

Physics

Department Information

- **Department Web Site:**
www.ndsu.edu/physics/ (<http://www.ndsu.edu/physics/>)
- **Credential Offered:**
B.S.; B.A.; Minor
- **Sample Program Guide:**
catalog.ndsu.edu/programs-study/undergraduate/physics/#planofstudytext (<http://catalog.ndsu.edu/programs-study/undergraduate/physics/#planofstudytext>)

Major Requirements

Major: Physics (Standard & Optical Science and Engineering Options)

Degree Type: B.A. or B.S.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (<http://catalog.ndsu.edu/past-bulletin-archive/2023-24/academic-policies/undergraduate-policies/degree-and-graduation/>) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

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May be satisfied by completing courses in another General Education category.

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General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (<http://catalog.ndsu.edu/past-bulletin-archive/2023-24/academic-policies/undergraduate-policies/general-education/#genedcoursestext>).

College Requirements

Code	Title	Credits
Bachelor of Arts (BA) Degree – An additional 12 credits Humanities and Social Sciences and proficiency at the second year level in a modern foreign language.*		12
Bachelor of Science (BS) Degree – An additional 6 credits in Humanities or Social Sciences *		6

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Humanities and Social Sciences may be fulfilled by any course having the following prefix: ADHM, ANTH, ARCH, ART, CJ, CLAS, COMM, ECON, ENGL, FREN, GEOG, GERM, HDFS, HIST, LA, LANG, MUSC, PHIL, POLS, PSYC, RELS, SOC, SPAN, THEA, WGS, or any course from the approved list of general education courses in humanities and social sciences (general education categories A and B). These credits must come from outside the department of the student's major.

Physics Major Requirements

A grade of 'C' or better is required for all PHYS and AST prefix courses.

Code	Title	Credits
Major Core Requirements		
PHYS 171	Introductory Projects in Physics	1
PHYS 251 & 251L	University Physics I and University Physics I Laboratory (May satisfy general education category S)	5
PHYS 252 & 252L	University Physics II and University Physics II Laboratory (May satisfy general education category S)	5
PHYS 350	Modern Physics	3
PHYS 355	Classical Mechanics	3
PHYS 360	Modern Physics II	3
PHYS 361	Electromagnetic Theory (or PHY 370: Electromagnetic Theory from MSUM)	3
PHYS 370	Introduction to Computational Physics	3
PHYS 411 & 411L	Optics for Scientists & Engineers and Optics for Scientists and Engineers Lab	4
PHYS 462	Thermal and Statistical Physics	3
PHYS 485	Quantum Mechanics I	3
PHYS 486	Quantum Mechanics II	3
PHYS 488	Senior Project I	1
PHYS 489	Senior Project II	2
CSCI 160 or ECE 173	Computer Science I Introduction to Computing	4
MATH 129 or MATH 329	Basic Linear Algebra Intermediate Linear Algebra	3
MATH 165	Calculus I (May satisfy general education category R)	4
MATH 166	Calculus II	4
MATH 265	Calculus III	4
MATH 266	Introduction to Differential Equations	3
MATH Electives - Select 6 credits from the following:		6
MATH 270	Introduction to Abstract Mathematics	
MATH 400 Level		
Select one of the following chemistry sequences (150/160 is recommended):		4
CHEM 150 & CHEM 160	Principles of Chemistry I and Principles of Chemistry Laboratory I	
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	
Select one of the following chemistry sequences (151/161 recommended):		4
CHEM 151 & CHEM 161	Principles of Chemistry II and Principles of Chemistry Laboratory II	

CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	
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Option Requirement

Select either the Standard option or the Optical Science & Engineering option to complete this major (requirements below). 10

Total Credits 88

Code	Title	Credits
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STANDARD OPTION

CSCI 161	Computer Science II	4
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Physics Electives: Select two courses from the following: 6

PHYS 215	Research For Undergraduates	
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PHYS 413	Lasers for Scientists and Engineers	
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PHYS 415	Elements of Photonics	
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PHYS 481	Materials Physics	
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MSUM AST	Astronomy courses (300/400 level) with departmental approval	
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PHYS 357	Concordia College Astrophysics	
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PHYS 419	Concordia College Introduction to General Relativity	
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Total Credits 10

Code	Title	Credits
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OPTICAL SCIENCE AND ENGINEERING OPTION

PHYS 413	Lasers for Scientists and Engineers	3
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PHYS 415	Elements of Photonics	3
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EE 206	Circuit Analysis I	4
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Total Credits 10

Program Notes

- Except for courses offered only as pass/fail grading, no course may be taken Pass/Fail.

Minor Requirements**Minor: Physics**

Required Credits: 19

Code	Title	Credits
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Required Courses

PHYS 251	University Physics I	4
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PHYS 252	University Physics II	4
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PHYS 252L	University Physics II Laboratory	1
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PHYS 350	Modern Physics	3
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Electives: Select 7 credits from the following: 7

PHYS 171	Introductory Projects in Physics	
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PHYS 251L	University Physics I Laboratory	
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PHYS 215	Research For Undergraduates	
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Any 300-400 level Physics course		
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ME 221 and ME 222 may be substituted for PHYS 251 and PHYS 251L		
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Total Credits 19

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.