

Physics (BS): Interdisciplinary Physics Concentration

Physics provides the conceptual foundation for science and engineering. A physics degree is a mark of major intellectual achievement and a gateway to a thousand careers. In the modern world, physicists often interact with a large number of other disciplines to address pressing academic and applied problems.

Most physics majors find employment in a government or industrial laboratory, or with a company that provides STEM (science, technology, engineering and math) products or services. Other physics majors go on to graduate studies in physics or related sciences, or professional schools (such as medicine or law).

The Interdisciplinary Physics Concentration at NC State allows students to customize a highly technical Bachelor of Science degree in consultation with an expert Faculty advisor. The combinations of different scientific fields that can be incorporated into the Interdisciplinary concentration are almost limitless. Examples include biophysics, geophysics, mathematical physics, and data science.

For more information about this program, visit our website (<https://physics.sciences.ncsu.edu/undergraduate/>).

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Plan Requirements

Code	Title	Hours
Orientation		
COS 100	Science of Change (Verify Requirement)	
Communication		
ENG 101	Academic Writing and Research	4
Select one of the following Advanced Writing courses:		3
ENG 331	Communication for Engineering and Technology	
ENG 332	Communication for Business and Management	
ENG 333	Communication for Science and Research	
Physics¹		
PY 201	University Physics I	4
PY 202	University Physics II	4
PY 203	University Physics III	4
PY 252	Instrumental and Data Analysis for Physics	2
PY 401	Quantum Physics I	3

PY 411	Mechanics I	3
PY 413	Thermal Physics	3
PY 414	Electromagnetism I	3
Advanced Experimental Physics (p. 2)		3
Math / Statistics / Computing²		
MA 141	Calculus I	4
MA 241	Calculus II	4
MA 242	Calculus III	4
MA 341	Applied Differential Equations I	3
Advanced Math Elective (p. 2)		3
Statistics Elective (p. 2)		3
PY 251	Introduction to Scientific Computing	3
Computing / Numerical Methods Elective (p. 2)		3
Other Science/Engineering³		
CH 101	Chemistry - A Molecular Science	3
CH 102	General Chemistry Laboratory	1
Basic Science Elective (p. 2)		3
Advised Science/Engineering Electives ⁴		18
GEP Courses		
GEP Humanities (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/)		6
GEP Social Sciences (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-social-sciences/)		6
GEP Health and Exercise Studies (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/)		2
GEP Interdisciplinary Perspectives (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-interdisciplinary-perspectives/)		5
GEP Elective (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/)		3
GEP Global Knowledge (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-global-knowledge/) (verify requirement)		
GEP Foundations of American Democracy (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-fad/) (verify requirement)		
World Language Proficiency (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/world-language-proficiency/) (verify requirement)		
Free Electives		
Free Electives		10
Total Hours		120

¹ At most one passing grade below C- is permitted in the Physics category.

² At most one passing grade below C- is permitted in the Math/Statistics/Computing category.

³ At most one passing grade below C- is permitted in the Other Science/Engineering category.

⁴ Students in the Interdisciplinary Physics option for the B.S. in Physics will identify a second area of interest in which to also focus their studies. These 18 credit hours will be planned by the student in consultation with their advisor and must be approved by the advisor and by the program, to ensure sufficient breadth and depth of study. This second disciplinary focal area can be selected from a wide

range of fields in science or engineering. Students should check the prerequisites and restrictions on courses in which they are interested.

Statistics Electives

Code	Title	Hours
BUS 350	Economics and Business Statistics	3
EC 351	Econometrics I	3
ST 307	Introduction to Statistical Programming- SAS	1
ST 308	Introduction to Statistical Programming - R	1
ST 311	Introduction to Statistics	3
ST 312	Introduction to Statistics II	3
ST 350	Economics and Business Statistics	3
ST 370	Probability and Statistics for Engineers	3
ST 371	Introduction to Probability and Distribution Theory	3
ST 372	Introduction to Statistical Inference and Regression	3

Computing / Numerical Methods Electives

Code	Title	Hours
CSC 302	Introduction to Numerical Methods	3
CSC 427	Introduction to Numerical Analysis I	3
CSC 428	Introduction to Numerical Analysis II	3
MA 402	Mathematics of Scientific Computing	3
MA 427	Introduction to Numerical Analysis I	3
MA 428	Introduction to Numerical Analysis II	3
PY 525	Computational Physics	3

Basic Science Elective

Code	Title	Hours
BIO 165		5
BIO 181	Introductory Biology: Ecology, Evolution, and Biodiversity	4
BIO 183	Introductory Biology: Cellular and Molecular Biology	4
CE 225	Mechanics of Solids	3
CH 201	Chemistry - A Quantitative Science	3
CH 202	Quantitative Chemistry Laboratory	1
CH 203	General Chemistry II for Students in Chemical Sciences	3
CH 204	General Chemistry Laboratory II for Students in Chemical Sciences	1
CH 220	Introductory Organic Chemistry	3
CH 222	Organic Chemistry I Lab	1
CHE 205	Chemical Process Principles	4
GN 301	Genetics in Human Affairs	3
MAE 214	Solid Mechanics	3
MEA 101	Geology I: Physical	3
MEA 110	Geology I Laboratory	1
MEA 200	Introduction to Oceanography	3
MEA 210	Oceanography Lab	1
MEA 215	Introduction to Atmospheric Sciences	4
MEA 220	Marine Biology	3
MSE 200	Mechanical Properties of Structural Materials	3

MSE 201	Structure and Properties of Engineering Materials	3
NE 202	Radiation Sources, Interaction and Detection	4
TE 200	Introduction to Polymer Science and Engineering	3

Advanced Experimental Physics

Code	Title	Hours
PY 452	Advanced Physics Laboratory	3
PY 456	Senior Design Project in Physics	3

Advanced Math Elective

Code	Title	Hours
MA 305	Introductory Linear Algebra and Matrices	3
MA 401	Applied Differential Equations II	3
MA 405	Introduction to Linear Algebra	3

First Year

Fall Semester	Hours
PY 201 University Physics I (CP) ¹	4
MA 141 Calculus I (CP) ²	4
ENG 101 Academic Writing and Research	4
GEP Health and Exercise Studies (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/)	1
COS 100 Science of Change	2
Hours	15

Spring Semester

PY 202 University Physics II (CP) ¹	4
MA 241 Calculus II (CP) ²	4
CH 101 Chemistry - A Molecular Science ³	3
CH 102 General Chemistry Laboratory ³	1
GEP Humanities (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/)	3
Hours	15

Second Year

Fall Semester	Hours
PY 203 University Physics III (CP) ¹	4
PY 251 Introduction to Scientific Computing ²	3
MA 242 Calculus III (CP) ²	4
Basic Sciences (p. 2) ³	3
GEP Health and Exercise Studies (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/)	1
Hours	15

Spring Semester

PY 252 Instrumental and Data Analysis for Physics ¹	2
PY 411 Mechanics I (CP) ¹	3
MA 341 Applied Differential Equations I ²	3
Advised Science/Engineering Elective ^{3,4}	3
GEP Humanities (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/)	3
Hours	14

Third Year**Fall Semester**

PY 414	Electromagnetism I ¹	3
Advised Science/Engineering Elective ^{3,4}		3
Advanced Math Elective (p. 2) ²		3
Statistics Elective (p. 2) ²		3
Advanced Writing Elective (p. 1)		3
Hours		15

Spring Semester

PY 401	Quantum Physics I ¹	3
PY 413	Thermal Physics ¹	3
Advised Science/Engineering Elective ^{3,4}		3
GEP Social Sciences (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-social-sciences/)		3
Free Elective		3
Hours		15

Fourth Year**Fall Semester**

Computing/Numerical Methods Elective (p. 2) ²		3
Advised Science/Engineering Electives ^{3,4}		6
GEP Interdisciplinary Perspectives (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-interdisciplinary-perspectives/)		3
Free Elective		4
Hours		16

Spring Semester

Advanced Experimental Physics (p. 2) ¹		3
Advised Science/Engineering Elective ^{3,4}		3
GEP Elective (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/)		3
GEP Social Sciences (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-social-sciences/)		3
Free Elective		3
Hours		15
Total Hours		120

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Career Opportunities**Career Titles**

- Aeronautical & Aerospace Engineer
- Aerospace Engineering Technician
- Architect
- Astronomer
- Atmospheric and Space Scientist
- Biophysicist
- Cartographer and Photogrammetrists
- Environmental Engineer
- Environmental Research Analyst
- Fuel Cell Engineers
- Geologist
- Geophysicist
- Hazardous Waste Management Analyst
- Hydrographer
- Hydrologist
- Industrial Engineer
- Industrial Hygienist
- Materials Engineer
- Materials Scientist
- Mathematician
- Mechanical Engineer
- Meteorologist
- Nuclear Engineer
- Nuclear Fuels Research Engineer
- Oceanographer
- Optometrist
- Petroleum Engineer
- Photogrammetrist
- Physicist
- Physics Professor
- Radiation Protection Engineer
- Seismologist
- Soil Engineer
- Solar Energy Systems Designer
- Structural Engineer
- Sustainability Specialists
- Technical Publications Writer
- Water Pollution Control Inspector
- Weather Forecaster

Learn More About Careers

NCcareers.org (<https://nccareers.org/>)

Explore North Carolina's central online resource for students, parents, educators, job seekers and career counselors looking for high quality job and career information.

Occupational Outlook Handbook (<https://www.bls.gov/ooh/>)

Browse the Occupational Outlook Handbook published by the Bureau of Labor Statistics to view state and area employment and wage statistics.

You can also identify and compare similar occupations based on your interests.

Career One Stop Videos (<https://www.careeronestop.org/>)

View videos that provide career details and information on wages, employment trends, skills needed, and more for any occupation.

Sponsored by the U.S. Department of Labor.

Focus 2 Career Assessment (<https://careers.dasa.ncsu.edu/explore-careers/career-assessments/>) (NC State student email address required)

This career, major and education planning system is available to current NC State students to learn about how your values, interests, competencies, and personality fit into the NC State majors and your future career. An NC State email address is required to create an account. Make an appointment with your career counselor (<https://careers.dasa.ncsu.edu/about/hours-appointments/>) to discuss the results.

Focus 2 Apply Assessment (<https://www.focus2career.com/Portal/Register.cfm?SID=1929>) (Available to prospective students)

A career assessment tool designed to support prospective students in exploring and choosing the right major and career path based on your unique personality, interests, skills and values. Get started with Focus 2 Apply and see how it can guide your journey at NC State.

American Institute of Physics (<http://www.aip.org/>)

American Physical Society (<http://www.aps.org/>)