PHYSICS, BACHELOR OF SCIENCE WITH A CONCENTRATION IN BIOMEDICAL PHYSICS

Requirements
The Bachelor of Science (B.S.) degree in physics with concentration in biomedical physics is offered for students who intend to continue education in biological physics, medical physics or go to medical school. To help the prospective physics majors make optimal decisions, they are encouraged to speak with a departmental adviser as early as possible.

To obtain a B.S. with a major in Physics and a concentration in biomedical physics, a student must fulfill university, college, and departmental requirements. Hour requirements follow:

- 46 hours of University General Education courses
  Most commonly, Physics majors do not complete 46 hours of coursework solely for the purpose of meeting University General Education requirements. Instead, they often test out of at least three hours of fundamental academic skills, take courses that meet both the six hours of diversity requirements and six hours of distribution requirements, and meet 4 hours of the natural sciences distribution requirement through completing major courses. In such cases, the number of credit hours taken solely to meet General Education requirements is reduced to 33 or fewer.
- 12-19 hours college breadth requirement
- 55 hours of major courses
- 15-16 hours cognate courses
- 0-4 hours of electives

TOTAL HOURS: 120

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>PHYS 1950</td>
<td>PHYSICS GATEWAY COURSE</td>
<td>1</td>
</tr>
<tr>
<td>PHYS 2110 &amp; PHYS 1154</td>
<td>GENERAL PHYSICS I - CALCULUS LEVEL and GENERAL PHYSICS LABORATORY I</td>
<td>5</td>
</tr>
<tr>
<td>PHYS 2120 &amp; PHYS 1164</td>
<td>GENERAL PHYSICS-CALCULUS LEVEL and GENERAL PHYSICS LABORATORY II</td>
<td>5</td>
</tr>
<tr>
<td>PHYS 2130</td>
<td>MODERN PHYSICS</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 3250</td>
<td>MATHEMATICAL METHODS OF PHYSICS I</td>
<td>3</td>
</tr>
<tr>
<td>MATH 1950</td>
<td>CALCULUS I</td>
<td>5</td>
</tr>
<tr>
<td>MATH 1960</td>
<td>CALCULUS II</td>
<td>4</td>
</tr>
<tr>
<td>MATH 1970</td>
<td>CALCULUS III</td>
<td>4</td>
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</tbody>
</table>

**Physics Core Courses**

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<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>PHYS 3300</td>
<td>INTRODUCTION TO BIOMEDICAL PHYSICS</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 3450</td>
<td>CLASSICAL MECHANICS</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 3600</td>
<td>THERMODYNAMICS AND STATISTICAL PHYSICS</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 3750</td>
<td>ELECTRICITY AND MAGNETISM I</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 3800</td>
<td>OPTICS</td>
<td>3</td>
</tr>
</tbody>
</table>

**Advanced Laboratory**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>PHYS 3504</td>
<td>EXPERIMENTAL PHYSICS I</td>
<td>1</td>
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</tbody>
</table>

Select one of the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 3524</td>
<td>EXPERIMENTAL MATERIALS SCIENCE</td>
<td>1</td>
</tr>
<tr>
<td>PHYS 3544</td>
<td>EXPERIMENTAL PHYSICS III</td>
<td></td>
</tr>
<tr>
<td>PHYS 3564</td>
<td>EXPERIMENTAL PHYSICS IV</td>
<td></td>
</tr>
</tbody>
</table>

**Senior Project and Physics Electives**

In addition to the above requirements, a senior project is mandatory, requiring 1 credit in either PHYS 4950 or PHYS 4960.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 4950</td>
<td>PROBLEMS IN PHYSICS</td>
<td>1</td>
</tr>
<tr>
<td>or PHYS 4960</td>
<td>PROBLEMS IN PHYSICS</td>
<td></td>
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The following two upper level electives are also required:

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>PHYS 4500</td>
<td>BIOLOGICAL PHYSICS</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 4550</td>
<td>PHYSICS IN MEDICINE</td>
<td>3</td>
</tr>
</tbody>
</table>

**Total Credits**: 55

1 Students taking a number of 2000-level mathematics courses may be permitted to waive PHYS 3250 or PHYS 3260.

2 Please see more details about the senior project in the “Other Information” portion of the physics section.

### Recommended Courses from other disciplines

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 1180 &amp; CHEM 1184</td>
<td>GENERAL CHEMISTRY I and GENERAL CHEMISTRY I LABORATORY</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 1190 &amp; CHEM 1194</td>
<td>GENERAL CHEMISTRY II and GENERAL CHEMISTRY II LABORATORY</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 2250</td>
<td>ORGANIC CHEMISTRY I</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 2260 &amp; CHEM 2274</td>
<td>ORGANIC CHEMISTRY II and ORGANIC CHEMISTRY LABORATORY</td>
<td>5</td>
</tr>
</tbody>
</table>

Select one of the following options:

**Option I**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 4610</td>
<td>BIOCHEMISTRY OF METABOLISM</td>
<td>4</td>
</tr>
</tbody>
</table>

**Option II**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>BIOL 1450</td>
<td>BIOLOGY I</td>
<td>5</td>
</tr>
<tr>
<td>BIOL 1750</td>
<td>BIOLOGY II</td>
<td>5</td>
</tr>
<tr>
<td>CHEM 4650 &amp; CHEM 4654</td>
<td>BIOCHEMISTRY I and BIOCHEMISTRY I LABORATORY</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 4660 &amp; CHEM 4664</td>
<td>BIOCHEMISTRY II and BIOCHEMISTRY II LABORATORY</td>
<td>4</td>
</tr>
</tbody>
</table>

**Freshman**

**Fall**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMST 1110 or CMST 2120</td>
<td>PUBLIC SPEAKING FUNDS or ARGUMENTATION AND DEBATE</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 1150</td>
<td>ENGLISH COMPOSITION I (*)</td>
<td>3</td>
</tr>
</tbody>
</table>

### Credits

*ENGL 1150: Requires appropriate placement.
**MATH 1950: Requires ALEKS Exam or ACT or SAT scores OR grades of C- or better within the past 2 years in both Math 1320 and 1330 or Math 1340.

**Spring**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL 1160</td>
<td>ENGLISH COMPOSITION II (*)</td>
<td>3</td>
</tr>
<tr>
<td>MATH 1960</td>
<td>CALCULUS II</td>
<td>4</td>
</tr>
</tbody>
</table>
PHYS 2110 & PHYS 1154
GENERAL PHYSICS I - CALCULUS LEVEL
and GENERAL PHYSICS LABORATORY I

PHYS 2120 & PHYS 1164
GENERAL PHYSICS-CALCULUS LEVEL
and GENERAL PHYSICS LABORATORY II

PHYS 3300
INTRODUCTION TO BIOMEDICAL PHYSICS

Humanities & Fine Arts Course #2
*ENGL 1160: Requires ENGL 1150 or placement via AP or EPPE.
**PHYS 2110: Requires MATH 1950.

Credits
15

Sophomore
Fall
MATH 1970
CALCULUS III

PHYS 2120
GENERAL PHYSICS-CALCULUS LEVEL
and GENERAL PHYSICS LABORATORY II

PHYS 3300
INTRODUCTION TO BIOMEDICAL PHYSICS

Social Science Course #1 & US Diversity
**PHYS 2120: Requires PHYS 2110 - PHYS 1154 and MATH 1960.
**PHYS 3300: Requires PHYS 2110.

Credits
15

Spring
PHYS 2130
MODERN PHYSICS

PHYS 3250
MATHEMATICAL METHODS OF PHYSICS

Natural/Physical Science no Lab***

Social Science #2

Humanities & Fine Arts Course #3^*PHYS 2130: Requires PHYS 2110, PHYS 2120, MATH 1950, and MATH 1960.
***NPS Must be in a field other than PHYS.
^HFA Must be in a 2nd discipline.

Credits
16

Junior
Fall
PHYS 3504
EXPERIMENTAL PHYSICS I

PHYS 3750
ELECTRICITY AND MAGNETISM I

PHYS 4500 or PHYS 4550
BIOLOGICAL PHYSICS

or PHYSICS IN MEDICINE

Social Science #3^*HFA Must be in a 2nd discipline.

Humanities & Fine Arts Gen Ed for A&S or Course towards Minor/2nd Major/Cognate Course

HIST 1000 or Course towards Minor/2nd Major/Cognate Course
**PHYS 3504: Requires PHYS 2120.
***PHYS 4500: Requires PHYS 2110, PHYS 2120 and 3300 recommended. PHYS 4550 Requires PHYS 2120 and 2110, and PHYS 2130 for PHYS majors. PHYS 3300 and PHYS 4500 are recommended.
***Must take both PHYS 4500 and PHYS 4550. PHYS 4500 is offered only in Fall of odd-numbered years. PHYS 4550 is offered only in Fall of even-numbered years.
^A&S College Requirement Options. HFA Must be in a 3rd discipline.

Credits
15

Spring
PHYS 3600
THERMODYNAMICS AND STATISTICAL PHYSICS

PHYS 4500 or PHYS 4550
BIOLOGICAL PHYSICS

or PHYSICS IN MEDICINE

Advanced Laboratory***Advanced Laboratory: Requires PHYS 2120. Options: PHYS 3524, 3544, or 3564. Each is designed to compliment specific classes. See Catalog for details.

Social Science for A&S or Course towards Minor/2nd Major/Cognate Course

Elective or Minor/2nd Major Course/Cognate Course

Elective
**PHYS 3600: Requires PHYS 2120 and MATH 1970.
**PHYS 4500: Requires PHYS 2120 and 3300 recommended. PHYS 4550 Requires PHYS 2120 and 2110, and PHYS 2130 for PHYS majors. PHYS 3300 and PHYS 4500 are recommended.
**Must take both PHYS 4500 and PHYS 4550. PHYS 4500 is offered only in Fall of odd-numbered years. PHYS 4550 is offered only in Fall of even-numbered years.
***Advanced Laboratory: Requires PHYS 2120. Options: PHYS 3524, 3544, or 3564. Each is designed to compliment specific classes. See Catalog for details.
^A&S College Requirement Options. SS must be from 3rd discipline.

Credits
13

Senior
Fall
PHYS 3504
EXPERIMENTAL PHYSICS I

PHYS 3750
ELECTRICITY AND MAGNETISM I

PHYS 4500 or PHYS 4550
BIOLOGICAL PHYSICS

or PHYSICS IN MEDICINE

Social Science #3^A&S College Requirement Options. HFA Must be in a 3rd discipline.

Upper Level PHYS Elective

Elective or Minor/2nd Major Course/Cognate Course

Elective
**PHYS 4950 and 4960: Requires PHYS 2120 and permission of instructor. See "Graduation Requirements" below for more information.
**27 upper level credits throughout the entire degree are required. Electives may need to be taken at the 3000-4000 level to reach this minimum. 120 total credits are required for a bachelor's degree.

Credits
13

Total Credits
120
This roadmap is a suggested plan of study and does not replace meeting with an advisor. Please note that students may need to adjust the actual sequence of courses based on course availability. Please consult an advisor in your major program for further guidance.

This plan is not a contract and curriculum is subject to change

**Additional Information About this Plan:**

**University Degree Requirements:**
The minimum number of hours for a UNO undergraduate degree is 120 credit hours. Please review the requirements for your specific program to determine all requirements for the program. In order to graduate on-time (four years for an undergraduate degree), you need to take 30 hours each year.

**Placement Exams:**
For Math, English, Foreign Language, a placement exam may be required. More information on these exams can be found at [https://www.unomaha.edu/enrollment-management/testing-center/placement-exams/information.php](https://www.unomaha.edu/enrollment-management/testing-center/placement-exams/information.php)

**Transfer credit or placement exam scores may change suggested plan of study**

**GPA Requirements: 2.0**

**Graduation Requirements:** Physics majors must also take the two assessment tests (Major Field Test and Local test) and complete the exit interview.

The senior project must be approved and the department chair notified at least eight months prior to graduation as a Physics major and the student must register for either PHYS 4950 ([https://catalog.unomaha.edu/search/?P=PHYS%204950](https://catalog.unomaha.edu/search/?P=PHYS%204950)) or PHYS 4960 ([https://catalog.unomaha.edu/search/?P=PHYS%204960](https://catalog.unomaha.edu/search/?P=PHYS%204960)).