## Physics

**Department of Physical Sciences**

**Department Chair:** Peter S. Meyer

**Physics Program Faculty: Professors** Rivers, Snowman; **Associate Professor** Del Vecchio; **Assistant Professors** Padmanabhan, Young

Students **must** consult with their assigned advisor before they will be able to register for courses.

Physics B.S.

Course Requirements

Courses

|  |  |  |  |
| --- | --- | --- | --- |
| PHYS 200 | Mechanics | 4 | F |
| PHYS 201 | Electricity and Magnetism | 4 | Sp |
| PHYS 307 | Quantum Mechanics I | 4 | F (even years) |
| PHYS 311 | Thermodynamics | 4 | F (odd years) |
| PHYS 312 | Mathematical Methods in Physics | 3 | Sp |
| PHYS 313 | Junior Laboratory | 3 | Sp |
| PHYS 401 | Advanced Electricity and Magnetism I | 4 | F (odd years) |
| PHYS 403 | Classical Mechanics | 4 | F (even years) |
| PHYS 413 | Senior Laboratory | 3 | Sp |
|  |  |  |  |

ONE COURSE from

|  |  |  |  |
| --- | --- | --- | --- |
| PHYS 315 | Optics | 4 | F (odd years) |
| PHYS 320 | Analog Electronics | 4 | F (even years) |
| PHYS 321 | Digital Electronics | 4 | Sp (odd years) |

TWO COURSES from

|  |  |  |  |
| --- | --- | --- | --- |
| PHYS 309 | Nanoscience and Nanotechnology | 4 | F (odd years) |
| PHYS 402 | Advanced Electricity and Magnetism II | 3 | Sp (even years) |
| PHYS 407 | Quantum Mechanics II | 3 | Sp (odd years) |
| PHYS 409 | Solid State Physics | 3 | F (even years) |
| PHYS 411 | Statistical Mechanics | 3 | As needed |

Cognates

|  |  |  |  |
| --- | --- | --- | --- |
| CHEM 103 | General Chemistry I | 4 | F, Sp, Su |
| CHEM 104 | General Chemistry II | 4 | F, Sp, Su |
| MATH 212 | Calculus I | 4 | F, Sp, Su |
| MATH 213 | Calculus II | 4 | F, Sp, Su |
| MATH 314 | Calculus III | 4 | F, Sp |
| MATH 416 | Ordinary Differential Equations | 4 | Sp (as needed) |

Total Credit Hours: 67-68

Physics Minor

Course Requirements

The minor in physics consists of a minimum of 17 credit hours, at least nine of which must be at the 300-level or above.

*Note: Connections courses cannot be used to satisfy these requirements.*

PHYS 200 - Mechanics (4)

This calculus-based course includes vectors, statics, kinematics, momentum, energy, rotational motion, small oscillations, and fluid mechanics. Lecture and laboratory.

General Education Category: Natural Science.

Prerequisite: Successful completion of or concurrent enrollment in MATH 212, or consent of department chair.

Offered: Fall.

PHYS 201 - Electricity and Magnetism (4)

This calculus-based course includes electrostatics in a vacuum and in the presence of matter, DC and AC circuits, electromagnetism, and an introduction to optics. Lecture and laboratory.

General Education Category: Advanced Quantitative/Scientific Reasoning.

Prerequisite: PHYS 200 and prior or concurrent enrollment in MATH 213, or consent of department chair.

Offered: Spring.

PHYS 307 - Quantum Mechanics I (4)

Topics include the failures of classical physics, the structure of the atom, and the wave description of matter including the Schödinger Equation, the hydrogen atom, angular momentum and spin. Lecture

Prerequisite: PHYS 201.

Offered: Fall (even years).

PHYS 309 - Nanoscience and Nanotechnology (4)

This course will introduce the basic physics of nanoscience, describe how properties change at the nanoscale and relate this basic science to new nanotechnologies**.**

General Education Category: Advanced Quantitative/Scientific Reasoning

Prerequisite: Any Natural Science General Education course.

Offered: Fall (odd years).

PHYS 311 - Thermodynamics (4)

This is an introduction to the laws of thermodynamics and its application to equilibrium systems, such as ideal gases, phase transformations, solutions and chemical reactions, and elementary statistical mechanics. Lecture.

Prerequisite: PHYS 200 and successful completion of or concurrent enrollment in MATH 213, or consent of department chair.

Offered: Fall (odd years).

PHYS 312 - Mathematical Methods in Physics (3)

Topics include curvilinear coordinates, complex variables, integral transforms, vectors and matrices, special functions, differential equations, and numerical methods as applied to physics. Lecture.

Prerequisite: MATH 314.

Offered: Spring.

PHYS 313 - Junior Laboratory (3)

Intermediate-level experiments are performed in all areas of physics. Students also learn research skills, such as data analysis, literature review, and communication skills. Laboratory.

Prerequisite: PHYS 201 and PHYS 307.

Offered: Spring.

PHYS 315 - Optics (4)

This course covers electromagnetic waves, geometric optics, and physical optics. Topics include: mirrors, lenses, optical systems, thick lenses, aberrations, interference, diffraction, polarization, coherence, and lasers. Laboratory.

Prerequisite: PHYS 102 or PHYS 201 or consent of department chair.

Offered: Fall (odd years).

PHYS 320 - Analog Electronics (4)

Students examine discrete components, including resistors, capacitors, diodes, and transistors, and their applications. Oscilloscopes and other standard laboratory test equipment are used extensively. Integrated circuits are also introduced.

Prerequisite: PHYS 102 or 201 or consent of department chair.

Offered: Fall (even years).

PHYS 321 - Digital Electronics (4)

Students explore basic logic chips and combine them to build digital devices including a microcomputer.  Devices include multiplexers, counters, adders, flip-flops, and memory buses. Laboratory.

Prerequisite: PHYS 102 or PHYS 201 or consent of department chair.

Offered: Spring (odd years).

PHYS 401 - Advanced Electricity and Magnetism I (4)

This is an examination of the theory and application of electrostatic fields, charge, potential, magnetic fields, steady currents, magnetic flux, inductance, transient current, radiation, magnetic energy and Maxwell’s Equations. Lecture.

Prerequisite: MATH 314 and PHYS 201.

Offered: Fall (odd years).

PHYS 402 - Advanced Electricity and Magnetism II (3)

This course covers the principles of electrodynamics, conservation laws, electromagnetic radiation, and the application of Special Relativity to electrodynamics. Lecture. (Formerly Advanced Electricity and Magentism.)

Prerequisite: PHYS 401.

Offered: Spring (even years).

PHYS 403 - Classical Mechanics (4)

This course covers, at an advanced level, the classical theory of linear and rotational dynamics of particles and continuous media. An introduction to Lagrangian mechanics and special relativity is included. Lecture. (Formerly Intermediate Mechanics.)

Prerequisite: MATH 314, PHYS 201.

Offered: Fall (even years).

PHYS 407 - Quantum Mechanics II (3)

Topics include the structure of solids, approximation techniques, nuclear physics, and particle physics. Lecture. (Formerly Quantum Mechanics.)

Prerequisite: PHYS 201 and PHYS 307.

Offered: Spring (odd years).