Engineering
PHSX 427 Advanced Optics
PHSX 437 Laser Applications
PHSX 461 Quantum Mechanics I (for non-physics students)
PHSX 507 Quantum Mechanics II
PHSX 515 Advanced Topics In Physics
PHSX 516 Experimental Physics (Fall - Optics)
PHSX 520 Electromagnetic Theory II
PHSX 531 Nonlinear Optics/Laser Spectroscopy
CHMY 421 Advanced Instrument Analysis
CHMY 527 Analytic Optical Spectroscopy
CHMY 557 Quantum Mechanics
CHMY 560 Symmetry, Orbitals, and Spectroscopy
CHMY 564 Adv Quantum Chemistry
MTSI 501 Material Structure and Bonding
MTSI 551 Adv Materials Characterization
ELEE/PHSX/CHMY 591 Special Topics
ELEE/PHSX/CHMY 592 Independent Study
OPTI 594 Optics Seminar

Technical electives (choose at least 5 credits): 5

ECE, Physics, Math, Chemistry, Business, etc. (400-level or above)

Master’s Thesis (ELEE/PHSX/CHMY 590) 10

Total Credits 30

Note: At least 20 credits must be at the 500 level.

1 A maximum of three (3) credits total among these courses is allowed if the subject is directly related to optics, upon approval by the academic advisor and research advisor/instructor.

2 A maximum of two (2) credits total of optics seminars is allowed.

ACCELERATED MS IN OPTICS AND PHOTONICS

The accelerated master’s degree allows undergraduate students who are currently pursuing their minor in Optics and Photonics to make simultaneous progress toward a bachelor’s and master’s degrees that will prepare them for high-demand jobs in laser engineering, remote sensing, and more. In addition to the Optical Technology Center founded in 1995, MSU has a culture of interdisciplinary research and a history of partnership with Bozeman’s thriving optics and photonics industry. The accelerated MS in Optics and Photonics is an interdisciplinary degree managed by the Optics and Photonics Degree Program Committee on behalf of the Departments of Physics, Electrical and Computer Engineering, and Chemistry and Biochemistry. Students apply to the Accelerated MS in Optics and Photonics and earn reserved credits towards the MS degree in Optics and Photonics while still an undergraduate. Students are admitted after graduation into the MS in Optics and Photonics program through one of the participating departments, chosen by the applicant based on their areas and department affiliation of faculty working in those areas. More information about the accelerated MS in Optics and Photonics can be found here: Accelerated MS in Optics and Photonics (https://optics.montana.edu/Optics_photonics_MS_accelerated.html).