

Physics

Disciplinary Minor (<http://catalog.uwgb.edu/archive/2016-2017/undergraduate/planning/disciplinary-majors-minors>)

Physics is the study of matter and energy, and their interactions in the areas of mechanics, heat, sound, optics, electricity, magnetism, radiation, and the atomic and sub-atomic world. Physics provides students with concepts and models for describing, understanding, and predicting many characteristics and phenomena of physical and biological systems. As such, it provides the foundation for many other sciences such as chemistry, astronomy, biology, geology, engineering, and medicine.

A minor in Physics is an appropriate choice for students pursuing interdisciplinary majors in Environmental Science and Human Biology. It is also a good choice for students who plan to teach at the secondary level because there is a chronic shortage of qualified physics teachers.

Students seeking information on teacher certification should contact the Education Office.

This disciplinary minor also requires:

Completion of an interdisciplinary major (<http://catalog.uwgb.edu/archive/2016-2017/undergraduate/planning/interdisciplinary-majors-minors>)

- Physics Minor (<http://catalog.uwgb.edu/archive/2016-2017/undergraduate/programs/physics/minor>)

Heidi S Fencil; Associate Professor; Ph.D., Ohio State*

Michael Hencheck; Associate Professor; Ph.D., Ohio State, chair

Brian Welsch; Assistant Professor; Ph.D., Montana State

Courses

PHYSICS 103. Fundamentals of Physics I. 5 Credits.

A non-calculus physics sequence covering fundamentals of mechanics, energy, power, thermodynamics and sound. Applications to the areas of biology, chemistry, the earth science and technology. This is a blended, or hybrid, course. It includes both online and face-to-face components. Full credit will not be granted for both PHYSICS 103 and PHYSICS 201.

P: Math 104 with at least a C grade or Math Placement of Math 202 or greater.

Fall Only.

PHYSICS 104. Fundamentals of Physics II. 5 Credits.

A non-calculus physics sequence covering fundamentals of electricity and magnetism, electronics, light, atomic and nuclear structure and relativity. Applications to the areas of biology, chemistry, the earth science and technology. This is a blended, or hybrid, course. It includes both online and face-to-face components. Full credit will not be granted for both PHYSICS 104 and PHYSICS 202.

P: Physics 103 with at least a C grade.

Spring.

PHYSICS 141. Astronomy. 3 Credits.

A study of the solar system, stars, galaxies and universe.

Fall and Spring.

PHYSICS 180. Concepts of Physics. 3 Credits.

Survey of physics, including motion, forces, momentum, energy, solids, liquids, gases, sound, heat, electricity, magnetism, light, atomic and nuclear physics. Designed for non science majors. Full credit will not be granted for both Physics 180 and 103, 104, 201 or 202.

Fall Only.

PHYSICS 181. Concepts of Physics Laboratory. 1 Credit.

Laboratory course to accompany Physics 180. Full credit will not be granted for both Physics 181 and 103, 104, 201 or 202.

P: Physics 180 or conc enr.

Fall Only.

PHYSICS 198. First Year Seminar. 3 Credits.

Reserved for New Incoming Freshman.

PHYSICS 201. Principles of Physics I. 5 Credits.

A calculus physics sequence for students of science and engineering. Includes fundamentals of mechanics, Newton's laws, momentum, energy, fluid statics and dynamics; temperature, heat transfer, thermodynamics; vibrations, waves and sound; electric forces and fields, DC and AC circuits, magnetism; atomic structure, semiconductors; electromagnetic waves, light; relativity, quantum mechanics, nuclear physics and elementary particles.

P: Math 202 with at least a C grade.

Fall Only.

PHYSICS 202. Principles of Physics II. 5 Credits.

A calculus physics sequence for students of science and engineering. Includes fundamentals of mechanics, Newton's laws, momentum, energy, fluid statics and dynamics; temperature, heat transfer, thermodynamics; vibrations, waves and sound; electric forces and fields, DC and AC circuits, magnetism; atomic structure, semiconductors; electromagnetic waves, light; relativity, quantum mechanics, nuclear physics and elementary particles.
P: Physics 201 with at least a C grade and Math 203 with at least a C grade.
Spring.

PHYSICS 310. Modern Physics. 3 Credits.

Modern physics has opened the door to exciting areas of exploration: very fast, very small, and very large. This course first examines the fast and small (relativity and elementary particle physics) then applies them to the large scale field of cosmology.
Spring.

PHYSICS 320. Thermodynamics and Kinetics. 3 Credits.

Temperature, heat and work, thermodynamic properties of gases, solids and solutions; homogeneous and heterogeneous equilibria; thermodynamics of electrochemical cells; statistical thermodynamics; calculation of thermodynamic properties; chemical kinetics.
P: Chem 212 and 214 with at least a C grade and Physics 202 with at least a C grade and Math 203 with at least a C grade.
Fall Only.

PHYSICS 321. Structure of Matter. 3 Credits.

Integrated approach to the concepts of physical chemistry and modern physics: introduction to quantum theory, symmetry, atomic and molecular structure, spectroscopy, X-rays, properties of gases, liquids and solids.
P: Chem 212 and 214 with at least a C grade and Physics 202 with at least a C grade and Math 203 with at least a C grade.
Spring.

PHYSICS 322. Thermodynamics and Kinetics Laboratory. 1 Credit.

Laboratory course to accompany Chem 320.
P: Chem 320 or conc enr or Physics 320 or conc enr.; and Env Sci 207 or conc enr or Hum Biol 207 or conc enr.
Fall Only.

PHYSICS 323. Structure of Matter Laboratory. 1 Credit.

Laboratory course to accompany Chem 321.
P: Chem 321 or conc enr or Physics 321 or conc enr.; and Env Sci 207 or conc enr or Hum Biol 207 or conc enr.
Spring.

PHYSICS 404. Electricity and Magnetism. 3 Credits.

An advanced approach to electrical and magnetic phenomena; waveguides, electrical energy generation and transmission, Maxwell's equations and electromagnetic waves, electric and magnetic properties of matter.
P: Physics 202 with at least a C grade and Math 209 with at least a C grade.
Fall Even.

PHYSICS 415. Solar and Alternate Energy Systems. 3 Credits.

Study of alternate energy systems which may be the important energy sources in the future, such as solar, wind, biomass, fusion, ocean thermal, fuel cells and magneto hydrodynamics.
P: Physics 104 with at least a C grade or 202 with at least a C grade.
Spring Even.

PHYSICS 417. Nuclear Physics and Radiochemistry. 3 Credits.

Properties and reactions of atomic nuclei; application of the properties of radioactive nuclei to the solution of chemical, physical, biological and environmental problems.
P: Chem 212 and 214 with at least a C grade and Physics 202 with at least a C grade: REC: Chem 321.
Fall Odd.

PHYSICS 420. Advanced Physics Laboratory. 1 Credit.

Upper-level experiments in Nuclear Physics, Optics and the experimental determination of fundamental physical constants.
P: Math 203 with at least a C grade, Physics 310 with at least a C grade.
Fall Odd.

PHYSICS 497. Internship. 1-12 Credits.

Supervised practical experience in an organization or activity appropriate to a student's career and educational interests. Internships are supervised by faculty members and require periodic student/faculty meetings.
P: jr st.
Fall and Spring.

PHYSICS 498. Independent Study. 1-4 Credits.

Independent study is offered on an individual basis at the student's request and consists of a program of learning activities planned in consultation with a faculty member. A student wishing to study or conduct research in an area not represented in available scheduled courses should develop a preliminary proposal and seek the sponsorship of a faculty member. The student's advisor can direct him or her to instructors with appropriate interests. A written report or equivalent is required for evaluation, and a short title describing the program must be sent early in the semester to the registrar for entry on the student's transcript.

P: fr or so st with cum gpa \geq 2.50; or jr or sr st with cum gpa \geq 2.00.

Fall and Spring.