

Physics

Charles A. Dana Professor Parker; Professors Syed; Associate Professor Hyde (Chair); Assistant Professors Knapik and Pallone.

Norwich University offers the Bachelor of Science in Physics to students desiring a strong background in basic physics. This curriculum prepares students for work in industry and government, for graduate work in physics and other physical sciences, or for a military career.

The Bachelor of Science curriculum requires 129-degree credits for graduation. Six hours of approved ROTC courses may be included in degree credits. Many advanced physics courses have designated courses as prerequisites.

B. S. in Physics - Curriculum Map

First Year

Fall	Credits	Spring	Credits
EN 101 Composition and Literature I	3	EN 102 Composition and Literature II	3
MA 121 Calculus I	4	MA 122 Calculus II	4
CH 103 General Chemistry I	4	CH 104 General Chemistry II	4
Elective (1) ¹	3-4	PS 110 Physics of Continuous Media	3
	14-15		14

Second Year

Fall	Credits	Spring	Credits
EN 201 World Literature I	3	EN 202 World Literature II	3
MA 223 Calculus III	4	MA 224 Differential Equations	4
PS 211 University Physics I	4	PS 212 University Physics II	4
PS 205 Basic Instrumentation in the Natural Sciences (or Elective) [§]	4	Electives (2)	6
Elective (1) ²	3		
	18		17

Third Year

Fall	Credits	Spring	Credits
Mathematics ³	3	Mathematics ³	3
PS 331 Mechanics or 354 Thermodynamics [§]	4	PS 332 Mechanics II or 363 Optics [§]	4
Elective (1) ²	3	PS 442 Modern Physics II or 424 Electricity and Magnetism II [§]	4
PS 205 Basic Instrumentation in the Natural Sciences (or Elective (1)) [§]	4	Electives (2) ²	6
	14		17

Fourth Year

Fall	Credits	Spring	Credits
PS 354 Thermodynamics or 331 Mechanics [§]	4	PS 363 Optics or 332 Mechanics II [§]	4
PS 423 Electricity and Magnetism I or 441 Modern Physics I [§]	4	PS 424 Electricity and Magnetism II or 442 Modern Physics II [§]	4
PS 461 Senior Project I	1	PS 462 Senior Project II	1
PS 451 Seminar I	1	PS 452 Seminar II	1
Electives (2) ²	6	Electives (2) ²	6
	16		16

Total Credits: 126-127

§ This course is offered in alternate years. Both courses listed are required. For the years these courses are offered, see Course Descriptions.

1 PS 107 Recommended.

2 One elective must be a semester of history.

2 One elective must be a course in psychology, sociology, economics, or political science.

2 One elective must be an ethics course offered by the philosophy program.

3 These math courses are subject to approval of Physics Dept.

Minor in Physics

The student must complete six physics courses each valued at three or four degree credits. These courses must include PS 211, PS 212, and either PS 205 and one course above 300 or two courses above 300.

Courses

PS 100. Elementary Physics. 4 Credits.

A study of topics from kinematics, dynamics, fluids, energy, acoustics, electricity, optics, and modern physics chosen for applicability to physical education and health. Classroom 3 hours, Laboratory 2 hours. Prerequisite: MA103 or equivalent.

PS 107. Introductory Solar System Astronomy. 4 Credits.

A descriptive study of the solar system, including the sun, planets, asteroids, comets and interplanetary space. The role of observation in the evolution of astronomy is emphasized. Lecture 3 hours, laboratory 2 hours. Does not count as a lab science if taken for 3 credits.

PS 108. Stellar and Galactic Astronomy. 4 Credits.

A descriptive introduction to the universe, including stars, galaxies, and recent deep space discoveries. Discussions survey the techniques used by astronomers to interpret the wide variety of observed phenomena in the cosmos. Lecture 3 hours, laboratory 2 hours. Does not count as a lab science if taken for 3 credits.

PS 110. Physics of Continuous Media. 3 Credits.

PS 201. General Physics I. 4 Credits.

An algebra-based study of mechanics, sound and heat, with correlated laboratory experiments. Classroom 3 hours, laboratory 2 hours. Prerequisite: MA107 or the equivalent.

PS 202. General Physics II. 4 Credits.

An algebra-based study of magnetism, electricity, light, and atomic physics, with correlated laboratory experiments. Classroom 3 hours, laboratory 2 hours. Prerequisite: PS201.

PS 205. Basic Instrumentation in the Natural Sciences. 4 Credits.

An introductory course in electricity and electronics including A.C. and D.C. bridge circuits, diodes and transistors, linear and digital integrated circuits. Emphasis is placed on the use of these devices in typical research equipment such as spectrophotometers, radiation counters, turbidity and conductivity meters, electronic thermometers, etc.. Lecture 3 hours, laboratory 3 hours. Prerequisites PS201, PS202.

PS 207. Meteorology and Climatology. 3,4 Credits.

A first study of atmospheric processes, elementary forecasting, and the major climatic classes. Particular emphasis is placed on the effects of these phenomena on human activities. Laboratory practice includes elementary forecasting techniques, observations, calculations, and theoretical analysis of weather and climate patterns. Classroom 3 hours, Laboratory 2 hours. Prerequisite: PS201 or PS202 or permission of the instructor. Does not count as a lab science if taken for 3 credits.

PS 211. University Physics I. 4 Credits.

A calculus-based study of vectors; Newton's laws; uniform, accelerated, rotational and harmonic motion; conservation laws; fluid mechanics; elasticity. Classroom 3 hours, laboratory 2 hours. Required in chemistry, mathematics and engineering curricula. Prerequisite: MA121.

PS 212. University Physics II. 4 Credits.

A calculus-based study of topics in electricity, magnetism, waves and optics. Classroom 3 hours, laboratory 2 hours. Prerequisite: PS122, Co-requisite: MA122.

PS 232. University Physics III. 3 Credits.

A study of topics from quantum phenomena, spectroscopy, relativity, nuclear and solid state physics. Classroom 3 hours. Prerequisite: PS202 or PS212, MA223 or permission of the instructor.

PS 331. Mechanics. 4 Credits.

Newtonian Mechanics applied to a particle including rectilinear and general motion, linear oscillations, non-inertial reference frames, gravitation, and central forces. Non-linear oscillators and chaos. Classroom: 3 hours; laboratory: 3 hours. Prerequisites: PS202 or PS212; MA224 offered odd numbered fall semesters.

PS 332. Mechanics II. 4 Credits.

Newtonian Mechanics applied to a system of particles including planar and general motion of rigid bodies, and oscillating systems. Lagrangian and Hamiltonian dynamical formulations. Introduction to relativistic dynamics. Classroom: 3 hours; laboratory: 3 hours. Prerequisite: PS331. Offered even numbered spring semesters.

PS 354. Thermodynamics. 4 Credits.

A study of first and second laws of thermodynamics with applications; thermodynamic potentials and applications to systems in equilibrium; introduction to statistical mechanics including Boltzmann statistics, quantum statistics, and statistical interpretation of entropy. Classroom 3 hours, laboratory 3 hours. Prerequisites: PS202 or PS212; MA224.

PS 363. Optics. 4 Credits.

A study of the nature and propagation of light; reflection and refraction, thick lenses, lens aberrations, and optical instruments. Interference, dispersion, diffraction, polarization, and color phenomena. Classroom 3 hours, laboratory 3 hours. Prerequisites: PS202 or PS212; MA224.

PS 421. Advanced Laboratory I. 1-4 Credit.

A laboratory investigation in a specific area of experimental physics designed in consultation with physics faculty. Prerequisite: Permission of the instructor. Offered fall semesters only.

PS 422. Advanced Laboratory II. 1-4 Credit.

A laboratory investigation in a specific area of experimental physics designed in consultation with physics faculty. Prerequisite: Permission of the instructor. Offered spring semesters only.

PS 423. Electricity and Magnetism I. 4 Credits.

A study of electrical circuits, electrostatic fields, application of Gauss' Law and Laplace's equation; dielectric theory; magnetic fields, induced electric fields and currents; theory of magnetic materials; Maxwell's equations and electromagnetic waves. Classroom 3 hours, laboratory 3 hours. Prerequisites: MA224 and PS205 or permission of instructor. Offered even numbered fall semesters.

PS 424. Electricity and Magnetism II. 4 Credits.

A continuation of PS423, studying electrical circuits, electrostatic fields, application of Gauss' Law and Laplace's equation; dielectric theory; magnetic fields, induced electric fields and currents; theory of magnetic materials; Maxwell's equations and electromagnetic waves. Classroom 3 hours, laboratory 3 hours. Prerequisites: PS423. Offered odd numbered spring semesters.

PS 441. Modern Physics I. 4 Credits.

An introduction to special relativity, quantum mechanics, structure and spectra of atoms and molecules, nuclear models, and nuclear interactions. Classroom 3 hours, laboratory 3 hours. Prerequisites: PS212 and MA224 or permission of instructor. Offered odd numbered fall semesters.

PS 442. Modern Physics II. 4 Credits.

A continuation of PS441, introducing special relativity, quantum mechanics, structure and spectra of atoms and molecules, nuclear models, and nuclear interactions. Classroom 3 hours, laboratory 3 hours. Prerequisite: PS441. Offered even numbered spring semesters.

PS 451. Seminar I. 1 Credit.

A study of special topics of current interest. This capstone course integrates reading, writing, speaking and critical thinking skills. Classroom 1 hour. Prerequisite: permission of the instructor. Offered fall semesters only.

PS 452. Seminar II. 1 Credit.

A continuation of PS451, investigating special topics of current interest. This capstone course integrates reading, writing, speaking, and critical thinking skills. Classroom 1 hour. Prerequisite: permission of the instructor. Offered spring semesters only.

PS 461. Senior Project I. 1 Credit.

A project-oriented capstone experience that integrates reading, writing, speaking and critical thinking. The senior student chooses a project with faculty advice and takes charge of its execution to a satisfying conclusion. The course requires oral and written presentations of the project results. Prerequisites: senior class standing and permission of the instructor. Offered fall semesters only.

PS 462. Senior Project II. 1 Credit.

A project-oriented capstone experience that integrates reading, writing, speaking and critical thinking. The senior student chooses a project with faculty advice and takes charge of its execution to a satisfying conclusion. The course requires an oral and written presentation of the completed project. Prerequisites: senior class standing and permission of the instructor. Offered spring semesters only.