

OBERLIN Physics & Astronomy: A quick guide to the major

COLLEGE & CONSERVATORY Wright Laboratory of Physics | 110 N. Professor Street | Oberlin, Ohio, 44074 | (440) 775-8330

Welcome to the Physics and Astronomy Department at Oberlin! We are happy to hear that you are interested in being a physics major. This short guide offers some information about typical coursework, research opportunities, special departmental features, and common career paths of our graduates.

To learn more, please contact physics@oberlin.edu, read the longer version of this document, and/or just stop by the department.

TYPICAL COURSE SEQUENCE FOR MAJORS:

The start into the majors sequence depends on your past experience in math and physics. Talk with the physics department chair and/or other faculty members teaching in the introductory sequence courses (PHYS 110, 111, and 212) to see what start makes the most sense for you.

Over the past ten years, about half of all majors begin taking physics at Oberlin with PHYS 110 in the Fall of their first year, a quarter take this class as sophomores (having taken Calculus I their first year), and the remaining quarter start farther into the sequence due to AP/IB or college/university credit.

After the first two years of coursework, schedules vary as students choose one of three different concentrations: in physics, in astrophysics, or in materials physics. The typical pathway of courses is listed below:

First Year in the Major:

Fall: Mechanics and Relativity (Physics 110)
Calculus II (Math 134)
Spring: Electricity, Magnetism, Thermodynamics (Physics 111)
Multivariate Calculus (Math 231)

Second Year in the Major:

Fall: Modern Physics (Physics 212)
Differential Equations (Math 234)
Spring: Classical Mechanics (Physics 310)

Third/Fourth Year(s) in the Major:

Schedules are more varied with students choosing from the following different core and elective offerings depending on their concentrations and interests.

Fall: Computational Modeling (Physics 290)*
Quantum Mechanics (Physics 312)
Intermediate Laboratory (Physics 314)
Waves and Optics (Physics 316)*
Electrodynamics (Physics 411)/Applied
Quantum Mechanics (Physics 412)
Spring: Electronics (Physics 242)*
Astrophysics I - Stars and Planets (Ast. 301)*
Astrophysics II - Galaxies and Cosmology (Ast. 302)*
Electricity and Magnetism (Physics 311)
Materials Physics (Physics 340)*
Statistical Mechanics (Physics 410)
Advanced Laboratory (Physics 414)

*Offered alternate years.

Students are also encouraged to take related courses in other departments such as Chemistry and Biochemistry, Computer Science, Geology, and Mathematics. See catalog.oberlin.edu for more details and specific requirements.

RESEARCH OPPORTUNITIES:

Most physics majors get involved in a physics-related research experience or independent project at some point during their time at Oberlin. If you already have an idea in mind of something that you would like to do, you should approach the faculty member whose research interests (see page 3) most closely align with your topic. Faculty members engage in research in many areas including astronomy, optics, materials physics, engineering, computational physics and theoretical physics—something should match up!

The natural times to get started are during Winter Term or as a special project, research experience, or private reading in the semester (PHYS 451/PHYS 555/PHYS 995); there are usually a dozen different students involved in this way in a given semester.

These experiences can lead to something more substantial, such as a (paid) summer research internship or a year-long honors project (for academic credit and honors at graduation). In a given year, roughly 6-10 majors work over the summer in research, and 3-4 students participate in the department honors program.

OTHER DEPARTMENTAL ACTIVITIES:

Besides classes and research experiences, be sure to join us for events like:

- The Physics Lecture Series, featuring talks from outside speakers (3-4 times a semester, usually Thurs. 4:35 pm in Wright 201)
- Monthly pizza lunches, with some type of informal presentation (Wed. at noon in Wright 209)
- Open Observatory/Planetarium sessions (1st and 3rd Fridays of the month at the top of Peters Hall)
- Physics coffee/tea and cookies (Mon.-Thurs. in the semester 4:30-5:30 pm in the reading lounge Wright 108)
- The end-of-year departmental picnic complete with dessert competition and faculty vs student volleyball game

Students also get involved in a variety of (paid) departmental jobs such as:

- Lab assistant
- Observatory assistant
- Tutor
- Homework grader

DEPARTMENTAL FACILITIES:

The physics and astronomy department is primarily located in the Wright Laboratory of Physics, which is the eastern side of the Oberlin Science Center. The building houses offices, classrooms, teaching and research laboratories, and a machine shop and an electronics shop. The department's observatory and planetarium are located further south on Professor St. at the top of Peters Hall.

Departmental research equipment includes a femtosecond frequency comb, a high-vacuum chamber for thin film deposition, two high precision

infrared spectrometers, several closed-cycle helium cryostats, an argon-filled glovebox, a vibrating sample magnetometer, a reflecting telescope with a state-of-the-art CCD camera, an electrically shielded room, and several computer labs. A multipurpose X-ray diffractometer is shared with the chemistry and geology departments.

In addition, majors have off-hours access to a seminar room for group problem sessions (Wright 102A), a computer room (Wright 107), and a reading lounge (Wright 108).

CAREER PATHS AFTER OBERLIN:

The department graduates about 14 physics majors each year—a number that typically places us on the American Institute of Physics list of top producers of physics majors from bachelors-degree only institutions.

So what do our students do after Oberlin?

Surveying the past ten years of Oberlin physics graduates, we found that the most common choice is more schooling—about 60% go on to graduate school in places all across the country and the world. Recent graduates are at: Harvard, MIT, UConnecticut, NYU, Cornell, UPenn, Ohio State, UMichigan, UWisconsin, UChicago, UCDavis, Stanford, and UArizona to name some institutions in vaguely geographical order.

About 70% of those going on do so either in physics or related fields (such as astronomy, chemistry, or different types of engineering), 20% pursue something more generally science-related such as medical school or science policy, and the remaining 10% go to graduate school in something not very related to physics (like history or divinity school).

Other common categories for Oberlin physics major graduates are careers in

- computer programming or data analysis (about 10%),
- high school science and math teaching (another 5-10%), and
- other science-related positions like laboratory technicians (about 10%).

OBERLIN Physics & Astronomy: Contact information

COLLEGE & CONSERVATORY Wright Laboratory of Physics | 110 N. Professor Street | Oberlin, Ohio, 44074 | (440) 775-8330

TEACHING MEMBERS

Stephen FitzGerald

Professor of Physics
(440) 775-8334 / Stephen.FitzGerald@oberlin.edu
Interests: Infrared spectroscopy, hydrogen storage, experimental condensed matter physics

Yumi Ijiri

Francis D Federighi Professor in Natural Sciences/Professor of Physics
(440) 775-6484 / Yumi.Ijiri@oberlin.edu
Interests: Magnetic materials, x-ray and neutron scattering, experimental condensed matter physics

Melinda Keller

Lecturer/Physics Lab Manager
(440) 775-8339 / Melinda.Keller@oberlin.edu
Interests: Optics, physics education

David (Dave) Lengyel

Observatory and Planetarium Coordinator
(440) 775-8636 / dlengyel@oberlin.edu
Interests: Observational astronomy projects

Robert (Rob) Owen

Associate Professor of Physics
(440) 775-8566 / Rob.Owen@oberlin.edu
Interests: General relativity, numerical relativity, computation, theoretical physics

John Scofield

Professor of Physics
(440) 775-8333 / John.Scofield@oberlin.edu
Interests: Photovoltaic and wind energy, energy use in buildings, experimental condensed matter physics

Jillian Scudder

Assistant Professor of Physics
(440) 775-6730 / Jillian.Scudder@oberlin.edu
Interests: Galaxy evolution across cosmic time, galaxy-galaxy interactions, public outreach

Christina Smith

Visiting Associate Professor of Physics
(440) 775-8331 / Christina.Smith@oberlin.edu
Interests: astrophysics

Jason Stalnaker

Professor of Physics,
Chair of Physics and Astronomy
(440) 775-8336 / Jason.Stalnaker@oberlin.edu
Interests: Atomic and molecular physics, nonlinear optics, laser physics

Daniel (Dan) Stinebring

Professor Emeritus of Physics
Dan.Stinebring@oberlin.edu
Interests: Radio astronomy, pulsars, cosmology, astrophysics

Daniel (Dan) Styer

John and Marianne Schiffer Professor of Physics
(440) 775-8183 / Dan.Styer@oberlin.edu
Interests: Quantum mechanics and its classical limit, Relativity for non-scientists, theoretical physics

OTHER DEPARTMENTAL STAFF

Brett Hernandez

Laboratory Technician
(440) 775-5204 / Brett.Hernandez@oberlin.edu

Cindi Manning

Budget Coordinator
(440) 775- 8301 / Cindi.Manning@oberlin.edu

Amy Reising

Administrative Assistant
(440) 775-8330 / Amy.Reising@oberlin.edu

Rachel Wysocki

Purchaser
(440) 775-8300 / Rachel.Wysocki@oberlin.edu

OTHER SCIENCE DEPARTMENTAL STAFF

Mike Miller

Machinist
(440) 775-6965

Bill Mohler

Electronics Specialist
(440) 775-8069 / Bill.Mohler@oberlin.edu