PHYSICS / BACHELOR OF SCIENCE

Total Credit Hours: 120-121
Major Credit Hours: 72

The B.S. degree gives students an excellent grounding in the fundamentals of physics with training in theoretical, computational, and experimental treatments of physics principles, phenomena, and applications. Students are also encouraged to get involved in research activities within the department. This program prepares students for entry into graduate programs in physics, astrophysics, medical physics, engineering, and other STEM fields. It also opens the door to a broad range of employment options in the both the public and private sectors, including employment in industry, in secondary education, and at national labs.

Requirements

Degree Requirements

The following courses must be completed in order to earn a B.S. in Physics.

A grade of "C-" or better must be earned in a prerequisite course in order to advance to the next course in the sequence unless otherwise noted in the catalog description. An overall GPA of 2.0 must be earned in the major in order for a student to graduate with a B.S. in Physics. Physics majors and minors may take a Physics class only two times. If a student has not achieved a minimum of a "C-" after the second attempt, the student may not repeat the class without the approval of the Physics Chair.

Physics majors with a Chemical Physics concentration may not double major or minor in chemistry. Physics majors with an Engineering Physics concentration may not minor in mechanical engineering.

In the Applied Physics concentration, students take a core set of physics courses and labs and either select a set of technical electives at Lewis University in consultation with their advisor or enter the five-year dual degree program leading to a B.S. in Mechanical Engineering from Northern Illinois University in addition to the B.S. in Physics (Applied Physics concentration) from Lewis University. The flexibility offered by the Applied Physics concentration is advantageous for students who wish to create individual programs of study to suit their interests and career goals, especially those who want to pursue careers in interdisciplinary fields like computational physics, environmental physics, or medical physics or who intend to enter graduate programs in Applied Physics, or related fields.

Code	Title	Hours
Core Courses		
CHEM 11000	General Chemistry 1 and Laboratory	4
MATH 20900	Calculus 1	4
MATH 23500	Calculus 2	4
MATH 25000	Calculus 3	4
MATH 30000	Differential Equations	3
PHYS 21000	General Physics 1	3
PHYS 21100	General Physics 1 Lab	1
PHYS 21500	General Physics 2	3
PHYS 21600	General Physics 2 Lab	1
PHYS 21800	General Physics 3	3
PHYS 21900	General Physics 3 Lab	1
PHYS 29600	Research Methods Seminar	1
PHYS 30000	Mechanics	4
PHYS 36500	Intermediate Physics Laboratory	3
PHYS 49600	Physics Seminar	1
Concentration		
Select one of the following Concentrations:		32
Advanced Physics Concentration (p. 1)		
Engineering Physics Concentration (p. 2)		
Applied Physics Concentration (p. 2)		
Chemical Physics Concentration (p. 3)		
Total Hours		**72**

Advanced Physics Concentration

Concentration: APHY

Code	Title	Hours
PHYS 31000	Electricity and Magnetism	4
PHYS 34100	Modern Physics	3
PHYS 44100	Quantum Mechanics	3
PHYS 46500	Capstone Project	1
Select one of the following thermodynamics courses:		3
CHEM 30000	Physical Chemistry I	
MMEG 35000	Engineering Thermodynamics	
PHYS 33100	Thermodynamics	
PHYS 31100	Analog and Digital Electronics	4
or PHYS 31800	Optics	
PHYS 40100	Computational Mechanics	3
or PHYS 41100	Computational Electrodynamics	
Select one of the following Computation courses:		3
CPSC 20000	Introduction to Computer Science	
CPSC 31500	Scientific Computing	
DATA 20000	Introduction to Data Science	
MATH 35000	Numerical Analysis	
MATH 36500	Mathematical Modeling	
Technical Electives		
Select at least eight additional hours of electives of the following: [1]		8
CHEM 11500	General Chemistry 2 and Laboratory	
MATH 22000	Applied Probability and Statistics	
PHYS 10500	Introduction to Astronomy	
PHYS 12400	Foundations of Physical Science	
Any 30000 or 40000 level Mathematics (MATH) or Physics (PHYS) course		
Any 20000, 30000, or 40000 level Chemistry (CHEM), Electrical and Computer Engineering (ECEN), Data Science (DATA), Computer Science (CPSC), or Mechanical and Materials Engineering(MMEG) course		
Total Hours		**32**

[1] The technical electives may not be used to satisfy other Physics major or concentration requirements. Mathematics minors cannot

use any 30000 or 40000 level Mathematics course to satisfy both this requirement and a Mathematics minor requirement.

PHYS 37100 Workshop in Physics may be taken multiple times for credit if different topics are offered. Up to two credit hours may be applied toward completion of these elective credits.

PHYS 47000 Undergraduate Research may be taken multiple times for credit. Up to six credit hours may be applied toward completion of these elective credits.

PHYS 49800 Special Topics in Physics may be taken multiple times for credit if different topics are offered. Up to nine credit hours may be applied toward completion of these elective credits.

PHYS 49900 Independent Study may be taken multiple times for credit. Up to three credit hours may be applied toward completion of these elective credits.

Engineering Physics Concentration

Concentration: EPHY

Code	Title	Hours
ECEN 20000	Engineering Design and Tools	3
MMEG 21000	Engineering Mechanics: Statics	3
MMEG 21100	Engineering Mechanics: Dynamics	3
MMEG 35000	Engineering Thermodynamics	3
PHYS 31000	Electricity and Magnetism	4
PHYS 34100	Modern Physics	3
PHYS 46500	Capstone Project	1
Engineering Elective [1]		
Any 30000-level or 40000-level Electrical and Computer Engineering (ECEN) or Mechanical Engineering (MMEG) course		3
Technical Electives [1]		
Select nine credits of technical electives of the following:		9
CHEM 11500	General Chemistry 2 and Laboratory	
CPSC 20000	Introduction to Computer Science	
CPSC 31500	Scientific Computing	
MATH 22000	Applied Probability and Statistics	
MATH 30500	Linear Algebra	
MATH 35000	Numerical Analysis	
MATH 36500	Mathematical Modeling	
PHYS 12400	Foundations of Physical Science	
Any 20000-level, 30000-level or 40000-level Electrical and Computer Engineering (ECEN) or Mechanical Engineering (MMEG) courses		
Any 30000-level or 40000-level Physics courses		
Total Hours		**32**

[1] The engineering elective and technical electives may not be used to satisfy the other Physics major or concentration requirements. Any course prerequisites must be met. Students should plan electives early with their advisor since some of these can be used to satisfy prerequisites for 30000 or 40000 level engineering electives.

PHYS 37100 Workshop in Physics may be taken multiple times for credit if different topics are offered. Up to two credit hours may be applied toward completion of these elective credits.

PHYS 47000 Undergraduate Research may be taken multiple times for credit. Up to six credit hours may be applied toward completion of these elective credits.

PHYS 49800 Special Topics in Physics may be taken multiple times for credit if different topics are offered. Up to six credit hours may be applied toward completion of these elective credits.

PHYS 49900 Independent Study may be taken multiple times for credit. Up to three credit hours may be applied toward completion of these elective credits.

Applied Physics Concentration

Concentration: APHY

Code	Title	Hours
PHYS 34100	Modern Physics	3
PHYS 46500	Capstone Project	1
PHYS 31000	Electricity and Magnetism	4
or PHYS 31100 Analog and Digital Electronics		
Select one of the following Computation courses:		3
CPSC 20000	Introduction to Computer Science	
CPSC 31500	Scientific Computing	
DATA 20000	Introduction to Data Science	
MATH 35000	Numerical Analysis	
MATH 36500	Mathematical Modeling	
Technical Electives		
Select 21 hours of technical electives of the following: [1]		21
Any Chemistry (CHEM), Biology (BIOL), Electrical and Computer Engineering (ECEN), Data Science (DATA), Materials and Mechanical Engineering (MMEG), and/or Physics (PHYS) courses		
Any 20000, 30000, or 40000 level Computer Science (CPSC) course		
Any Mathematics course (MATH 19900 or higher)		
Total Hours		**32**

[1] The engineering elective and technical electives may not be used to satisfy other Physics major or concentration requirements. Any course prerequisites must be met. At least six credit hours must be at the 30000 or 40000 level.

PHYS 37100 Workshop in Physics may be taken multiple times for credit if different topics are offered. Up to two credit hours may be applied toward completion of these elective credits.

PHYS 47000 Undergraduate Research may be taken multiple times for credit. Up to six credit hours may be applied toward completion of these elective credits.

PHYS 49800 Special Topics in Physics may be taken multiple times for credit if different topics are offered. Up to nine credit hours may be applied toward completion of these elective credits.

PHYS 49900 Independent Study may be taken multiple times for credit. Up to three credit hours may be applied toward completion of these elective credits.

Chemical Physics Concentration

Concentration: CHPH

Code	Title	Hours
CHEM 11500	General Chemistry 2 and Laboratory	4
CHEM 23000	Organic Chemistry I	3
CHEM 23200	Fundamental Spectroscopy	2
CHEM 30000	Physical Chemistry I	3
CHEM 30100	Physical Chemistry I Lab	1
CHEM 30500	Physical Chemistry 2	3
CHEM 30600	Physical Chemistry 2 Lab	1
CHEM 33200	Advanced Instrumental Analysis	2
PHYS 31000	Electricity and Magnetism	4
PHYS 46500	Capstone Project	1
CHEM 24200	Introduction to Solid State Chemistry	2
or PHYS 34200	Applied Modern Physics: Atoms, Molecules, and Condensed Matter	
Technical Electives		
Select at least six hours of the following: [1]		6
PHYS 12400	Foundations of Physical Science	
Any 30000 or 40000 level Physics (PHYS) course		
Any 20000, 30000, or 40000 level Chemistry (CHEM) course		
Total Hours		**32**

[1] The technical electives may not be used to satisfy other Physics major or concentration requirements. Any course prerequisites must be met.

PHYS 37100 Workshop in Physics may be taken multiple times for credit if different topics are offered. Up to two credit hours may be applied toward completion of these elective credits.

CHEM 45000 Research and/or PHYS 47000 Undergraduate Research may be taken multiple times for credit. Up to five credit hours may be applied toward completion of these elective credits.

CHEM 47000 Internship may be taken multiple times for credit if different topics are offered. Up to two credit hours may be applied toward completion of these elective credits.

CHEM 49800 Special Topics and/or PHYS 49800 Special Topics in Physics may be taken multiple times for credit if different topics are offered.

PHYS 49900 Independent Study may be taken multiple times for credit. Up to three credit hours may be applied toward completion of these elective credits.