

## PHYSICS (PHYS)

### Courses

#### **PHYS 5125. Mathematical Physics. 3 Credits.**

Introduction to basic mathematical methods of theoretical physics; vector and tensor analysis, partial differential equations, orthogonal functions, complex variables and variational techniques. Prerequisites: Graduate student or undergraduate student with Instructor permission; knowledge of PHYS 2200 and PHYS 4300 topics strongly recommended.

#### **PHYS 5185. Nano-analysis of Materials. 1 Credit.**

Explores the theory and practical operation of advanced techniques to analyze the structure, composition, and surfaces of micro and nano-scale materials. Students will be trained as users of a Field Emission Scanning Electron Microscope (FESEM) including x-ray elemental analysis. Credit will not be given for both PHYS 3175 and PHYS 5185. Prerequisite: Graduate student.

#### **PHYS 5200. Advanced Dynamics. 3 Credits.**

Classical mechanics presented as the basis of the concepts and methods of modern physics. Variational, Lagrangian, and Hamiltonian formulations, canonical transformations, continuous systems. Prerequisite: Graduate student or undergraduate student with Instructor permission; knowledge PHYS 2200 topics strongly recommended.

#### **PHYS 5300. Electromagnetic Theory. 3 Credits.**

Development of Maxwell's theory of electromagnetism emphasizing its physical basis and the modes of mathematical description. Prerequisite: Graduate student or undergraduate student with Instructor permission; knowledge of PHYS 4300 topics strongly recommended.

#### **PHYS 5400. Statistical Mechanics. 3 Credits.**

Following a review of thermodynamics, covers the fundamentals of classical and quantum statistical mechanics including ensembles, identical particles, Bose and Fermi statistics, phase-transitions and critical phenomena, renormalization group, irreversible processes and fluctuations. Prerequisite: Graduate student or undergraduate student with Instructor permission; knowledge of PHYS 3400 topics strongly recommended.

#### **PHYS 5500. Quantum Mechanics II. 3 Credits.**

Mathematical and physical foundations of nonrelativistic quantum mechanics from the unifying point of view of Dirac. Symmetry operations and the algebraic structure of quantum mechanics are emphasized. Prerequisite: Graduate student or undergraduate student with Instructor permission; knowledge of PHYS 3400 topics strongly recommended.

#### **PHYS 5675. Gr Semiconductor Materials/Dev. 0 or 4 Credits.**

Covers Energy band theory, effective mass, band structure and electronic properties of semiconductors. Transport of electrons and holes in bulk materials and across interfaces. MOSFETs, BJTs, pn junctions, and Schottky barriers. Experimental portion of course will have a laboratory component for electronic measurements of Prerequisite: Electrical Engineering Graduate student, Materials Science Graduate student, or Instructor permission. Cross-listed with: EE 5440.

#### **PHYS 5990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles. Prerequisites: Department permission, Graduate student.

#### **PHYS 6000. Teaching of College Physics. 1 Credit.**

Instructional strategies and techniques with application to the teaching of laboratories and recitations. Prerequisites: Undergraduate degree in Physics; Instructor permission.

#### **PHYS 6391. Master's Thesis Research. 1-18 Credits.**

Research for the Master's Thesis.

#### **PHYS 6700. Biological Physics II. 3 Credits.**

Physical principles of biological systems including advanced techniques in macromolecular structure (experimental and computational), molecular solvation and hydration models, thermostatics, two-state models and cooperativity, elasticity and mechanics of soft tissues, chemical equilibria and reaction kinetics including enzymes. Prerequisites: Graduate student, knowledge of PHYS 1650 and MATH 2248 topics strongly recommended.

#### **PHYS 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

#### **PHYS 6991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

#### **PHYS 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

#### **PHYS 6994. Teaching Assistantship. 1-3 Credits.**

Student service as a teaching assistant, usually in an introductory level course in the discipline, for which credit is awarded. Offered at department discretion.

#### **PHYS 6995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

#### **PHYS 7491. Doctoral Dissertation Research. 1-18 Credits.**

Research for the Doctoral Dissertation.

#### **PHYS 7990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**PHYS 7991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

**PHYS 7993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.