

# PHY: Physics Courses

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## Courses

### PHY 1020 Conceptual Physics

College of Sci and Engineering, Department of Physics

3 sh (may not be repeated for credit)

An introductory course in physics designed for non-science majors, emphasizing topics relevant to everyday life. The course focuses on major physical discoveries and their implications for the world around us. Meets General Education requirement in Natural Sciences.

### PHY 2048 Calculus-Based Physics I

College of Sci and Engineering, Department of Physics

3 sh (may not be repeated for credit)

Prerequisite: [MAC 2311](#) AND [MAC 2312](#)\*

Physics with Calculus I is the first of a two-semester sequence of calculus-based physics topics for scientists and engineers. The principal subject of this course is mechanics, the science of motion. The topics covered will be the kinematics and dynamics of particles and rigid bodies, conservation laws and principles, gravity, and oscillations. Meets General Education requirement in Natural Sciences.

### PHY 2048C Calculus-Based Physics I Studio

College of Sci and Engineering, Department of Physics

5 sh (may not be repeated for credit)

Prerequisite: [MAC 2311](#) AND [MAC 2312](#)\*

Physics with Calculus I Studio is the first of a two-semester sequence of calculus-based physics topics for scientists and engineers. The principal subject of this course is mechanics, the science of motion. The topics covered will be the kinematics and dynamics of particles and rigid bodies, conservation laws and principles, gravity, oscillations and waves. Meets General Education requirement in Natural Sciences.

### PHY 2048L Calculus-Based Physics I Lab

College of Sci and Engineering, Department of Physics

1 sh (may not be repeated for credit)

Prerequisite: [PHY 2048](#)\*

Selected experiments in mechanics, oscillatory motion, and heat. Material and supply fee will be assessed.

### PHY 2049 Calculus-Based Physics II

College of Sci and Engineering, Department of Physics

3 sh (may not be repeated for credit)

Prerequisite: [MAC 2312](#) AND [PHY 2048](#)

Continuation of [PHY 2048](#). Electrostatics and magnetism; basic electric circuits; optics; selected topics in modern physics. Meets General Education requirement in Natural Sciences.

### PHY 2049L Calculus-Based Physics II Lab

College of Sci and Engineering, Department of Physics

1 sh (may not be repeated for credit)

Prerequisite: [PHY 2048/L](#) AND [PHY 2049](#)\*

Selected experiments in optics, electricity, and magnetism.

### PHY 2053 Algebra-Based Physics I

College of Sci and Engineering, Department of Physics

3 sh (may not be repeated for credit)

Prerequisite: ([MAC 1105](#) AND [MAC 1114](#)) OR ([MAC 1114](#) AND [MAC 1140](#)) OR [MAC 1147](#) OR [MAC 2311](#)

Algebra-Based Physics 1 is the first of a two-semester sequence of physics topics chosen as an introduction to this science. This is an algebra and trigonometry based physics course. Structure and properties of matter; kinematics, dynamics and statics; momentum and energy; rotation; elasticity; fluids; temperature and expansion, heat transfer, thermal behavior of gases; oscillations; wave motion and sound. Meets General Education requirement in Natural Sciences.

### PHY 2053L Algebra-Based Physics I Lab

College of Sci and Engineering, Department of Physics

1 sh (may not be repeated for credit)

Prerequisite: [PHY 2053](#)\*

Selected experiments in mechanics, oscillatory motion, and heat.

### PHY 2054 Algebra-Based Physics II

College of Sci and Engineering, Department of Physics

3 sh (may not be repeated for credit)

Prerequisite: [PHY 2053](#)

Algebra-Based Physics II is the second of a two-semester sequence of physics topics chosen as an introduction to this science. This is an algebra and trigonometry based course. Light; optics; electricity and magnetism; circuits; elementary quantum theory; atomic, nuclear and particle physics. Meets General Education requirement in Natural Sciences.

### PHY 2054L Algebra-Based Physics II Lab

College of Sci and Engineering, Department of Physics

1 sh (may not be repeated for credit)

Prerequisite: [PHY 2054](#)\*

Selected experiments in optics, electricity, and magnetism.

### PHY 2905 Directed Study

College of Sci and Engineering, Department of Physics

1-12 sh (may be repeated indefinitely for credit)

### PHY 3106 Calculus-Based Physics III

College of Sci and Engineering, Department of Physics

3 sh (may not be repeated for credit)

Prerequisite: [PHY 2049](#)

Laws of thermodynamics, wave phenomena, breakdown of classical physics, theory of relativity, quantization of charge, light, and energy, atomic structure.

### PHY 3107 Calculus-Based Physics IV

College of Sci and Engineering, Department of Physics

3 sh (may not be repeated for credit)

Prerequisite: [MAP 2302](#) AND [PHY 3106](#)

Special topics in modern physics: quantum mechanics, atomic structure, molecular structure, atomic and molecular spectra, physics of solids, and band structure, nuclear structure, nuclear forces, radioactive decay and nuclear reactions, elementary particles, and fundamental interactions.

**PHY 3220 Intermediate Mechanics**

College of Sci and Engineering, Department of Physics

4 sh (may not be repeated for credit)

Prerequisite: [MAP 2302\\*](#) AND [PHY 2048](#)

Particle mechanics in 1, 2 and 3 dimensions for various forces. Central forces and celestial mechanics. Systems of many particles. Rigid body dynamics. Introduction to Lagrangian methods.

**PHY 3424 Optics**

College of Sci and Engineering, Department of Physics

3 sh (may not be repeated for credit)

Prerequisite: [PHY 2049](#)

Geometrical, physical, and modern optics. Polarization, interference, diffraction, holography, and optical fibers. A grade of C- or better is required for all prerequisites.

**PHY 3722C Electronics**

College of Sci and Engineering, Department of Physics

3 sh (may not be repeated for credit)

Prerequisite: [PHY 2049](#)

This is an introductory course in electronic design and circuitry with emphasis on common instrumentation. This course has both lecture and laboratory components.

**PHY 3802L Intermediate Physics Lab**

College of Sci and Engineering, Department of Physics

3 sh (may not be repeated for credit)

Prerequisite: [PHY 3106](#)

Laboratory work in basic measurements of physical constants; experiments in electronics, modern physics, nuclear physics, optics, and solid state physics.

**PHY 3905 Directed Study**

College of Sci and Engineering, Department of Physics

1-12 sh (may be repeated indefinitely for credit)

**PHY 4323 Electricity and Magnetism I**

College of Sci and Engineering, Department of Physics

3 sh (may not be repeated for credit)

Prerequisite: [MAC 2313](#) AND [MAP 2302](#) AND [PHY 2049](#) AND [PHZ 4113](#)

Electrostatics, Gauss's Theorem, magnetic fields, Biot-Savart Law, electromagnetic induction, introduction to Maxwell's Equations, and electromagnetic waves. A grade of C- or better is required for prerequisite courses.

**PHY 4325 Electricity and Magnetism II**

College of Sci and Engineering, Department of Physics

3 sh (may not be repeated for credit)

Prerequisite: [PHY 4323](#)

Continuation of [PHY 4323](#) Electricity & Magnetism I. Maxwell's equations and electromagnetic waves in vacuum and in a medium, radiation from dipoles and antennas, transmission lines, wave guides, relativistic electrodynamics, Lienard-Weichert Potentials. A grade of C- or better in prerequisite courses is required.

**PHY 4445 Lasers and Applications**

College of Sci and Engineering, Department of Physics

3 sh (may not be repeated for credit)

Prerequisite: [MAC 2313](#) AND [MAP 2302](#) AND [PHY 2049](#)

Introduction to lasers and applications covering topics on nature of light, photons, elements of semi-conductor physics, modulation of light, displays, laser principles, types of lasers and their design, photodetectors, fiber optics, optical communications. A grade of C- or better is required for all prerequisite courses.

**PHY 4513 Thermal and Statistical Physics**

College of Sci and Engineering, Department of Physics

3 sh (may not be repeated for credit)

Prerequisite: [MAC 2313](#) AND [PHY 2048](#) AND [PHZ 4113\\*](#)

Laws of thermodynamics and their application to simple systems, kinetic theory of gases, introduction to the classical and quantum statistical mechanics of weakly interacting systems.

**PHY 4604 Quantum Theory I**

College of Sci and Engineering, Department of Physics

3 sh (may not be repeated for credit)

Prerequisite: [PHY 3107](#) AND [PHZ 4113](#)

This is the first semester of a two semester undergraduate level course covering the theory of quantum mechanics. This theory is the foundations of modern physics and is an introduction to the main concepts and tools for applying quantum mechanics to a variety of different problems.

**PHY 4605 Quantum Theory II**

College of Sci and Engineering, Department of Physics

3 sh (may not be repeated for credit)

Prerequisite: [PHY 4604](#)

This is the second semester of a two semester undergraduate level course covering the theory of quantum mechanics. This theory is the foundations of modern physics. This course emphasizes the application of quantum mechanics to a variety of problems. Offered Spring semester only.

**PHY 4822L Advanced Physics Lab**

College of Sci and Engineering, Department of Physics

3 sh (may not be repeated for credit)

Prerequisite: [PHY 3107](#) AND [PHY 3802L](#)

Advanced laboratory topics are treated. Modern physics laboratory equipment is used to introduce students to current laboratory practices.

**PHY 4905 Directed Study**

College of Sci and Engineering, Department of Physics

1-12 sh (may be repeated indefinitely for credit)

**PHY 4910 Undergraduate Research**

College of Sci and Engineering, Department of Physics

1-2 sh (may be repeated for up to 10 sh of credit)

Prerequisite: [PHY 2049](#)

Undergraduate experimental or theoretical research under the direction of physics faculty.

**PHY 5905 Directed Study**

College of Sci and Engineering, Department of Physics

1-12 sh (may be repeated indefinitely for credit)

\* This course may be taken prior to or during the same term.