

Applied Physics Topical Areas

[July 2025]

The Applied Physics concentration requires four electives addressing a cohesive physics-related topic. These courses may be from the departments of Astronomy, Biology, Chemistry, Environmental Science, Mathematics, Physics, Statistics, Biomedical Engineering, Chemical Engineering, Civil & Environmental Engineering, Computer Science, Electrical & Computer Engineering, Materials Science & Engineering, or Mechanical & Aerospace Engineering. One course can be at the 2000-level or higher, and the other three must be at the 3000-level or higher.

The following suggestions illustrate possible topics you might pick, and available courses that would support them. Note that in some cases, additional prerequisite courses are required even though they will not satisfy physics major requirements.

The Applied Physics concentration is designed to be highly flexible, so use these suggestions as a starting point to develop your own course plan, in consultation with your physics advisor.

Biophysics

Suggested advanced physics courses: PHYS 3210, 3310 and 3420

Topical electives:

BME 2104	Cell and Molecular Biology (Prereq: CHEM 1410)
PHYS 3040	Physics of the Human Body
BIOL 3000	Cell Biology (Prereq: CHEM 1410/20, BIOL 2100 or BME 2104)
EVSC 3060	Biomechanics

Additional prerequisites:

CHEM 1410	Intro Chemistry 1
CHEM 1420	Intro Chemistry 2

Alternative electives:

BIOL 2100	Intro Biology
BME 2315	Computational Biomedical Engineering
PSYC 3200	Fundamentals of Neuroscience

Chemical Physics

Suggested advanced physics courses: PHYS 3310, 3650 and 3660

Topical electives:

CHEM 3410	Physical Chemistry 1 (Prereq: CHEM 1420)
CHEM 3420	Physical Chemistry 2 (Prereq: CHEM 3410)
CHEM 3811	Physical Chemistry Laboratory 1 (Prereq: CHEM 1421; Coreq: CHEM 3410)
CHEM 3812	Physical Chemistry Laboratory 2 (Coreq: CHEM 3420)

Additional prerequisites:

CHEM 1410	Intro Chemistry 1
CHEM 1411	Chemistry 1 Laboratory
CHEM 1420	Intro Chemistry 2
CHEM 1421	Chemistry 2 Laboratory

Alternative electives:

PHYS 5320	Photonics
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Computational Physics

Suggested advanced physics courses: PHYS 3310, 3420 and 3650

Topical electives:

CS 2100	Data Structures and Algorithms 1
CS 3100	Data Structures and Algorithms 2 (Prereq: CS 2100, CS2120)
PHYS 3630	Computational Physics
PHYS 5640	Computational Physics 2 (Prereq: PHYS 3630)

Additional prerequisites:

CS 2120	Discrete Math
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Device Physics

Suggested advanced physics courses: PHYS 3420, 3430 and 3650

Topical electives:

PHYS 3150	Electronics Lab (Substitutes for ECE 2300)
PHYS 3620	Condensed Matter Physics
ECE 2600	Electronics (Prereq: ECE 2300; Coreq: ECE 2700)
ECE 3660	Microelectronics (Prereq: ECE 2600)

Additional prerequisites:

ECE 2700	Signals and Systems
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Alternative electives:

ECE 3103	Solid State Devices (Prereq: ECE 2300)
ECE 4209	RF Circuit Design (Prereq: ECE 2700)
ECE 5260	Microwave Engineering (Prereq: ECE 2600)

Geophysics

Suggested advanced physics courses: PHYS 3210, 3310 and 3420

Topical electives:

EVSC 2800	Geology (Prereq: CHEM 1410)
EVSC 3300	Atmosphere and Weather
EVSC 3600	Hydrology
EVSC 4890	Planetary Geology (Prereq: EVSC 2800)

Additional prerequisites:

CHEM 1410	Intro Chemistry 1
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Alternative electives:

EVSC 3810	Natural Hazards (Prereq: EVSC 2800)
EVSC 4010	Introduction to Remote Sensing
EVSC 4630	Land-Atmosphere Interactions (Prereq: EVSC 3300 or 3600)

Materials Science

Suggested advanced physics courses: PHYS 3310, 3650 and 3660

Topical electives:

MSE 2090	Introduction to Materials Science
MSE 3101	Materials Science Lab
MSE 3670	Electronic, Magnetic and Optical Materials
PHYS 3620	Condensed Matter Physics

Alternative electives:

PHYS 5620	Solid State Physics
MSE 3050	Thermodynamics and Phase Equilibria
MSE 3060	Structure and Defects
MSE 4270	Atomistic Simulation

Medical Physics

Suggested advanced physics courses: PHYS 3310, 3420 and 3430

Topical electives:

PHYS 3040	Physics of the Human Body
PHYS 3250	Applied Nuclear Physics
BIOL 3410	Human Anatomy 1
BIOL 3420	Human Anatomy 2

Alternative electives:

BME 3310	Biomedical Systems
BEM 4783	Medical Imaging Modalities (Prereq: BME 2315 or 3310)

Nuclear Physics

Suggested advanced physics courses: PHYS 3420, 3430 and 3650

Topical electives:

PHYS 3250	Applied Nuclear Physics
PHYS 3630	Computational Physics
PHYS 3660	Quantum Mechanics 2
PHYS 5720	Intro to Nuclear and Particle Physics

Alternative electives:

BME 4783	Medical Imaging Modalities (Prereq: BME 2315 or 3310)
ASTR 5450	High-Energy Astrophysics
CHEM 5240	Principles of Magnetic Resonance

Optics and Photonics

Suggested advanced physics courses: PHYS 3420, 3430 and 3650

Topical electives:

PHYS 3660	Quantum Mechanics 2
PHYS 5310	Optics
PHYS 5320	Photonics
ECE 6642	Optoelectronic Devices

Alternative electives:

ECE 2700	Signals and Systems
ECE 4230	Optical and Quantum Electronics
ASTR 5340	Introduction to Radio Astronomy

Quantum Technology

Suggested advanced physics courses: PHYS 3420, 3650 and 3660

Topical electives:

PHYS 3150	Electronics Lab (Substitutes for ECE 2300)
PHYS 3620	Condensed Matter Physics
PHYS 5880	Quantum Computing
ECE 3103	Solid State Devices (Prereq: ECE 2300)

Alternative electives:

PHYS 5320	Fundamentals of Photonics
PHYS 5620	Solid State Physics
ECE 2700	Signals and Systems
ECE 6642	Optoelectronic Devices

Rocket Science

Suggested advanced physics courses: PHYS 3210, 3310 and 3420

PHYS 3210 substitutes for MAE 2320

PHYS 3310 substitutes for MAE 2100

Topical electives:

MAE 2030 Intro to Aerospace Engineering

MAE 3010 Astronautics (MAE 2320)

MAE 3210 Fluid Mechanics

MAE 4120 Aerospace Propulsion (Prereq: MAE 2100, MAE 3210)