

## BACHELOR OF SCIENCE/BACHELOR OF ARTS IN **CHEMISTRY AND BIOCHEMISTRY**

### **CHEMISTRY OVERVIEW**

In today's world where science plays an increasingly important role, chemistry is at the forefront of many educational, technological, and industrial opportunities. As chemistry majors, students study many complex issues, from the chemical basis of life to environmental problems caused by chemicals and pollutants. The Lewis University program centers on helping student to acquire the knowledge and skills needed to investigate and understand complex chemical phenomenon through classroom and hands-on laboratory experimentation.

Focusing on the diverse goals of students entering the program, Lewis offers both a Bachelor of Science (B.S.) and Bachelor of Arts (B.A.) degree. The B.A. degree can be used by students who do not plan to pursue graduate studies. For those students who plan to go on to pursue a master's or doctorate degree, a B.S. degree is recommended.

### **CAREER OPPORTUNITIES**

Students may pursue a variety of careers with a bachelor's degree in chemistry. The types of organizations include:

- agriculture and food science
- environmental science
- chemical manufacturing
- oil and lubricant specialties
- elementary and high school teaching
- forensic science
- materials science
- occupational health and safety
- pharmacy

### **FURTHER CAREER PREPARATION**

Students who obtain a B.S. in Chemistry may decide to pursue graduate studies in biochemistry, forensic science and related fields, or go on to pursue a degree in education. Students may decide to teach in grades 6-12. Lewis has a fully approved teacher certification program.

### **BIOCHEMISTRY OVERVIEW**

Biochemistry is a broad scientific discipline. It is the study of the structure and chemical reactions (chemistry) of living systems (biology). Biochemistry students will study a variety of things including: how living things obtain energy from food, the chemical basis of heredity, and what fundamental changes occur in disease. The program at Lewis University offers both classroom and laboratory instruction.

Studying the cell and chemistry of life results in valuable contributions being made in medicine, industry, and society. The knowledge is used in fighting illnesses, in development of new pharmaceuticals, and in many inventions that improve the quality of life. The field of biochemistry is challenging, yet rewarding and full of opportunity. Careers in biochemistry can take many paths.

### **CAREER PATHS**

- Biochemistry is an integral part of medicine. Much of the research to develop cures for cancer and infectious diseases is performed by biochemists.
- In food science, biochemists research ways to develop abundant and inexpensive sources of nutritious food, as well as preserve food.
- In agriculture, biochemists study the interaction of herbicides with plants.
- In pharmacology, biochemists develop new drugs and study drug interactions.
- Industries that produce pharmaceuticals, agricultural chemicals, foods, feeds and consumer products may employ biochemists outside of the lab in positions in marketing, management, and technical writing and editing.

### **FURTHER CAREER PREPARATION**

Students who obtain a B.S. in Biochemistry may also decide to pursue graduate studies in biochemistry, molecular biology, forensic science and related science fields, or go on to pursue a degree in education.

### **CONTACT**

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## EMPLOYMENT OUTLOOK

Employment opportunities in biochemistry and chemistry is favorable. Statistics provided by the U.S. Department of Labor predict that jobs in both fields will increase at a rate between 10 percent and 20 percent through the year 2012. Job opportunities for chemists will rise in the areas of pharmaceutical and medical manufacturing companies, as well as in scientific research and development firms. The growing field of biochemistry is expanding to include more jobs in private research firms and pharmaceutical companies, and the food, agricultural and consumer product industries are employing biochemists both in and out of the laboratory. According to the American Chemical Society, a significant growth will occur in the field of genetic research. Competition will remain steep for teaching positions, especially at the college level.

## FACULTY

### Brother Pierre St. Raymond, FSC

Brother Pierre is a Professor of Chemistry and a native of New Orleans, La. He has taught in the Department of Chemistry for ten years. He has a B.S. from the College of Santa Fe and a Ph.D. from the University of Maryland.

### Brother Andrew Winka, FSC

An Associate Professor of Chemistry, Brother Andrew is a native of West New York, N.J., and is in his fifth year at Lewis. He obtained a B.A. from Catholic University of America, an M.A. from SUNY at Buffalo, an M.S. from Manhattan College, and a Ph.D. from Rutgers University.

## HONORS ORGANIZATION

The Department of Chemistry is affiliated with the national honors organization, Gamma Sigma Epsilon. Students who meet the criteria established by the organization may join.

## ADDITIONAL WEB SITES FOR FURTHER INFORMATION

The College Board - [www.collegeboard.com](http://www.collegeboard.com)

The American Chemical Society - [www.ACS.org](http://www.ACS.org)

Careers in Science - [www.sciencecareers.org](http://www.sciencecareers.org)

Scientist's Employment Network - [www.scijobs.org](http://www.scijobs.org)

Science Jobs in Bioscience and Chemistry - [www.sciencejobs.com](http://www.sciencejobs.com)

American Oil Chemists Society - [www.aocs.org](http://www.aocs.org)

American Society for Biochemistry and Molecular Biology - [www.asbmb.org](http://www.asbmb.org)

Chem Jobs: Chemist Jobs for Chemists, Biochemists and Pharmaceutical Scientists - [www.chemjobs.net](http://www.chemjobs.net)

Federation of American Societies for Experimental Biology Career Resources - [www.faseb.org](http://www.faseb.org)

World Wide Club for the Chemical Community - [www.chemweb.com](http://www.chemweb.com)

## BACHELOR OF SCIENCE/CHEMISTRY

Total Credit Hours: 128

Major Credit Hours: 67

A grade of C or better must be earned in a prerequisite course in order to advance to the next course in the sequence.

### I. Core Courses (54)

13-200 Calculus I (4)

13-201 Calculus II (4)

13-250 Calculus III (4)

03-110 General Chemistry I (4) and (03-111) Lab (1)

03-115 General Chemistry II (4) and (03-116) Lab (1)

03-220 Organic Chemistry I (4) and (03-221) Lab (1)

03-225 Organic Chemistry II (4) and (03-226) Lab (1)

03-320 Analytical Chemistry I (3) and (03-321) Lab (2)

03-300 Physical Chemistry I (3) and (03-301) Lab (1)

03-305 Physical Chemistry II (3) and (03-306) Lab (1)

03-325 Instrumental Analysis (3) and (03-326) Lab (2)

03-497 Seminar (1)

### II. Select one Physics sequence: (10)

17-200 College Physics I (4) and (17-201) Lab (1)

17-205 College Physics II (4) and (17-206) Lab (1)  
OR

17-210 General Physics I (4) and (17-211) Lab (1)

17-215 General Physics II (4) and (17-216) Lab (1)

### III. Select at least six credit hours from the following Chemistry Courses:

03-340 Environmental Chemistry I (3)  
and Lab (03-343) (1)

03-342 Environmental Chemistry II (3)  
and Lab (03-343) (1)

03-400 Advanced Inorganic Chemistry (3)

03-401 Advanced Organic Chemistry (3)

03-402 Topics in Organic Chemistry (3)

03-403 Nuclear Chemistry (3)

03-404 Radiochemistry (3)

03-405 Biochemistry I: Molecular  
Biochemistry (3) and Lab (03-406) (1)

03-407 Biochemistry II: Nutritional  
Biochemistry (3) and Lab (03-408) (1)

03-450 Research (1-4)

03-498 Special Topics (1-4)

03-499 Independent Study (1-4)

### IV. The advanced writing requirement is satisfied by successful completion of the following courses which contain strong writing components; General Chemistry I, General Chemistry II, Analytical Chemistry, and Instrumental Chemistry.

### **FORENSIC CONCENTRATION (CHEMISTRY)**

With the growing popularity of forensic science, students are entering the field of forensic investigation. Specifically, interest in the role of the scientific laboratory in forensic investigation has attracted students who want to achieve competence in forensic science. The concentration in laboratory forensic science requires students to become well grounded in the fields of chemistry or biochemistry. The Chemistry Department's forensic chemistry concentration is directed toward preparing students for careers in the science laboratory, not at the crime scene.

The student who wants to earn a Bachelor of Science in Chemistry with a forensic concentration must take 8 credit hours in addition to 72-73 required in the major (62-63 in core Chemistry and Calculus courses and 10 in Physics). These additional 8 credits may be distributed as follows:

#### **I. Required Course: (4)**

03-415 Advanced Forensic Chemistry I (4)

#### **II. At least four credit hours from the following: (4)**

03-407 Biochemistry II (3) and (03-408) Lab (1)

03-416 Advanced Forensic Chemistry II (4)

03-417 Trace Analysis (3)

03-418 Advanced Toxicology (3)

03-450 Research (1-4)

03-470 Internship (1-6)

03-498 Special Topics (1-4)

03-499 Independent Study (1-4)

### **BACHELOR OF ARTS/CHEMISTRY**

Total Credit Hours: 128

Major Credit Hours: 39

A grade of C or better must be earned in a prerequisite course in order to advance to the next course in the sequence

#### **I. Core Courses (21)**

03-110 General Chemistry I (4) and (03-111) Lab (1)

03-115 General Chemistry II (4) and (03-116) Lab (1)

03-220 Organic Chemistry I (4) and (03-221) Lab (1)

03-225 Organic Chemistry II (4) and (03-226) Lab (1)

03-497 Seminar (1)

**II. Select at least six credit hours (two or three courses) from the 300- or 400-level chemistry courses. (6)**

**III. Select four supporting courses in other sciences. These courses will be selected in consultation with the student's faculty advisor. (12)**

**IV. The advanced writing requirement is fulfilled by successful completion of the upper-division laboratory courses.**

**V. Biology majors who have declared a B.A. in Chemistry as a second major can substitute 02-496 Research Methods for 03-497 Seminar.**

### **MINOR/CHEMISTRY**

Minor Credit Hours: 20

#### **I. Core Courses (20)**

03-110 General Chemistry I (4) and (03-111) Lab (1)

03-115 General Chemistry II (4) and (03-116) Lab (1)

03-220 Organic Chemistry I (4) and (03-221) Lab (1)

03-225 Organic Chemistry II (4) and (03-226) Lab (1)

### **BACHELOR OF SCIENCE/BIOCHEMISTRY**

Total Credit Hours: 128  
Major Credit Hours: 83

A grade of C or better must be earned in a prerequisite course in order to advance to the next course in the sequence.

#### **I. Core Courses (73)**

02-110 General Biology I (4) and (02-111) Lab (1)  
02-115 General Biology II (4) and (02-116) Lab (1)  
02-220 Genetics (4) and (02-221) Lab (1)  
02-224 Microbiology (4) and (02-226) Lab (1)  
02-305 Molecular Cell Biology (4) and (02-306) Lab (1)  
03-110 General Chemistry I (4) and (03-111) Lab (1)  
03-115 General Chemistry II (4) and (03-116) Lab (1)  
03-220 Organic Chemistry I (4) and (03-221) Lab (1)  
03-225 Organic Chemistry II (4) and (03-226) Lab (1)  
03-300 Physical Chemistry I (3) and (03-301) Lab (1)  
03-305 Physical Chemistry II (3) and (03-306) Lab (1)  
03-405 Biochemistry I: Molecular Biochemistry (3)  
and (03-406) Lab (1)  
03-407 Biochemistry II: Nutritional Biochemistry (3)  
and (03-408) Lab (1)  
13-200 Calculus I (4)  
13-201 Calculus II (4)  
13-250 Calculus III (4)

#### **II. Select one Physics sequence: (10)**

17-200 College Physics I (4) and (17-201) Lab (1)  
17-205 College Physics II (4) and (17-206) Lab (1)  
OR  
17-210 General Physics I (4) and (17-211) Lab (1)  
17-215 General Physics II (4) and (17-216) Lab (1)

**III. The advanced writing requirement is fulfilled by successful completion of the upper-division laboratory classes.**

### **MINOR/BIOCHEMISTRY**

Minor Credit Hours: 28

#### **I. Core Courses (28)**

03-110 General Chemistry I (4) and (03-111) Lab (1)  
03-115 General Chemistry II (4) and (03-116) Lab (1)  
03-220 Organic Chemistry I (4) and (03-221) Lab (1)  
03-225 Organic Chemistry II (4) and (03-226) Lab (1)  
03-405 Biochemistry I: Molecular Biochemistry (3)  
and (03-406) Lab (1)  
03-407 Biochemistry II: Nutritional Biochemistry (3)  
and (03-408) Lab (1)

### **BACHELOR OF ARTS/BIOCHEMISTRY**

Total Credit Hours: 128  
Major Credit Hours: 66-68

A grade of C or better must be earned in a prerequisite course in order to advance to the next course in the sequence.

#### **I. Core Courses (60)**

02-110 General Biology I (4) and (02-111) Lab (1)  
02-115 General Biology II (4) and (02-116) Lab (1)  
02-220 Genetics (4) and (02-221) Lab (1)  
02-224 Microbiology (4) and (02-226) Lab (1)  
03-110 General Chemistry I (4) and (03-111) Lab (1)  
03-115 General Chemistry II (4) and (03-116) Lab (1)  
03-220 Organic Chemistry I (4) and (03-221) Lab (1)  
03-225 Organic Chemistry II (4) and (03-226) Lab (1)  
03-405 Biochemistry I: Molecular Biochemistry (3)  
and (03-406) Lab (1)  
03-407 Biochemistry II: Nutritional Biochemistry (3)  
and (03-408) Lab (1)  
13-200 Calculus I (4)  
13-201 Calculus II (4)  
13-250 Calculus III (4)

**II. Supporting Science Courses (6-8 credit hours). Six to eight credit hours of natural science or computer science courses must be selected in support of the core requisites.**

**III. The advanced writing requirement is fulfilled by successful completion of the upper-division laboratory classes.**



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