

BIOMOLECULAR SCIENCE

Joy Broin, Regents Science 360

507-786-3100

broin1@stolaf.edu

wp.stolaf.edu/bmols/biomolecular-science (<http://wp.stolaf.edu/bmols/biomolecular-science>)

Biomolecular science incorporates a wide range of traditional scientific fields. Expanding interest in the intersections of disciplines such as biology, chemistry, computer science, mathematics, psychology, and physics has led to the development and growth of new scientific areas. Biochemistry and molecular biology have been recognized as interdisciplinary sciences for many years. Newer on the scene are fields such as bioinformatics, molecular evolution, and biophysical chemistry.

Overview of the Concentration

The concentration in biomolecular science will appeal to any student who is seeking an understanding of the core sciences of biology and chemistry but wishes to pursue an integrated selection of upper-level courses or to apply the study of biology and chemistry to a different major. The quarter-credit course, BMOLS 201 Explorations in Biomolecular Science (0.25), introduces concentrators and other interested students to the breadth of this scientific area. An experiential learning component takes biomolecular science out of the traditional classroom and enables students to explore its applications in fields such as medicine, agriculture, or genetics.

Intended Learning Outcomes for the Concentration (<http://wp.stolaf.edu/curriculum-committee/biomolecular-science-concentration-ilos>)

Requirements

The following core courses must be completed:

| | | |
|---------------------|---|------|
| BIO 150 | Evolutionary Foundations of Biodiversity | 1.00 |
| BIO 227 | Cell Biology ¹ | 1.00 |
| BIO 233 | Intermediate Genetics | 1.00 |
| BMOLS 201 | Explorations in Biomolecular Science (0.25) | 0.25 |
| CHEM 125 | Structural Chemistry and Equilibrium ^{1,2} | 1.00 |
| CHEM 126 | Energies and Rates of Chemical Reactions ¹ | 1.00 |
| CHEM 247 & CHEM 253 | Organic Chemistry I and Synthesis Laboratory I (0.25) | 1.25 |
| CHEM 248 & CHEM 254 | Organic Chemistry II and Synthesis Laboratory II (0.25) | 1.25 |
| CHEM 379 & CHEM 373 | Biochemistry I and Experimental Biochemistry (0.25) | 1.25 |

Experiential Learning Component

Participation in an experiential learning component (see below)

Electives

Select at least two level III electives from the following:

| | |
|----------|---|
| BIO 315 | Principles of Bioinformatics |
| BIO 341 | Advanced Cell Biology |
| BIO 364 | Molecular Biology |
| BIO 372 | Developmental Biology |
| BIO 382 | Immunology |
| BIO 383 | Evolutionary Biology |
| CHEM 384 | Bioanalytical Chemistry |
| CHEM 385 | Biochemistry II |
| CHEM 391 | Selected Topics in Chemistry (when taught as Biophysical Chemistry) |
| CSCI 315 | Bioinformatics |

¹ CH/BI 125, CH/BI 126 and CH/BI 227 can substitute for CHEM 125, CHEM 126, and BIO 227.

² CHEM 121 and CHEM 123 can substitute for CHEM 125

Students are encouraged to consult with their advisor and the program director about the appropriate physics and mathematical sequences for their interests as well as appropriate complementary courses.

Experiential Learning Component

Participation in an experimentally based research experience or employment that takes biomolecular sciences beyond the traditional classroom is required of each concentrator. This can occur either on- or off-campus. This activity must be pre-approved by the Biomolecular Science Committee and be supported after the fact by a letter from a supervisor.

Courses

BMOLS 201: Explorations in Biomolecular Science (0.25)

A quarter-credit course devoted to a broad study of the field of biomolecular science through the reading and discussion of primary and secondary literature across the field. Through exploration of the breadth of the field, biomolecular science concentrators plan their own level III course structure. While required of all biomolecular science concentrators, this course is open to all interested students. Offered annually in the spring semester. P/N only.

Prerequisite: BIO 150, CHEM 125, or CH/BI 125, or the equivalent.

BMOLS 294: Academic Internship

BMOLS 298: Independent Study

BMOLS 394: Academic Internship

BMOLS 396: Directed Undergraduate Research

This course provides a comprehensive research opportunity, including an introduction to relevant background material, technical instruction, identification of a meaningful project, and data collection. The topic is determined by the faculty member in charge of the course and may relate to his/her research interests. Offered based on department decision. May be offered as a 1.00 credit course or .50 credit course.

Prerequisite: determined by individual instructor.

BMOLS 398: *Independent Research*

Faculty

Director, 2016-2017

Eric Cole

Professor of Biology
developmental biology; invertebrate zoology

Beth R.J. Abdella

Associate Professor of Chemistry
bio-organic chemistry

Douglas J. Beussman (on leave)

Professor of Chemistry
analytical area - mass spectrometry; chemical instrumentation;
proteomics; forensic science; bioanalytical

Lisa M. Bowers (on leave fall)

Assistant Professor of Biology
microbiology; genetics; molecular biology; synthetic biology

James A. Demas

Assistant Professor of Biology and Physics
neuronal biophysics; sensory circuits; retinal neurophysiology

Steven A. Freedberg

Associate Professor of Biology
evolutionary biology; computer simulation modeling; bioinformatics

Kimberly A. Kandl

Associate Professor of Biology
cell biology; molecular biology; genetics

Laura L. Listenberger

Associate Professor of Biology and Chemistry
lipid biochemistry; cell and molecular biology

Gregory W. Muth

Associate Professor of Chemistry
biochemistry

Jeffrey J. Schwinefus

Associate Professor of Chemistry
physical and biophysical chemistry

Anne Walter (on leave)

Professor of Biology
comparative animal and cell physiology; membrane physiology and
biophysics; comparative enzymology; applying biology in international
settings