DEPARTMENT OF PHYSICS
COLLEGE OF ARTS AND SCIENCES

Faculty

William Nettles (2006). University Professor of Physics, Department Chair, and Associate Dean of the College of Arts and Sciences. B.S., Mississippi College; M.S., and Ph.D., Vanderbilt University.

Ildefonso Guilaran (2008). Professor of Physics. B.S., Western Kentucky University; M.S. and Ph.D., Florida State University.

Geoffrey Poore (2010). Associate Professor of Physics. B.A., Wheaton College; M.S. and Ph.D., University of Illinois.

David A. Ward (1992, 1999). Professor of Physics, B.S. and M.A., University of South Florida; Ph.D., North Carolina State University.

Staff

Christine Rowland (2006). Academic Secretary–Engineering, Physics, Math, and Computer Science.

Curriculum

The programs offered by the Department of Physics are designed to help students understand the physical world by examining the laws which describe the interactions throughout the universe, the methods by which the cosmos can be studied, and the relationship of physics to other aspects of human experience. The department offers courses that effectively serve all students within the institution, recognizing that each student's needs and career goals may be different. The curriculum is designed to provide content of the appropriate level and diversity for students classified as physics majors/minors, non-science majors, engineers, pre-professionals, and those preparing for a teaching career in secondary school. The faculty endeavor to create an atmosphere in which students are challenged to acquire problem-solving skills using advanced mathematics and modern methods in science. Students are encouraged to develop in-depth analytical skills and an attitude of scientific curiosity while maintaining a Christian worldview. In summary, the physics curriculum provides liberal arts students with a working knowledge of science and meets the career needs of students who wish to:

- pursue a teaching career in elementary or secondary school;
- enter engineering, one of the health professions, or an allied health field;
- become a professional/industrial physicist; or
- continue study of physics or a related field at the graduate level.

I. Major in Physics–38 hours
   A. Physics 231-232, 311, 313, 314, 420, 424(1-3 hours), 430, 498–28–30 hours
   B. Select three or more courses: PHY 262, 325, 350, 360, 395-6-7*; 400, 410, 417, 425 (1-2 hours**), 495*
   C. Prerequisites: MAT 211, 212, 213, 314
   *Must be approved Special/Independent Studies
   **Maximum 3 hours from 424 and 425 apply to major.

II. Major in Physical Science–44 hours
   A. CHE 111, 112, 113, 211, 221–15 hours
   B. PHY 112, 231-32, 311, 310 or 301–22 hours
   C. Upper-level Electives from CHE and PHY–7 hours; maximum 1 hour from 424 and 1 from 498.

III. Major in Physics with Discipline-Specific Honors

Students who are pursuing a major in physics have the option of completing an honors program in the discipline. Students who are interested in this Honors program should refer to the general requirements for Discipline-Specific Honors (DSH) as well as the requirements for the program in physics below:

- To apply for admission to the Physics DSH program

  - The remaining nine credit hours of upper-division honors contract must be above PHY 311 and have a minimum prerequisite of PHY 232.
  - Honors contract work will consist of writing a review article on a relevant topic, preparing and giving one or more presentations on relevant topics, completing additional homework of a particularly advanced and challenging nature, designing a physical or computational experiment for a course that does not include a lab component, or a similarly demanding project approved by the department.
  - PHY 498 (Seminar) may be taken for 3 hours of honors contact. Only honors students may take this course for more than 1 credit hour.
- Physics DSH students must attend at least four regularly scheduled honors colloquia during each of the student's junior and senior years. Students who are only in Physics DSH for three semesters must attend two colloquia per semester for an overall total of at least six colloquia. Within one week of attending a colloquium, the student will submit a short written summary and reflection paper to the student's honors advisor.
- A grade of C or below in any honors contract course will result in a student's re-evaluation by the department. In the absence of extenuating circumstances, the department will typically dismiss the student from the program. If a student receives more than one B for honors contract classes, the department will assess whether the student should be allowed to continue the program.
- To graduate with Discipline-Specific Honors in Physics, the student must have both a 3.5 cumulative GPA and a 3.5 Physics GPA.

IV.

Course Offerings in Physics (PHY)

( ) Hours Credit; F-Fall; W-Winter; S-Spring; Su-Summer

111. Principles of the Physical Sciences (4) F, W, S
Introduction to physics and chemistry for non-science majors including their historical, philosophical, and social significance. Exercises are indicative of various scientific methods. Knowledge of basic algebra is assumed. Science credit will not be given after completion of a course in CHE or a PHY course numbered 200 or higher. Three lectures, one 2-hour laboratory/week.

112. Earth and Space Science (4) F, W, Su–As Needed
Reciprocal credit: GEO 112.
Earth science and astronomy: their nature, history, divisions, and relation to other sciences. The physical laws of nature will be examined as they apply to physical geography, meteorology, and astronomy. Three lectures, one 2-hour laboratory/week.

213-4. Introduction to Physics (4) 213—F, Su; 214—S, Su
Prerequisites: MAT 111 and 112, or 116.
The first semester involves the study of classical mechanics, wave motion, fluid flow, sound, temperature, and heat. The second involves the study of electricity, magnetism, light, optics, and modern physics. Cannot be used as a PHY Elective toward majors/minors. Three lectures, one 3-hour laboratory/week.

231-2. University Physics I, II with Calculus (5) 231—F, S; 232—F, S
Prerequisite to 231: MAT 211. Pre- or corequisite to 232: MAT 212.
The first semester involves the study of classical mechanics, wave motion, fluid flow and sound. The second involves the study of temperature and heat, electricity, magnetism, light and optics. Four lectures, one laboratory/week.

262. Electrical and Electronic Circuits (4)
Prerequisite: PHY 232 and MAT 212. Reciprocal credit: EGR 262. See EGR 262 for course description.

301. Perspectives in Science (4)
Prerequisites: PHY 111-2. Reciprocal credit: CHE 301.
The study of science from a historical and philosophical perspective in an interdisciplinary manner, exploring the complementarity of physical and biological sciences, while addressing relationships to other disciplines such as art, religion, and politics. Examines the role of science in global issues and life issues. Three lecture, 2 lab hours/week.

310. Energy, Environment, and Society (4)
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410. Nuclear Physics (3)
Prerequisites: MAT 213 and PHY 311.
A study of the atomic nucleus, including its constituents, interactions and energies. Radiative processes, angular momentum, and practical applications such as astrophysics, medical physics, energy production, and environmental physics.

417. Introduction to Condensed Matter Physics (3)
Prerequisite: PHY 311.
An introduction to properties of various phases of matter from the macroscopic scale down to the atomic. The topics covered in this course will include crystal structure, the reciprocal lattice, structural analysis techniques (wave diffraction), the historical progression and theories of various models of electrical conduction, energy bands, semiconductors, metals, and Fermi surfaces.

420. Quantum Mechanics (3)
Prerequisites: PHY 311 and MAT 314.
Fundamental principles of quantum mechanics, methods of calculation, and solutions to Schrodinger's equation. Applications to atomic, molecular, and nuclear physics with an introduction to operator notation. Three lecture hours/week.

424-425. Physics Research (1-3) F, S
Prerequisite: PHY 311.
Application of a simple piece of original work to include a literature search and summary paper on a topic of current interest in phw(es)0pnder -0.8 ( )5.4 (aceultysumer)-14.1 (evsitn, a ƀDC pı