

Physics

Astronomy, PHYS

1050-1060. Descriptive Astronomy. 3 hours each. (3;1) Planetary and stellar astronomy; techniques of astronomical measurement; developments related to evolution and systematics of the solar system and the stars. For all students interested in astronomy. Prerequisite(s): proficiency in algebra.

1050 (PHYS 1311). The Solar System. History of astronomy and the physical properties of the earth, moon, planets and minor bodies. *May be used to satisfy a portion of the Natural Sciences requirement of the University Core Curriculum.*

1060 (PHYS 1312). Stars and the Universe. Properties of stars and stellar systems and a study of the origin, evolution and future of the universe. *May be used to satisfy a portion of the Natural Sciences requirement of the University Core Curriculum.*

1051-1061. Laboratory Sequence for Descriptive Astronomy. 1 hour each. (0;1)

1051 (PHYS 1111). The Solar Systems Observations Laboratory. Outdoor laboratory emphasizes the use of the astronomical telescope to observe the moon, planets, comets, etc. The indoor laboratories focus on the use of the planetarium and photographic studies of the moon and planets. This course is designed to accompany PHYS 1050. Prerequisite(s): PHYS 1050 (may be taken concurrently). *May be used to satisfy a portion of the Natural Sciences requirement of the University Core Curriculum.*

1061 (PHYS 1112). Stellar Systems Observations Laboratory. Outdoor laboratory emphasizes the use of the astronomical telescope to observe the analysis of stellar spectra, globular clusters and their galactic distributions, and classification of galaxies. This course is designed to accompany PHYS 1060. Prerequisite(s): PHYS 1060 (may be taken concurrently). *May be used to satisfy a portion of the Natural Sciences requirement of the University Core Curriculum.*

Physics, PHYS

1210 (PHYS 1415). Conceptual Physics. 4 hours. (3;3) Principles and applications of mechanics, heat, sound, light, electricity and atomic physics for the elementary education major. Prerequisite(s): MATH 1100 or higher and interdisciplinary studies (elementary education) major status. May not use both PHYS 1210 and 1311 to satisfy a laboratory science requirement. *May be used to satisfy a portion of the Natural Sciences requirement of the University Core Curriculum (by elementary education students).*

1251. Science and Technology of Musical Sound. 3 hours. Sound production; nature of vibrations in percussion, string, and wind instruments. Sound propagation; sound speed; echoes. Sound intensity, physical and perceived. Sound pitch, physical and perceived; intervals. Complex sounds; harmonic series. Room acoustics; reverberation time; ideal listening rooms. Wave phenomena; interference and diffraction. Digital sound recording; musical scales; the human voice. Prerequisite(s): MATH 1100 or above. *May be used to satisfy a portion of the Natural Sciences requirement of the University Core Curriculum.*

1271. Science and Technology of Musical Sound Laboratory. 1 hour. (0;3) Companion laboratory to PHYS 1251. Prerequisite(s): PHYS 1251 (may be taken concurrently). *May be used to satisfy a portion of the Natural Sciences requirement of the University Core Curriculum.*

1311 (PHYS 1310). Introduction to the World of Physics. 3 hours. Basic principles and concepts of physics for the liberal-arts major necessary to the understanding of our increasingly technological environment and the science on which it is based; and current ideas concerning the micro world and the universe at large. Topics include: mechanics; properties of matter; heat; sound; electricity and magnetism; light; and atomic, nuclear and fundamental particle physics. Prerequisite(s): proficiency in algebra. May not use both PHYS 1210 and PHYS 1311 to satisfy a laboratory science requirement. *May be used to satisfy a portion of the Natural Sciences requirement of the University Core Curriculum.*

1312. Essential Physics. 3 hours. (3;0;1) Principles and concepts of physics essential to the understanding of modern technological society by the liberal arts major are examined in their cultural context. Topics include Newtonian mechanics, relativity, light, electromagnetic theory, atomic physics, quantum mechanics and nuclear physics. Prerequisite(s): concurrent enrollment in PHYS 1332 and admission to Honors College. *May be used to satisfy a portion of the Natural Sciences requirement of the University Core Curriculum.*

1331 (PHYS 1110). Introduction to the World of Physics Laboratory. 1 hour. (0;3) Prerequisite(s): PHYS 1311 (may be taken concurrently). *May be used to satisfy a portion of the Natural Sciences requirement of the University Core Curriculum.*

1332. Essential Physics Laboratory. 1 hour. (0;3) Companion laboratory to PHYS 1312. Prerequisite(s): PHYS 1312 (may be taken concurrently) and admission to Honors College. *May be used to satisfy a portion of the Natural Sciences requirement of the University Core Curriculum.*

1410-1420. General Physics. 3 hours each. (3;0;1) Non-calculus based physics sequence suitable for life sciences majors and preprofessional students.

1410 (PHYS 1301). General Physics I. Principles and applications of mechanics, sound and heat. Prerequisite(s): proficiency in algebra and trigonometry. It is recommended that the course be taken concurrently with PHYS 1430. *May be used to satisfy a portion of the Natural Sciences requirement of the University Core Curriculum.*

1420 (PHYS 1302). General Physics II. Principles and applications of electricity, magnetism, light and atomic physics. Prerequisite(s): PHYS 1410 or consent of department. It is recommended that the course be taken concurrently with PHYS 1440. *May be used to satisfy a portion of the Natural Sciences requirement of the University Core Curriculum.*

1430-1440. Laboratory Sequence for General Physics. 1 hour each. (0;3) Laboratory to accompany the course sequence 1410-1420.

1430 (PHYS 1101). General Physics Laboratory I. Prerequisite(s): PHYS 1410 (may be taken concurrently). *May be used to satisfy a portion of the Natural Sciences requirement of the University Core Curriculum.*

1440 (PHYS 1102). General Physics Laboratory II. Prerequisite(s): PHYS 1420 (may be taken concurrently). *May be used to satisfy a portion of the Natural Sciences requirement of the University Core Curriculum.*

1510-1520. General Physics with Calculus Sequence. 3 hours each. (3;0;1) Calculus-based physics sequence suitable for future science teachers and for pre-medicine and other health-related preprofessional students.

1510. General Physics I with Calculus. Principles and applications of mechanics, sound and heat. Prerequisite(s): MATH 1710 (may be taken concurrently), and consent of department. It is recommended that the course be taken concurrently with PHYS 1530. *May be used to satisfy a portion of the Natural Sciences requirement of the University Core Curriculum.*

1520. General Physics II with Calculus. Principles and applications of electricity, magnetism, light, atomic and nuclear physics. Prerequisite(s): PHYS 1510. It is recommended that the course be taken concurrently with PHYS 1540. *May be used to satisfy a portion of the Natural Sciences requirement of the University Core Curriculum.*

1530-1540. Laboratory Sequence for General Physics with Calculus. 1 hour each. (0;3) Laboratory to accompany the course sequence 1510-1520.

1530. General Physics with Calculus Laboratory I. Laboratory to accompany PHYS 1510. Prerequisite(s): concurrent enrollment in PHYS 1510. *May be used to satisfy a portion of the Natural Sciences requirement of the University Core Curriculum.*

1540. General Physics with Calculus Laboratory II. Laboratory to accompany PHYS 1520. Prerequisite(s): concurrent enrollment in PHYS 1520. *May be used to satisfy a portion of the Natural Sciences requirement of the University Core Curriculum.*

1710-2220-3010. General Technical Physics. 3 hours each. (3;0;1) Calculus-based physics sequence suitable for physics, engineering physics, engineering technology, mathematics, computer science and chemistry majors.

1710 (PHYS 2325). Mechanics. Laws of motion; inertia, acceleration, force, energy, momentum and angular momentum. Rotational and oscillatory motion. Gravitation. Prerequisite(s): MATH 1710. It is recommended that the course be taken concurrently with PHYS 1730. *May be used to satisfy a portion of the Natural Sciences requirement of the University Core Curriculum.*

2220 (PHYS 2326). Electricity and Magnetism. Electric fields, dc and ac circuits, magnetic fields and magnetic induction. Electric and magnetic properties of matter. Prerequisite(s): PHYS 1420 or 1710; MATH 1720. It is recommended that the course be taken concurrently with PHYS 2240. *May be used to satisfy a portion of the Natural Sciences requirement of the University Core Curriculum.*

3010. Modern Physics. Relativity, quantum physics, atomic structure, properties of matter and nuclear physics. Prerequisite(s): PHYS 1420 or 2220, and MATH 1710. It is recommended that the course be taken concurrently with PHYS 3030.

1730-2240-3030. Laboratory Sequence for General Technical Physics. 1 hour each. (0;3) Laboratory to accompany the course sequence 1710-2220-3010.

1730 (PHYS 2125). Laboratory in Mechanics. Prerequisite(s): PHYS 1710 (may be taken concurrently). *May be used to satisfy a portion of the Natural Sciences requirement of the University Core Curriculum.*

2240 (PHYS 2126). Laboratory in Wave Motion, Electricity, Magnetism and Optics. Prerequisite(s): PHYS 2220 (may be taken concurrently). *May be used to satisfy a portion of the Natural Sciences requirement of the University Core Curriculum.*

3030. Laboratory in Modern Physics. Prerequisite(s): PHYS 3010 (may be taken concurrently).

2900-2910. Special Problems. 1-3 hours each. Individualized instruction in theoretical or experimental problems. For elective credit only.

3210-3220. Mechanics. 3 hours each. (3;0;1)

3210. Vector treatment of the motion of a particle in one, two and three dimensions; motion of a system of particles; conservation laws; the statics of fluids and solids; the motion of rigid bodies. Prerequisite(s): PHYS 2220.

3220. Gravitation; moving coordinate systems; mechanics of continuous media; generalized coordinates and the Lagrangian and Hamiltonian formulations of mechanics; applications of tensors to rotation of rigid bodies; theory of small vibrations. Prerequisite(s): PHYS 3210.

3310. Mathematical Methods in the Physical Sciences. 3 hours. (3;0;1) Application of advanced mathematical techniques to the solution of problems in physics. Vector spaces, complex analysis, matrices, linear transformations, vector calculus, Fourier series and integrals, the Laplace transformation, and special functions. Prerequisite(s): PHYS 2220 and MATH 1720.

3420. Electronics. 4 hours. (1-3;4-6) Analog and digital electronics, applications and diagnostic techniques. Selections from direct- and alternating-current circuits, and measurements; uses of diodes, transistors, etc., as switches; applications of Boolean algebra; memory and storage devices; counters and shift registers; computer structures and bussing; servo systems and operations amplifiers; digital and analog-digital instrumentation and interfacing with computers. Prerequisite(s): PHYS 1420/1440 or 2220/2240, and MATH 1710.

4110. Statistical and Thermal Physics. 3 hours. (3;0;1) Basic probability concepts; statistical description of systems of particles; statistical thermodynamics and thermodynamic laws; macroscopic and microscopic descriptions of systems; phase transformation. Prerequisite(s): PHYS 3010/3030.

4150. Experimental Physics I. 3 hours. (1;6) Laboratory experience via use of research-quality instruments. Modern experiments in solid state, atomic and molecular physics. Topics, which may vary, include nonlinear dynamics and chaos in circuits and lasers; SQUIDS and high temperature superconductivity; holography; X-ray diffraction; and electron scanning microscopy. Prerequisite(s): PHYS 3010/3030.

4160. Experimental Physics II. 3 hours. (1;6) Experimental techniques of precision measurements in nuclear and atomic physics. Topics, which may vary, cover recent developments in modern physics suitable for advanced undergraduates and graduate students. Rutherford scattering, low energy nuclear reactions; ion-induced inner-shell ionization at MeV energies; nuclear magnetic resonance to obtain local electronic structure; magnetic transport and magneto-optics; and modern techniques in surface analysis (ion sputtering). Prerequisite(s): PHYS 3010/3030.

4210. Electricity and Magnetism. 3 hours. (3;0;1) Vector treatment of static electric and magnetic fields in free space, multipole field distributions, boundary value problems, fields in material media, and electromagnetic waves. Prerequisite(s): PHYS 2220/2240.

4220. Electromagnetic Waves. 3 hours. (3;0;1) Maxwell's equations; plane and spherical waves; reflection, refraction, guided waves, radiation and scattering. Prerequisite(s): PHYS 4210.

4310. Quantum Mechanics. 3 hours. (3;0;1) Origins of the modern theory of atomic structure; Schrodinger's formulation of non-relativistic, single-particle quantum mechanics and application to simple systems; the one-electron atom. Prerequisite(s): PHYS 3010/3030.

4350. Advanced Modern Physics I – Atomic and Molecular Physics. 3 hours. Introduction to various quantum mechanical models of atomic and molecular structure and spectra. Hydrogen atom and simple spectra; external fields, line splitting; line broadening; addition of angular momentum and spin; effective fields, variational method; Hartree and Hartree-Fock theory; structure and spectra of multielectron atoms; Rydberg atoms; molecular binding; rotational, vibrational and electronic states and spectra of diatomic molecules. Prerequisite(s): PHYS 4310.

4360. Advanced Modern Physics II – Nuclear and Particle Physics. 3 hours. Comprehensive study of nuclear structure and dynamics; survey of particle physics; properties of the nuclear force; interpretation of experimental data via specific many-body models; interaction of radiation with matter; classification of particles and nuclei; scattering theory; conservation laws and symmetry; and contemporary results. Prerequisite(s): PHYS 4350.

4420. Physical Optics. 3 hours. (3;0;1) Huygens' principle and application to geometrical optics; interference phenomena; Fraunhofer and Fresnel diffraction; polarization; electromagnetic theory of light and interaction with matter. Part of the instruction will be in a laboratory setting. Prerequisite(s): PHYS 2220/2240.

4500. Introduction to Solid-State Physics. 3 hours. An introduction to the major areas of solid-state physics, including crystal structure and symmetry, lattice vibrations and phonons, thermal properties, energy bands, semiconductors, superconductivity, and magnetic properties. Prerequisite(s): PHYS 3010.

4550. Modern Classical Dynamics. 3 hours. Introduction to nonlinear dynamical systems; onset of chaos, phase space portraits, universality of chaos, strange attractors, experimental verification, fluid dynamics and the KAM theorem. Prerequisite(s): PHYS 3220.

4600. Computer Based Physics. 3 hours. Symbolic and numerical evaluations of single-variable and multi-variable integrals with a single line of programming. Symbolic evaluation of derivatives. Symbolic manipulation of lists including vectors and matrices. Data analysis. Multidimensional plots. Symbolic derivations. Symbolic and numerical solutions to single and multiple, linear and nonlinear, differential and partial differential equations. Probability densities and Monte Carlo methods. Random walk and classical trajectory simulations. Prerequisite(s): PHYS 2220.

4610. Topics in Astronomy. 3 hours. (3;0;1) Selected topics in planetary and stellar astronomy: techniques of astronomical observation and measurement; evolution, composition and properties of our solar system and the universe; history of astronomy. Designed for students seeking secondary physical science/science teacher certification. The recitation hour for PHYS 4610 serves to cover teaching methods in astronomy, including the demonstration of measurement equipment (e.g., spectrometers, digital imaging, telescopes, etc.). Prerequisite(s): consent of department.

4630. Topics in Astronomy Laboratory. 1 hour. (0;3) Laboratory sequence for PHYS 4610. Designed for students seeking secondary physical science/science teacher certification. Emphasizes data acquisition (e.g., via astronomical observations), data analysis (e.g., of stellar spectra) for the selected topics covered in PHYS 4610, and includes an overview of how to set up the equipment for the laboratory exercises. Prerequisite(s): PHYS 4610 (may be taken concurrently).

4700. Procedures and Materials for Science Instruction. 3 hours. (2;4) Problems, techniques and procedures for classroom and laboratory experiences based on current science education research. Recommended for students who are obtaining secondary teacher certification in a science field. Field experience in the public schools is required. Prerequisite(s): 16 hours of physics, completion of freshman and sophomore science courses required for certification and consent of department. Does not count as an elective toward a major or minor in physics, except for students seeking certification. (Same as CHEM 4700 and BIOL 4700.)

4710. Foundations of Theoretical Physics. 3 hours. Overview of topics in theoretical physics. Symmetry; mechanics: Newton's laws, celestial mechanics, Hamiltonian formalism; electromagnetism: Maxwell's equations, nonlinear optics and classical field theory, quantum optics, lasers, chaotic diffraction; quantum mechanics: measurements and scattering theory; statistical physics: entropy, equilibrium statistical mechanics; and contemporary areas: fractals, chaos and nonlinear dynamics. Topics may vary. Prerequisite(s): PHYS 4210 and 4310; PHYS 4110 (may be taken concurrently).

4900-4910. Special Problems. 1–3 hours each. Must have the consent of the faculty member prior to enrollment. May be repeated for credit.

4950. Senior Thesis. 3–6 hours. (0; 9–18) Individual research on a problem chosen in consultation with a faculty member. Research may be conducted on campus, during an internship off-campus, or as an exchange student in a study abroad program. Prerequisite(s): consent of faculty member.

4951. Honors College Capstone Thesis. 3 hours. Major research project prepared by the student under the supervision of a faculty member and presented in standard thesis format. An oral defense is required of each student for successful completion of the thesis. Prerequisite(s): completion of at least 6 hours in honors courses; completion of at least 12 hours in the major department in which the thesis is prepared; approval of the department chair and the dean of the school or college in which the thesis is prepared; approval of the dean of the Honors College. May be substituted for HNRS 4000.

4960-4970. Science Institute (Physics). 1–6 hours each. For students accepted by the university as participants in special institute programs. May be repeated for credit but not to exceed a total of 6 hours in each course.

Political Science

International Studies, INST

4800. International Studies Internship. 3 hours. Students seek supervised work-related internships to any of the areas of concentration in the international studies major. The internship aims at the advancement of the student's professional field of study and career objectives. Prerequisite(s): international studies major status; junior or senior classification; minimum GPA of 3.0 and 6 upper-level hours in the student's primary area of concentration at UNT; student must meet employer's requirements and have consent of department internship supervisor. May be repeated for credit; up to 6 hours of internship may count towards the major. Pass/no pass only.

4900-4910. Special Problems. Prerequisite(s): consent of department.

4951. Honors College Capstone Thesis. 3 hours. Major research project prepared by the student under the supervision of a faculty member and presented in standard thesis format. An oral defense is required of each student for successful completion of the thesis. Prerequisite(s): completion of at least 6 hours in honors courses; completion of at least 12 hours in the major department in which the thesis is prepared; approval of the department chair and the dean of the school or college in which the thesis is prepared; approval of the dean of the Honors College. May be substituted for HNRS 4000.

Political Science, PSCI

Students are eligible to take advanced courses after 6 hours of introductory work.

Prerequisites: PSCI 1040 and 1050 are prerequisite to advanced courses in American government and politics, public law, public policy, and international relations (See Fields A, B, D and F in departmental copy). Three hours of political science are prerequisite to advanced courses in political theory and methodology and comparative government and politics (See Fields C and E in departmental copy).

1040-1050-1060. American Government. 3 hours each. *PSCI 1040 must be taken to satisfy the requirement of a course emphasizing U.S. and Texas constitutions. PSCI 1050 or PSCI 1060 fulfills the remaining 3 hours of the legislative requirement for 6 hours of government.*

1040 (GOVT 2301). American Government: Laws and Institutions. U.S. and Texas constitutions, federalism, local government, institutions, civil rights and civil liberties. *Satisfies legislative requirement of a course emphasizing U.S. and Texas constitutions.*

1050 (GOVT 2302). American Government: Process and Policies. Political parties, elections, interest groups, mass media, public opinion and public policy.

1060. American Government: Topics. Individually or team-taught courses that explore in depth a substantive aspect of American government or politics. Topics vary and may include (but are not limited to) specific contemporary public issues, institutional simulations, and politics through the arts and literature. May be repeated for credit as topics vary. May be used for duplication only when topic is the same.

1041-1051. Honors American Government. 3 hours each. *Fulfills legislative requirement of 6 hours of American government for students in the University Honors Program; 1041 satisfies the requirement of a course emphasizing U.S. and Texas constitutions.*

1041. Constitutions of the United States and Texas, federalism and political processes. Prerequisite(s): acceptance to Honors College.

1051. Organization, powers, processes and functions of national and state governments. Prerequisite(s): PSCI 1041 and acceptance to Honors College.

1085. The American Political and Economic Experience. 3 hours. Study of the organization, powers, processes and functions of institutions of national and state governments; civil liberties and civil rights; and public policy. Integrated into each political science topic are topics of macroeconomics, which are discussed in the context of American government. Includes principles of economic organization and growth in modern economies; decision-making that affects economic policy and activities, including official appointments to the Federal Reserve; economic issues, including money and banking and monetary and fiscal policy; and discussion of income and business cycles as they relate to various areas, including education, social welfare, and environmental policy. Prerequisite(s): acceptance into the Honors College. May be substituted for PSCI 1050/1051 and ECON 1110. *Fulfills 3 hours of the legislative requirement of 6 hours of American government.*