Physics Minor

Dr. Lloyd Makarowitz, Chair
Physics Dept.
Lloyd.Makarowitz@farmingdale.edu
631-420-2188
School of Arts & Sciences

The physics minor is designed for students who want to add a concentration in physics to their studies. The critical thinking, data management, and analytical problem solving skills taught in physics courses are important to a wide variety of career paths, making physics minors more attractive to potential employers. Students who are interested in pursuing graduate education in biology, chemistry, engineering, finance, mathematics, or medicine will be particularly well served by this minor, as will be students who intend to transfer to pursue a physics major elsewhere in SUNY. The physics department at Farmingdale places a substantial value on performing practical physics research, and students may count up to six credits of research towards a minor.

About Academic Minors

Farmingdale State College students are invited to enhance their studies with an "Academic Minor." A minor is a cluster of thematically related courses drawn from one or more departments. In addition to department based minors (e.g. computer programming & info systems), interdisciplinary minors are also available (e.g. legal studies).

Academic minors are approved by the College-Wide Curriculum Committee and the Provost. Students must make application for an academic minor through the department offering the minor in conjunction with the Registrar's Office Specific course work must be determined in consultation with a faculty member in the department offering the minor. A statement of successful completion of the academic minor will appear on the student's transcript at the time of graduation.

• A minor is considered to be an optional supplement to a student's major program of study.
• Completion of a minor is not a graduation requirement and is subject to the availability of the courses selected. However, if the requirements for a minor are not completed prior to certification of graduation in the major, it will be assumed that the minor has been dropped. Consequently, the student will only be certified for graduation in their primary major.
• Only students in 4 year baccalaureate programs can apply for a minor.
• A minor should consist of 15 to 21 credits, with the exception of the Chemistry and Air Force ROTC minors which require 22 credits.
• At least 12 credits must be in courses at the 200 level or higher.
• At least 9 credits must be residency credits.
• Specific requirements for each minor are determined by the department granting the minor. Each minor and criteria are described in the Academic Minors Information Guide.
• Students must maintain a minimum cumulative GPA of at least 2.0 in their minor. Some minors may require a higher GPA.
• Students are prohibited from declaring a minor in the same discipline as their major (e.g. one cannot combine an applied math minor with an applied math major). Academic minors may not apply to all curricula.
• Students are permitted to double-count minor courses with liberal arts courses, general education courses and free electives but can only double-count up to 6 credits of required major coursework toward the minor.
• Students are only permitted to take more than one minor with appropriate written approval of their Department Chair or School Dean.
Fall 2017: Subject to Revision

Required: (15 credits)

- PHY 143 General Physics I (Calculus) 4
- PHY 144 General Physics II (Calculus) 4
- PHY 255 Oscillatory Motion and Waves 3
- PHY 333 Modern Physics 3
- PHY 334 Modern Physics Lab 1

Two of the following courses: (6 credits)

- PHY 228 Introduction to Computational Physics 3
- PHY 299 Integrative Climate Physics with Applications 4
- PHY 310 Analytical Mechanics 3
- PHY 323 Electromagnetic Theory 3
- PHY 356 or MTH 356 Mathematical Methods in Math and Physics 3
- PHY 420 Optics 3
- PHY 480 Physics Research I 3
- PHY 481 Physics Research II 3

Course Descriptions

**PHY 143 General Physics I (Calculus)**
A fundamental, calculus based, physics course with laboratory offered primarily for students in Science curricula. Topics discussed include Mechanics, Wave Motion, Kinetic Theory, and Thermodynamics. One of MTH 130 or MTH 150 must be taken either as a prerequisite or corequisite. Credits: 4

**PHY 144 General Physics II (Calculus)**
A continuation of PHY 143. Topics discussed include Electricity, Magnetism and Optics. Prerequisite(s): PHY 143 Corequisite(s): PHY 144L Credits: 4

**PHY 255 Oscillatory Motion and Waves**
An introduction to physical concepts (wave packets, normal modes, interference and diffraction) and mathematical techniques (Fourier series, transforms, complex numbers, eigenvectors), including the wave equation. Prerequisite(s): PHY 136 or PHY 144 and MTH 151 or MTH 236 all with a minimum grade of C or higher. Credits: 3

**PHY 333 Modern Physics**
An introduction to topics in modern physics for upper-division students. Topics included are Einstein's Special Theory of Relativity, Atomic Physics, Applied Nuclear Physics, and Solid State Physics. Prerequisite(s): PHY 136 or 144 Credits: 3

**PHY 334 Modern Physics Lab**
An introduction to topics in modern physics for upper-division students. Topics included are Einstein's Special Theory of Relativity, Atomic Physics, Applied Nuclear Physics, and Solid State Physics. Prerequisite(s): PHY 136 or 144 Corequisite(s): PHY 333T Credits: 1

PHY 228 Introduction to Computational Physics
An introduction to computational physics in which students will apply the mathematical techniques of root finding, numerical integration, interpolation, Fourier analysis, and the solution of ordinary differential equations to physical problems including chaotic dynamics, circuit response, electrostatics, data modeling and prediction, and biophysics. No previous programming experience is expected though basic computer skills will be helpful. Prerequisite(s): (PHY 135 or PHY 143) and (MTH 130 or MTH 150) Credits: 3

PHY 310 Analytical Mechanics

PHY 323 Electromagnetic Theory
This course is an introduction to electromagnetic theory. Topics covered are Vector Analysis; Coulomb's Law; Gauss's Law; the Del Operator; the Divergence and Gradient; the Potential; Potential Gradient; Conductors, Dielectrics and Capacitors; the Magnetic Field; the Biot-Savart Law; Ampere's Law; the Curl of E and H; Faraday's Law; Maxwell's Equations. Prerequisite(s): PHY 136 and MTH 236 Credits: 3

PHY 356 or MTH 356 Mathematical Methods in Math and Physics
This is a new integrated math-physics course with applications to topics in physics and the engineering technologies. It is meant to be interdisciplinary in nature and directed toward students in the Bachelor of Technology and Applied Math Programs. Topics to be covered include: Vector Algebra, Vector Calculus, Scalar and Vector Field Theory, Fourier Series, Fourier Integral, Fourier Transforms and Laplace Transforms. The focus will be on application and integration of math methods to physics and engineering technologies. Note: Students completing this course may not receive credit for MTH 356. Prerequisite(s): MTH 236 or 252 and PHY 136 or 144 Credits: 3

PHY 420 Optics
This course is an introduction to the study of light on the intermediate level. It is an elective course for students in their fourth year of the Electrical Technology program. It begins with a review of the mathematics of wave motion. Starting from Maxwell's equations, the electromagnetic theory of light is discussed. Topics covered will be the propagation of light, the laws of reflection and refraction, the superposition of waves, interference and diffraction of light, the quantum nature of light, and the concept of the laser. Prerequisite(s): PHY 323 Credits: 3

PHY 480 Physics Research I
Physics Research I represents substantial projects or work experiences for 135 hours earning 3 credits. Students will work alongside physics faculty in their professional research. Registration requires submission of resume three months in advance, physics faculty invitation or recommendation, and department Chair approval. Prerequisite(s): PHY 135 or PHY 143 with a minimum grade of C or higher; and permission of department chair Credits: 3

PHY 481 Physics Research II
Physics Research II represents substantial projects or work experiences for 135 hours earning 3 credits. Students will work alongside physics faculty in their professional research. Registration requires submission of resume three months in advance,
physics faculty invitation or recommendation, and department Chair approval. Prerequisite(s): PHY 480 Physics Research I with a minimum grade of B or better; and permission of department chair. Credits: 3

Admission to Farmingdale State College - State University of New York is based on the qualifications of the applicant without regard to age, sex, marital or military status, race, color, creed, religion, national origin, disability or sexual orientation.