

MAJOR IN PHYSICS, PHYSICS CONCENTRATION

Requirements Effective Fall 2023

Each course used to meet requirements of the concentration need a minimum grade of C-, including courses to satisfy AUCC Categories 1, 2, and 3A.

Freshman

		AUCC	Credits
CO 150	College Composition (GT-CO2)	1A	3
Select one of the following groups:			5
CS 150B	Culture and Coding: Python (GT-AH3)	3B	
Electives			
or			
CS 152	Python for STEM		
Arts and Humanities (http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#arts-humanities)		3B	
MATH 160	Calculus for Physical Scientists I (GT-MA1)	1B	4
MATH 161	Calculus for Physical Scientists II (GT-MA1)	1B	4
PH 141	Physics for Scientists and Engineers I (GT-SC1)	3A	5
PH 142	Physics for Scientists and Engineers II (GT-SC1)	3A	5
PH 193	Introductory Seminar in Physics		1
Diversity, Equity, and Inclusion (http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#diversity-equity-inclusion)		1C	3
Total Credits			30

Sophomore

MATH 261	Calculus for Physical Scientists III		4
Select one from the following:			4
MATH 340	Intro to Ordinary Differential Equations		
MATH 345	Differential Equations		
PH 210	Introduction to Computing in Physics		3
PH 245 ¹	Introduction to Electronics		3
PH 293	Selected Topics in Physics		1
PH 314	Introduction to Modern Physics		4
PH 315	Modern Physics Laboratory		2
Arts and Humanities (http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#arts-humanities)		3B	3
Historical Perspectives (http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#historical-perspectives)		3D	3
Social and Behavioral Sciences (http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#social-behavioral-sciences)		3C	3
Total Credits			30

Junior

Select one from the following: ²			3
CHEM 301	Advanced Scientific Writing—Chemistry (GT-CO3)	2	
CO 300	Writing Arguments (GT-CO3)	2	

CO 301B	Writing in the Disciplines: Sciences (GT-CO3)	2	
JTC 300	Strategic Writing and Communication (GT-CO3)	2	
LB 300	Specialized Professional Writing	2	
MATH 369	Linear Algebra I		3
PH 341	Mechanics		4
PH 351 ¹	Electricity and Magnetism		4
PH 353	Optics and Waves		4
PH 361	Physical Thermodynamics		3
Mathematics and Statistics List (select a minimum of 3 credits)			3
Electives ³			6

Total Credits **30**

Senior

PH 425	Advanced Physics Laboratory	4C	2
PH 451	Introductory Quantum Mechanics I	4A,4B	3
PH 452	Introductory Quantum Mechanics II		3
PH 462	Statistical Physics		3
PH 492	Seminar	4C	1
Technical Course List (select at least two courses from the list below)			6
Electives ³			12

Total Credits **30**

Program Total Credits: **120**

Mathematics and Statistics List (select a minimum of 3 credits)

Code	Title	Credits
MATH 317	Advanced Calculus of One Variable	3
MATH 332	Partial Differential Equations	3
MATH 366	Introduction to Abstract Algebra	3
MATH 419	Introduction to Complex Variables	3
MATH 430/ECE 430	Fourier and Wavelet Analysis with Apps	3
MATH 466	Abstract Algebra I	3
MATH 469	Linear Algebra II	3
MATH 472	Introduction to Topology	3
MATH 474	Introduction to Differential Geometry	3
PH 571	Mathematical Methods for Physics I	3
STAT 315	Intro to Theory and Practice of Statistics	3
STAT 420	Probability and Mathematical Statistics I	3

CHEM 120	Foundations of Modern Chemistry (GT-SC2)	4
CHEM 121	Foundations of Modern Chemistry Laboratory (GT-SC1)	1
CHEM 231	Foundations of Analytical Chemistry	3
CHEM 241	Foundations of Organic Chemistry	4
CHEM 245	Fundamentals of Organic Chemistry	4
CHEM 263	Foundations of Inorganic Chemistry	4
CHEM 341	Modern Organic Chemistry I	3
CHEM 345	Organic Chemistry I	4
CHEM 474	Physical Chemistry I	3
CIVE 300	Fluid Mechanics	3
CIVE 301	Fluid Mechanics Laboratory	1
CS 220	Discrete Structures and their Applications ⁴	4
CS 270	Computer Organization ⁴	4
CS 320	Algorithms–Theory and Practice	3
CS 345	Machine Learning Foundations and Practice	3

Technical Course List (select a minimum of 6 credits from a minimum of 2 courses not taken elsewhere in the program)

Code	Title	Credits
ATS 550	Atmospheric Radiation and Remote Sensing	3
BC 411	Physical Biochemistry	4
CBE 331	Momentum Transfer and Mechanical Separations	3
CBE 332	Heat and Mass Transfer Fundamentals	3
CHEM 111	General Chemistry I (GT-SC2)	4
CHEM 112	General Chemistry Lab I (GT-SC1)	1
CHEM 113	General Chemistry II	3
CHEM 114	General Chemistry Lab II	1

ECE 312	Linear System Analysis II	3
ECE 331	Electronics Principles I	4
ECE 332	Electronics Principles II	4
ECE 404	Experiments in Optical Electronics	2
ECE 415	Semiconductor Physics and Junctions	2
ECE 441	Optical Electronics	3
ECE 444	Antennas and Radiation	3
ECE 507	Plasma Physics and Applications	3
ECE 546	Laser Fundamentals and Devices	3
ERHS 450	Introduction to Radiation Biology	3
ERHS 530	Radiological Physics and Dosimetry I	3
ERHS 531	Nuclear Instruments and Measurements	2
GEOL 578	Global Seismology	4

MATH 317	Advanced Calculus of One Variable	3
MATH 332	Partial Differential Equations	3
MATH 366	Introduction to Abstract Algebra	3
MATH 405	Introduction to Number Theory	3
MATH 419	Introduction to Complex Variables	3
MATH 430/ECE 430	Fourier and Wavelet Analysis with Apps	3
MATH 450	Introduction to Numerical Analysis I	3
MATH 451	Introduction to Numerical Analysis II	3
MATH 466	Abstract Algebra I	3
MATH 467	Abstract Algebra II	3
MATH 469	Linear Algebra II	3
MATH 472	Introduction to Topology	3
MATH 474	Introduction to Differential Geometry	3
MECH 331	Introduction to Engineering Materials	4
MECH 344	Heat and Mass Transfer	3
MECH 460	Aeronautics	3
MECH 468	Space Propulsion and Power Engineering	3
MECH 518	Orbital Mechanics	3
PH 498	Research ⁴	1-6
PH 517	Chaos, Fractals, and Nonlinear Dynamics	3
PH 521	Introduction to Lasers	3
PH 522	Introductory Laser Laboratory	1
PH 531	Introductory Condensed Matter Physics	3
PH 561	Elementary Particle Physics	3
PH 571	Mathematical Methods for Physics I	3
STAT 315	Intro to Theory and Practice of Statistics	3
STAT 341	Statistical Data Analysis I	3
STAT 400	Statistical Computing	3
STAT 420	Probability and Mathematical Statistics I	3
STAT 421	Introduction to Stochastic Processes	3
STAT 430	Probability and Mathematical Statistics II	3
STAT 440	Bayesian Data Analysis	3
STAT 460	Applied Multivariate Analysis	3

¹ For students who change majors from Electrical Engineering or are double-majoring in Electrical Engineering, please see advisor for possible substitutions.

² CHEM 301 and CO 301B are recommended. Other courses in All-University Core Curriculum (AUCC) Category 2 may be accepted as substitutes if they are taken prior to declaring the Physics major or are taken to meet requirements of another major.

³ Select enough elective credits to bring the program total to a minimum of 120 credits, of which at least 42 must be upper-division (300-, 400-level).

⁴ Only 3 credits from this course are applied towards the Technical Electives requirement.