Department of Physics and Astronomy

www.wku.edu/physics
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Degree(s)

Minor(s)

Faculty
Professor
Michael T. Carini, PhD (Astrophysics), Georgia State University, 1990
A. G. Emslie, PhD (Astronomy), University of Glasgow, 1979
Richard F. Gelderman, PhD (Astronomy), University of Virginia, 1994
Vladimir Dobrokhotov, PhD (Physics), University of Idaho, 2006
Sanju Gupta, PhD (Physics – Chemistry), University of Puerto Rico Rio Piedras, 2003
Edward Kintzel, PhD (Physics), Florida State University, 2002
Ivan S. Novikov, PhD (Mathematics, Physics), St. Petersburg State U-Russia, 2000

Associate Professor
Vladimir Dobrokhotov, PhD (Physics), University of Idaho, 2006

Astronomy Courses

ASTR 405G Astronomy for Teachers 3 Hours
Selected topics in astronomy for elementary and secondary teachers.

Physics Courses

PHYS 404G Laboratory Optics 1 Hour
The conclusions and concepts of optics and techniques of experimental optics.
Corequisite(s): PHYS 441G.

PHYS 409G Laboratory Exper Physics/Research Tech 1 Hour
Laboratory techniques in experimental research, includes drawing and fabrication of apparatus, technical photography, and statistical treatment of data.
Prerequisite(s): Two years of college physics.

PHYS 410G Physics for Teachers 3 Hours
A broad study, including laboratory experiences, of the areas of physics relevant to science teaching in grades K-12. For pre-service for in-service teachers who have a minimal physics background. Instruction will be differentiated according to student needs. Applicable toward a major or minor in physics only for those students obtaining teacher certification.

PHYS 431G Radiation Biophysics 4 Hours
The properties of the various forms of radiation and their interactions with, and effects on, living matter. Laboratory offers training in monitoring ionizing radiations and techniques of radioactive isotopes.
Prerequisite(s): PHYS 201-PHY 202 or PHYS 231-PHY 232.
Grade Mode: Non-graded

PHYS 440G Electromagnetism I 3 Hours
Introduction to the study of classical electromagnetic fields, including electrostatics.

PHYS 441G Optics 3 Hours
Geometrical and physical optics including wave propagation, refraction, dispersion, diffraction, and polarization.
Corequisite(s): PHYS 404G.

PHYS 445G Electromagnetism II 3 Hours
Study of classical electrodynamics with emphasis on Maxwell's equations, electromagnetic waves, dispersion and radiation.

PHYS 450G Classical Mechanics II 3 Hours
A continuation of PHYS 350. Includes motion in central potentials, dynamics of systems of particles, rigid body motion.

PHYS 465G Geophysics 3 Hours
General and exploration geophysics. Topics include the origin of the earth and the solar system, the earth's interior, gravity and isostasy, seismology, upper atmosphere, continents and ocean basins, etc.
Equivalent(s): GEOL 465G.

PHYS 475G Modern Develop/Physics 1-3 Hours (repeatable max of 6 hrs)
Directed study under the supervision of a faculty member.

PHYS 480G Quantum Mechanics 3 Hours
Fundamental principles of quantum mechanics including the hydrogen and helium atoms, the harmonic oscillator, and the Schroedinger wave equation.
Prerequisite(s): PHYS 320, PHYS 350, PHYS 450.

PHYS 501 Classical Dev in Physics 3 Hours
Physics for junior high and high school teachers covers the discovery of physical laws, the origin of forces, motion, energy, momentum, conservation, principles, wave phenomena, and electromagnetics.

PHYS 502 Modern Develop/Physics 3 Hours
Physics for junior high and high school teachers. Covers atomic structure, the nucleus, elementary particles, probability and uncertainty, and special relativity. Emphasizes the impact of twentieth century discoveries on the foundations of physical law.

PHYS 503 Physics Demonstration 3 Hours
Designed to acquaint the junior high and high school teacher with laboratory equipment and demonstrations for use in secondary education.

PHYS 505 Investigations/Physics 3 Hours
Topics of individual interest relating to the teaching of physics.

PHYS 506 Overview of Homeland Security 1 Hour
Special requirements: Instructor permission required if not enrolled into graduate program in Homeland Security Sciences. A weekly seminar course available as an in-class group discussion, a real-time webcast, or a downloadable PEG file from the departmental website. Seminar speakers from Department of Homeland Security, businesses, and other recognized national and international experts, will provide an overview of the Homeland Security area. To be taken during the first semester of matriculation.

PHYS 510 Methods in Math Physics 3 Hours
No course description is available

PHYS 511 Quantitative Modeling for Physics Instruction I: Mechanics 3 Hours
An in-depth study of topics in physics typically taught at the high school level. Emphasizes both the content of physics as well as the process of effectively communicating the content to secondary students. Topics include kinematics, Newton’s laws of motion, energy, momentum and other topics in mechanics.
Prerequisite(s): One year of math-based physics at the college level.
PHYS 512  Quantitative Modeling for Physics Instruction II: Electromagnetism  3 Hours
An in-depth study of topics in physics typically taught at the high school level. Emphasizes both the content of physics as well as the process of effectively communicating the content to secondary students. Topics include electric and magnetic fields, and circuits.
Prerequisite(s): One year of math-based physics at the college level.

PHYS 516  Classroom Physics Teaching: Theory and Practice  3 Hours
Designed to assist new physics instructors in teaching physics. Includes constructing and using laboratory equipment, implementing research-based curriculum, and assessments in physics.
Prerequisite(s): PHYS 511 or PHYS 512; must be instructor in a physical science course as verified by a letter from the school principal or equivalent.

PHYS 518  Classroom Applications of Physics and Science Education Research  3 Hours (repeatable max of 6 hrs)
Help instructors to make practical connections between discipline-based science education research in physics and other areas with their own classroom teach. Students will read original research, document examples in classroom, and evaluate and modify curricular materials.
Prerequisite(s): PHYS 511 or PHYS 512; must be instructor in a physical science course as verified by a letter from the school principal or equivalent.

PHYS 519  Physical Science Education Research Methods  3 Hours
Equips physics and physical science instructors to design and carry out practical educational research projects with the goal of improving instruction. Covers research methodologies in physics and other discipline-based science education research (DBSER), designing and carrying out research projects with the goal of informing classroom instruction.
Prerequisite(s): PHYS 518.

PHYS 520  Atomic and Molecular  3 Hours
No course description is available

PHYS 530  Statistical Physics  3 Hours
No course description is available

PHYS 540  Electromagnetic Theory  3 Hours
No course description is available

PHYS 550  Classical Mechanics  3 Hours
No course description is available

PHYS 560  Introduction to Physics Applications in Homeland Security  3 Hours
A preparatory course in Homeland Security Science for students with limited physics background. An overview of physics applicable to Homeland Security Sciences. Topics include atomic and nuclear physics, optics and analytical techniques.

PHYS 570  Nuclear / Radiological Detection and Remediation  3 Hours
An advanced study of the fundamental principles of nuclear physics and their applications for detection and remediation of nuclear and radiological threats.
Corequisite(s): PHYS 571.
Prerequisite(s): PHYS 560.

PHYS 571  Nuclear / Radiological Detection and Remediation Laboratory  1 Hour
Required for students enrolled in PHYS 570 (Nuclear/Radiological Detection and Remediation). Students perform laboratory experiments in applications of nuclear physics for detection and remediation of nuclear and radiological threats. Students will gain experience in computerized data acquisition and data analysis using modern techniques and equipment.
Corequisite(s): PHYS 570.
Prerequisite(s): PHYS 560.

PHYS 580  Quantum Theory  3 Hours
No course description is available

PHYS 590  Physical Principles of CBE Detection and Remediation  3 Hours
The course explores physical principles behind chemical agent, biological agent and explosives detection and remediation, and examines current detection techniques and systems deployed.
Corequisite(s): PHYS 591.
Prerequisite(s): PHYS 570 or equivalent.

PHYS 591  Physics CBE Detection and Remediation Laboratory  1 Hour
Explores physical principles behind chemical agent, biological agent and explosives detection and remediation. Examines current detection techniques and systems deployed.
Corequisite(s): PHYS 590.
Prerequisite(s): PHYS 570 or equivalent.

PHYS 598  Graduate Seminar  0.5 Hours
No course description is available

PHYS 599  Thesis Research / Writing  1-6 Hours (repeatable max of 6 hrs)
Thesis research/writing.
Corequisite(s): PHYS 570 or equivalent.
Prerequisite(s): PHYS 570 or equivalent.

PHYS 600  Maintain Matriculation  1-6 Hours (repeatable max of 6 hrs)
Continued enrollment for thesis completion.
Grade Mode: Non-graded

PHYS 660  Theory of Solids  3 Hours
No course description is available

PHYS 670  Theoretical Nuclear Physics  3 Hours
No course description is available

PHYS 675  Advanced Topics in Physics  1-3 Hours
No course description is available