

PHYSICS (PHSX)

PHSX 101 - Freshman Physics Experience. 1 Credit.

Offered autumn. This course is intended for all incoming students either majoring in physics or considering majoring in physics. This seminar course presents an overview of the undergraduate experience as a physics major. Seminars on recent developments in physics and astronomy and opportunities for undergraduate involvement in research and instruction are included.

PHSX 105N - Fundamentals of Physical Science. 3 Credits.

Offered every term. Offered at Missoula College. An introduction to the basic principles of physics, chemistry, and nuclear reactions with emphasis on the scientific method and process. Topics include scientific process; motion; work and energy; heat and temperature; and waves (sound and light); atomic structure; the periodic table of elements; chemical bonding and nomenclature; chemical formulas and equations; and solutions. Knowledge of basic algebraic functions, decimals, and scientific notation is recommended. Suitable for students with little science background.

Gen Ed Attributes: Natural Science

PHSX 141N - Einstein's Relativity. 3 Credits.

Offered spring. Prereq., working knowledge of high school physics and high school calculus, or consent of instr. Modern theoretical study of space, time, the principle of relativity, and its implications. Analysis of apparent paradoxes, and applications to particle physics.

Gen Ed Attributes: Natural Science

PHSX 191 - Special Topics. 1-6 Credits.

(R-6) Offered intermittently. Experimental offerings of visiting professors, experimental offerings of new courses, or one-time offerings of current topics.

PHSX 192 - Independent Study. 1-6 Credits.

PHSX 198 - Internship. 1-9 Credits.

(R-6) Offered intermittently. Prereq., consent of department. Extended classroom experience which provides practical application of classroom learning during placements off campus. Prior approval must be obtained from the faculty supervisor and the Internship Services office. A maximum of 6 credits of Internship (198, 298, 398, 498) may count toward graduation.

PHSX 205N - College Physics I. 4 Credits.

Offered autumn and spring. Prereq., M 122 or M 151 or EdReady placement level 4.5 or Maplesoft Calculus score ≥ 15 . Coreq. or prereq. PHSX 206N. Mechanics, sound, and heat. For non-physical science majors. This course satisfies the lecture portion of medical school requirements in general physics. Credit not allowed for both PHSX 215N/PHSX 218N and PHSX 205N/PHSX 208N.

Gen Ed Attributes: Natural Science

PHSX 206N - College Physics I Laboratory. 1 Credit.

Offered autumn and spring. Prereq. or coreq., PHSX 205N. Mechanics, sound, and heat. For non-physical science majors. This course satisfies the laboratory portion of medical school requirements in general physics. Credit not allowed for both PHSX 215N/PHSX 218N and PHSX 205N/PHSX 208N. Gen Ed Attributes: Natural Science Lab Course (N)

Gen Ed Attributes: Natural Science Lab Course, Natural Science

PHSX 207N - College Physics II. 4 Credits.

Offered autumn and spring. Prereq. PHSX 205N and prereq. or coreq., PHSX 208N. Electricity, magnetism, light, and modern physics. For non-physical science majors. This course satisfies the lecture portion of medical school requirements in general physics. Credit not allowed for both PHSX 215N/PHSX 218N and PHSX 205N/PHSX 208N.

Gen Ed Attributes: Natural Science

PHSX 208N - College Physics II Laboratory. 1 Credit.

Offered autumn and spring. Prereq., PHSX 206N, prereq. or coreq., PHSX 207N. Electricity, magnetism, light and modern physics. For non-physical science majors. This course satisfies the laboratory portion of medical school requirements in general physics. Credit not allowed for both PHSX 215N/PHSX 218N and PHSX 205N/PHSX 208N. Gen Ed Attributes: Natural Science Lab Course (N)

Gen Ed Attributes: Natural Science Lab Course, Natural Science

PHSX 215N - Fundamentals of Physics with Calculus I. 4 Credits.

Offered autumn. Prereq. or coreq., PHSX 216N and M 171 or equiv. This course satisfies the lecture portion of medical and technical school requirements in general physics. Mechanics, fluids, waves and sound. Credit not allowed for both PHSX 215N/PHSX 218N and PHSX 205N/PHSX 208N.

Gen Ed Attributes: Natural Science

PHSX 216N - Physics Laboratory I with Calculus. 1 Credit.

Offered autumn. Coreq., PHSX 215N. This course satisfies the laboratory portion of medical and technical school requirements in general physics. Mechanics, fluids, waves, and sound. Credit not allowed for both PHSX 215N/PHSX 218N and PHSX 205N/PHSX 208N. Gen Ed Attributes: Natural Science Lab Course (N)

Gen Ed Attributes: Natural Science Lab Course, Natural Science

PHSX 217N - Fundamentals of Physics with Calculus II. 4 Credits.

Offered spring. Prereq., PHSX 215N, and prereq. or coreq. PHSX 218N, and prereq. or coreq., M 172 or equivalent. This course satisfies the lecture portion of medical and technical school requirements in general physics. Heat, electricity, magnetism, and light. Credit not allowed for both PHSX 215N/PHSX 218N and PHSX 205N/PHSX 208N.

Gen Ed Attributes: Natural Science

PHSX 218N - Physics Laboratory II with Calculus. 1 Credit.

Offered spring. Prereq., PHSX 215N, coreq., PHSX 217N. This course satisfies the laboratory portion of medical and technical school requirements in general physics. Heat, electricity, magnetism, and light. Credit not allowed for both PHSX 215N/PHSX 218N and PHSX 205N/PHSX 208N. Gen Ed Attributes: Natural Science Lab Course (N)

Gen Ed Attributes: Natural Science Lab Course, Natural Science

PHSX 291 - Special Topics. 1-9 Credits.

(R-6) Offered intermittently. Experimental offerings of visiting professors, experimental offerings of new courses, or one-time offerings of current topics.

PHSX 292 - Independent Study. 1-9 Credits.

(R-9) Course material appropriate to the needs and objectives of the individual student.

PHSX 301 - Intro Theoretical Physics. 3 Credits.

Offered spring. Prereq., M 273 and Prereq., or coreq., PHSX 217N-218N or PHSX 207N - PHSX 208N. Selected topics from applied linear algebra, ordinary and partial differential equations, vector analysis, complex variables, and Fourier series. Applications to classical mechanics, electromagnetism, and quantum mechanics.

PHSX 311 - Oscillations and Waves. 2 Credits.

Offered autumn. Prereq., PHSX 217N-PHSX 218N or PHSX 207N-PHSX 208N; Prereq., or coreq., M 273. Detailed study of oscillations and waves at the intermediate level, to develop physical intuition and mathematical skills needed for analyzing a wide range of periodic phenomena encountered in physics.

PHSX 320 - Classical Mechanics. 3 Credits.

Offered spring. Prereq., or Coreq., PHSX 301. Topics in classical mechanics at the intermediate level, emphasizing Lagrangian and Hamiltonian dynamics.

PHSX 323 - Intermediate Physics Lab. 3 Credits.

Offered spring. Prereq., PHSX 217N- PHSX 218N or PHSX 207N- PHSX 208N, and PHSX 311. Laboratory course in the application of analog and digital electronics to experimental physics, with additional emphasis on data analysis techniques.

PHSX 327 - Optics. 3 Credits.

Offered spring. Prereq., PHSX 311. Intermediate level study of light and optics, including geometrical optics, wave optics, optical instruments, coherence, polarization, and special topics.

PHSX 330 - Communicating Physics. 3 Credits.

Offered spring even-numbered years. Prereq., WRIT 101 or equivalent, one intermediate writing course, and PHSX 217N - PHSX 218N or PHSX 207N - PHSX 208N. Oral and written communication skills in physics, to include teaching high school and college physics, presenting seminars, and writing technical and non-technical physics articles.

Gen Ed Attributes: Writing in the Disciplines

PHSX 333 - Computational Physics. 3 Credits.

Offered spring odd-numbered years. Prereq., PHSX 217N-218N or PHSX 207N-208N; coreq., any upper-division PHSX course. Solution of advanced problems in physics using computational methods. Students will learn a variety of numerical methods, including FORTRAN programming techniques.

PHSX 343 - Modern Physics. 3 Credits.

Offered autumn. Prereq., PHSX 217N-PHSX 218N or PHSX 207N-PHSX 208N and prereq., or coreq., M 273. Includes historical background for development of modern physics and an introduction to quantum mechanics, atomic and nuclear physics. Credit not allowed for graduate degree in physics.

PHSX 389 - Research Initiation. 1 Credit.

Prereq., junior-level standing as a Physics major. This one-credit seminar course is intended as an introduction to independent research for junior-level physics majors. This course will connect student researchers with faculty mentors and help prepare the students for PHSX 499 Senior Capstone Seminar. Offered as CR/NCR only.

PHSX 390 - Undergraduate Research. 1-6 Credits.

(R-6) Offered intermittently. Directed individual research and study appropriate to the background and objectives of the student.

PHSX 391 - Special Topics. 1-12 Credits.

(R-9) Offered intermittently. Experimental offerings of visiting professors, experimental offerings of new courses, or one-time offerings of current topics.

PHSX 392 - Independent Study. 1-6 Credits.

(R-6) Offered intermittently. Prereq., consent of instr. Independent research in topics of current interest in physics.

PHSX 398 - Internship. 1-6 Credits.

(R-6) Offered intermittently. Prereq., consent of department. Extended classroom experience which provides practical application of classroom learning during placements off campus. Prior approval must be obtained from the faculty supervisor and the Internship Services office. A maximum of 6 credits of Internship (198, 298, 398, 498) may count toward graduation.

PHSX 423 - Electricity & Magnetism I. 3 Credits.

Offered autumn. Prereq, PHSX 301. Electricity and magnetism at the intermediate level. Level: Undergraduate-Graduate

PHSX 425 - Electricity & Magnetism II. 3 Credits.

Offered spring. Prereq., PHSX 423. Continuation of PHSX 423. Electricity and magnetism at the intermediate level. Level: Undergraduate-Graduate

PHSX 444 - Advanced Physics Lab. 3 Credits.

Offered autumn. Prereq., PHSX 461; PHSX 323 suggested but not required. Advanced experiments in classical and modern physics, including optics, spectroscopy, laser science, atomic, nuclear, and particle physics, Data analysis techniques for experimental scientists. Recommended for students entering graduate school in any experimental science. Level: Undergraduate

PHSX 446 - Thermodynamics & Statistical Mechanics. 3 Credits.

Offered spring even-numbered years. Prereq., PHSX 343. Topics in thermodynamics and statistical mechanics. Level: Undergraduate-Graduate

PHSX 451 - Elementary Particle Physics. 3 Credits.

Offered alternate odd years. Prereq., PHSX 301 and PHSX 343. This course will provide a sound introduction to the Standard Model of particle physics introducing students to the fundamental particles, fundamental forces, and the Feynman calculus. Level: Undergraduate

PHSX 456 - General Relativity. 3 Credits.

Offered periodically dependent upon faculty availability and student interest. Mountain Campus. Prereq., PHSX 141N or PHSX 343, M 221 or PHSX 301. An introduction to Einstein's gravity: the theory of general relativity. Students will be introduced to the concept of gravity as a manifestation of the curvature of spacetime. The course includes development of tensor calculus and the formulation of the Einstein equation with applications to black holes, gravitational lensing, cosmology, and gravitational waves. Level: Undergraduate

PHSX 461 - Quantum Mechanics I. 3 Credits.

Offered autumn. Prereq., PHSX 311, PHSX 343; prereq. or coreq., M 311 or M 221. Introduction to quantum mechanics. Topics include Schroedinger equation, piecewise constant potential, harmonic oscillator, hydrogen atom, angular momentum theory, electron spin. Level: Undergraduate-Graduate

PHSX 462 - Quantum Mechanics II. 3 Credits.

Offered spring. Prereq., PHSX 461 or consent of instr. Advanced topics in quantum mechanics including linear vector spaces and Dirac notation, quantum dynamics, time-dependent perturbation theory, and scattering theory. Level: Undergraduate-Graduate

PHSX 490 - Undergraduate Research. 1-6 Credits.

(R-6) Offered intermittently. Directed individual research and study appropriate to the background and objectives of the student. Level: Undergraduate

PHSX 491 - Special Topics. 3 Credits.

(R-6) Offered intermittently. Prereq., PHSX 141N or PHSX 343, PHSX 301, or consent of instr. Studies of a topic in advanced modern physics. The topic chosen will vary according to instructor. Level: Undergraduate-Graduate

PHSX 492 - Independent Study. 1-9 Credits.

(R-9) Offered intermittently. University omnibus option for independent work. Level: Undergraduate

PHSX 499 - Senior Capstone Seminar. 1 Credit.

Offered autumn. Prereq., junior or senior standing in physics. Each student will present a seminar on research performed prior to or during their senior year. Level: Undergraduate

PHSX 590 - Research. 1-6 Credits.

(R-9) Offered intermittently. Research in selected physics topics. Level: Graduate

PHSX 591 - Special Topics. 1-9 Credits.

(R-24) Offered intermittently. Experimental offerings of visiting professors, experimental offerings of new courses, or one-time offerings of current topics. Level: Graduate

PHSX 598 - Internship. 1-9 Credits.

(R-9) Offered intermittently. Prereq., consent of department. Extended classroom experience which provides practical application of classroom learning during placements off campus. Prior approval must be obtained from the faculty supervisor and the Internship Services office. Level: Graduate

PHSX 599 - Thesis. 1-9 Credits.

(R-9) Offered intermittently. Thesis preparation and execution. Level: Graduate