ENGINEERING PHYSICS MAJOR (B.S.)

https://ceps.unh.edu/physics/program/bs/engineering-physics-major

Description

The goal of the UNH BSEP program is to produce broadly-trained engineers who can provide solutions to today's challenging problems in support of a technologically evolving society. The core of the program is based on interdisciplinary training, complemented with a deeper understanding of the physical principles needed to support careers in engineering, engineering research or, perhaps, further training in systems engineering. The program balances depth and breadth in skill development; flexibility and functionality are what drive the program in the sense that 1) the particular focus is based on the student's interests, and 2) the breadth of the course selection is guided by the post-graduation goals of the student (e.g., employment versus graduate school).

Requirements

Degree Requirements

Minimum Credit Requirement: 128 credits

Minimum Residency Requirement: 32 credits must be taken at UNH

Minimum GPA: 2.0 required for conferral*

Core Curriculum Required: Discovery & Writing Program Requirements

Foreign Language Requirement: No

All Major, Option and Elective Requirements as indicated.
**Major GPA requirements as indicated.*

Major Requirements

A student must have a minimum grade of C in each 400- or 500-level courses that are part of the core requirements and an overall grade-point average of 2.33 in these courses in order to continue in the program.

Code	Title	Credits
Core Requirements for all tracks:		
CHEM 403	General Chemistry I	4
or CHEM 405	Chemical Principles for Engineers	
CS 410P	Introduction to Scientific Programming/Python	4
or IAM 550	Introduction to Engineering Computing	
MATH 425	Calculus I	4
MATH 426	Calculus II	4
Choose one:		8-12
MATH 527 & MATH 528	Differential Equations with Linear Algebra and Multidimensional Calculus	
or MATH 525 & MATH 526	Linearity I and Linearity II	
PHYS 400	Physics Seminar I	1
PHYS 407	General Physics I	4
PHYS 408	General Physics II	4
PHYS 505	General Physics III	3
PHYS 506	General Physics III Laboratory	1
PHYS 508	Thermodynamics and Statistical Mechanics	4
PHYS 615	Classical Mechanics and Mathematical Physics I	4
PHYS 616	Classical Mechanics and Mathematical Physics II	4
PHYS 703	Electricity and Magnetism I	4
Capstone:		4
PHYS 797	Senior Design Project	
Additional courses for Aerospace Track		
ECE 541	Electric Circuits	4
ECE 548	Electronic Design I	4
ECE 651	Electronic Design II	4
ME 608	Fluid Dynamics	3
ME 743	Satellite Systems, Dynamics, and Control	3
Electives in major: choose three from the following		
ME 603	Heat Transfer	
ME 646	Experimental Measurement and Data Analysis	
ME 670	Systems Modeling, Simulation, and Control	
ME 705	Thermal System Analysis and Design	
ME 707	Analytical Fluid Dynamics	
ME 747	Experimental Measurement and Modeling of Complex Systems	
ME 786	Introduction to Finite Element Analysis	
PHYS 708	Optics	
PHYS 712	Space Plasma Physics	
Additional Courses for the Engineering Research track		
ECE 541	Electric Circuits	4
ECE 543	Introduction to Digital Systems	4
ECE 548	Electronic Design I	4
ECE 633	Signals and Systems I	3
ECE 647	Random Processes and Signals in Engineering	3
ECE 651	Electronic Design II	4
ME 608	Fluid Dynamics	3
PHYS 704	Electricity and Magnetism II	4
PHYS 708	Optics	4
Electives in major: choose three from the following		12
ECE 634	Signals and Systems II	
ME 561	Introduction to Materials Science	
ME 670	Systems Modeling, Simulation, and Control	
ME 706	Renewable Energy: Physical and Engineering Principles	
ME 712	Waves in Fluids	
ME 743	Satellite Systems, Dynamics, and Control	

Degree Plan

Aerospace Track

First Year

Fall		**Credits**
PHYS 407H	Honors/General Physics I	4
MATH 425H	Honors/Calculus I	4
PHYS 400	Physics Seminar I	1
ENGL 401	First-Year Writing	4
Discovery Course		4
	Credits	**17**
Spring		
PHYS 408H	Honors/General Physics II	4
MATH 426H	Honors/Calculus II	4
CHEM 405	Chemical Principles for Engineers	4
IAM 550	Introduction to Engineering Computing	4
	Credits	**16**

Second Year

Fall		
PHYS 505	General Physics III	3
PHYS 506	General Physics III Laboratory	1

PHYS 508	Thermodynamics and Statistical Mechanics	4
MATH 528	Multidimensional Calculus	4
Discovery Course		4
	Credits	**16**
Spring		
PHYS 615	Classical Mechanics and Mathematical Physics I	4
MATH 527	Differential Equations with Linear Algebra	4
Discovery Courses		8
	Credits	**16**
Third Year		
Fall		
PHYS 616	Classical Mechanics and Mathematical Physics II	4
ME 608	Fluid Dynamics	3
ECE 541	Electric Circuits	4
Discovery Course		4
	Credits	**15**
Spring		
PHYS 703	Electricity and Magnetism I	4
ECE 548	Electronic Design I	4
Elective in Major		3-4
Discovery Course		4
	Credits	**15-16**
Fourth Year		
Fall		
PHYS 797	Senior Design Project	2
ECE 651	Electronic Design II	4
Elective in Major		3-4
Discovery Course		4
Free Elective		4
	Credits	**17-18**
Spring		
PHYS 797	Senior Design Project	2
ME 743	Satellite Systems, Dynamics, and Control	3
Elective in Major		4
Discovery Course		4
Free Elective		4
	Credits	**17**
	Total Credits	**129-131**

Engineering Research Track

First Year		
Fall		**Credits**
PHYS 407H	Honors/General Physics I	4
MATH 425H	Honors/Calculus I	4
CHEM 405	Chemical Principles for Engineers	4
PHYS 400	Physics Seminar I	1
Discovery Course		4
	Credits	**17**
Spring		
PHYS 408H	Honors/General Physics II	4
MATH 426H	Honors/Calculus II	4
IAM 550	Introduction to Engineering Computing	4
ENGL 401	First-Year Writing	4
	Credits	**16**
Second Year		
Fall		
PHYS 505	General Physics III	3
PHYS 506	General Physics III Laboratory	1
MATH 528	Multidimensional Calculus	4
ECE 541	Electric Circuits	4
Discovery Course		4
	Credits	**16**
Spring		
PHYS 615	Classical Mechanics and Mathematical Physics I	4
MATH 527	Differential Equations with Linear Algebra	4
ECE 548	Electronic Design I	4
Discovery Course		4
	Credits	**16**
Third Year		
Fall		
PHYS 508	Thermodynamics and Statistical Mechanics	4
ECE 651	Electronic Design II	4
PHYS 616	Classical Mechanics and Mathematical Physics II	4
Discovery Course		4
	Credits	**16**
Spring		
PHYS 703	Electricity and Magnetism I	4
ECE 543	Introduction to Digital Systems	4
Elective in Major		4
Discovery Course		4
	Credits	**16**
Fourth Year		
Fall		
PHYS 797	Senior Design Project	2
PHYS 704	Electricity and Magnetism II	4
PHYS 708	Optics	4
ECE 633	Signals and Systems I	3
Elective in Major		4
Discovery Course		4
	Credits	**21**
Spring		
PHYS 797	Senior Design Project	2
ECE 647	Random Processes and Signals in Engineering	3
ME 608	Fluid Dynamics	3
Elective in Major		4

Discovery Course	4
Credits	**16**
Total Credits	**134**

Student Learning Outcomes

Students are expected to achieve the outcomes below upon graduation.

- An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
- An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
- An ability to communicate effectively with a range of audiences.
- An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
- An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
- An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
- An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.