

PHYSICS (PHYS & PLAB)

Credit toward the degree will be granted for only one of the Physics courses in each of the following combinations: 142-191-221, 192-222, 193-223, 194-224.

100. Acoustics for Musicians. Credit 3 hours. Prerequisites: Mathematics 155 or 161, or Math ACT score of 20 or higher. The fundamentals of sound, waves and related phenomena for music majors. Three hours of lecture per week.

121. Elementary Modern Electronics. Credit 3 hours. Prerequisite: Registration for or prior credit for Physic 123. A course emphasizing circuit design with modern integrated circuit chips.

123. Elementary Modern Electronics Laboratory. Credit 1 hour. Prerequisite: Registration for or prior credit for Physics 121. A laboratory course involving the construction of radios, digital counters, clocks, frequency meters and other devices for electronic measurement and control.

130. Orientation to the Physics Curriculum. Credit 1 hour. Prerequisites: Major in physics or secondary science education with a teaching area of physics, or permission of the Department Head. This course will orient incoming physics majors to the physics curriculum by placing physical principles in the context of current events and current research. To this end, the physics faculty and other visiting speakers will present on topics of their choosing.

142. Physics for Elementary Education. Credit 4 hours. Prerequisites: Education majors, inservice teachers, or permission of the Department Head. This course is designed to prepare preservice and inservice K-12 teachers to teach physical science as a process of inquiry. The curriculum will focus on small number of topics in elementary physics, and students will actively engage in a process of hands-on investigation and discovery in a laboratory setting. The central objective is to provide an active learning environment that promotes critical thinking skills, collaborative learning, and an understanding and appreciation of the process of scientific investigation. Three hours of lecture and two hours of laboratory per week.

191. General Physics. Credit 3 hours. Prerequisites: Mathematics 162, or 165, or 200, or permission of the Department Head. A study of the fundamentals of mechanics, heat and sound for students in the biological sciences, industrial technology, and other areas where a knowledge of calculus is not required.

191H. General Physics Honors. Credit 3 hours. Prerequisites: Enhanced ACT mathematics standard score of 27 or higher or completion of Mathematics 162, or 165, or 200 with a grade of C or higher; and registration for Physics Lab 193H. A study of the fundamentals of mechanics, heat and sound for students in disciplines where a knowledge of calculus is not required.

192. General Physics. Credit 3 hours. Prerequisite: Physics 191. A study of the fundamentals of electricity, magnetism, light, and modern physics for students in the biological sciences, industrial technology, and other areas where a knowledge of calculus is not required.

193. General Physics Laboratory. Credit 1 hour. Prerequisite: Registration for or prior credit for Physics 191. Selected laboratory experiments designed to supplement the lecture in Physics 191. Two hours of laboratory a week.

193H. General Physics Honors Laboratory. Credit 1 hour. Prerequisite: Registration for or prior credit for Physics 191H. Selected laboratory experiments designed to supplement the lecture in Physics 191H. Two hours of laboratory a week.

194. General Physics Laboratory. Credit 1 hour. Prerequisites: Physics Lab 193 and registration for or prior credit for PHYS 192. Selected laboratory experiments designed to supplement the lecture in Physics 192. Two hours of laboratory a week.

221. General Physics. Credit 3 hours. Prerequisites: Registration or prior credit for Mathematics 201. Basic principles of mechanics, heat and sound for technical students only.

222. General Physics. Credit 3 hours. Prerequisite: Physics 221. Basic principles of electricity, magnetism, and light for technical students only.

223. General Physics Laboratory. Credit 1 hour. Prerequisite: Registration for or prior credit for Physics 221. A corresponding laboratory course for Physics 221. Three hours of laboratory a week.

224. General Physics Laboratory. Credit 1 hour. Prerequisites: Physics Lab 223 and registration for or prior credit for Physics 222. A corresponding laboratory course for Physics 222. Three hours of laboratory a week.

241. Engineering Statics. Credit 3 hours. Prerequisites: Physics 221 and Physics 222 and Mathematics 201. Vectors; two-dimensional and three-dimensional force system; equilibrium; friction; centroids; mass moments of inertia; second moments of areas.

242. Engineering Circuits. Credit 3 hours. Prerequisites: Physics 221 and Physics 222 and Mathematics 201. Introduction to linear, time-invariant and jumped circuits. Kirchoff's laws, analysis of resistive circuits and steady-state and analysis of RLC and transformer circuits.

301. Electricity and Magnetism. Credit 3 hours. Prerequisite: Physics 222. Advanced study of the fundamentals of electricity and magnetism.

303. Electricity and Magnetism Laboratory. Credit 1 hour. Prerequisites: Physics Lab 224 and registration for or prior credit for Physics 301. Selected experiments in advanced electricity and magnetism. Three hours of laboratory a week.

312. Optics. Credit 3 hours. Prerequisites: Physics 222/224 and registration for or prior credit for Physics 314. Advanced study of the fundamentals of geometric and physical optics.

314. Optics Laboratory. Credit 1 hour. Prerequisite: Registration for or prior credit for Physics 312. A laboratory course designed to introduce the student to the operational techniques of advanced optical instruments. Two hours of laboratory a week.

321. Thermodynamics. Credit 3 hours. Prerequisites: Physics 222/224 and Mathematics 201. An introduction to the principles of thermodynamics, kinetic theory, and statistical mechanics.

331. Mathematical Physics. Credit 3 hours. Prerequisites: Physics 222/224 and Mathematics 201. A study of vectors, complex variables, and other selected topics that have application in mechanics, electromagnetic wave theory, and vibratory motion.

332. Intermediate Mechanics. Credit 3 hours. Prerequisite: Physics 222. A study of the fundamentals of mechanics.

335. Physics Education Laboratory. Credit 3 hours. Prerequisite: This course can only be taken by science education majors or by consent of the Department Head of Chemistry and Physics. A laboratory course designed for secondary and/or elementary school science teachers. Experiments will be presented and performed that illustrate the theories of physics and that can be used as demonstrations. Theory will be presented and used in conjunction with experiments. Six hours of laboratory per week.

336. Physical Science Laboratory. Credit 4 hours. This course may be taken only by elementary education majors and elementary school teachers or by consent of the Department Head of Chemistry and Physics. A laboratory course designed for elementary education majors or elementary school teachers. Experiments will be presented and performed that illustrate physical theories and that can be used as demonstrations. Theory and concepts will be presented and used in conjunction with experiments. Six hours of laboratory per week.

351. Modern Physics. Credit 3 hours. Prerequisites: Physics 222/224. A survey of the modern physical theories of relativity, quantum mechanics, the solid state, molecular structure, and elementary particles.

381. Intermediate Mechanics for Science Education. Credit 3 hours. Prerequisite: Physics 222. A study of the fundamentals of mechanics. A course designed for students in Science Education. This course may not be used for a major or minor in physics. Credit may not be given for both Phys 332 and 381.

382. Electricity and Magnetism for Science Education. Credit 3 hours. Prerequisite: Physics 222. Advanced study of the fundamentals of electricity and magnetism. A course designed for students in Science Education. This course may not be used for a major or minor in physics. Credit may not be given for both Physics 382 and 301.

401/501. Advanced Mechanics. Credit 3 hours. Prerequisites: Physics 332. A continuation of Physics 332 with further study of the fundamentals of mechanics.

402/502. Electromagnetic Wave Theory. Credit 3 hours. Prerequisite: Physics 301. A theoretical treatment of electromagnetic waves.

411/511. Physics Seminar. Credit 1 hour. Prerequisite: Permission of the Department Head. Reviews and discussion of current research topics by students, faculty, and industrial personnel.

412/512. Physics Seminar. Credit 1 hour. A continuation of Physics 411/511.

421/521. Quantum Mechanics I. Credit 3 hours. Prerequisites: Physics 222/224. A course on the fundamentals of quantum mechanics.

422/522. Quantum Mechanics II. Credit 3 hours. Prerequisites: Physics 421/521. A continuation of Physics 421/521.

425. Advanced Undergraduate Laboratory. Credit 2 hours. Prerequisites: Physics 301, 303, and Physics 351. An advanced laboratory for all majors in physics. Selected experiments in modern physics will be performed with an emphasis on data acquisition and error analysis. Six hours of laboratory per week.

430/530. Special Topics in Physics. Credit 1-3 hours per semester. Prerequisite: Senior standing in physics or permission of the Department Head. A reading course with topics and credit to be decided by agreement between the Department Head and the student. This course may be repeated for a total of six credit hours if different topics are studied.

612. Laser Physics. Credit 3 hours. Prerequisite: PHYS 402 or permission of Department Head. Topics include electromagnetic fields, propagation of optical beams, optical resonators, interaction of radiation and atomic systems, laser oscillation, modulation of optical radiation and some specific laser systems. Laser interferometric gravitational wave detector may be used as an example.

619. Computational Methods in Physics. Credit 3 hours. Prerequisites: Physics 331 or Mathematics 350 or Chemistry 395. Computational methods for solving practical problems arising in physics. Topics include numerical methods for solving equations, systems of equations, ordinary differential equations, partial differential equations, polynomial integration and least square approximation.

621. Conceptual Frameworks in Introductory Physics I. Credit 3 hours. Prerequisites: Physics 221 and permission of the Department Head. This is a three credit-hour graduate course that will provide a rigorous treatment of the conceptual frameworks of introductory physics. Three major themes will guide the course: the process of science, motion as explained by force, and motion as explained by energy. The course will consist of textbook-supported guided inquiry exercises that lead students through their own development of the conceptual frameworks of physics by constructing, applying, evaluating, and/or revising theories and models in light of empirical evidence.

622. Conceptual Frameworks in Introductory Physics II. Credit 3 hours. Prerequisites: Physics 222, Physics 621, and permission of the Department Head. This is a three credit-hour graduate course that will provide a rigorous treatment of the conceptual frameworks of introductory physics. Three major themes will guide the course: the process of science, motion as explained by force, and motion as explained by energy. The course will consist of textbook-supported guided inquiry exercises that lead students through their own development of the conceptual frameworks of physics by constructing, applying, evaluating, and/or revising theories and models in light of empirical evidence.