

# PHYSICS

*Program Purpose: Students who complete Physics courses will apply fundamental physical laws and equations describing physical phenomena to analyze both quantitatively and qualitatively specific problems in the physical universe; recognize, comprehend, and apply the similar principles in the various disciplines of physics, and critically evaluate and analyze observations and measurements through the use of accepted scientific methods and report the results in formal papers that conform to the style of modern scientific writing.*

The strong emphasis in physics on fundamental concepts and problem solving makes it one of the most versatile majors available. The Physics major provides the basis for careers in applied physics and in interdisciplinary areas such as astronomy, biophysics, environmental science, oceanography, and scientific instrumentation.

**NOTE:** Some courses may have credit limitations. Refer to the **Credit Limitations** and **UC Credit Limitations** areas, and the UC Transfer Course Agreement (<http://catalog.vcccd.edu/moorpark/transfer-information/transfer-uc/#uctcatext>) page for details.

## PHYS M01 Descriptive Physics 3 Units

*In-Class Hours:* 52.5 lecture

*Prerequisites:* Intermediate Algebra (MATH M03) or equivalent or placement as determined by the college's multiple-measure assessment process

Introduces the basic principles of Newtonian mechanics, thermodynamics, wave motion, electromagnetism, optics, and modern physics. Examines topics such as kinematics, atomic nature of matter, relativity, and nuclear physics.

**Catalog Notes:** This class is designed for students who have not previously taken a physics class.

**Grade Modes:** Letter Graded, Student Option- Letter/Credit, Pass/No Pass Grading

**Degree Applicability:** Applies to Associate Degree

**AA/AS GE:** A2

**Transfer Credit:** CSU, UC

**UC Credit Limitations:** No credit if taken after PHYS M10A or PHYS M20A

**CSU GE-Breadth:** B1

**IGETC:** 5A

## PHYS M01L Descriptive Physics Laboratory 1 Unit

*In-Class Hours:* 52.5 laboratory

*Prerequisites:* (MATH M03 or MATH M03B) and PHYS M01 or concurrent enrollment

Examines the basic phenomena in mechanics, thermodynamics, wave motion, electromagnetism, optics, and modern physics. Introduces the use of common real-world modern laboratory instruments, learned and practiced during the experiments. Teaches elementary principles of data taking, data reduction, synthesis, and analysis, as well as the writing of scientific reports.

**Grade Modes:** Letter Graded, Student Option- Letter/Credit, Pass/No Pass Grading

**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 M10A General Physics I 4 Units

*In-Class Hours:* 70 lecture

*Prerequisites:* MATH M05 and M06 or MATH M07

*C-ID:* PHYS 105, PHYS 100S (with PHYS M10AL)

Introduces the basics of statics, mechanics, and wave motion. Includes kinematics, dynamics, work and energy, momentum, fluids, waves, simple harmonic motion and thermodynamics.

**Catalog Notes:** This course is designed for students who need an algebra/trigonometry-based physics course.

**Grade Modes:** Letter Graded, Student Option- Letter/Credit, Pass/No Pass Grading

**Degree Applicability:** Applies to Associate Degree

**AA/AS GE:** A2

**Transfer Credit:** CSU, UC

**UC Credit Limitations:** PHYS M10A, PHYS M10B and PHYS M20A, PHYS M20B, PHYS M20C combined: maximum credit, 1 series - deduct credit for duplication of topics

**CSU GE-Breadth:** B1

**IGETC:** 5A

## PHYS M10AL General Physics I Lab 1 Unit

*In-Class Hours:* 52.5 laboratory

*Prerequisites:* MATH M05 and MATH M06 (or MATH M07) and PHYS M10A or concurrent enrollment

*C-ID:* PHYS 105, PHYS 100S (with PHYS M10A)

Examines basic phenomena in mechanics, thermodynamics, and wave motion. Applies common, modern laboratory instruments in hands-on experiments using real world data. Teaches the principles of data taking, reduction, synthesis, and analysis, in addition to the writing of scientific reports.

**Grade Modes:** Letter Graded, Student Option- Letter/Credit, Pass/No Pass Grading

**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 M10B General Physics II 4 Units

*In-Class Hours:* 70 lecture

*Prerequisites:* PHYS M10A

*C-ID:* PHYS 110 (with PHYS M10BL), PHYS 100S (with PHYS M10A +M10AL+M10BL)

Introduces electricity, magnetism, direct-current circuits, optics, and modern physics. Uses trigonometry to develop the subject matter.

Examines topics such as geometric optics, physical optics, relativity, quantum physics, and nuclear physics. Designed for students who need a trigonometry-based physics course.

**Grade Modes:** Letter Graded, Student Option- Letter/Credit, Pass/No Pass Grading

**Degree Applicability:** Applies to Associate Degree

**AA/AS GE:** A2

**Transfer Credit:** CSU, UC

**UC Credit Limitations:** PHYS M10A, PHYS M10B and PHYS M20A, PHYS M20B, PHYS M20C combined: maximum credit, 1 series - deduct credit for duplication of topics

**CSU GE-Breadth:** B1

**IGETC:** 5A

**PHYS M10BL General Physics II Laboratory 1 Unit***In-Class Hours:* 52.5 laboratory*Prerequisites:* PHYS M10A and PHYS M10AL and PHYS M10B or concurrent enrollment Applies to Associate Degree*C-ID:* PHYS 110 (with PHYS M10B), PHYS 100S (with PHYS M10A +M10AL+M10B)

Examines the basic real-world phenomena in electromagnetism, optics, and modern physics. Applies common modern laboratory instruments in hands-on experiments. Teaches and relates the principles of data taking, reduction, synthesis, and analysis, in addition to the writing of scientific reports using appropriate units and significant figures.

**Grade Modes:** Letter Graded, Student Option- Letter/Credit, Pass/No Pass Grading**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 M20A Mechanics of Solids and Fluids 4 Units***In-Class Hours:* 70 lecture*Prerequisites:* MATH M25A or MATH M25AH*Advisories/Rec Prep:* PHYS M10A or high school physics, and MATH M25B or concurrent enrollment*C-ID:* PHYS 205, PHYS 200S (with PHYS M20AL+M20B+M20BL+M20C +M20CL)

Introduces the basic principles of the mechanics of solids and fluids. Uses calculus to develop the subject matter. Covers kinematics, Newtonian mechanics including rotational dynamics, work, energy, fluid statics and dynamics, and simple harmonic motion.

**Grade Modes:** Letter Graded, Student Option- Letter/Credit, Pass/No Pass Grading**Degree Applicability:** Applies to Associate Degree**AA/AS GE:** A2**Transfer Credit:** CSU, UC**UC Credit Limitations:** PHYS M10A, PHYS M10B and PHYS M20A, PHYS M20B, PHYS M20C combined: maximum credit, 1 series - deduct credit for duplication of topics**CSU GE-Breadth:** B1**IGETC:** 5A**PHYS M20AL Mechanics of Solids and Fluids Laboratory 1 Unit***In-Class Hours:* 52.5 laboratory*Prerequisites:* MATH M25A and PHYS M20A (or concurrent enrollment)*C-ID:* PHYS 205, PHYS 200S (with PHYS M20A + M20B+M20BL+M20C +M20CL)

Examines the basic laws of the mechanics of solids and fluids. Applies common, modern laboratory instruments in hands-on experiments with real world data. Teaches the principles of data taking, reduction, synthesis, and analysis, in addition to the writing of scientific reports.

**Grade Modes:** Letter Graded, Student Option- Letter/Credit, Pass/No Pass Grading**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 M20B Thermodynamics, Electricity, and Magnetism 4 Units***In-Class Hours:* 70 lecture*Prerequisites:* PHYS M20A and MATH M25B*Advisories/Rec Prep:* MATH M25C (or concurrent enrollment)*C-ID:* PHYS 210, PHYS 200S (with PHYS M20A+M20AL+M20BL+M20C +M20CL)

Introduces the basic principles of thermodynamics and electromagnetism. Uses calculus to develop the subject matter. Includes the following topics: temperature, heat, the laws of thermodynamics, electrostatics, capacitance, DC circuits, magnetic forces and fields, electromagnetic induction, AC circuits, Maxwell's equations, and electromagnetic waves.

**Grade Modes:** Letter Graded, Student Option- Letter/Credit, Pass/No Pass Grading**Degree Applicability:** Applies to Associate Degree**AA/AS GE:** A2**Transfer Credit:** CSU, UC**UC Credit Limitations:** PHYS M10A, PHYS M10B and PHYS M20A, PHYS M20B, PHYS M20C combined: maximum credit, 1 series - deduct credit for duplication of topics**CSU GE-Breadth:** B1**IGETC:** 5A**PHYS M20BL Thermodynamics, Electricity, and Magnetism Laboratory 1 Unit***In-Class Hours:* 52.5 laboratory*Prerequisites:* PHYS M20AL and PHYS M20B or concurrent enrollment*C-ID:* PHYS 210, PHYS 200S (with PHYS M20A + M20AL + M20B + M20C + M20CL)

Examines the basic phenomena in thermodynamics and electromagnetism. Uses real-world modern instruments such as digital and analog voltmeters, ammeters, and oscilloscopes. Teaches the principles of data taking, reduction, synthesis, and analysis, in addition to the writing of scientific reports.

**Grade Modes:** Letter Graded, Student Option- Letter/Credit, Pass/No Pass Grading**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 M20C Wave Motion, Optics, and Modern Physics 4 Units***In-Class Hours:* 70 lecture*Prerequisites:* MATH M25C and PHYS M20B*C-ID:* PHYS 215, PHYS 200S (with PHYS M20A + M20AL + M20B + M20BL+ M20CL)

Introduces the basic principles of wave motion, optics, and modern physics using calculus to develop the subject matter. Includes the following topics: classical wave theory, wave-particle duality, reflection, refraction, interference, diffraction, optical elements and systems, applications of Schrodinger's equation, atomic structure, molecular structure, the quantum nature of solids, consequences of special and general relativity, nuclear physics, particle physics, and cosmology.

**Grade Modes:** Letter Graded, Student Option- Letter/Credit, Pass/No Pass Grading**Degree Applicability:** Applies to Associate Degree**AA/AS GE:** A2**Transfer Credit:** CSU, UC**UC Credit Limitations:** PHYS M10A, PHYS M10B and PHYS M20A, PHYS M20B, PHYS M20C combined: maximum credit, 1 series - deduct credit for duplication of topics**CSU GE-Breadth:** B1**IGETC:** 5A**PHYS M20CL Wave Motion, Optics, and Modern Physics Laboratory 1 Unit***In-Class Hours:* 52.5 laboratory*Prerequisites:* PHYS M20B and PHYS M20BL and MATH M25C and PHYS M20C (or concurrent enrollment)*C-ID:* PHYS 215, PHYS 200S (with PHYS M20A+M20AL+M20B+M20BL+M20C)

Examines some of the basic phenomena in wave motion, optics, and modern physics. Uses real world modern instruments such as digital and analog voltmeters, ammeters, digital storage oscilloscopes, frequency counters, lasers, spectrometers, optical energy and poser meters during the experiments. Teaches the principles of data taking, reduction, synthesis, and analysis, in addition to the writing of scientific reports.

**Grade Modes:** Letter Graded, Student Option- Letter/Credit, Pass/No Pass Grading**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 M80 Internship in Physics 1-4 Units***In-Class Hours:* 60-240 unpaid cooperative, 75-300 paid cooperative*Prerequisites:* Completion of or concurrent enrollment in one course in the discipline and instructor approval

Provides on-the-job learning to develop effective work habits, attitudes, and career awareness in paid or unpaid internships that are related to the discipline. Involves the development and documentation of learning objectives and the completion of an internship paper, presentation, or project. Includes both workplace supervisor and faculty adviser feedback and/or written evaluations. Course Credit Limitation: To take the course, contact the Career Transfer Center. Requires orientation session. Students receive one unit of credit for each 60 hours unpaid or 75 hours paid work. May enroll in up to 4 units a semester with a maximum of 16 total units of any type of work experience.

**Grade Modes:** Letter Graded, Student Option- Letter/Credit, Pass/No Pass Grading**Repeatable for Credit:** Course may be taken up to 3 times for credit.**Degree Applicability:** Applies to Associate Degree**AA/AS GE:** None**Transfer Credit:** CSU**UC Credit Limitations:** None**CSU GE-Breadth:** None**IGETC:** None**PHYS M122 Independent Study - Physics 0.5-3 Units***Formerly:* PHYS M22A*In-Class Hours:* 26.25-157.5 laboratory*Prerequisites:* Completion of one course in Physics and instructor approval

Allows independent study for students who wish to extend their knowledge of a particular area of Physics through research and study. Utilizes an approved independent project. Includes one-on-one work with instructor. Interested students should contact a Physics instructor for assistance in developing a contract for learning about a specific topic.

**Grade Modes:** Letter Graded, Student Option- Letter/Credit, Pass/No Pass Grading**Degree Applicability:** Applies to Associate Degree**AA/AS GE:** None**Transfer Credit:** CSU**UC Credit Limitations:** None**CSU GE-Breadth:** None**IGETC:** None

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

## Dean

Robert Cabral, Phone (805) 378-1572

## Faculty

Erik Reese, Charles (Rick) Edwards

## Counselors

Daniel Aguilar, Chuck Brinkman, Trevor Hess, Samantha Zaldivar