

# Chemistry - Biochemistry Emphasis, B.S.

Biochemistry studies the chemical composition of living things. Biochemistry combines the study of biology with organic and inorganic chemistry as applied to topics such as enzymology, genetics, toxicology, pharmacology, food science, and medicine. Students with this degree may pursue graduate study or work in the field of biotechnology or in one of the many related areas or be eligible for many employment opportunities in chemistry and biology.

## Matriculation Requirements

To matriculate into the Chemistry degree, students must have adviser approval, and completed CHEM 1210, CHEM 1220, CHEM 1250, and CHEM 1260 all with a C- or higher.

## Program Requirements

| Code   | Title   | Credit Hours      |
|--|---|-------------------|
| <b>Total Credit Hours</b>                            |   | <b>120</b>        |
| <b>Chemistry Requirements</b>                        |   | <b>80 Credits</b> |
| Complete the requirements                            |   | 80                |
| <b>Emphasis Requirements</b>                         |   | <b>40 Credits</b> |
| BIOL 3400  | Cell Biology                                      | 3                 |
| BIOL 3405  | Cell Biology Laboratory                           | 1                 |
| CHEM 3060  | Physical Chemistry I WE                           | 4                 |
| CHEM 3065  | Physical Chemistry I Lab                          | 1                 |
| CHEM 3100  | Advanced Inorganic Chemistry                      | 4                 |
| CHEM 3115  | Advanced Inorganic Chemistry Lab                  | 1                 |
| CHEM 3620  | Biological Chemistry II                           | 3                 |
| Chemistry Electives (12 credits) from the following: |   | 12                |
| CHEM 3020  | Environmental Chemistry (3)                       |                   |
| CHEM 3025  | Environmental Chemistry Laboratory (1)            |                   |
| CHEM 3300  | Biomolecular Modeling and Simulations (4)         |                   |
| CHEM 3800  | Energy Use on Earth GI (3)                        |                   |
| CHEM 4030  | Radiochemistry (3)                                |                   |
| CHEM 4600  | Structure Determination (3)                       |                   |
| CHEM 4605  | Structure Determination Laboratory (1)            |                   |
| CHEM 482R  | Chemistry Internship (1-4)                        |                   |
| CHEM 489R  | Undergraduate Research in Chemistry (1-4)         |                   |
| CHEM 495R  | Advanced Topics in Organic Chemistry (3)          |                   |
| CHEM 496R  | Special Topics in Chemistry (1-4)                 |                   |
| CHEM 499R  | Independent Study and Research (1-4)              |                   |
| CHEM 4800  | Pharmacology (3)                                  |                   |
| Biology Electives (11 credits) from the following:   |   | 11                |
| BIOL 3500  | Genetics (3)                                      |                   |
| BIOL 3300  | Developmental Biology (3)                         |                   |
| BIOL 3515  | Advanced Genetics Laboratory (1)                  |                   |
| BIOL 3550  | Molecular Biology (3)                             |                   |
| BIOL 4300  | Bioinformatics and Genome Analysis (4)            |                   |
| BIOL 4550  | Molecular Evolution and Bioinformatics WE (3)     |                   |
| BIOL 4450  | Immunology (3)                                    |                   |
| BIOL 4455  | Immunology Laboratory (1)                         |                   |
| MICR 3450  | General Microbiology (3)                          |                   |
| MICR 3455  | General Microbiology Laboratory (1)               |                   |
| ZOOL 2320<br>& ZOOL 2325                             | Human Anatomy<br>and Human Anatomy Laboratory (4) |                   |

|                          |   |
|--------------------------|---|
| ZOOL 2420<br>& ZOOL 2425 | Human Physiology<br>and Human Physiology Laboratory (4) |
| ZOOL 4300                | Histology (4)   |
| ZOOL 4700                | Advanced Anatomy (4)                                    |
| ZOOL 4780                | Neuroscience (4)  |

## Core Requirements

| Code                                      | Title  | Credit Hours      |
|---|--|-------------------|
| <b>Total Credit Hours</b>                 |  | <b>80</b>         |
| <b>General Education Requirements</b>     |  | <b>39 Credits</b> |
| ENGL 1010<br>or ENGH 1005                 | Introduction to Academic Writing CC<br>Literacies and Composition Across Contexts CC | 3                 |
| ENGL 2010                                 | Intermediate Academic Writing CC   | 3                 |
| MATH 1210                                 | Calculus I QL  | 4                 |
| Complete one of the following:            |  | 3                 |
| HIST 1700                                 | American Civilization AS (3)   |                   |
| HIST 2700<br>& HIST 2710                  | US History to 1877 AS<br>and US History since 1877 AS (6)                            |                   |
| HIST 1740                                 | US Economic History AS (3)   |                   |
| POLS 1000                                 | American Heritage AS (3)   |                   |
| POLS 1100                                 | American National Government AS (3)  |                   |
| Complete the following:                   |  |                   |
| PHIL 2050<br>or PHIL 205G<br>or PHIL 205H | Ethics and Values IH<br>Ethics and Values IH GI<br>Ethics and Values IH              | 3                 |
| HLTH 1100<br>or EXSC 1097                 | Personal Health and Wellness TE<br>Fitness for Life TE                               | 2                 |
| Distribution Courses:                     |  |                   |
| BIOL 1610                                 | College Biology I BB   | 4                 |
| CHEM 1210                                 | Principles of Chemistry I PP <sup>1</sup>  | 4                 |
| CHEM 1220                                 | Principles of Chemistry II PP <sup>2</sup>   | 4                 |
| Fine Arts                                 |  | 3                 |
| Humanities                                |  | 3                 |
| Social/Behavioral Science                 |  | 3                 |
| <b>Discipline Core Requirements</b>       |  | <b>41 Credits</b> |
| CHEM 1215                                 | Principles of Chemistry I Laboratory <sup>3</sup>                                    | 1                 |
| CHEM 1225                                 | Principles of Chemistry II Laboratory <sup>4</sup>                                   | 1                 |
| CHEM 1250                                 | Chemistry Cornerstone- Research and Careers  | 1                 |
| CHEM 1260                                 | Chemistry Cornerstone- Ethics  | 1                 |
| BIOL 1615                                 | College Biology I Laboratory   | 1                 |
| CHEM 2310                                 | Organic Chemistry I  | 4                 |
| CHEM 2315                                 | Organic Chemistry I Laboratory   | 1                 |
| CHEM 2320                                 | Organic Chemistry II   | 4                 |
| CHEM 2325                                 | Organic Chemistry II Laboratory  | 1                 |
| CHEM 3000                                 | Analytical Chemistry   | 2                 |
| CHEM 3005                                 | Analytical Chemistry Laboratory  | 2                 |
| CHEM 3600                                 | Biological Chemistry   | 3                 |
| CHEM 3605                                 | Biological Chemistry Lab   | 1                 |
| CHEM 4000                                 | Instrumental Analysis WE   | 2                 |
| CHEM 4005                                 | Instrumental Analysis Laboratory   | 2                 |

|           |   |   |
|-----------|---|---|
| MATH 1220 | Calculus II                                 | 4 |
| PHYS 2210 | Physics for Scientists and Engineers I PP   | 4 |
| PHYS 2220 | Physics for Scientists and Engineers II PP  | 4 |
| PHYS 2215 | Physics for Scientists and Engineers I Lab  | 1 |
| PHYS 2225 | Physics for Scientists and Engineers II Lab | 1 |

1

To be taken with CHEM 1215 Principles of Chemistry I Laboratory

2

To be taken with CHEM 1225 Principles of Chemistry II Laboratory

3

To be taken with CHEM 1210 Principles of Chemistry I PP

4

To be taken with CHEM 1220 Principles of Chemistry II PP

## Graduation Requirements

1. Completion of a minimum of 120 semester credits with a minimum of 40 upper-division credits.
2. Overall grade point average of 2.0 (C) or above with a minimum of 2.25 in Major.
3. Residency hours -- minimum of 30 credit hours through course attendance at UVU, with at least 10 hours earned in the last 45 hours.
4. Completion of GE and specified departmental requirements.
5. A minimum of 54 credit hours must be in the major with a minimum of 20 credits taken at UVU. A minimum of 28 chemistry credits must be upper-division.
6. Complete all chemistry and physics courses with a minimum grade of "C-" or better.
7. Successful completion of at least one Global/Intercultural course.

## Graduation Plan

This graduation plan is a sample plan and is intended to be a guide. Your specific plan may differ based on your Math and English placement and/or transfer credits applied. You are encouraged to meet with an advisor and set up an individualized graduation plan in Wolverine Track (<http://www.uvu.edu/wolverinetrack/>).

### First Year

| Semester 1                         |                                     | Credit Hours |
|------------------------------------|-------------------------------------|--------------|
| ENGL 1010                          | Introduction to Academic Writing CC | 3            |
| MATH 1210                          | Calculus I QL                       | 4            |
| American Institutions Distribution |                                     | 3            |
| Fine Arts                          |                                     | 3            |
| Social/Behavioral Science          |                                     | 3            |
| <b>Credit Hours</b>                |                                     | <b>16</b>    |

|                     |                                      |           |
|---------------------|--------------------------------------|-----------|
| <b>Semester 2</b>   |                                      |           |
| BIOL 1610           | College Biology I BB                 | 4         |
| BIOL 1615           | College Biology I Laboratory         | 1         |
| CHEM 1210           | Principles of Chemistry I PP         | 4         |
| CHEM 1215           | Principles of Chemistry I Laboratory | 1         |
| MATH 1220           | Calculus II                          | 4         |
| ENGL 2010           | Intermediate Academic Writing CC     | 3         |
| <b>Credit Hours</b> |                                      | <b>17</b> |

### Second Year

| Semester 3          |  | Credit Hours |
|---------------------|--|--------------|
| PHYS 2210           | Physics for Scientists and Engineers I PP  | 4            |
| PHYS 2215           | Physics for Scientists and Engineers I Lab | 1            |
| CHEM 1220           | Principles of Chemistry II PP              | 4            |
| CHEM 1225           | Principles of Chemistry II Laboratory      | 1            |
| Humanities          |  | 3            |
| <b>Credit Hours</b> |  | <b>13</b>    |

| Semester 4 |  | Credit Hours |
|------------|--|--------------|
| CHEM 2310  | Organic Chemistry I                        | 4            |
| CHEM 2315  | Organic Chemistry I Laboratory             | 1            |
| PHYS 2220  | Physics for Scientists and Engineers II PP | 4            |

|                                   |   |            |
|-----------------------------------|---|------------|
| PHYS 2225                         | Physics for Scientists and Engineers II Lab               | 1          |
| HLTH 1100<br>or EXSC 1097         | Personal Health and Wellness TE<br>or Fitness for Life TE | 2          |
| Biology Elective                  |   | 4          |
| <b>Credit Hours</b>               |   | <b>16</b>  |
| <b>Third Year</b>                 |   |            |
| <b>Semester 5</b>                 |   |            |
| CHEM 2320                         | Organic Chemistry II                                      | 4          |
| CHEM 2325                         | Organic Chemistry II Laboratory                           | 1          |
| CHEM 1250                         | Chemistry Cornerstone- Research and Careers               | 1          |
| PHIL 205G                         | Ethics and Values IH GI                                   | 3          |
| Biology Elective                  |   | 4          |
| <b>Credit Hours</b>               |   | <b>13</b>  |
| <b>Semester 6</b>                 |   |            |
| BIOL 3400                         | Cell Biology  | 3          |
| BIOL 3405                         | Cell Biology Laboratory                                   | 1          |
| CHEM 1260                         | Chemistry Cornerstone- Ethics                             | 1          |
| CHEM 3000                         | Analytical Chemistry                                      | 2          |
| CHEM 3005                         | Analytical Chemistry Laboratory                           | 2          |
| CHEM 3600                         | Biological Chemistry                                      | 3          |
| CHEM 3605                         | Biological Chemistry Lab                                  | 1          |
| Biology Elective                  |   | 3          |
| <b>Credit Hours</b>               |   | <b>16</b>  |
| <b>Fourth Year</b>                |   |            |
| <b>Semester 7</b>                 |   |            |
| CHEM 3060                         | Physical Chemistry I WE                                   | 4          |
| CHEM 3065                         | Physical Chemistry I Lab                                  | 1          |
| CHEM 3100                         | Advanced Inorganic Chemistry                              | 4          |
| CHEM 3115                         | Advanced Inorganic Chemistry Lab                          | 1          |
| Upper-Division Chemistry Elective |   | 6          |
| <b>Credit Hours</b>               |   | <b>16</b>  |
| <b>Semester 8</b>                 |   |            |
| CHEM 3620                         | Biological Chemistry II                                   | 3          |
| CHEM 4000                         | Instrumental Analysis WE                                  | 2          |
| CHEM 4005                         | Instrumental Analysis Laboratory                          | 2          |
| Upper-Division Chemistry Elective |   | 6          |
| <b>Credit Hours</b>               |   | <b>13</b>  |
| <b>Total Credit Hours</b>         |   | <b>120</b> |

## Program Learning Outcomes

1. Students will demonstrate progress along their desired career path.
2. Students are prepared to enter the chemistry workplace and postgraduate education.
3. Understand how physical scientists think and form judgments about the physical world.
4. Convey scientific ideas and knowledge clearly and professionally, in both written and oral forms.
5. Demonstrate the ability to apply chemical principles and laboratory skills to solve scientific problems.
6. Students will demonstrate knowledge of the unifying principles of chemistry.