Biomedical Sciences, B.S.

Learning Outcomes
Graduates of the biomedical sciences program will achieve the following.

• Foundational Knowledge: Comprehension of Fundamental Principles and Concepts in the Natural and Social Sciences
  Graduates will be able to:
  - integrate across the natural and social sciences;
  - apply foundational knowledge and conceptual frameworks to biomedicine;
  - recognize the consequences of evolutionary history in the understanding of human biology and disease;
  - evaluate new information reported in the news and/or in scientific publications against prior knowledge.

• New Discovery: Scientific Reasoning and Experimental Process in Biomedicine
  Graduates will be able to:
  - perform basic laboratory procedures, including correct operation of devices;
  - formulate questions about natural processes based on current knowledge;
  - construct a hypothesis to guide experimental enquiry;
  - design experiments, identifying variables of analysis and controls for error;
  - consider appropriate strategies or technologies applicable to investigate a novel problem;
  - collect, organize, summarize, and interpret data; and
  - analyze and evaluate experimental results to inform a hypothesis; and
  - distinguish between necessary and sufficient causes.

• Quantitative Skills: Mathematical Reasoning and Basic Numeracy Applied to Biomedicine
  Graduates will be able to:
  - perform essential mathematical operations such as unit conversions, dilutions, and molarity calculations;
  - apply mathematical concepts and rules of probability to make predictions;
  - select and apply appropriate statistical tests to determine significance of experimental results; and
  - use mathematical and/or statistical expressions to evaluate hypotheses with experimental data.

• Information Literacy: Acquisition, Analysis, and Summary of Published Biomedical Information
  Graduates will be able to:
  - locate and evaluate the relevance and credibility of information from electronic and print sources;
  - navigate and obtain relevant information from public databases;
  - recognize and appropriately cite sources of information;
  - identify questions addressed and methodologies used; and
  - assess findings reported and conclusions drawn in published scientific articles.

• Communication Proficiency: Written and Oral Presentation of Biomedical Information
  Graduates will be able to:
  - write concise scientific reports based on findings or literature searches;
  - construct visual presentations of results or findings from the scientific literature; and
  - present findings or results from the literature orally with appropriate media.

Requirements
The Bachelor of Science with a major in biomedical sciences requires a minimum of 120 s.h., including at least 78-83 s.h. of work for the major. Students must maintain a g.p.a. of at least 2.00 in all courses for the major and in all UI courses for the major. They also must complete the College of Liberal Arts and Sciences GE CLAS Core.

The interdisciplinary major provides an excellent foundation for medical training and for research and/or practice in the chemical, genetic, cellular, and physiological bases of human disease. The curriculum includes required and elective course work in biochemistry, biology, chemistry, health and human physiology, mathematics, microbiology and immunology, physics, psychology, sociology, and statistics. Students who wish to apply transfer credit toward the major should consult their departmental advisor.

The B.S. with a major in biomedical sciences requires the following course work.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Required Courses</td>
<td>62-63</td>
</tr>
<tr>
<td></td>
<td>Elective Courses</td>
<td>16-20</td>
</tr>
<tr>
<td></td>
<td>Total Hours</td>
<td>78-83</td>
</tr>
</tbody>
</table>

Required Courses
Students complete the following course work (62-63 s.h.).

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Chemistry</strong></td>
<td></td>
</tr>
<tr>
<td>All of these:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOC:3120</td>
<td>Biochemistry and Molecular Biology I</td>
<td>3</td>
</tr>
<tr>
<td>BIOC:3130</td>
<td>Biochemistry and Molecular Biology II</td>
<td>3</td>
</tr>
<tr>
<td>CHEM:1110</td>
<td>Principles of Chemistry I</td>
<td>4</td>
</tr>
<tr>
<td>CHEM:1120</td>
<td>Principles of Chemistry II</td>
<td>4</td>
</tr>
<tr>
<td>CHEM:2210</td>
<td>Organic Chemistry I</td>
<td>3</td>
</tr>
<tr>
<td>CHEM:2220</td>
<td>Organic Chemistry II</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td><strong>Life Sciences</strong></td>
<td></td>
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<td></td>
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</tbody>
</table>
All of these:
- BIOL:1411 Foundations of Biology 4
- BIOL:2211 Genes, Genomes, and the Human Condition 3
- BIOL:3373 Human Population Genetics and Variation 3
- HHP:3500 Human Physiology 3
- MICR:2157-2158 General Microbiology 5

Mathematics
One of these:
- MATH:1460 Calculus for the Biological Sciences 4
- MATH:1550 Engineering Mathematics I: Single Variable Calculus 4
- MATH:1850 Calculus I 4

Statistics
This course:
- STAT:3510 Biostatistics 3

Physics
One of these sequences:
- PHYS:1511-1512 College Physics I-II 8
- PHYS:1611-1612 Introductory Physics I-II 8

Social Sciences
All of these:
- PSY:1001 Elementary Psychology 3
- PSY:2130 Advanced Psychology for Pre-Medical Track 3
- SOC:1010 Introduction to Sociology 3-4

Elective Courses
Students complete a total of 16-20 s.h. of elective course work chosen from the following lists.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL:3626</td>
<td>Cell Biology Laboratory</td>
<td>4</td>
</tr>
<tr>
<td>BIOL:3656</td>
<td>Neurobiology Laboratory</td>
<td>4</td>
</tr>
<tr>
<td>BIOL:3676</td>
<td>Evolution Lab</td>
<td>4</td>
</tr>
<tr>
<td>BIOL:3716</td>
<td>Genetics and Biotechnology Lab</td>
<td>4</td>
</tr>
<tr>
<td>BIOL:3736</td>
<td>Developmental Biology Lab</td>
<td>4</td>
</tr>
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Mathematics
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- MATH:1550 Engineering Mathematics I: Single Variable Calculus 4
- MATH:1850 Calculus I 4

Statistics
This course:
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<tr>
<td>BIOL:5241</td>
<td>Biophysical Chemistry I</td>
<td>3</td>
</tr>
<tr>
<td>BIOL:2254</td>
<td>Endocrinology</td>
<td>3</td>
</tr>
<tr>
<td>BIOL:2723</td>
<td>Cell Biology</td>
<td>3</td>
</tr>
<tr>
<td>BIOL:2753</td>
<td>Introduction to Neurobiology</td>
<td>3</td>
</tr>
<tr>
<td>BIOL:3233</td>
<td>Introduction to Developmental Biology</td>
<td>3</td>
</tr>
<tr>
<td>BIOL:3343</td>
<td>Animal Physiology</td>
<td>3</td>
</tr>
<tr>
<td>BIOL:4213</td>
<td>Bioinformatics</td>
<td>4</td>
</tr>
<tr>
<td>MICR:3147</td>
<td>Immunology and Human Disease</td>
<td>3</td>
</tr>
<tr>
<td>MICR:3168</td>
<td>Viruses and Human Disease</td>
<td>3</td>
</tr>
</tbody>
</table>

Chemistry Lab
One of these:
- BIOC:3140 Experimental Biochemistry 2
- CHEM:2410 Organic Chemistry Laboratory 3

Investigative Lab
One of these:
- BIOL:4999 Honors Research in Biology ar.
- Another approved honors research course 6
- An additional lab course 4

Honors
Honors in the Major
Students majoring in biomedical sciences are encouraged to graduate with honors in the major. Honors students in the major may enroll in courses with honors sections offered by the Department of Biology and by other departments and programs. They also are advised to participate in the Iowa Center for Research by Undergraduates (ICRU) and to apply for research scholarships.

To graduate with honors, students must fulfill the following requirements:

- complete the requirements for a major in biomedical sciences with a g.p.a. of at least 3.33 in all University of Iowa course work in the major;
- complete 1 s.h. in BIOL:4898 Communicating Research;
- complete 2 s.h. in either BIOL:4998 Honors Seminar in Biology or an advanced biology seminar course;
- complete a minimum of 6 s.h. (taken over two or more semesters) of BIOL:4999 Honors Research in Biology;
- write a brief research proposal summarizing the background and goals of their proposed honors research;
- upon completion of their research, submit an acceptable honors thesis; and
- give an oral presentation of their research findings.

Biomedical sciences majors interested in graduating with honors in the major should contact the biomedical sciences honors advisor as early as possible, preferably during their sophomore or junior year, so that they may be matched with an appropriate lab. Contact the Department of Biology to learn more about honors in the major.

University of Iowa Honors Program
In addition to honors in the major, students have opportunities for honors study and activities through membership in the University of Iowa Honors Program. Visit Honors at Iowa to learn about the University’s honors program.

Membership in the UI Honors Program is not required to earn honors in the biomedical sciences major.
Academic Plans

Four-Year Graduation Plan

The following checkpoints list the minimum requirements students must complete by certain semesters in order to stay on the University's Four-Year Graduation Plan. Courses in the major are those required to complete the major; they may be offered by departments other than the major department.


**Before the seventh semester begins:** BIOC:3120 Biochemistry and Molecular Biology I, BIOC:3140 Experimental Biochemistry or CHEM:2410 Organic Chemistry Laboratory, BIOL:2211 Genes, Genomes, and the Human Condition, BIOL:3373 Human Population Genetics and Variation, and STAT:3510 Biostatistics.

**During the eighth semester:** enrollment in all remaining course work in the major, all remaining GE CLAS Core courses, and a sufficient number of semester hours to graduate

Career Advancement

The Pomerantz Career Center offers multiple resources to help students find internships and jobs.