

# PHYSICS

Physics is the science of understanding the nature of the observable universe, on both microscopic and macroscopic scales. It spawns from the questions posed by ancient philosophers seeking to understand their existence and the ways of the natural world. Physics ultimately utilizes mathematics, observations, and logic to coherently model the natural phenomena that we encounter daily; from something as simple as how an object falls to something as complex as the ongoing expansion of the Universe. Physics often imbues us with the ability know what will occur given certain parameters and intricacies of a system. This, in turn, allows us to devise and develop technologies that utilize our knowledge and propel us as a people into the future.

The physics program at Oxnard College offers the Associate in Science in Physics for UC Transfer (A.S.-UCTP) degree and the Associate in Science in Physics for Transfer (AS-T), designed for CSU Transfer. The courses in this program may prepare students for technician-level jobs or university transfer to Bachelor of Arts or Bachelor of Science degree programs in physics.

## University of California Credit Limitation on Transfer of Physics Courses

The UC will give credit for only one Physics series:

Course ID	Title	Units/ Hours
PHYS R101	College Physics 1	4
PHYS R101L & PHYS R102	College Physics 1 Laboratory and College Physics 2	5
PHYS R102L	College Physics 2 Laboratory	1
or		
PHYS R121 & PHYS R122	Physics with Calculus 1 and Physics with Calculus 2	10
or		
PHYS R131	Physics for Scientists and Engineers 1	5
PHYS R132	Physics for Scientists and Engineers 2	5
PHYS R133	Physics for Scientists and Engineers 3	5

**NOTE:** The UC limits enrollment in some courses. See the UC Transfer Course Agreement (<http://catalog.vcccd.edu/oxnard/transfer-information/transfer-uc/#uctcatext>) page for details.

### PHYS R101 College Physics 1 4 Units

*In-Class Hours:* 70 lecture

*Prerequisites:* MATH R116 or placement as determined by the college's multiple measures assessment process

This course is an introduction to classical mechanics and thermal physics that is appropriate for non-majors. It assumes a prior knowledge of mathematics through algebra/trigonometry. Central topics include kinematics, vectors, forces, energy, rotational motion, heat, fluids, waves, and sound. The course is designed to meet the needs of students majoring in the biological sciences and science-allied fields such as architecture.

**Grade Modes:** Letter Graded

**Degree Applicability:** Applies to Associate Degree

**AA/AS GE:** A2

**Transfer Credit:** CSU, UC

**UC Credit Limitations:** None

**CSU GE-Breadth:** B1

**IGETC:** 5A

### PHYS R101L College Physics 1 Laboratory 1 Unit

*In-Class Hours:* 52.5 laboratory

*Prerequisites:* PHYS R101 or concurrent enrollment

*C-ID:* PHYS 105

This course is the laboratory that complements PHYS R101, which may be taken either previously or concurrently. It provides students with opportunities to learn and apply the scientific method through investigations of the phenomena discussed in that course. It also introduces students to methods of computer-assisted data analysis.

**Grade Modes:** Letter Graded

**Degree Applicability:** Applies to Associate Degree

**AA/AS GE:** A2

**Transfer Credit:** CSU, UC

**UC Credit Limitations:** None

**CSU GE-Breadth:** B3

**IGETC:** 5C

### PHYS R102 College Physics 2 4 Units

*In-Class Hours:* 70 lecture

*Prerequisites:* PHYS R101

This course is an introduction to electromagnetic theory, optics, and modern physics that is appropriate for non-majors. It assumes a prior knowledge of mathematics through algebra/trigonometry, and of the fundamentals of classical mechanics. Central topics include electricity, magnetism, optics, quantum ideas, atomic and nuclear physics, and special relativity. The course is designed to meet the needs of students majoring in the biological sciences and science-allied fields such as architecture.

**Grade Modes:** Letter Graded

**Degree Applicability:** Applies to Associate Degree

**AA/AS GE:** A2

**Transfer Credit:** CSU, UC

**UC Credit Limitations:** None

**CSU GE-Breadth:** B1

**IGETC:** 5A

**PHYS R102L College Physics 2 Laboratory 1 Unit***In-Class Hours:* 52.5 laboratory*Prerequisites:* PHYS R102 or concurrent enrollment*C-ID:* PHYS 110, PHYS 100 S

This course provides students with opportunities to learn and apply the scientific method through investigations of the phenomena discussed in a college physics lecture. It also introduces students to methods of computer-assisted data analysis.

**Grade Modes:** Letter Graded**Degree Applicability:** Applies to Associate Degree**AA/AS GE:** A2**Transfer Credit:** CSU, UC**UC Credit Limitations:** None**CSU GE-Breadth:** B3**IGETC:** 5C**PHYS R121 Physics with Calculus 1 5 Units***In-Class Hours:* 70 lecture, 52.5 laboratory*Prerequisites:* MATH R120*C-ID:* PHYS 105

This course is an introduction to classical mechanics and thermal physics. Topics include vectors, motion, force, energy, heat, fluids, waves, and sound. The laboratory provides students with opportunities to learn and apply the scientific method through investigations of the phenomena discussed in lecture. It also introduces students to methods of computer-assisted data analysis. The course is designed to meet the needs of students majoring in the biological sciences, although it may also be suitable for students in certain other majors. It is not appropriate for students planning to major in fields such as engineering, mathematics, the physical sciences, or computer science.

**Grade Modes:** Letter Graded**Degree Applicability:** Applies to Associate Degree**AA/AS GE:** A2**Transfer Credit:** CSU, UC**UC Credit Limitations:** None**CSU GE-Breadth:** B1, B3**IGETC:** 5A, 5C**PHYS R122 Physics with Calculus 2 5 Units***In-Class Hours:* 70 lecture, 52.5 laboratory*Prerequisites:* PHYS R121 and MATH R121*C-ID:* PHYS 110, PHYS 100S (PHYS R121 + PHYS R122)

This course is an introduction to electromagnetic theory, optics, and modern physics. Topics include electricity, magnetism, optics, quantum ideas, atomic and nuclear physics, and special relativity. The laboratory provides students with opportunities to learn and apply the scientific method through investigations of the phenomena discussed in lecture. It also provides students with additional exposure to methods of computer-assisted data analysis. The course is designed to meet the needs of students majoring in the biological sciences, although it may also be suitable for students in certain other majors. It is not appropriate for students planning to major in fields such as engineering, mathematics, the physical sciences, or computer science.

**Grade Modes:** Letter Graded**Degree Applicability:** Applies to Associate Degree**AA/AS GE:** A2**Transfer Credit:** CSU, UC**UC Credit Limitations:** None**CSU GE-Breadth:** B1, B3**IGETC:** 5A, 5C**PHYS R131 Physics for Scientists and Engineers 1 5 Units***In-Class Hours:* 70 lecture, 52.5 laboratory*Prerequisites:* MATH R120*Advisories/Rec Prep:* PHYS R101*C-ID:* PHYS 205

This course is an introduction to the statics and dynamics of rigid bodies and ideal fluids. Central topics include Newton's laws; conservation of energy, linear momentum, and angular momentum; equilibrium of rigid bodies; and oscillatory motion. Although the course emphasizes conceptual understanding, students also learn to apply mathematical techniques such as vector algebra, differential and integral calculus, Taylor series, and linear differential equations to the solution of problems. The laboratory provides students with opportunities to learn and apply the scientific method through investigations of the phenomena discussed in lecture. The course is appropriate for students majoring in the physical sciences, engineering, mathematics, computer science, and related fields.

**Grade Modes:** Letter Graded**Degree Applicability:** Applies to Associate Degree**AA/AS GE:** A2**Transfer Credit:** CSU, UC**UC Credit Limitations:** None**CSU GE-Breadth:** B1, B3**IGETC:** 5A, 5C**PHYS R132 Physics for Scientists and Engineers 2 5 Units***In-Class Hours:* 70 lecture, 52.5 laboratory*Prerequisites:* PHYS R131 and MATH R121*C-ID:* PHYS 210

This course is an introduction to electricity and magnetism along with thermodynamics, with emphasis on understanding field theory, the behavior of simple electrical circuits, heat exchange, the laws of thermodynamics and thermodynamic processes. Central topics include gravitational, electric, and magnetic fields; the laws of Coulomb, Gauss, Ohm, Kirchhoff, Ampere, Biot-Savart, and Faraday; simple circuit analysis; Maxwell equations; heat, entropy, thermodynamic processes, and the thermodynamic laws. Although the course emphasizes conceptual understanding, students also learn to apply mathematical techniques such as vector algebra, vector differentiation and integration, binomial approximations, and linear differential equations to the solution of problems. The laboratory provides students with opportunities to learn and apply the scientific method through investigations of the phenomena discussed in lecture. The course is appropriate for students majoring in the physical sciences, engineering, mathematics, computer science, and related fields.

**Grade Modes:** Letter Graded**Field Trips:** May be required**Degree Applicability:** Applies to Associate Degree**AA/AS GE:** A2**Transfer Credit:** CSU, UC**UC Credit Limitations:** None**CSU GE-Breadth:** B1, B3**IGETC:** 5A, 5C

**PHYS R133 Physics for Scientists and Engineers 3 5 Units**

*In-Class Hours:* 70 lecture, 52.5 laboratory

*Prerequisites:* PHYS R132 and MATH R122

*C-ID:* PHYS 215, PHYS 200 S

This course is an introduction to wave motion (with emphasis placed on the study of sound and electromagnetic wave phenomena), geometrical and wave optics, and selected elementary topics on special relativity and quantum mechanics. Central topics include mechanical and electromagnetic waves; geometric optics; interference and diffraction; relativistic kinematics and dynamics; and elementary quantum theory with atomic structure. Although the course emphasizes conceptual understanding, students also learn to apply mathematical techniques such as vector calculus, Fourier analysis, numerical approximations, and multi-variable integration to the solution of problems. The laboratory provides students with opportunities to learn and apply the scientific method through investigations of the phenomena discussed in lecture. The course is appropriate for students majoring in the physical sciences, engineering, mathematics, computer science, and related fields.

**Grade Modes:** Letter Graded

**Degree Applicability:** Applies to Associate Degree

**AA/AS GE:** A2

**Transfer Credit:** CSU, UC

**UC Credit Limitations:** None

**CSU GE-Breadth:** B1, B3

**IGETC:** 5A, 5C

- Physics, Associate in Science for Transfer (<http://catalog.vcccd.edu/oxnard/programs-courses/physics/physics-ast/>)
- Physics, Associate in Science for UC Transfer (<http://catalog.vcccd.edu/oxnard/programs-courses/physics/physics-as-uctp/>)

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