APPLIED PHYSICS

Academic Year

2014-2015

School

School of Science, Engineering and Technology School Web site

School Dean

Winston F. Erevelles, Ph.D. werevelles@stmarytx.edu

Department

Physics and Earth Sciences

Department Chair

Richard Cardenas, Ph.D. rcardenas@stmarytx.edu

Description of Program/Major

The applied physics degree has an option in computer science or electrical engineering. Applied physics is a Bachelor of Science degree plan that provides an instructional base in physics, engineering, mathematics and computer applications. It prepares students to enter today's high technology marketplace upon graduation. Along with technical courses, students in the program benefit from liberal arts courses in English, social science, philosophy, theology, speech, foreign language and fine arts.

Degree Requirements

Core Curriculum (SMC)

St. Mary's University Core (30 Hours)
All St. Mary's Core SMC13## "Reflection" courses must be completed before registering for SMC23## "Practice" courses. "Reflection" courses can be taken in any order followed by "Practice" courses in any order.

SMC 1301	Foundations of Civilization	3
SMC 1311	Foundations of Reflection: Self	3
SMC 1312	Foundations of Reflection: Nature	3
SMC 1313	Foundations of Reflection: Others	3
SMC 1314	Foundations of Reflection: God	3
SMC 2301	Foundations of Practice: Ethics	3
SMC 2302	Foundations of Practice: Civic Engagement and Social Action	3
SMC 2303	Foundations of Practice: Fine Arts and Creative Process	3
SMC 2304	Foundations of Practice: Literature	3
SMC 4301	Capstone Seminar: Prospects for Community and Civilization	3

School Specific Core (SSC)

School of Science, Engineering, and Technology Specific Core (21 Hours)

Speech	SE 1321 (for international students), SE 1341, SE 2333, SE 3391	3
Composition and Rhetoric (grade of "C" or better)	EN 1311, EN 1313 (for international students)	3
Foreign Languages	Six hours at the sophomore level (2311, 2312) in a Foreign Language previously studied for a minimum of one year; Or, 6 hours of introductory level (1311, 1312) in a Foreign Language not previously studied; Or, 12 hours of CLEP credit for a language previously studied.	6
Social Science	BA 1310, BA 3325, CJ 2300, CJ 3300, EC 2301, EC 2303, PO 1311, PO 1312, PO 1314, PS 1301, PS 3386, SC/CR 1311, SC 3321, HU 3300, HU 3303	3
Theology	Advanced Theology 33XX	3
Fine Arts	AR, DM, MU or Literature: EN 2321, 2322, 2353, 2354, 2355, 2356	3

Four Year Degree Plan

Sample Degree Plan, Applied Physics, Computer Science Option (BS)
Sample Degree Plan, Applied Physics, Engineering Option (BS)

Department Courses and Descriptions

PY 1300
Physics Concepts & Application (3)
Designed to convey the considerable bearing physical laws have on common experience. Applications in trades, professions and industry are provided. Directed to ward non-science majors to help them evaluate the evidence of their own experience and see the pervasiveness of physics in virtually every aspect of technological society. Topics: Motion, Gravity, Relativity, Energy and Power, Energy Resources, Waves, Sound and Electricity.

PY 1310
Modern Astronomy (3)
A course that will be of interest to students not majoring in science, engineering or mathematics as well as those majoring in these fields. This course deals mainly with stellar and galactic astronomy but begins with a brief survey of our solar system including orbits and Kepler's laws. The emphasis is placed upon how compositions, ages and evolution are deduced. The course will be somewhat quantitative but the mathematical requirements are minimal.

PY 1401
General Physics I (4)
First semester: mechanics, sound and heat. Second semester: electricity, light, atomic and nuclear physics. Intended for non-physics and non-engineering students. (Lecture 3 hours; Lab 4 hours.) (PHYS 1401)

PY 1402
General Physics II (4)
First semester: mechanics, sound and heat. Second semester: electricity, light, atomic and nuclear physics. Intended for non-physics and non-engineering students. (Lecture 3 hours; Lab 4 hours.) (PHYS 1402)

PY 1404
University Physics I (4)
Calculus based physics. (Lecture 3 hours; Lab 4 hours.) Co-requisite MT 2412 (PHYS 2425)

PY 2404
University Physics II (4)
Calculus based physics. (Lecture 3 hours; Lab 4 hours.) Prerequisites PY1404, MT 2412 (PHYS 2426)

PY 3101
Atomic Physics Lab (1)
(Lab 4 hours per week; usually concurrent with PY 3301.)

PY 3102
Nuclear Physics Lab (1)
(Lab 4 hours per week; usually concurrent with PY 3302.)

PY 3113
Electronics Lab I (1)
Same as EG 3156

PY 3114
Electronics Laboratory II (1)
Same as EG 3157

PY 3125
Special Topics Laboratory (1)

PY 3301
Atomic Physics (3)
Special relativity, electrons and quanta, Quantum Theory, SchrÃ¶dinger's Equation, x-rays -spectra. Note: PY 1404 and PY 2404 are prerequisites and MT 3311 is a co-requisite for 3000 level physics courses.

PY 3302
Nuclear Physics (3)
Radio activity, Rutherford scattering, nuclear atom, radiation detectors, nuclear reaction, alpha decay, beta decay, gamma radiation, nuclear models, accelerators. Prerequisite: PY 3301. Note: PY 1404 and PY 2404 are prerequisites and MT 3311 is a co-requisite for 3000 level physics courses.

PY 3304
Thermodynamics (3)
States and processes, equations of state, internal energy, enthalpy, the ideal gas, incompressible substances, entropy and the second law, second law analysis, thermodynamics relationships, engineering applications. Note: PY 1404 and PY 2404 are prerequisites and MT 3311 is a co-requisite for 3000 level physics courses.

PY 3305
Physical Optics (3)
Wave theory, interference, diffraction, polarization, spectroscopy, and photometry. Note: PY 1404 and PY 2404 are prerequisites and MT 3311 is a co-requisite for 3000 level physics courses.

PY 3307
Mechanics (3)
Vector approach to Newtonian mechanics. Static and Kinetics. Introduction to the Lagrangian and Hamiltonian approach. Note: PY 1404 and PY 2404 are prerequisites and MT 3311 is a co-requisite for 3000 level physics courses.

PY 3308
Quantum Mechanics (3)
Schrodinger wave equation, stationary state solutions, the hydrogen atom, angular momentum, perturbation theory. Note: PY 1404 and PY 2404 are prerequisites and MT 3311 is a co-requisite for 3000 level physics courses.

PY 3309
Electromagnetics (3)
Vector analysis, electrostatics, dielectrics, magnetostatics, Maxwellâ€™s equation, wave propagation, radiation. Note: PY 1404 and PY 2404 are prerequisites and MT 3311 is a co-requisite for 3000 level physics courses.

PY 3313
Electronics (3)
Theory of semiconductors; discrete devices and integrated circuits; linear and digital operation. (EG 2341, EG 2152, EG 2352, EG 2353 are prerequisites.) Note: PY 1404 and PY 2404 are prerequisites and MT 3311 is a co-requisite for 3000 level physics courses. (same as EG3356)

PY 3314
Electronics (3)
Theory of semiconductors; discrete devices and integrated circuits; linear and digital operation. (EG 2341, EG 2152, EG 2352, EG 2353 are prerequisites.) Note: PY 1404 and PY 2404 are prerequisites and MT 3311 is a co-requisite for 3000 level physics courses. (same as EG3357)

PY 3325
Special Topics (3)
This course is used to introduce special topics of interest. Topics in past have included the following: Particle Physics, Biophysics, Functional Neuro imaging, Fiesta of Physics Outreach, Advanced Electromagnetic theory and Advanced Quantum Mechanics. Note: PY 1404 and PY 2404 are prerequisites and MT 3311 is a co-requisite for 3000 level physics courses.

Department Faculty

Applied Physics Faculty Website

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