

## CHEMISTRY-BIOLOGY DUAL MAJOR

*Dr. Xiaoping Sun, Program Director*

### Chemistry-Biology Dual Program Mission Statement

The mission of the chemistry-biology dual-major program is to educate each student about the nature of chemistry, biology and biochemistry, and to prepare the student with sufficient knowledge and skills to pursue productive work in chemistry, biology or biochemistry in a professional or graduate school, or in the workforce, and to pursue enlightened living and community involvement.

### Program Description

This specially-designed BS degree program allows interested students to obtain a dual-major in chemistry and biology within a four-year timeframe. BS degree holders possessing a strong knowledge base in both chemistry and biology are particularly competitive for professional schools.

### Chemistry-Biology Dual Program Learning Outcomes

The graduate will:

1. Apply the major concepts, principles and theories of chemistry and biochemistry to solve problems.
2. Demonstrate safe and ethical laboratory and synthesis skills to obtain accurate results.
3. Search the chemical and biochemical literature, perform research, and create new scientific knowledge.
4. Evaluate data and communicate the findings of a chemical or biochemical research project.

### What You Will Study

The Program consists of 40 credits of required chemistry courses, 32 credits of required and elective biology courses, 20 credits of required mathematics and physics courses, 3 credits in the Natural Science Sequence, and about 27 credits of General Education. The science and mathematics curriculum for this Dual-Major Program is as follows:

#### REQUIRED CHEMISTRY COURSES - 39 CREDIT HOURS

CHEM 101	General Chemistry I and Lab	4 credits
CHEM 102	General Chemistry II and Lab	4 credits
CHEM 201	Organic Chemistry I and Lab	4 credits
CHEM 202	Organic Chemistry II and Lab	4 credits
CHEM 251	Quantitative Analysis and Lab	4 credits
CHEM 362	Instrumental Analysis and Lab	4 credits
CHEM 410	Biochemistry	4 credits

CHEM 411 <b>OR</b> CHEM 420	Advanced Organic Chemistry Advanced Biochemistry	3 credits
CHEM 412	Physical Chemistry I	3 credits
CHEM 494	Proposal Writing in Chemistry	1 credit
CHEM 495	Research in Chemical Science	3 credits
CHEM 496	Seminar in Chemical Science	1 credit

#### **REQUIRED BIOLOGY COURSES – 27 to 28 CREDIT HOURS**

BIOL 130	Introductory Biology for Majors and Lab	4 credits
BIOL 215 <b>OR</b> BIOL 224	General Botany and Lab or General Zoology and Lab	4 credits
BIOL 251	Human Anatomy and Physiology I and Lab	4 credits
BIOL 252	Human Anatomy and Physiology II and Lab	4 credits
BIOL 331	Microbiology for Majors and Lab	4 credits
BIOL 332	Genetics and Lab	4 credits
BIOL XXX	300 or 400-level Electives and Labs	3-4 credits

#### **REQUIRED MATHEMATICS COURSES – 12 CREDIT HOURS**

MATH 123	Pre-Calculus	4 credits
MATH 201	Calculus I	4 credits
MATH 202	Calculus II	4 credits

#### **REQUIRED PHYSICS COURSES – 8 CREDIT HOURS**

PHSC 201	Introductory Physics I and Lab	4 credits
PHSC 202	Introductory Physics II and Lab	4 credits

#### **REQUIRED NATURAL SCIENCE COURSE – 3 CREDIT HOURS**

NSCI 220 <b>Or</b> Math 240	Statistics in Science and Research or Probability and Statistics	3 credits
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An AP score of 4 or higher may be used to fulfill the CHEM 101 and CHEM 102 requirement. The initial course in MATH and eligibility to take CHEM 101 will be determined based on math course placement.

### Typical Four-Year Schedule:

FIRST YEAR			
FALL SEMESTER		SPRING SEMESTER	
CHEM 101 General Chemistry I and Lab (STEM Flex)	4	CHEM 102 General Chemistry II and Lab	4
ENGL 101 Freshman Writing I	3	SPCH 103 Oral Communication (embedded)	3
BIOL 130 Introductory Biology Majors and Lab (STEM Flex)	4	ENGL 102 Freshman Writing II	3
MATH 123 Pre-Calculus (Flex elective)	4	MATH 201 Calculus I (Flex elective)	4
UNIV 104 College Motivation	3	UNIV 105 Foundations	3
<b>TOTAL CREDITS</b>	<b>18</b>	<b>TOTAL CREDITS</b>	<b>17</b>

SECOND YEAR			
FALL SEMESTER		SPRING SEMESTER	
CHEM 201 Organic Chemistry I and Lab	4	CHEM 202 Organic Chemistry II and Lab	4
BIOL 251 A&P I and Lab	4	BIOL 252 A&P II and Lab	4
MATH 202 Calculus II	4	SSCI Flex	3
		HUMN Flex	3
PHSC 201 Introductory Physics I and Lab	4	PHSC 202 Introductory Physics II and Lab	4
<b>TOTAL CREDITS</b>	<b>16</b>	<b>TOTAL CREDITS</b>	<b>18</b>

THIRD YEAR			
FALL SEMESTER		SPRING SEMESTER	
CHEM 251 Quantitative Analysis and Lab	4	CHEM 362 Instrumental Analysis and Lab	4
BIOL 331 Microbiology and Lab	4	BIOL 332 Genetics and Lab	4
NSCI 220 Statistics	3	HUMN Flex	3
CHEM 410 Biochemistry	4	BIOL XXX Upper-level class and Lab	4
SSCI Flex	3	BIOL 215 or 224 and Lab	4
<b>TOTAL CREDITS</b>	<b>18</b>	<b>TOTAL CREDITS</b>	<b>19</b>

## FOURTH YEAR

FALL SEMESTER		SPRING SEMESTER	
CHEM 412 Physical Chemistry I	3	CHEM 411 Advanced Organic Chemistry Or CHEM 420 Advanced Biochemistry	3
CHEM 494 Proposal Writing in Chemistry	1	CHEM 496 Seminar in Chem. Science	1
CHEM 495 Research in Chem. Science	3	Elective-1	3
HUMN Flex	3	BIOL XXX Upper-level class and Lab	4
Elective	3	Elective-2	3
<b>TOTAL CREDITS</b>	<b>13</b>	<b>TOTAL CREDITS</b>	<b>14</b>

Please note that many chemistry and biology classes have a lab. Although the lab is registered for as a separate class, the credit hour totals above include the lab hours. The student must pass both the lecture and lab portion of the class in order to receive any of the credit.

It is possible to obtain a Chemistry degree in 3 years. Please contact Dr. Watson for a schedule.

### Admission Requirements

Students must gain general admission to the University of Charleston.

### Additional Requirements

Students must meet all General Education required for graduation from the University of Charleston. Students should take care to fulfill prerequisites for upper division courses as noted in the course descriptions. In order to graduate, students must earn a C or better in all courses required for the major.