

Physics (PHYS)

Courses

PHYS A101 Physics of Sports 3 Credits

Introduces liberal arts students to the theory, methods and techniques of physics, the most basic of the sciences, using the theme of sports.

Provides broad exposure to many aspects of physics, including mechanics, friction and fluid flow, and how they apply to hockey, basketball, soccer, skiing, track and field, football, and other sports.

Attributes: UAA Natural Sciences GER.

PHYS A115 Physical Science 3 Credits

Exposes students to basic concepts in physics. Presents general knowledge of science rather than an in-depth study of any one field.

Registration Restrictions: Placement into MATH A105 or higher.

PHYS A115L Physical Science Lab 1 Credit

Exposes students to basic concepts in physics labs. Presents general knowledge of science rather than an in-depth study of any one field.

Prerequisites: PHYS A115 with a minimum grade of D or concurrent enrollment.

PHYS A123 College Physics I 3 Credits

Algebra-based introduction to classical physics, including: kinematics, Newton's Laws, momentum, work, energy, gravity, rotational motion, fluids, heat, temperature, and laws of thermodynamics.

Special Note: PHYS A123L is a separate laboratory course.

Prerequisites: MATH A105 with a minimum grade of C or MATH A151 with a minimum grade of C or MATH A152 with a minimum grade of C or MATH A251 with a minimum grade of C or MATH A251F with a minimum grade of C or ALEKS Overall Test 1 with a score of 055 or ALEKS Overall Test 2 with a score of 055 or ALEKS Overall Test 3 with a score of 055 or ALEKS Overall Test 4 with a score of 055 or ALEKS Overall Test 5 with a score of 055.

Attributes: UAA Natural Sciences GER.

PHYS A123L College Physics I Laboratory 1 Credit

Introductory physics laboratory with experiments in mechanics, fluids and thermodynamics.

Prerequisites: PHYS A123 with a minimum grade of C or concurrent enrollment.

Attributes: UAA Natural Sci Lab Only GER.

PHYS A124 College Physics II 3 Credits

Algebra-based introduction to classical physics, including: Coulomb's law, electrical potential, electric circuits, capacitance, Kirchhoff's laws, magnetic fields, Faraday's law, electromagnetic waves, physical and geometric optics, waves, and particles. Additional topics include: oscillations.

Special Note: PHYS A124L is a separate laboratory course.

Prerequisites: PHYS A123 with a minimum grade of C.

Attributes: UAA Natural Sciences GER.

PHYS A124L College Physics II Laboratory 1 Credit

Introductory physics laboratory with experiments in electricity and magnetism, waves, and optics.

Prerequisites: (PHYS A123 with a minimum grade of C and PHYS A123L with a minimum grade of C) and PHYS A124 with a minimum grade of C or concurrent enrollment.

Attributes: UAA Natural Sci Lab Only GER.

PHYS A124R College Physics II Problem Solving 1 Credit

Techniques of problem solving for material covered in PHYS A124. Includes student discussion and presentation of solutions.

Corequisites: PHYS A124.

PHYS A130 Survey of College Physics 3 Credits

Introduction to core principles of physics in classical mechanics, waves, electricity and magnetism, and optics. Specifically designed to prepare students for entry into calculus based physics.

Prerequisites: MATH A105 with a minimum grade of C or MATH A151 with a minimum grade of C or MATH A152 with a minimum grade of C or MATH A251 with a minimum grade of C or MATH A251F with a minimum grade of C or ALEKS Overall Test 1 with a score of 055 or ALEKS Overall Test 2 with a score of 055 or ALEKS Overall Test 3 with a score of 055 or ALEKS Overall Test 4 with a score of 055 or ALEKS Overall Test 5 with a score of 055.

PHYS A211 General Physics I 3 Credits

Introduces classical mechanics, including: kinematics, Newton's Laws, momentum, work, energy, gravity, rotational motion, oscillations and fluids.

Special Note: PHYS A211L is a separate laboratory course.

Registration Restrictions: Students who earned an AP Physics 1 exam score of 3 or higher and submitted that result to UAA meet the criteria to take this course. Please contact an advisor for an override.

Prerequisites: (PHYS A130 with a minimum grade of C or UAA PHYS A211 Placement Exam with a score of 19) and (MATH A251 with a minimum grade of C or MATH A251F with a minimum grade of C) and (MATH A252 with a minimum grade of C or concurrent enrollment or MATH A252F with a minimum grade of C or concurrent enrollment).

Attributes: UAA Natural Sciences GER.

PHYS A211L General Physics I Laboratory 1 Credit

Calculus-based introductory physics laboratory with experiments in computerized data collection and analysis, mechanics, waves, elasticity and wave motion.

Prerequisites: PHYS A211 with a minimum grade of C or concurrent enrollment.

Attributes: UAA Natural Sci Lab Only GER.

PHYS A211R General Physics I Problem Solving 1 Credit

Techniques of problem solving for material covered in PHYS A211. Includes student discussion and presentation of solutions in a small-group setting.

Corequisites: PHYS A211.

PHYS A212 General Physics II 3 Credits

Calculus-based introduction to classical physics, including: Coulomb's Law, electrical potential, electric circuits, capacitance, Kirchoff's Laws, Biot-Savart Law, Faraday's Law and electromagnetic waves.

Special Note: Additional topics include waves and sound.

PHYS A212L is a separate laboratory course.

Prerequisites: (MATH A252 with a minimum grade of C or MATH A252F with a minimum grade of C) and MATH A253 with a minimum grade of C or concurrent enrollment and PHYS A211 with a minimum grade of C.

Attributes: UAA Natural Sciences GER.

PHYS A212L General Physics II Laboratory 1 Credit

Calculus-based introductory physics laboratory with experiments in electric and magnetic fields, geometric and physical optics, and light.

Prerequisites: PHYS A211 with a minimum grade of C and PHYS A211L with a minimum grade of C and PHYS A212 with a minimum grade of C or concurrent enrollment.

Attributes: UAA Natural Sci Lab Only GER.

PHYS A212R General Physics II Problem Solving 1 Credit

Techniques of problem solving for material covered in PHYS A212. Includes student discussion and presentation of solutions.

Special Note: This course does not meet General Education Requirements.

Corequisites: PHYS A212.

PHYS A214 Waves, Thermodynamics and Electricity 3 Credits

Calculus-based study of waves and sound, thermodynamics, and electricity, including electrical circuits.

Prerequisites: (MATH A252 with a minimum grade of C or MATH A252F with a minimum grade of C) and MATH A253 with a minimum grade of C or concurrent enrollment and PHYS A211 with a minimum grade of C.

PHYS A214L Waves, Thermodynamics and Electricity Laboratory 1 Credit

Calculus-based introductory physics laboratory with experiments in waves and sound, electric fields, circuits, and thermodynamics.

Registration Restrictions: If the equivalent of PHYS A214 is taken from another institution, it must be completed prior to taking PHYS A214L.

Prerequisites: PHYS A211 with a minimum grade of C and PHYS A211L with a minimum grade of C and PHYS A214 with a minimum grade of C or concurrent enrollment.

PHYS A303 Modern Physics 3 Credits

Introduces modern physics, primarily special relativity and quantum mechanics. Applies these topics to the quantum structure of atoms, molecules, and solids; lasers; nuclear/particle physics and cosmology.

Prerequisites: MATH A302 with a minimum grade of C and PHYS A212 with a minimum grade of C.

PHYS A311 Intermediate Classical Mechanics 3 Credits

Newtonian, Lagrangian, and Hamiltonian mechanics, dynamics of systems of particles and rigid bodies.

Prerequisites: MATH A302 with a minimum grade of C and PHYS A212 with a minimum grade of C.

PHYS A314 Electromagnetics 3 Credits

Electromagnetic theory and applications. Static electric fields in free space and material media; steady current systems and associated magnetic effects. Includes electrostatics, magnetostatics, Maxwell's equations, electromagnetic wave propagation and transmission lines. Application of Maxwell's equations to engineering systems.

Crosslisted With: EE A314.

Prerequisites: PHYS A212 with a minimum grade of C and PHYS A212L with a minimum grade of C and MATH A302 with a minimum grade of C.

PHYS A320 Simulation of Physical Systems 3 Credits

Introduces methods of computer simulation with diverse applications in physics such as numerical integration of Newton's equation, cellular automata, random walks, Monte Carlo methods, percolation and the dynamics of many body systems. No prior programming experience is required.

Prerequisites: (MATH A252 with a minimum grade of C or MATH A252F with a minimum grade of C) and (PHYS A124 with a minimum grade of C or PHYS A212 with a minimum grade of C).

PHYS A324 Electromagnetics II 3 Credits

Use of Maxwell's equations in analysis of plane wave propagation, wave reflection, radiation and antennas, waveguides, cavity resonators, transmission lines, and radio propagation.

Crosslisted With: EE A324.

Prerequisites: EE A314 with a minimum grade of C or PHYS A314 with a minimum grade of C.

PHYS A362 Optics 4 Credits

Interaction of light with matter: theory of geometric and nonlinear optics, Fourier optics, coherence theory, lasers, and additional topics of interest. Practical experience with relevant theories through laboratory projects including investigation of diffraction, interference and polarization. Design and construction of a telescope, a microscope and an interferometer.

Prerequisites: PHYS A212 with a minimum grade of C and PHYS A212L with a minimum grade of C.

PHYS A381 Advanced Physics Laboratory 3 Credits

Theory and practical application of topics in upper-division physics, using advanced laboratory experiments and techniques with statistical and error analysis of data.

Prerequisites: PHYS A303 with a minimum grade of C or concurrent enrollment.

PHYS A403 Quantum Mechanics 4 Credits

Fundamentals of quantum mechanics including applications to the hydrogen atom, particle spin and perturbation theory.

Special Note: Not available for credit to students who have completed PHYS A603.

May Be Stacked With: PHYS A603

Prerequisites: PHYS A303 with a minimum grade of C and MATH A314 with a minimum grade of C.

PHYS A413 Statistical and Thermal Physics 4 Credits

Principles of applications of statistical mechanics and thermodynamics.

Special Note: Not available for credit to students who have completed PHYS A613.

May Be Stacked With: PHYS A613

Prerequisites: PHYS A212 with a minimum grade of C.

PHYS A456 Nonlinear Dynamics and Chaos 3 Credits

Introduces nonlinear dynamics and chaos. Develops analytical methods and geometric intuition using concrete examples from physics, biology, chemistry, and engineering. Topics covered include phase plane analysis, iterated maps, fractals, and strange attractors.

Registration Restrictions: Completion of GER Tier 1 (basic college-level skills) courses and junior standing

Crosslisted With: CHEM A456 and BIOL A456

Prerequisites: MATH A253 with a minimum grade of C and (PHYS A124 with a minimum grade of C or PHYS A212 with a minimum grade of C).

Attributes: UAA Integrative Capstone GER.

PHYS A490 Selected Topics in Physics 1-4 Credits

Detailed study of a selected topic in physics.

Special Note: May be repeated for credit for a maximum of 12 credits with a change of subtitle. Not available for credit to students who have completed PHYS A690 with the same topic.

May Be Stacked With: PHYS A690

Prerequisites: PHYS A303 with a minimum grade of C.

PHYS A498 Individual Research 1-6 Credits

Research projects to be arranged with individual faculty members who will direct the research program.

Special Note: May be repeated for a maximum of 6 credits.

Registration Restrictions: Department permission.

PHYS A603 Advanced Quantum Mechanics 4 Credits

Mathematical foundations of quantum mechanics and advanced applications to the hydrogen atom, particle spin and perturbation theory. Includes review of current literature and/or independent research on the topic.

Special Note: Not available for credit to students who have completed PHYS A403.

Registration Restrictions: Graduate standing and approval of faculty advisor.

May Be Stacked With: PHYS A403

PHYS A613 Advanced Statistical and Thermal Physics 4 Credits

Principles and advanced applications of statistical mechanics and thermodynamics. Include review of current literature and/or independent research on the topic.

Special Note: Not available for credit to students who have completed PHYS A413.

Registration Restrictions: Graduate standing and approval of faculty advisor

May Be Stacked With: PHYS A413

PHYS A690 Advanced Selected Topics in Physics 1-4 Credits

Detailed study of a selected topic in physics at the graduate level.

Includes review of current literature and/or independent research on the topic.

Special Note: May be repeated for a maximum of 12 credits with a change of subtitle. Not available for credit to students who have completed PHYS A490 with the same topic.

Registration Restrictions: Graduate standing and approval of faculty advisor

May Be Stacked With: PHYS A490

PHYS A699 Thesis 1-6 Credits

Involves planning, preparation and completion of a graduate level thesis.

Special Note: May be repeated for a maximum of 12 credits.

Registration Restrictions: Graduate standing and instructor approval