

BICM: Biology Cell & Molecular Option

Winona State University

About the BICM Major:

The Cell and Molecular Option of the Biology Major (BICM) is one of five options available in the Biology Department at Winona State University. This option is intended for career-minded students interested in the exciting new areas of biology including **biotechnology, molecular genetics and recombinant DNA techniques**. The program is designed to provide students with the background necessary to enter the **technical job market** or continue their education at the **medical or graduate school** of their choice. Because entrance requirements vary greatly between medical and graduate schools, students should carefully plan their individual programs in consultation with their faculty advisor.

Who to contact?

Students interested in the BICM major should contact **Dr. Edward Thompson, Chair of the Biology Department, Winona State University; Winona, MN 55987-5838**. He can answer any questions you have about majoring in biology and will be happy to assign a biology program advisor. Dr. Thompson can be reached by telephone at **(507) 457-5270** or by email at **ethompson@winona.edu**. Information about WSU and the Biology Department is also available on the WWW at **<http://bio.winona.edu/>** and **<http://www.winona.edu/>**

Preparation for the BICM Major:

Freshman entering the Cell and Molecular Option are normally expected to have completed a rigorous, college preparatory high school curriculum including 4 years of English, 3 years of Math and 3 years of science (biology, chemistry and physics).

Course selection and scheduling:

The BICM major requires a number of course sequences and many prerequisite courses. Many of the required courses are only taught once per year. Therefore, it is very important to work very closely with your faculty advisor in planning your schedule. Further, because the biology department enforces the prerequisites established for its offerings, students should make every effort to complete the First-year/Second-year sequence of courses according to the recommended schedule. Note that enrollment in the elective courses in biology requires completion of the First-year/Second-year course sequence.

Typical Class schedule:

There are many ways to progress through the BICM major and it is not possible to detail each of them. However, the idealized schedule detailed below can allow a student to graduate in the **standard four-year program**. Careful attention should be given to the selection of general education courses which will satisfy each of the various categories listed in the WSU catalog. A checklist is provided which can be used to track progress in the BICM major.

Fall: First Year	Spring: First Year
Basics of Life 241 (4 sh)	Organismal Diversity 242 (4 sh)
Principles of Chemistry 212 (4 sh)	Principles of Chemistry 213 (4 sh)
Mathematics 120 (4 sh) or Mathematics 160 (4 sh)	Mathematics 160 (4 sh) or Mathematics 165 (4 sh)
English 111 (4 sh)	Speech 191 (3 sh)
	Physical Education Elective (1 sh)
16 sh Total	16 sh Total

Fall: Second Year	Spring: Second Year
Cell Biology 308 (3 sh)	Ecology 312 (3 sh)
Biometry 305 {recommended} (3 sh)	Genetics 310 (3 sh)
	Cell Biology Laboratory 307 (1 sh)
Organic Chemistry 350 (4 sh)	Organic Chemistry 351 (5 sh)
University Studies Elective (3 sh)	University Studies Elective (3 sh)
University Studies Elective (3 sh)	Physical Education Elective (1 sh)
16 sh Total	16 sh Total

Fall: Third Year	Spring: Third Year
Biochemistry 400 (4 sh)	Biology Elective (3 sh)
Physics 201 (4 sh) or Physics 221 (4 sh)	Biology Elective (4 sh)
Molecular Biology 430 (3 sh)	Physics 202 (4 sh) or Physics 222 (4 sh)
University Studies Elective (3 sh)	University Studies Elective (3 sh)
Elective (2 sh)	Elective (2 sh)
16 sh Total	16 sh Total

Fall: Fourth Year	Spring: Fourth Year
Elective (4 sh) or Physics 223 (4 sh)	Biology Elective (3 sh)
University Studies Elective (3 sh)	Biology Elective (3 sh) or University Studies Elective (3 sh)
Student Research 499 (3 sh)	Biology Elective (4 sh)
Biology Elective (3 sh)	Biology Elective (3 sh)
Elective (3 sh)	Elective (3 sh)
16 sh Total	16 sh Total

Recommended Electives for BICM Major:

309 Developmental Biology, 323 General Physiology, 340 Virology, 393 Animal Cell Culture, 394 Plant Tissue Culture - Principles and Application, 431 Molecular Biology Laboratory, 409 General Microbiology, 410 Membrane Biology, 411 Protein Structure and Function, 441 Comparative Vertebrate Physiology, 445 Immunology, 490 Issues in Biology

Biology Course Prerequisites

Course	Co-requisite	Prerequisite
Basics of Life 241 or Organismal Diversity 242	Chemistry 212 & Math 150, or Chemistry 213 & Math 155	High School Biology and Chemistry
Ecology 312	Organic Chemistry 340 or 350	Basics of Life 241 and Organismal Diversity 242
Ecology Laboratory 313	Ecology 312	Basics of Life 241 and Organismal Diversity 242
Cell Biology 308	Organic Chemistry 340 or 350	Basics of Life 241 and Organismal Diversity 242 and Organic Chemistry 340 or 350
Cell and Genetics Laboratory 307	Cell Biology 308	
Genetics 310		Basics of Life 241 and Organismal Diversity 242
Biology Electives		Completion of Biology sequence: 241, 242, 312, 308, 310

BICM Checklist:

Course or Condition:	
<ul style="list-style-type: none"> - BICM Major Declared - Biology Faculty Member as BICM Advisor 	
<ul style="list-style-type: none"> - 241 Basics of Life (4 sh) - 242 Organismal Diversity (4 sh) - 312 General Ecology (3 sh) - 308 Cell Biology (3 sh) - 310 Genetics (3 sh) 	<ul style="list-style-type: none"> - 307 Cell and Genetics Laboratory (1 sh) - 430 Molecular Biology (3 sh) - Two of Biology 309, 393, 394, 409, 431, or 445 (7-8 sh) - 499 Student Research (3 sh) [Biology Capstone Requirement] - Biology Electives (9-10 semester hours)
<ul style="list-style-type: none"> - 160 Math (4 sh) - 165 Math (4 sh) (recommended, not required) - 305 Biometry (3 sh) (recommended, not required) 	
<ul style="list-style-type: none"> - 212 Principles of Chemistry (4 sh) - 213 Principles of Chemistry (4 sh) - 350, 351 Organic Chemistry (4 sh, 5 sh) - 400 Biochemistry (4 sh) 	
<ul style="list-style-type: none"> - 201 General Physics (4 sh) - 202 General Physics (4 sh) - University Physics 221, 222, 223 (substitution for Physics 201, 202) 	
<ul style="list-style-type: none"> - 111 English (4 sh) - 191 Speech CMST (3 sh) - Physical Education Activities (2 sh) - Humanities (6 sh) - Social Science (6 sh) - Fine and Performing Arts (3 sh) 	<ul style="list-style-type: none"> - Critical Analysis (3 sh) (Satisfied with Genetics 310) - Science and Social Policy (3 sh) (Satisfied with Issues in Biology 490) - Global and Multicultural Perspectives (3 sh) - Contemporary Citizenship or Democratic Institutions (3 sh) - Writing Flag (6 sh) (Satisfied with Biology 308 and 312) - Oral Flag (3 sh) (Satisfied with Biology 307, 495, 310L or 309) - Math/Stats/Critical Analysis Flag (3 sh) (Satisfied with Biometry 305)
<ul style="list-style-type: none"> - Total University Credits = 128 semester hours (or more) 	

WSU HONORS IN BIOLOGY PROGRAM

Philosophy:

Any science can be described as having two major aspects: 1) an organized body of knowledge and 2) a formal way of adding new information to the existing body of knowledge. Thus, science is related to method and process, and it is not merely a collection of factual information. The Biology Department at WSU believes that students who desire advanced careers in biology need significant experiences which involve them directly in an intimate and meaningful process of biological inquiry. The Honors in Biology Program is designed to provide this enhanced opportunity to eligible biology majors.

Eligibility:

To be eligible for the Honors in Biology Program, a student must:

- 1) Be a Biology (any option) or a Life Science Major,
- 2) Have completed the biology core sequence (Basics of Life, Organismal Diversity, Ecology, Cell Biology and Genetics) or it's equivalent,

- 3) Have a 3.25 GPA, both overall and within the major,
- 4) Identify a WSU faculty member who is willing to serve as a research advisor to the student, and
- 5) Apply for and be granted admission into the Honors in Biology Program by the Biology Department Honors Committee.

Completion:

A student will be recognized as having successfully completed the Honors in Biology Program after satisfying the following requirements:

- 1) Completion of the Honors in Biology seminar offered in the spring. Honors students graduating at the end of fall semester may satisfy this requirement by giving a seminar describing their honors research to the department in another venue approved by the Honors Committee.
- 2) Presentation of her/his honors research project at the Annual Biology Research Symposium; and
- 3) Submission of a written approvable Honors Thesis in an appropriate format and style. Approval by both the research advisor and the Honors Committee is required.

FACULTY MEMBER	HONORS RESEARCH INTERESTS
Kimberly M. Bates , Associate Professor; 1997 - B.S., University of Massachusetts-Amherst M.S., Ph.D., University of Missouri-Columbia	Immunoparasitology; Serology; Zoonotic diseases; Design and implementation of serological assays; Epidemiology of lungworm in cattle and deer; Lyme disease.
Steven Berg , Professor; 1986 - B.S., Pacific Lutheran University Ph.D., Purdue University	Membrane studies; Bioenergetics; Photosynthesis; Use of computers in teaching biology.
Bruno Borsari , Assistant Professor; 2005 - D. Ag. Sc., University of Bologna, Italy Ph.D., University of New Orleans	Curriculum assessment of biology and applied life sciences. Instrument design. Agroecology, Apiculture, Prairie restoration, soil biology and reclamation.
Emmanuel Brako , Professor; 1989 - B.S., Tuskegee University M.S., Ph.D., Louisiana State University and A & M College B.V.M., University of Nairobi	Effects of viruses, phytochemicals (garlic), and UV irradiation on cell structure and function; Light and electron microscopy.
Michael D. DeLong , Professor; 1992 - B.S., University of Southern Mississippi M.S., Memphis State University (TN) Ph.D., University of Idaho, Moscow	Ecology of large rivers; Invertebrate ecology; Food web dynamics.
David W. Essar , Professor; 1992 - B.S., Ferris State College (MI) M.S., Ph.D., University of Iowa	Microbial molecular genetics and physiology; Molecular evolution; The use of genetic fingerprinting in species identification.
Kimberly J. Evenson , Professor; 1995 - B.S., M.S., North Dakota State University, Fargo Ph.D. University of Minnesota-Twin Cities	Molecular biology and tissue culture of oilseed plants; Isolation of medicinal plant compounds.
Neal D. Mundahl , Professor; 1989 - B.A., Winona State University M.S., Michigan Technological University Ph.D., Miami University (Ohio)	Fish ecology; Bio-monitoring of coldwater streams; Avian ecology.
Frances R. Ragsdale , Professor; 1993 - B.S., Eastern Oregon State M.S., Southeastern Louisiana University Ph.D., University of Idaho	Comparative vertebrate physiology, blood chemistry, and exercise physiology of reptiles.
Lawrence A. Reuter , Professor; 1979 - B.A., Saint Mary's College of Minnesota Ph.D., Princeton University	Regulation of growth and development in early <i>Drosophila</i> embryos; Steroid hormone effects in mammals.
Robin K. Richardson , Professor; 1992 - B.S., Michigan State University M.S., Central Michigan University, Mt. Pleasant Ph.D., University of Oklahoma, Norman	Parent investment in lizards and spiders; Behavioral ecology of spiders.
Scott Segal , Assistant Professor; 2006 - B.S. University of Wisconsin, Madison Ph.D. Northwestern University, Chicago IL	Regulation of gene expression Control of mRNA translation and degradation
Edward Thompson , Professor; 1992 - B.A., Macalester College, St. Paul Ph.D., Medical College of Wisconsin, Milwaukee	Diabetes; Heart Disease; Muscle Physiology.
Edward Wilson , Assistant Professor; 2004- B.A., Luther College, Decorah IA; M.S., Ph.D., Iowa State University	Phytochemicals and nutritional physiology of fruit juices; Physiology of nitric oxide and smooth muscle; Comparative physiology of earthworms