Optics and Photonics Minor (Non-Teaching)

The undergraduate non-teaching minor in Optics and Photonics provides a core set of knowledge and skills necessary to participate in the rapidly growing opportunities in optical science and engineering. Requirements include courses in optics, electrical engineering and physics, as well as electives chosen to match the interests and needs of each student.

Students pursuing the BS in Electrical Engineering can earn the Optics and Photonics Minor within the 125 credits required for the major by careful selection of electives and by completing an optics-related capstone design project.

Students pursuing the BS in Physics Professional Option or the BS in Physics Interdisciplinary Option can earn the Optics and Photonics Minor with no extra credits by carefully selecting physics electives, by taking EELE 482 as one of their university or declared area electives, and by completing optics-related research (PHSX 490R and PHSX 499R) as their required senior project.

Required core courses for minor (12 credits):

- EELE 334 Electromagnetic Theory I 3
  - or PHSX 423 Electricity and Magnetism I 3
- EELE 432 Applied Electromagnetics 3
  - or PHSX 425 Electricity and Magnetism II 3
- EELE 482 Electro-Optical Systems 3
- PHSX 427 Advanced Optics 3
  - or PHSX 437 Laser Applications

Optics electives (choose at least 9 credits):

- CHMY 371 Physical Chemistry-Quantum Chemistry and Spectroscopy I
- EELE 408 Photovoltaic Systems
- EELE 448 Optical Communications Systems
- EELE 481 Optical Design
- EELE 484 Laser Engineering
- EELE 488R Electrical Engineering Design I 3
- EELE 489R Electrical Engr Design II 3
- EEE 490R Undergraduate Research 1
- EELE 492 Independent Study 2
- PHSX 427 Advanced Optics
- PHSX 437 Laser Applications
- PHSX 444 Advanced Physics Lab
- PHSX 490R Undergraduate Research 1
- PHSX 492 Independent Study 2
- PHSX 494 Seminar/Workshop 1
- PHSX 499R Senior Capstone Seminar 1

Total Credits 21

1 A maximum of four (4) credits (total) of these classes may be used if the topic is directly related to optics, on approval by academic advisor and research advisor/instructor.

2 A maximum of three (3) credits (total) of these classes may be used if the topic is directly related to optics, on approval by academic advisor and research advisor/instructor.

3 EELE488R and EELE489R must involve projects directly related to optics and be approved by academic advisor and ECE optics faculty.

Note: The following 500-level classes can be taken as electives in the Optics and Photonics minor by seniors with a cumulative grade-point average >= 3.25 (by petition to the Registrar) and provided all prerequisites are met.

- MTSI 503 Electrical, Optical and Magnetic properties of materials
- EELE 538 Adv Top Electromagnet & Optics
- EELE 581 Fourier Optics/Imaging Theory
- EELE 582 Optical Design
- EELE 583 Remote Sensing Systems
- PHSX 515 Advanced Topics In Physics (if topic is directly optics related)
- PHSX 531 Nonlinear Optics/Laser Spectroscopy
- CHMY 527 Analytic Optical Spectroscopy
- CHMY 557 Quantum Mechanics
- CHMY 560 Symmetry, Orbitals, and Spectroscopy

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).