PHYSICS (PHYS)

See Course Description Symbols and Terms (https://catalog.csuchico.edu/academic-standards-policies/course-description-symbols-terms/) for an explanation of course description terminology and symbols, the course numbering system, and course credit units.

PHYS 100 Introduction to Astronomy: Survey of the Cosmos **3 Units GE**
Typically Offered: Fall and spring
This course provides an overview of modern physical theory, emphasizing the approach of science in understanding our place in the universe. The student discovers how simple, fundamental physical principles enable us to understand key features in diverse physical systems: from the radiometric dating of early hominid ancestors to the measurement of the expansion rate of the Universe. The course emphasizes our current understanding of astronomy, solar system formation, stellar evolution, and cosmic evolution. This in turn leads us to investigate the physical conditions salient to life on Earth, and ways in which these conditions are 'rare'. 2 hours activity, 2 hours discussion. (007392)
General Education: Laboratory Activity (B3); Physical Science (B1)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Lower Division

PHYS 102 Thinking Like a Physicist **1 Unit**
Prerequisite: Recommended: For students who have not met other PHYS 202A prerequisites such as MATH 118 or High school trigonometry.
Corequisites: PHYS 202A.
Typically Offered: Fall and spring
This course provides the math and trigonometry background necessary for success in introductory physics. Specifically designed to be taken alongside PHYS 202A for students who have not met other PHYS 202A prerequisites such as MATH 118 or High school trigonometry. 1 hour lecture. (021291)
Grade Basis: Credit/No Credit
Repeatability: You may take this course for a maximum of 1 unit
Course Attributes: Lower Division

PHYS 109 Paths to Success in Physics **1 Unit**
Typically Offered: Fall only
A university success course for physics majors new to California State University, Chico. Appropriate for all incoming freshman and transfer students. This course explores academic and career opportunities in physics and related fields, introduces current topics in physics, acquaints students with resources available on campus and provides an introduction to physics research. 1 hour discussion. (021671)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 1 unit
Course Attributes: Lower Division

PHYS 202A General Physics I **4 Units GE**
Prerequisite: High school physics; High school trigonometry, and second-year high school algebra or MATH 118; or concurrent enrollment in PHYS 102.
Typically Offered: Fall and spring
Mechanics, properties of matter, wave motion, sound, heat. Science majors are encouraged to take PHYS 204A instead of this course. 3 hours discussion, 3 hours laboratory. (007394)
General Education: Laboratory Activity (B3); Physical Science (B1)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Lower Division

PHYS 202B General Physics II **4 Units**
Prerequisite: PHYS 202A with a grade of C- or higher.
Typically Offered: Fall and spring
Light, electricity, magnetism, selected topics in modern physics. Science majors are encouraged to take PHYS 204B instead of this course. Algebra and trigonometry are used. 3 hours discussion, 3 hours laboratory. (007395)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Lower Division

PHYS 202X Physics Problem Session **1 Unit**
Prerequisite: Concurrent enrollment in PHYS 202A.
Typically Offered: Fall and spring
Designed to supplement PHYS 202A with additional applications of introductory physics. Provides the student with the opportunity for additional assistance in developing problem-solving abilities. 2 hours activity. (007398)
Grade Basis: Credit/No Credit
Repeatability: You may take this course for a maximum of 6 units
Course Attributes: Lower Division

PHYS 202Y Physics Problem Session **1 Unit**
Corequisites: PHYS 202B.
Typically Offered: Fall and spring
Designed to supplement PHYS 202B with additional applications of introductory physics. Provides the student with the opportunity for additional assistance in developing problem-solving abilities. 2 hours activity. (007399)
Grade Basis: Credit/No Credit
Repeatability: You may take this course for a maximum of 6 units
Course Attributes: Lower Division

PHYS 204A Physics for Students of Science and Engineering: Mechanics **4 Units GE**
Prerequisite: High school physics or faculty permission. Concurrent enrollment in or prior completion of MATH 121 (second semester of calculus) or equivalent.
Typically Offered: Fall and spring
Vectors, kinematics, particle dynamics, friction, work, energy, power, momentum, dynamics and statics of rigid bodies, oscillations, gravitation, fluids. Calculus used. A grade of C- or higher is required before progressing to either PHYS 204B or PHYS 204C. 3 hours discussion, 3 hours laboratory. (007401)
General Education: Laboratory Activity (B3); Physical Science (B1)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Lower Division

PHYS 204B Physics for Students of Science and Engineering: Electricity and Magnetism **4 Units**
Prerequisite: MATH 121, PHYS 204A with a grade of C- or higher.
Typically Offered: Fall and spring
Charge and matter, electric field, Gauss' law, electric potential, capacitors and dielectrics, current and resistance, magnetic field, Ampere's law, Faraday's law of induction, magnetic properties of matter, electromagnetic oscillations and waves. Calculus used. 3 hours discussion, 3 hours laboratory. (007402)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Lower Division

PHYS 204C Physics for Students of Science and Engineering: Heat, Wave Motion, Sound, Light, and Modern Topics **4 Units**
Prerequisite: MATH 121, PHYS 204A with a grade of C- or higher.
Typically Offered: Fall and spring
Temperature, first and second law of thermodynamics, and kinetic theory. Waves in elastic media, standing waves and resonance, and sound. Ray and wave optics, reflection, refraction, lenses, mirrors, diffraction, and polarization. Selected topics in modern physics. Calculus used. 3 hours discussion, 3 hours laboratory. (007403)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Lower Division

PHYS 204X Physics Problem Session **1 Unit**
Corequisites: PHYS 204A.
Typically Offered: Fall and spring
Designed to supplement PHYS 204A with additional applications of introductory physics. Provides the student with the opportunity for additional assistance in developing problem-solving abilities. 2 hours activity. (007406)
Grade Basis: Credit/No Credit
Repeatability: You may take this course for a maximum of 6 units
Course Attributes: Lower Division

PHYS 204Y Physics Problem Session **1 Unit**
Corequisites: PHYS 204B.
Typically Offered: Fall and spring
Designed to supplement PHYS 204B with additional applications of introductory physics. Provides the student with the opportunity for additional assistance in developing problem-solving abilities. 2 hours activity. (007407)
Grade Basis: Credit/No Credit
Repeatability: You may take this course for a maximum of 6 units
Course Attributes: Lower Division

PHYS 298 Special Topics **1-3 Units**
Prerequisite: Department permission.
Typically Offered: Fall and spring
This course is for special topics offered for 1.0-3.0 units. Typically the topic is offered on a one-time-only basis and may vary from term to term and be different for different sections. See the Class Schedule for the specific topic being offered. 3 hours supervision. (007412)
Grade Basis: Graded
Repeatability: You may take this course more than once
Course Attributes: Lower Division

PHYS 300 Introduction to Modern Physics: Relativity and Quantum Theory **3 Units**
Prerequisite: PHYS 204A, PHYS 204B, PHYS 204C, or PHYS 202A and PHYS 202B and calculus with faculty permission.
Typically Offered: Fall only
This course focuses on the radical changes in our conception of the physical world that emerged in the early 20th and 21st centuries. The course begins with the theory of special relativity, which altered our understanding of the nature of space, time, matter, and energy. The course's middle section is devoted to the introduction of quantum theory. The last section introduces particle physics, general relativity, and cosmology. 2 hours activity, 2 hours discussion. (007417)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

PHYS 301 Analytical Mechanics **3 Units**
Prerequisite: PHYS 204B, PHYS 204C, PHYS 314 (may be taken concurrently).
Typically Offered: Fall only
Newton's laws of motion, particle dynamics, accelerated reference systems, central force problems, conservation laws, celestial mechanics, many body systems, rotational motion, rigid body dynamics, Euler's equations, Lagrange's and Hamilton's formulations, oscillating systems, and waves. 3 hours discussion. (007419)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

PHYS 302 Electricity and Magnetism **3 Units**
Prerequisite: PHYS 204C, PHYS 314.
Typically Offered: Spring only
Vector analysis; electrostatic fields and potentials: Poisson's equation, boundary value problems and multipole expansions; dielectrics, magnetostatics, magnetic fields in matter, Maxwell's equations, field energy and momentum, Fresnel equations, propagation of electromagnetic waves in dispersive media, waveguides and coaxial cables, radiating systems. 3 hours discussion. (007422)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

PHYS 307 Physics of Music **3 Units GE**
Prerequisite: GE Oral Communication (A1); GE Written Communication (A2); GE Critical Thinking (A3); GE Physical Sciences (B1); GE Life Sciences (B2); GE Mathematics/Quantitative Reasoning (B4) requirements, or consent of the instructor.
Typically Offered: Fall and spring
This course is intended for non-science majors and explores the deep connection between physics and music. Basic principles of physics and scientific reasoning are taught in the context of the production and perception of music, emphasizing the historic and scientific interplay between physics and music. No previous knowledge of physics or music is assumed. Through learning the physical concepts used to describe music, students are able to extend their understanding to additional examples of physical phenomena. 2 hours activity, 2 hours lecture. (021877)
General Education: Upper-Division Scientific Inq/Quant Reason (UDB); Innovation, Design, and the Arts Pathway; Science, Technology, and Society Pathway
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

PHYS 309 Physics Associates Program **1 Unit**
Prerequisite: Faculty permission.
Typically Offered: Fall and spring
The course provides two hours/week of physics tutoring. 2 hours activity. (007429)
Grade Basis: Credit/No Credit
Repeatability: You may take this course for a maximum of 6 units
Course Attributes: Upper Division

PHYS 312 Computational Physics **3 Units**
Prerequisite: PHYS 204B.
Corequisites: PHYS 204C.
Typically Offered: Spring only
This course prepares physics majors to be self-sufficient in personal computer use to solve experimental and theoretical physics problems. Topics include, but are not limited to, analysis of experimental data, projectile motion, random processes, vector fields and potentials, vibrating systems, and electric circuits. 2 hours discussion, 3 hours laboratory. (007411)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

PHYS 314 Methods of Theoretical Physics **3 Units**
Prerequisite: MATH 220, MATH 260, PHYS 204B.
Typically Offered: Fall only
This course provides students with the skills needed to apply advanced topics in mathematics to upper-division physics problems. It focuses on applications of calculus, multi-variable calculus, differential equations, linear algebra, Fourier techniques, partial differential equations, and boundary-value problems to physics problems in classical mechanics, EM, and other advanced physics courses. 3 hours lecture. (022045)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

PHYS 315 Thermal Physics **3 Units**
Prerequisite: PHYS 300. Recommended: MATH 361.
Typically Offered: Spring only
This course develops the laws of macroscopic equilibrium thermodynamics along with applications to representative physical problems. The course concludes with an investigation of the microscopic statistical properties underlying these laws. 3 hours discussion. (021447)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

PHYS 327 Electronics for Scientists **4 Units**
Prerequisite: PHYS 204B, PHYS 204C.
Typically Offered: Spring only
This course is an introduction to basic laboratory electronics for scientists. Topics include fundamentals of linear and non-linear circuit elements, operational amplifiers, simple digital circuits, A/D and D/A conversion, noise reduction, introductory-level LabVIEW programming, and an introduction to microcontroller systems. A weekly three hour lab gives students experience in designing, building, and debugging circuitry for laboratory/control tasks. 3 hours laboratory, 3 hours lecture. (021423)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Upper Division

PHYS 341 Advanced Inquiry into Physics **3 Units**
Prerequisite: SCED 141; or PHYS 100; or PHYS 202A and PHYS 202B; or PHYS 204A, PHYS 204B, and PHYS 204C.
Typically Offered: Fall and spring
This course builds on concepts developed in the introductory physics course in greater mathematical and representational sophistication. There is a significant emphasis on participation in and reflection on scientific inquiry. Topics addressed include kinematics, electrostatics and electrodynamics, simple machines, and wave phenomena. 4 hours activity, 1 hour discussion. (020986)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

PHYS 361 Astronomy - Stars and Telescopes **3 Units**
Prerequisite: PHYS 202A and PHYS 202B; or PHYS 204A and PHYS 204C.
Typically Offered: Fall and spring
Fundamentals of modern astronomy including the Sun; stellar structure; evolution of stars from formation to stellar remnants; white dwarfs, neutron stars, pulsars, and black holes; novae and supernovae; modern telescopes from radio to gamma rays; hands-on experience with optical observations; analysis and interpretation of stellar data. 3 hours lecture. (022417)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

PHYS 365 Astronomy - Galaxies and Cosmology **3 Units**
Prerequisite: PHYS 361.
Typically Offered: Fall and spring
Current theoretical and observational understanding of galaxies, including the Milky Way and cosmology. Galaxy formation, structure and evolution are covered in the context of our wider cosmological understanding of the universe as a whole. Observational and theoretical underpinnings for our current model of cosmology, the Hot Big Bang, as well as the effects of dark matter and dark energy, will be discussed in detail. 3 hours lecture. (022418)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

PHYS 376W Physics for Future World Leaders (W) **3 Units GE, W**
Prerequisite: GE Oral Communication (A1); GE Written Communication (A2); GE Critical Thinking (A3); GE Mathematics/Quantitative Reasoning (B4) requirements, or consent of the instructor.
Typically Offered: Fall and spring
This course explores the fundamentals of physics at a level helpful to future world leaders. Topics include the nature of scientific investigations, power generation, nuclear reactors and nuclear weapons, green energy pros and cons, and many others. One main goal for students is to understand the scientific issues and scientific methods sufficiently to make intelligent choices as citizens. 3 hours lecture. (007363)
General Education: Upper-Division Scientific Inq/Quant Reason (UDB); Equity, Ethics, and Policy Pathway; Global Studies Pathway
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division; Writing Course

PHYS 398 Special Topics **1-3 Units**
Typically Offered: Spring only
This course is for special topics offered for 1.0-3.0 units. Typically the topic is offered on a one-time-only basis and may vary from term to term and be different for different sections. See the Class Schedule for the specific topic being offered. 1 hour lecture. (007415)
Grade Basis: Graded
Repeatability: You may take this course more than once
Course Attributes: Upper Division

PHYS 399 Special Problems **1-3 Units**
Typically Offered: Fall and spring
This course is an independent study of special problems offered for 1.0-3.0 units. You must register directly with a supervising faculty member. 9 hours supervision. (007416)
Grade Basis: Credit/No Credit
Repeatability: You may take this course for a maximum of 6 units
Course Attributes: Upper Division

PHYS 427W Advanced Laboratory (W) **3 Units W, GW**
Prerequisite: GE Written Communication (A2) requirement, PHYS 300, PHYS 327.
Typically Offered: Fall only
Experiments involving atomic and nuclear physics, measurement of physical constants, chaos, solid-state physics, and general-purpose laboratory skills techniques including computerized data collection and analysis. 2 hours discussion, 3 hours laboratory. (007437)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division; Writing Course; Graduation Writing Assessment

PHYS 435A Quantum Mechanics I **3 Units**
Prerequisite: PHYS 300; either PHYS 314 or MATH 361.
Typically Offered: Fall only
A survey of one-dimensional and three-dimensional solutions to Schrodinger's equation designed to build an understanding of commutator algebra and Hilbert space. Formalisms associated with angular momentum and spin are included. 1 hour activity, 2 hours discussion. (007441)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

PHYS 435B Quantum Mechanics II **3 Units**
Prerequisite: PHYS 435A.
Typically Offered: Spring only
This course extends the use of Schrodinger's equation with a variety of approximation methods to study physical systems including atomic physics, nuclear structure, and scattering problems. 3 hours discussion. (007444)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

PHYS 450 Optics **3 Units**
Prerequisite: PHYS 204A, PHYS 204B, PHYS 204C.
Typically Offered: Fall only
Geometrical and physical optics, interference, diffraction, reflection, dispersion, resolution, polarization, fiber optics, laser optics, and holography. 2 hours discussion, 3 hours laboratory. (002549)
Cross listing(s): EECE 450
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

PHYS 451 Lasers and Their Applications **3 Units**
Prerequisite: PHYS 204C. Recommended: EECE 450 or PHYS 450.
Typically Offered: Spring only
The theory and mechanism of laser action, various types of lasers and their applications and future use. Laboratory involves measurements with lasers, fiber optics, data transmission, and holography. 2 hours discussion, 3 hours laboratory. (002550)
Cross listing(s): EECE 451
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

PHYS 489P Internship in Professional Physics **3 Units**
Prerequisite: PHYS 300 and faculty permission.
Typically Offered: Fall and spring
This is a supervised internship in professional physics. This internship may take place at a university, government laboratory, or private sector company. This course may be taken more than once. It cannot be used for the minor in physics. 9 hours supervision. (007447)
Grade Basis: Credit/No Credit
Repeatability: You may take this course for a maximum of 15 units
Course Attributes: Upper Division

PHYS 489T Internship in Physics Teaching **3 Units**
Prerequisite: PHYS 327 and faculty permission.
Typically Offered: Fall and spring
This is a supervised internship in physics teaching which will take place in a local high school physics classroom. This course may be taken more than once, but a maximum of 3 units of any PHYS 289 may be counted toward the degree. This course cannot be used for the minor in physics. 9 hours supervision. (007448)
Grade Basis: Credit/No Credit
Repeatability: You may take this course for a maximum of 15 units
Course Attributes: Upper Division

PHYS 492W Communicating Physics (W) **3 Units W**
Prerequisite: GE Written Communication (A2) requirement, junior standing, open to Physics majors only.
Typically Offered: Spring only
Presentation and discussion of current physics literature and/or special studies of students and faculty, in professional journal form, other written forms, and in seminar presentation. 2 hours discussion, 1 hour seminar. (022057)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division; Writing Course

PHYS 498 Special Topics **1-3 Units**
Prerequisite: Upper-division standing in physics, faculty permission.
Typically Offered: Inquire at department
This course is for special topics offered for 1.0-3.0 units. Typically the topic is offered on a one-time-only basis and may vary from term to term and be different for different sections. See the Class Schedule for the specific topic being offered. 1 hour seminar. (007450)
Grade Basis: Graded
Repeatability: You may take this course more than once
Course Attributes: Upper Division

PHYS 499 Special Problems **1-3 Units**
Typically Offered: Fall and spring
This course is an independent study of special problems and is offered for 1.0-3.0 units. You must register directly with a supervising faculty member. 3 hours supervision. (007451)
Grade Basis: Credit/No Credit
Repeatability: You may take this course for a maximum of 6 units
Course Attributes: Upper Division

PHYS 499H Honors Research Project **3 Units**
Prerequisite: Faculty permission.
Typically Offered: Fall and spring
Open by invitation to physics majors who have a GPA of 3.5 or higher. This is an "Honors in the Major" course. 9 hours supervision. (022533)
Grade Basis: ABC/No Credit
Repeatability: You may take this course for a maximum of 6 units
Course Attributes: Upper Division

PHYS 697 Independent Study **1-4 Units**
Typically Offered: Fall and spring
This course is a graduate-level independent study offered for 1.0-4.0 units. You must register directly with a supervising faculty member. 9 hours supervision. (007456)
Grade Basis: Report in Progress: Graded
Repeatability: You may take this course for a maximum of 6 units
Course Attributes: Graduate Division

PHYS 699T Master's Thesis **1-6 Units**
Typically Offered: Fall and spring
This course is offered for 1.0-6.0 units. You must register directly with a supervising faculty member. 9 hours supervision. (007461)
Grade Basis: Report in Progress: CR/NC
Repeatability: You may take this course for a maximum of 6 units
Course Attributes: Graduate Division