Physics

PHYS 1100 The Fun of Physics (1 semester hour) An introductory course in physics in the modern world. Focuses on the work of a physicist. What does a physicist do? What are some of the exciting topics on which physicists are working today? The faculty discusses their favorite concepts and the opportunities for student participation in research. Must be taken on a credit/no credit basis only. (1-0) Y

PHYS 1101 (PHYS 1101) College Physics Laboratory I (1 semester hour) A laboratory course to accompany PHYS 1301 and PHYS 2325. Cannot be used to satisfy degree requirements for majors in the School of Engineering and Computer Science. (0-3) Y

PHYS 1102 (PHYS 1102) College Physics Laboratory II (1 semester hour) A laboratory course to accompany PHYS 1302 and PHYS 2326. Cannot be used to satisfy degree requirements for majors in the School of Engineering and Computer Science. (0-3) Y

PHYS 1301 (PHYS 1301) College Physics I (3 semester hours) Algebra and trigonometry based basic physics. Topics include mechanics, heat and thermodynamics. Cannot be used to satisfy degree requirements for majors in the School of Engineering and Computer Science. Check with your program advisor. Prerequisite: MATH 1314. Corequisite: PHYS 2125. (3-0) Y

PHYS 1302 (PHYS 1302) College Physics II (3 semester hours) Continuation of PHYS 1301. Topics include electricity, magnetism and optics. Cannot be used to satisfy degree requirements for majors in the School of Engineering and Computer Science. Check with your program advisor. Prerequisite: PHYS 1301. Corequisite: PHYS 2126. (3-0) Y

PHYS 2125 (PHYS 2125) Physics Laboratory I (1 semester hour) Laboratory course to accompany PHYS 2325. Personal computer-based data presentation and curve fitting. Basic measurement concepts such as experimental uncertainty, mean, standard deviation, standard error, and error propagation will be covered. Corequisite: PHYS 1301 or PHYS 2325 or PHYS 2421. (0-3) Y

PHYS 2126 (PHYS 2126) Physics Laboratory II (1 semester hour) Laboratory course to accompany PHYS 2326. Experiments investigate Coulomb's Law, electric fields, Ohm's and Kirchoff's laws, RC circuits, magnetic forces between conductors, motors and transformers. Corequisite: PHYS 1302 or PHYS 2326 or PHYS 2422. (0-3) Y

PHYS 2303 Contemporary Physics (3 semester hours) Topics include the fundamentals of geometric optics, interference, diffraction, special relativity, structure of the atom, nuclear physics, radioactivity and elementary particles. (3-0) Y

PHYS 2325 (PHYS 2325) Mechanics (3 semester hours) Calculus based. Basic physics including a study of space and time, kinematics, forces, energy and momentum, conservation laws, rotational motion, torques, and harmonic oscillation. Two lectures per week. Prerequisite: MATH 2413 or MATH 2417. Corequisites: MATH 2414 or MATH 2419 and PHYS 2125. (3-0) Y

PHYS 2326 (PHYS 2326) Electromagnetism and Waves (3 semester hours) Continuation of PHYS 2325. Topics include electrostatics and electromagnetics, electric field and potential, electric currents, magnetic fields, laws of Coulomb, Ampere, and Faraday, Maxwell's theory of wave propagation. Two lectures per week. Prerequisites: PHYS 2325 and MATH 2414 or MATH 2419. Corequisite: PHYS 2126. (3-0) Y

PHYS 2421 Honors Physics I - Mechanics and Heat (4 semester hours) Calculus-based physics. This class is a more rigorous version of PHYS 2325 with additional topics in thermal physics. Derivations are more general and rely more heavily on calculus and the use of vectors. More challenging problems and applications. Two lectures plus a required recitation session per week. Prerequisite: MATH 2413 or MATH 2417 with a minimum grade of B in either course. Corequisite: MATH 2414 or MATH 2419 and PHYS 2125. (4-0) Y

PHYS 2422 Honors Physics II - Electromagnetism and Waves (4 semester hours) Calculus-based basic physics. This class is a more rigorous version of PHYS 2326. Derivations are more general and rely more heavily on multi-dimensional calculus concepts such as divergence, gradient, curl, and the theorems of Green, Stokes and Gauss. More challenging problems and applications. Two lectures plus a required recitation session per week. Prerequisites: PHYS 2325 or PHYS 2421, and MATH 2414 or MATH 2419. Corequisites: MATH 2415 and PHYS 2126. (4-0) Y

PHYS 3125 Electronics Laboratory (1 semester hour) Laboratory course to accompany PHYS 3325. Students will use common laboratory equipment to diagnose and troubleshoot breadboard circuits they build in lab. The lab exercises are closely tied to the topics covered weekly in PHYS 3325 lectures. The final lab of the semester is a design lab in which students design, build, and test a sequential logic circuit to solve a specific problem. Corequisite: PHYS 3325. (0-3) Y

PHYS 3312 Classical Mechanics (3 semester hours) Newton's laws; collisions; two body problems and trajectories; Lagrangian formulation; rotational dynamics and the inertia tensor; rotating coordinate systems; gravitation. Prerequisite: PHYS 3311 or PHYS 3411 or equivalent. (3-0) Y

PHYS 3317 Physics of the Human Body (3 semester hours) This course would be an introduction to basic biophysics of the human body. Topics include body motion and the forces which cause it, properties of the body like elasticity and how it affects things like muscles and bones, energy conservation of the body and how it affects metabolism, fluid flow and the circulatory system, waves and how they affect hearing and sight. Prerequisites: PHYS 1301 or PHYS 2325 and MATH 2413. (3-0) R

PHYS 3324 Scientific Computing (3 semester hours) Introduction to modern programming languages like C and Fortran. Applications of programming for scientific analysis, manipulation, and graphical display. (3-0) R

PHYS 3325 Electronics (3 semester hours) Topics include direct and alternating current circuits, diodes and transistors, feedback, passive and active filters, simple amplifiers, and combinatorial and sequential digital electronics. Prerequisite: PHYS 2326 or PHYS 2422. Corequisite: PHYS 3125. (3-0) Y

PHYS 3330 Numerical Methods in Physics and Computational Techniques (3 semester hours) The course covers concepts and computational techniques in numerical methods for solving physics problems. Topics typically include probability, statistics, data analysis, fits, numerical solutions, and interpretation of the experimental data. Prerequisites: MATH 2415 or MATH 2419 and MATH 2418. (3-0) Y

PHYS 3380 Astronomy (3 semester hours) An essentially descriptive course outlining the current views of the universe and the sources of data supporting those views. The solar system and its origin, stars, galaxies, pulsars, quasars, black holes, nebulae and the evolution of the universe. Opportunity to use a UT Dallas telescope is provided. Prerequisite: PHYS 2326 or PHYS 2422. (3-0) Y

PHYS 3411 Theoretical Physics (4 semester hours) Complex numbers; Vector spaces and linear operators; Line integrals; surface & volume integrals; Gradient, divergence & curl; vector integral theorems; Fourier series; Product solutions of PDEs. Co-requisite: Differential Equations (MATH 2420 or equivalent). Prerequisites: Linear

Algebra (MATH 2418 or equivalent), Calculus of Several Variables (MATH 2415) or Calculus II (MATH 2419), PHYS 2326 or PHYS 2422. (4-0) Y

PHYS 3416 Electricity and Magnetism (4 semester hours) Coulomb's and Gauss' laws; potentials, methods for solving electric field distributions near conductors; potentials due to clusters of charges; polarization of dielectric materials; electric displacement. Magnetic fields in a vacuum and in matter; time varying electric and magnetic fields; Maxwell's equations; electromagnetic waves. Prerequisite: Either PHYS 3311 or PHYS 3411 or equivalent. (4-0) Y

PHYS 4301 Quantum Mechanics I (3 semester hours) Fundamental concepts: the Stern Gerlach experiment; the Dirac formalism; kets; bras and operators; base kets and matrix representations. Measurements, observables and the uncertainty relations. Position, momentum, and translation. Wave functions in position and momentum space. Time evolution and Schrodinger's equation, Heisenberg picture. Orbital angular momentum, spin, and angular momentum addition. Applications include simple harmonic oscillator and the Hydrogen atom. Prerequisites: PHYS 3411 and MATH 2418. (3-0) Y

PHYS 4302 Quantum Mechanics II (3 semester hours) Fermions and bosons, perturbation theory, WKB approximation, scattering. Prerequisite: PHYS 4301. (3-0) T

PHYS 4311 Thermodynamics and Statistical Mechanics (3 semester hours) Study of the elements of thermodynamics, kinetic theory, and statistical mechanics; the concepts of temperature, entropy, phase transitions, transport phenomena, partition functions, statistical ensembles; the Maxwell Boltzmann, Fermi-Dirac, and Bose-Einstein distributions; and the equipartition theorem. Applications of the theories will be considered. Corequisite: PHYS 3411 (or PHYS 3311). Prerequisite: PHYS 2326 or PHYS 2422. (3-0) Y

PHYS 4324 Computer Interfacing and Data Acquisition (3 semester hours) Hardware and software techniques to utilize computers in data acquisition and control of physics experiments. Operation of digital input and output devices, analog to digital converters, digital to analog converters, and intercomputer communication. Hands-on operation of several devices. (3-0) T

PHYS 4328 Optics (3 semester hours) Topics include electromagnetic waves and radiation, the interaction of light and matter, geometric optics, polarization, interference, and diffraction. Prerequisite: PHYS 3416. (3-0) Y

PHYS 4352 Concepts of Modern Physics (3 semester hours) Quantum mechanics at an advanced undergraduate level will be applied to the discussion of applications such as lasers, semiconductors, superconductors, solid state devices, and elementary particle physics. Selection of topics may vary by semester. Prerequisite: PHYS 4302. (3-0) Y

PHYS 4371 Solid State Physics (3 semester hours) This course provides a basic but detailed picture of important concepts in solid state physics. Material covered includes crystal structure, x-ray crystallography, reciprocal space, lattice vibrations, thermal properties of solids, free electron gas, Bloch functions, metals, insulators and semiconductors. The course concludes with a description of basic semiconductor devices. Prerequisite: PHYS 3416. (3-0) Y

PHYS 4373 Physical Measurements Laboratory (3 semester hours) Experiments illustrating concepts in thermodynamics and physical properties of matter, vacuum technology, gas phase kinetics, mass spectroscopy and optical spectroscopy, basic operations in electronics, literature skills, and use of computers. Prerequisite: PHYS 3416. (0-6) Y

PHYS 4381 Space Science (3 semester hours) A survey of the structure and dynamics of the atmospheres of planets, including ionospheres and magnetospheres, as influenced by the sun's radiation and the solar wind. Topics include aurora and airglow, photochemistry and atmospheric electricity. Prerequisite: PHYS 2422 or PHYS 2326 or equivalent. (3-0) T

PHYS 4383 Plasma Physics (3 semester hours) Plasmas are the fourth state of matter, in which some or all of the neutral particles in a gas are ionized. A working knowledge of plasma physics is important in nuclear physics, semiconductor processing, space science, astronomy, and many other areas. This course will examine the fundamental treatment of plasmas as embodied in the fluid equations, magneto-hydrodynamics, and simple kinetic theory. Specific topics include plasma waves and instabilities, diffusion, guiding center motion and drifts, currents in plasmas, and particle collisions. Prerequisite: PHYS 3311 or PHYS 3411. Prerequisite or corequisite: PHYS 3416. (3-0) R

PHYS 4386 Elementary Particle Physics (3 semester hours) The course will cover current knowledge and understanding of elementary particle physics, the kinematics of productions and decays of particles, the Quark Model and the Standard Model, particle compositions, and the principles of modern particle detectors. Prerequisites: PHYS 4301 and PHYS 4311. (3-0) T

PHYS 4390 Senior Research and Advanced Writing (3 semester hours) Individual instruction course designed to develop skills for research and clear, precise and accurate scientific writing. Research may be either scientific experimentation or critical analysis of scientific literature. Topics will vary from section to section depending upon the interests of the student, but will be selected from a specific area of physics. Satisfies the Advanced writing requirement. (3-0) S

PHYS 4395 Cosmology (3 semester hours) The course is a simplified overview of contemporary cosmology including: cosmological principle; scale of distance and expansion law of the universe; redshift; Friedmann equations and cosmological models of the universe; cosmological probes and techniques; baryonic matter; dark matter; dark energy and cosmic acceleration. Prerequisites: PHYS 3311 or PHYS 3411 or ENGR 3300 or MATH 2420 and MATH 2415. (3-0) T

PHYS 4399 Senior Honors Research in Physics (3 semester hours) Individual instruction course designed to develop skills for research and clear, precise and accurate scientific writing. Research may be either scientific experimentation or critical analysis of scientific literature. Topics will vary from section to section depending on the interests of the student, but will be selected from a specific area of physics. Satisfies the Advanced writing requirement. Topics may vary. (3-0) S

PHYS 4v07 Senior Research Projects (1-6 semester hours) Intended as an introduction to research, this course involves independent research activities under the guidance of a faculty member on advanced topics in physics. May be repeated for credit (9 hours maximum). Prerequisite: Instructor consent required. ([1-6]-0) R

PHYS 4v10 Special Topics in Physics (1-9 semester hours) Subject matter will vary from semester to semester. May be repeated for credit as topics vary (9 hours maximum). Prerequisite: Instructor consent required. ([1-9]-0) S

PHYS 1301

PHYS 1302

PHYS 3341

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