

Physics Education

Department Information

- **Department Location:**
Katherine Kilbourne Burgum Family Life, 4-H Center
- **Department Phone:**
701-231-7921
- **Department Web Site:**
www.ndsu.edu/education/
- **Degrees Offered:**
B.S.; B.A.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/physics-education/

Physics is the most fundamental and exact of the physical sciences. Its laws are basic to deep understanding in all of technology, and in many fields of study, such as astronomy, chemistry, engineering, materials science, photonics, biology, medicine, geology, and environmental science. Physicists often end up in a wide range of leadership positions. Notable examples include Jimmy Carter, Elon Musk, Steven Wolfram, Douglas Hofstadter, and Angela Merkel.

The Department of Physics has growing undergraduate and graduate programs. Yet, its size remains comparatively small, allowing personalized interactions between students with all of its 12 faculty members. Not only do students participate in research projects early on, they often become authors in peer-reviewed publications and present their results in the regional and national conferences and workshops. In addition, our students are highly engaged; they regularly participate successfully in the University Physics Competition and contribute actively to various outreach activities.

The Department of Physics has a strong research focus on three fields: materials (especially soft materials), computational physics, and physics education research. While this represents only a small subset of all existing physics fields, our focus makes us competitive and successful on the national level and beyond. Students can choose among a number of curricular options that prepare them for industrial, governmental, and academic careers. The Fargo/Moorhead urban area contains three colleges with a physics program. Courses can be taken in each college through the Tri-College University. This increases the number of available courses to a level typical for large universities only.

A prospective physics major is generally expected to have taken physics, chemistry, and mathematics courses. Computer courses can also be useful. Incoming students should normally be ready to start learning calculus. Some of our incoming students have already taken AP courses in physics or mathematics. Note, however, that deficiencies in any of these subjects may be remedied in the freshman or later years at the University.

The most popular curricular option in the Department of Physics is the standard physics major. Also popular are our two double major programs in Physics and Mathematics as well as in Physics and Computer Science. Starting in fall 2017 we offer a new double major in Electrical and Computer Engineering and Physics. All these programs allow well-prepared students to complete the requirements for both majors in four years by taking advantage of the close connections between physics, mathematics, computer science, and engineering. In addition, we offer a physics major with a focus on optical science and engineering. The optical science and engineering option, which is the only regional program of this type, includes an interdisciplinary optics/photonics sequence of courses taught by the Department of Physics and the Department of Electrical and Computer Engineering using a state-of-the-art optics teaching laboratory. Finally, highly qualified students can earn both a Bachelor's and Master's degree in physics by enrolling into the Accelerated Masters program in their junior year.

All of our physics majors (including the double majors and physics majors with the optical science and engineering option) take introductory courses in classical mechanics, computational physics, electricity and magnetism, optics, thermodynamics, quantum mechanics, and modern physics, as well as selected specialized courses such as photonics, lasers, or condensed matter physics. In addition, all physics majors get involved in research projects with faculty, typically in fields like materials (including bio- and polymer physics), computational physics, and physics education research. Two dedicated courses allow students to receive credit for their research efforts. Any of our curriculum options prepares students for graduate work in physics or related fields and subsequent employment in industry, government, or academia. Physics graduates have excellent job perspectives because they are widely valued as creative and persistent problem solvers who are often able to step into leadership positions.

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

First Year		
Fall	Credits Spring	Credits
CHEM 121 & 121L (or CHEM 150 & 160)	4 CHEM 122 & 122L (or CHEM 151 & 161)	4

ENGL 110	4 EDUC 321	3
GEOL 105 & 105L	4 ENGL 120	3
MATH 165	4 GEOL 106 & 106L (Meets Global Perspectives Gen Ed requirement)	4
PHYS 110	3 MATH 166	4
PHYS 171	1 Complete Praxis Core Academic Skills Exam	
	20	18

Second Year

Fall	Credits Spring	Credits
BIOL 150 & 150L	4 CSCI 114 or MIS 116	3
COMM 110	3 PHYS 252 & 252L	5
EDUC 322	3 PHYS 252R	1
PHYS 215	1 PHYS 350	3
PHYS 251 & 251L	5 STAT 330	3
PHYS 251R	1 Humanities & Fine Arts Gen Ed	3
MATH 129	3 Wellness Gen Ed	2
Apply to the School of Education		
	20	20

Third Year

Fall	Credits Spring	Credits
BIOL 124 & 124L	4 EDUC 481	3
EDUC 451	3 EDUC 486	3
EDUC 489	3 MATH 128 (Co-Requisite of Math 266)	1
MATH 265	4 MATH 266	3
PHYS 360	3 PHYS 361	3
Social & Behavioral Science Gen Ed	3 PHYS 300-400 Elective	3
	Social & Behavioral Science Gen Ed	3
	20	19

Fourth Year

Fall	Credits Spring	Credits
CHEM Elective w/Lab	4 EDUC 485	1
ENGL 324	3 EDUC 487	9
PHYS 355	3 EDUC 488	3
PHYS 411 & 411L	4	
PHYS 462	3	
Humanities & Fine Arts/Cultural Diversity Gen Ed	3	
Apply for Student Teaching		
Complete Praxis PLT Exam		

Complete Praxis II Content Exam

20

13

Total Credits: 150