

PHYSICS COMPREHENSIVE, BACHELOR OF SCIENCE

Offered by Department of Physics and Astronomy (<http://catalog.unk.edu/undergraduate/departments-programs/physics-astronomy/>)

Code	Title	Credit Hours
General Education		
<i>Foundational Requirements (LOPERs 1-4)</i>		14
Including:		
LOPER 4: Mathematics, Statistics, and Quantitative Reasoning		
MATH 115	Calculus I with Analytic Geometry ¹	
<i>Broad Knowledge Requirements (LOPERs 5-8)</i>		11
Including:		
Take any one course in LOPER 5, LOPER 6, or LOPER 7 that satisfies a Dispositional Requirement (LOPER 9 or LOPER 10) and a Broad Knowledge Requirement. The courses that meet these criteria are listed at https://catalog.unk.edu/undergraduate/general-studies/courses-satisfy-broad-knowledge-dispositional (https://catalog.unk.edu/undergraduate/general-studies/courses-satisfy-broad-knowledge-dispositional/). See advisor for assistance.		
LOPER 8: Natural Sciences		
PHYS 275	General Physics I (Calculus)	
PHYS 275L	General Physics I (Calculus) Laboratory	
<i>Dispositional Requirements (LOPERs 9-10) ²</i>		6
<i>Wellness (LOPER 11) Optional</i>		0
BS Science-related course requirements		8
MATH 202	Calculus II with Analytic Geometry	
MATH 305	Differential Equations	
Program Specified Requirements		5
PHYS 276	General Physics II (Calculus)	
PHYS 276L	General Physics II (Calculus) Laboratory	
Major Option		
Complete all required courses		56-62
Unrestricted electives		
Needed to reach 120 credit hour minimum		14-20
Total Credit Hours		120

Major Option

Code	Title	Credit Hours
Physics Comprehensive Core Requirements		
PHYS 346	Modern Physics I	4
PHYS 410	Mathematical Techniques in Physics I	3
Physics Comprehensive Math Requirements		
MATH 260	Calculus III	5
Physics Comprehensive Chemistry Requirements		
CHEM 160	General Chemistry	3
CHEM 160L	General Chemistry Laboratory	1

CHEM 161	General Chemistry	3
CHEM 161L	General Chemistry Laboratory	1

Physics Emphasis Requirements

Select one of the following:	36-42
Comprehensive Physics Emphasis	
Engineering Emphasis	
Astrophysics Emphasis	

Total Credit Hours 56-62

Comprehensive Physics Emphasis

Code	Title	Credit Hours
Comprehensive Physics Emphasis Requirements		
PHYS 123	Freshman Physics Seminar	3
PHYS 360	Computational Methods in Physics and Astronomy	3
PHYS 402	Analytic Mechanics	4
PHYS 407	Electricity & Magnetism	4
PHYS 419	Quantum Mechanics	4
PHYS 420	Advanced Physics Laboratory	3
PHYS 430	Optics	3
PHYS 435	Solid State Physics	3
PHYS 440	Thermodynamics and Statistical Mechanics	3
PHYS 495	Research in Physics	3
PHYS 498	Senior Seminar in Physics	3
Total Credit Hours		36

Engineering Emphasis

Code	Title	Credit Hours
Engineering Emphasis Requirements		
<i>Engineering Core Requirements</i>		
ENGR 101	Introduction to Engineering	3
<i>Physics Elective Requirements</i>		
Select 9 credit hours from the following courses:		9
PHYS 350	Astrophysics I	
PHYS 351	Astrophysics II	
PHYS 360	Computational Methods in Physics and Astronomy	
PHYS 361	Astronomy Methods II	
PHYS 402	Analytic Mechanics	
PHYS 407	Electricity & Magnetism	
PHYS 419	Quantum Mechanics	
PHYS 420	Advanced Physics Laboratory	
PHYS 430	Optics	
PHYS 435	Solid State Physics	
PHYS 440	Thermodynamics and Statistical Mechanics	
PHYS 495	Research in Physics	
<i>Engineering Electives</i>		11
ENGR 130	Computer Aided Drafting for Mechanical Engineering	

ENGR 155	Engineering Problem Solving: MATLAB
ENGR 200	Engineering Thermodynamics
ENGR 215	Engineering Circuits I
ENGR 216	Engineering Circuits II
ENGR 223	Engineering Statics
ENGR 325	Mechanics of Materials
ENGR 373	Engineering Dynamics

Students must take 18 credit hours of engineering classes at 300 level or above from an ABET (Accreditation Board of Engineering and Technology) accredited university. Three of these hours must demonstrate experiential learning, e.g. Senior Engineering Design.

Total Credit Hours 41

Astrophysics Emphasis

Code	Title	Credit Hours
Astrophysics Emphasis Requirements		
PHYS 123	Freshman Physics Seminar	3
PHYS 210	Astronomy	3
PHYS 350	Astrophysics I	3
PHYS 351	Astrophysics II	3
PHYS 360	Computational Methods in Physics and Astronomy	3
PHYS 361	Astronomy Methods II	3
PHYS 402	Analytic Mechanics	4
PHYS 407	Electricity & Magnetism	4
PHYS 419	Quantum Mechanics	4
PHYS 430	Optics	3
PHYS 440	Thermodynamics and Statistical Mechanics	3
PHYS 495	Research in Physics	3
PHYS 498	Senior Seminar in Physics	3
Total Credit Hours		42

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Students without sufficient preparation will also need to take the following courses, increasing the total credit hours needed:

- MATH 102
- MATH 103

2

Designated courses with the appropriate content may be approved to satisfy one of the Broad Knowledge requirements plus LOPER 9 or Broad Knowledge plus LOPER 10. Courses may be approved to satisfy LOPER 9 or LOPER 10 alone. (Courses satisfying LOPER 9 or LOPER 10 alone must be 3 credit hours.) Students applying this option will need to take additional hours in other categories to meet the required General Education hours.

This document represents a sample 4-year plan for degree completion with this major. Actual course selection and sequence may vary and should be discussed individually with your academic advisor. Advisors can also help you plan other experiences to enrich your undergraduate education such as internships, education abroad, undergraduate research, learning communities, and service learning and community-based learning.

Code	Title	Credit Hours
Semester 1		
LOPER 1: First-year Seminar		3
PHYS 123	Freshman Physics Seminar	3
MATH 115	Calculus I with Analytic Geometry	5
LOPER 2: Writing Skills		3
Total Credit Hours		14

Code	Title	Credit Hours
Semester 2		
PHYS 275 & 275L	General Physics I (Calculus) and General Physics I (Calculus) Laboratory	5
MATH 202	Calculus II with Analytic Geometry	5
LOPER 3: Oral Communication Skills		3
LOPER 5: Visual or Performing Arts		3
Total Credit Hours		16

Code	Title	Credit Hours
Semester 3		
PHYS 276 & 276L	General Physics II (Calculus) and General Physics II (Calculus) Laboratory	5
MATH 260	Calculus III	5
CHEM 160 & 160L	General Chemistry and General Chemistry Laboratory	4
Total Credit Hours		14

Code	Title	Credit Hours
Semester 4		
PHYS 346	Modern Physics I	4
PHYS 410	Mathematical Techniques in Physics I	3
MATH 305	Differential Equations	3
CHEM 161 & 161L	General Chemistry and General Chemistry Laboratory	4
Total Credit Hours		14

Code	Title	Credit Hours
Semester 5		
PHYS 360	Computational Methods in Physics and Astronomy	3
PHYS 407	Electricity & Magnetism	4
PHYS 430	Optics	3
LOPER 6: Humanities		3
LOPER 7: Social Science		3
Total Credit Hours		16

Code	Title	Credit Hours
Semester 6		
PHYS 419	Quantum Mechanics	4
PHYS 420	Advanced Physics Laboratory	3
LOPER 9: Civic Competency and Engagement		3
LOPER 10: Respect for Human Diversity		3
Unrestricted Elective		3
Total Credit Hours		16

Code	Title	Credit Hours
Semester 7		
PHYS 402	Analytic Mechanics	4
PHYS 440	Thermodynamics and Statistical Mechanics	3
PHYS 495	Research in Physics	3
Unrestricted Elective		3
Unrestricted Elective		3
Total Credit Hours		16

Code	Title	Credit Hours
Semester 8		
PHYS 435	Solid State Physics	3
PHYS 498	Senior Seminar in Physics	3
Unrestricted Elective		3
Unrestricted Elective		3
Unrestricted Elective		3
Total Credit Hours		15

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Code	Title	Credit Hours
Semester 1		
LOPER 1: First-year Seminar		3
PHYS 123	Freshman Physics Seminar	3
MATH 115	Calculus I with Analytic Geometry	5
LOPER 2: Writing Skills		3
LOPER 3: Oral Communication Skills		3
Total Credit Hours		17

Code	Title	Credit Hours
Semester 2		
PHYS 275 & 275L	General Physics I (Calculus) and General Physics I (Calculus) Laboratory	5
MATH 202	Calculus II with Analytic Geometry	5

PHYS 210	Astronomy	3
LOPER 5: Visual or Performing Arts		3
Total Credit Hours		16

Code	Title	Credit Hours
Semester 3		
PHYS 276 & 276L	General Physics II (Calculus) and General Physics II (Calculus) Laboratory	5
MATH 260	Calculus III	5
CHEM 160 & 160L	General Chemistry and General Chemistry Laboratory	4
Total Credit Hours		14

Code	Title	Credit Hours
Semester 4		
PHYS 346	Modern Physics I	4
PHYS 410	Mathematical Techniques in Physics I	3
MATH 305	Differential Equations	3
CHEM 161 & 161L	General Chemistry and General Chemistry Laboratory	4
Total Credit Hours		14

Code	Title	Credit Hours
Semester 5		
PHYS 360	Computational Methods in Physics and Astronomy	3
PHYS 407	Electricity & Magnetism	4
PHYS 430	Optics	3
LOPER 6: Humanities		3
LOPER 7: Social Science		3
Total Credit Hours		16

Code	Title	Credit Hours
Semester 6		
PHYS 419	Quantum Mechanics	4
PHYS 361	Astronomy Methods II	3
LOPER 9: Civic Competency and Engagement		3
LOPER 10: Respect for Human Diversity		3
Unrestricted Elective		3
Total Credit Hours		16

Code	Title	Credit Hours
Semester 7		
PHYS 402	Analytic Mechanics	4
PHYS 440	Thermodynamics and Statistical Mechanics	3
PHYS 495	Research in Physics	3
PHYS 350	Astrophysics I	3

Unrestricted Elective	2
Total Credit Hours	15

Code	Title	Credit Hours
Semester 8		
PHYS 351	Astrophysics II	3
PHYS 498	Senior Seminar in Physics	3
Unrestricted Elective		3
Unrestricted Elective		3
Unrestricted Elective		3
Total Credit Hours		15

This document represents a sample 4-year plan for degree completion with this major. Actual course selection and sequence may vary and should be discussed individually with your academic advisor. Advisors can also help you plan other experiences to enrich your undergraduate education such as internships, education abroad, undergraduate research, learning communities, and service learning and community-based learning.

Code	Title	Credit Hours
Semester 1		
LOPER 1: First-year Seminar		3
ENGR 101	Introduction to Engineering	3
MATH 115	Calculus I with Analytic Geometry	5
LOPER 2: Writing Skills		3
LOPER 3: Oral Communication Skills		3
Total Credit Hours		17

Code	Title	Credit Hours
Semester 2		
PHYS 275 & 275L	General Physics I (Calculus) and General Physics I (Calculus) Laboratory	5
MATH 202	Calculus II with Analytic Geometry	5
LOPER 5: Visual or Performing Arts		3
LOPER 6: Humanities		3
Total Credit Hours		16

Code	Title	Credit Hours
Semester 3		
PHYS 276 & 276L	General Physics II (Calculus) and General Physics II (Calculus) Laboratory	5
MATH 260	Calculus III	5
CHEM 160 & 160L	General Chemistry and General Chemistry Laboratory	4
ENGR Elective		3
Total Credit Hours		17

Code	Title	Credit Hours
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Semester 4		
PHYS 346	Modern Physics I	4
PHYS 410	Mathematical Techniques in Physics I	3
MATH 305	Differential Equations	3
CHEM 161 & 161L	General Chemistry and General Chemistry Laboratory	4
ENGR Elective		3
Total Credit Hours		17

Code	Title	Credit Hours
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Semester 5		
ENGR Elective		4
PHYS Elective		4
LOPER 7: Social Science		3
LOPER 9: Civic Competency and Engagement		3
Unrestricted Elective		3
Total Credit Hours		17

Code	Title	Credit Hours
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Semester 6		
ENGR Elective		3
PHYS Elective		3
PHYS Elective		3
LOPER 10: Respect for Human Diversity		3
Unrestricted Elective		3
Total Credit Hours		15

Code	Title	Credit Hours
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Semester 7		
Semester is spent at UNL for completion of 3+2 degree. For this semester, see UNL for suggested class schedule.		

Code	Title	Credit Hours
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Semester 8		
Semester is spent at UNL for completion of 3+2 degree. For this semester, see UNL for suggested class schedule.		

Students may take ACE (<https://ace.unl.edu/courses/listing/>) courses in place of LOPER courses to fulfill General Education requirements. See your advisor for more information.