NASA spacecraft. Students look at cataclysmic variable stars, search for black holes, scan probe microscopies, examine the biophysics of self-assembled biomolecules, and learn physics pedagogy.

Under the direction of the graduate adviser and the graduate faculty, a coherent program, directed toward the student's goal in graduate study and designed within the framework outlined in the copy that follows, is prepared and submitted to the department. There is a standard core of classical mechanics (PHYS 203), classical electrodynamics (PHYS 220A, B) and quantum mechanics (PHYS 222A, B) which is strongly recommended for students planning to pursue further graduate study — and, at least in part, for all students. Other courses, both from within and from outside the department, can be used to complete the 30 unit master's program. A culminating experience, consisting of either a project (PHYS 298) plus a competency examination or a thesis (PHYS 299), is required.

Undergraduate education equivalent to a physics major at California State University, Fresno is necessary for admission. Note the other requirements under *Graduate Program.*

	Units
Physics graduate courses	**21**
PHYS 298 or 299 (minimum)	(3)
Additional graduate courses in physics	(18)
Students planning further graduate study should include PHYS 203, 220A-B, 222A, and 222B.	
Upper-division or graduate electives in physics or related fields	**9**
Total	**30**

COURSES
Physics (PHYS)

2A. General Physics (4)
Prerequisite: completion of General Education Quantitative Reasoning requirement. Topics and concepts in Newtonian mechanics of point particles and rigid bodies, energy, properties of fluids, heat and thermodynamics, waves and sound. G.E. Breadth B1. (3 lecture, 3 lab hours) (CAN PHYS 2)

2B. General Physics (4)
Prerequisite: PHYS 2A. Topics and concepts in light, electricity, magnetism, atomic structure, relativity, quantum nature of light and matter, nuclear structure and radiation. (3 lecture, 3 lab hours) (CAN PHYS 4)

4A. Mechanics and Wave Motion (3)
Prerequisite: MATH 76 (may be taken concurrently). Topics in classical Newtonian mechanics including linear and circular motion; energy; linear and angular momentum; systems of particles; rigid body motion; wave motion and sound. G.E. Breadth B1 when taken with PHYS 4AL.

4AL. Laboratory in Mechanics and Wave Motion (1)
Corequisite: PHYS 4A. Introduction to laboratory methods. Experiments in mechanics, waves, and sound. G.E. Breadth B1. (3 lab hours)

4B. Electricity, Magnetism, and Heat (3)
Prerequisites: PHYS 4A; MATH 77 (may be taken concurrently). Topics in classical physics including heat and thermodynamics, electrostatics, electric fields and potential, currents and AC and DC electric circuits, magnetic fields, electromagnetic induction.

4BL. Laboratory in Electricity, Magnetism, and Heat (1)
Corequisite: PHYS 4B. Experiments in electricity, magnetism, heat, and thermodynamics. (3 lab hours)

4C. Light and Modern Physics (3)
Prerequisites: PHYS 4B; MATH 77. Maxwell's Equations, geometrical optics; electromagnetic radiation; physical optics; introduction to special relativity; quantum physics; and the physics of atoms, nuclei, and the solid state.

10. Conceptual Physics (4)
Prerequisite: MATH 45 (may be taken concurrently). Basic ideas of physics and their relationship to the everyday environment. Physical phenomena, misconceptions, terminology, scientific method, and metric system. Memorable demonstrations in lectures; household-related experiments in the lab. G.E. Breadth B1. (3 lecture, 2 lab hours)

90. Directed Study (1-2; max total 3)
Prerequisite: any university-level physics course. Individually arranged course of study in some limited area of physics, either to remove a deficiency or to investigate in more depth. (1-2 hours to be arranged)

100. Concepts of Modern Physics (3)
Prerequisite: General Education Quantitative Reasoning and Area B Breadth requirements. Conceptual development of relativity and quantum theory. Demonstration of abstract concepts with mechanical analogues; visualization with diagrams. G.E. Integration IB. (3 lecture hours)

102. Modern Physics (3)
Prerequisite: PHYS 4C. Fundamental concepts of atomic and nuclear structure, transitions and radiation. Includes discussions of relativistic mechanics, quantum mechanics, solid state physics. Special topics as they pertain to modern developments in physics, engineering, and chemistry.

104. Experimental Techniques in Condensed Matter Physics (4)
Prerequisite: PHYS 4C. Shop techniques and safety instructions. Basic concepts in condensed matter physics. Measurements of conductivity, energy gap in semiconductors, drift mobility, Hall coefficients, photoconductivity, magnetic susceptibilities, exciton spectra, dielectric loss. Experience in X-ray diffraction, vacuum technology, thin-film deposition, and low temperature techniques. (1 lecture, 9 lab hours)

105A-B. Analytical Mechanics (3-3)
Prerequisite: PHYS 4C. (A) Analytical and vector treatment of the fundamental principles of statics, kinematics, and dynamics. (B) Advanced dynamics; harmonic motion, central force fields, and Lagrange's equations.