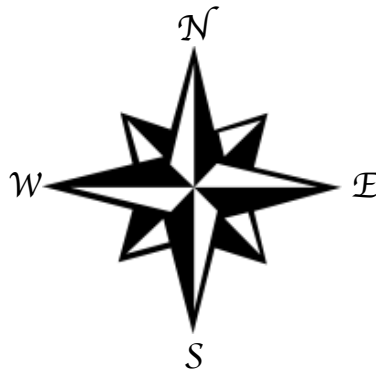


# Student Handbook

for the

# BIOLOGY MAJOR



DEPARTMENT OF BIOLOGY  
WESTFIELD STATE UNIVERSITY

**Westfield**  
— Founded 1838

# Department of Biology

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Welcome to the Biology Department! This Handbook is intended to provide you with a brief overview of our Department and Major Program, and to provide you with information that will be useful to you as you complete your Biology Major. Consult the most current edition of the University *Bulletin* for more detailed information on University and Departmental policies and requirements. This Handbook also contains information and recommendations not included in the *Bulletin*. As a Biology Major, you will be assigned an Academic Advisor who will also be a valuable source of assistance and guidance on your path to graduation. We hope that this Handbook serves as a useful guide throughout your time at Westfield State University.

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## MISSION STATEMENT

The mission of the Biology Department of Westfield State University is to foster in all students an understanding of and curiosity about the living world and biological processes, an appreciation of how scientific knowledge is acquired, and the ability to apply their knowledge and skills to generate new questions.

We provide our majors with a broad education in all of the fundamental areas of modern biology, while also assisting them in their pursuit of advanced knowledge and skills in one or more sub-disciplines. Our faculty create a high-quality, nurturing learning environment in which students are challenged to expand and critically evaluate their knowledge, critically evaluate information, and communicate effectively. We produce well-educated citizens who are prepared to take advantage of a wide range of career opportunities, and who can become active and valued members of society.

## REQUIREMENTS

Students majoring in Biology must complete both the University Common Core requirements and the courses required for the Major. Materials relevant to these requirements are also listed in the APPENDICES. All Biology Majors must take the following courses from within the Department:

- Mathematical Methods in the Natural Sciences (BIOL 123)\*
- The introductory major's biology sequence (BIOL 128 & 129)
- First year and senior seminars (BIOL 180 & 380)
- Two one-credit departmental seminars (BIOL 280-289)
- Upper-level courses including ONE course from each of the following areas:
  - Evolution
  - Ecology
  - Cell / Molecular
  - Organismal / Physiology
- A minimum of 15 additional credits within the Department, including at least two courses at the 300-level

Majors must also complete the following courses from outside the Department:

- General Chemistry I & II (CHEM 109 & 111)\*
- Organic Chemistry I & II (CHEM 201 & 203)

\* These courses also count toward satisfaction of the University Common Core requirements.

Students seeking certification in Secondary Education in Biology have some specific requirements within the Major. If you are interested in this option, you should consult with our Secondary Education Advisor as early as possible.

## ADVISING

Upon declaring biology as your major, you will be assigned an Academic Advisor by the Department Chair. This advisor will aid you in selecting courses, long-range planning of a course of study, satisfying the requirements of the University and Major, and other academic issues that may arise as you continue your studies. You will need to consult with your advisor at least twice per year in order to enroll in courses for future semesters, but you are encouraged to consult with your advisor whenever you have a question regarding your academic program. When you decide upon an area of concentration within the Major, it may be beneficial to switch to an advisor with expertise in that field, or whom you believe can most successfully guide you toward your academic goals. To change your advisor, consult with your proposed new advisor and then with the Department Chair.

Several forms are included in the APPENDICES of this Handbook to help you and your Academic Advisor plan your long-term course of study and to guide your progress toward completion of all of the University and Departmental graduation requirements.

## COURSE SEQUENCE RECOMMENDATIONS

Biology majors are strongly encouraged to take Biology 123, 128, and 129 in their first year (or as soon thereafter as possible). These courses are prerequisites for most of the upper-level courses in the Major. Although it may be beneficial to take Biology 128 and 129 sequentially, the courses are designed so that it is possible to take them in either order.

All incoming students are expected to enroll in Biology 180, a one-credit seminar course. This seminar is designed to introduce students new to our program to the theory and practice of biological inquiry, and to introduce the student portfolio (see ASSESSMENT).

The Department recommends that majors take the two-semester general chemistry sequence (CHEM 109, 111) in their second year and the two-semester organic chemistry sequence (CHEM 201, 203) in their third year. If desired, biochemistry (CHEM 313) may be taken concurrently with CHEM 203, or in the fourth year (completion of biochemistry satisfies the requirements for a minor in chemistry). Additional information on course sequence recommendations may be found in Appendix 3 of this booklet.

If you are interested in applying to medical school, it may be beneficial to start the chemistry sequence in your first year, since you may be better prepared to take the MTEL exam. You should discuss your interests and career goals with your Academic Advisor or the Pre-med or Pre-health Advisor.

## UPPER-LEVEL COURSES

Some upper-level courses (particularly 300-level courses) are offered only in alternate years, and occasionally are cancelled by the Registrar due to low enrollment. It is important, therefore, not to wait until the final semester of your University career to take your 300-level courses. Work with your Academic Advisor to be certain that you have *taken all of the courses that are prerequisites* for upper-level courses in which you are interested. You are also permitted to count one semester of Independent Research (Biology 399) as one of the 300-level courses required for the major (although this course may not count toward the distribution requirements for your concentration within the major).

Course offerings vary from semester to semester and from year to year, particularly at the upper level. A schedule of courses and the semesters in which they are generally offered is listed in Appendix 4 of this Handbook. You should consult this list and your Academic Advisor as you plan your long-term course of study.

## INTERNSHIPS & INDEPENDENT PROJECTS

Internships (1-6 credits, depending upon arrangement) provide a fabulous opportunity to learn skills and gain experience while obtaining exposure to the expectations and demands of your chosen field. The intention of the internship program is to provide the student with “real world” experience and exposure outside the campus while earning course credit. Internships may be paid or unpaid positions that involve joint supervision by a faculty member and a supervisor at the off-campus site. The internship program is particularly recommended for students who intend to pursue a career immediately following graduation. The availability and variety of internship opportunities varies from semester to semester. The Department Chair, your Academic Advisor, or a faculty member with a specialty within your area of interest may be able to help direct you to internship opportunities specific to biology. The Career Services Center (see STUDENT RESOURCES) may also be able to provide information on internship opportunities. Additional opportunities may be found on various web sites.

Independent Study (Biology 299; 1-3 credits) and Independent Research (Biology 399; generally 3 credits) programs allow students to pursue independent research or technology projects under the supervision of a faculty member. An independent study or research project is highly recommended for students intending to pursue graduate or professional school. Projects are generally designed by the student, with guidance from the faculty supervisor. If you are interested in performing an independent project, you should approach a faculty member who is experienced in your general subject of interest.

## ASSESSMENT

All biology majors are required to demonstrate that they have met specific learning objectives. One of the tools used by the Department to assess the progress of our majors toward the mastery of these objectives is the on-going compilation and evaluation of a student portfolio. This portfolio will be introduced in the First Year Seminar (BIOL 180), and will be presented and discussed with a faculty supervisor on a yearly basis as part of the Department seminar series. Successful completion of the seminar series requires the presentation of a complete portfolio in the Senior Seminar (BIOL 380).

The learning objectives are separated into three areas containing specific goals:

### Knowledge Goals:

Upon completion of a major in Biology, students will demonstrate an understanding of the following conceptual strands in biology and related disciplines:

- Matter and energy in organisms
  - a. Structure of biological molecules
  - b. Catalysis and metabolic pathways
  - c. Energy conversions in organisms
- Structure-function relationships in cells and organisms
  - a. Cell structure and function
  - b. Physiology of multicellular organisms
  - c. Adaptations to the environment
- Transmission of genetic information in organisms and populations
  - a. Transmission genetics
  - b. Molecular mechanisms of information coding, use, and transfer
  - c. Population genetics
- Evolution and the origin of organismal diversity
  - a. Evidence for evolution
  - b. Process of evolution
  - c. Patterns of evolution
- Structure and function of ecosystems
  - a. Intra- and interspecific interactions
  - b. Population growth
  - c. Energy flow in ecosystems
  - d. Matter cycling in ecosystems
- Nature and history of scientific thought

### Skill Goals:

Upon completion of a major in Biology, students will demonstrate mastery of the following skills:

- Formulation of scientific models based on observation of biological phenomena

- Evaluation of scientific models
- Application of quantitative methods to biological problems
- Written, oral, and multimedia scientific communication
- Retrieval and evaluation of information from the scientific literature, electronic databases, and online resources
- Use of scientific instrumentation and information technology
- Use of basic laboratory techniques
- Self-assessment of knowledge and learning skills

### Dispositional Goals:

Upon completion of a major in Biology, students will demonstrate that they have reflected upon:

- Their motivation for studying biology
- The impact of biological studies on the environment and human societies

Knowledge goals are assessed mainly through exams, and many of the Skill and Dispositional Outcomes are met during laboratory experiences and seminars. Materials for the portfolio may also include work produced as part of internships, independent study projects, or independent research. The portfolio should include a short narrative and evidence for each of the departmental goals. The checklist includes proficiencies in laboratory/field techniques, instrumentation, technology, and oral and written communication skills. A detailed description of the portfolio components will be provided during the First Year Seminar (BIOL 180).

## STUDENT RESOURCES

A number of resources are available to all students at Westfield State University free of charge. These resources include the Tutoring Center, Student Support Services, the Reading and Writing Center, the Career Services Center, and resources on the Department's web page. The Tutoring Center provides tutoring and other academic assistance to students, and provides opportunities for advanced students to serve as paid tutors. Student Support Services provides workshops and assistance on study skills, data analysis, writing laboratory reports, and other skills that are valuable to students in general and Biology Majors in particular. The Reading and Writing Center provides assistance in planning, writing, and revising assignments. A wide range of resources are provided by the Career Services Center, including job fairs, listings of internship and employment opportunities, graduate school information, and individual assistance on resume writing, job interview preparation, and related skills.

Information valuable specifically to Biology Majors may be found on the Department's web page ([www.biology.wsc.edu](http://www.biology.wsc.edu)). Materials posted on this site include updated versions of this Student Handbook, requirements for the Major in Biology, a listing of all courses offered by the Department (including descriptions and syllabi for some of the courses), and learning objectives that students are expected to meet as part of the requirements for completion of the Major. Also

available on the site are schedules and other information about Departmental faculty and staff, a link to the Westfield State University Writer's Guide (which provides useful information on writing papers, assignments, and laboratory reports), laboratory exercises for some of our courses, and data generated by students. It will be useful to you as a student to familiarize yourself with the information and resources available on this web site.

## GRADUATE & PROFESSIONAL SCHOOL PREPARATION

If you have an interest in attending a graduate or professional school following graduation from Westfield State University, additional preparation may be necessary. You should discuss your plans with your Academic Advisor. You may also wish to discuss your interests with our pre-med, pre-health, and graduate school advisors. These advisors may suggest specific courses or a specific concentration within the major. In particular, courses in physics and calculus are recommended for students interested in graduate and professional schools. You should also become acquainted with the resources available at the Career Services Center (see STUDENT RESOURCES).

## APPENDICES

The following section contains several forms that allow you and your Academic Advisor to track and plan your course selections. There are a variety of choices available to Biology Majors, so you should consult frequently with your Academic Advisor to plan the course of study that will best meet your personal interests and goals.

## A-1. UNIVERSITY CORE REQUIREMENTS

### **Humanities** (18 hrs total)

English Composition (6 hrs)

11 (or 105)

12 (or 110)

Literary and Philosophical Analysis (6 hrs)

\_\_\_\_\_

\_\_\_\_\_

Appreciation of the Arts (6 hrs)

\_\_\_\_\_

\_\_\_\_\_

### **Social Science** (12 hrs total)

US History and Government (3 hrs)

\_\_\_\_\_

Social Understanding (9 hrs)

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

### **Mathematics/Applied Analytical Reasoning** (6 hrs total)

BIOL 123

Additional 3 credit hours by advisement \_\_\_\_\_

### **Science** (7 hrs total)\*      \* Biology majors may not apply BIOL 102, 104, or 106 toward the Core

CHEM 109 (General Chemistry I)

CHEM 111 (General Chemistry II)

### **Diversity** (6 hrs total)

Global Diversity (3 hrs) \_\_\_\_\_

United States (3 hrs) \_\_\_\_\_



## A-2. MAJOR REQUIREMENTS: **BIOLOGY**

INTRODUCTORY COURSES (Biol 123 also counts toward the Common Core):

- BIOL 123 (Mathematical Methods ...) \_\_\_\_\_
- BIOL 128 (Introduction to Organismal, ...) \_\_\_\_\_
- BIOL 129 (Introduction to Cellular, ...) \_\_\_\_\_

SEMINARS:

- BIOL 180 (First Year Seminar) \_\_\_\_\_
- BIOL 280 – 289 (Special Topics Seminar) \_\_\_\_\_
- BIOL 280 – 289 (Special Topics Seminar) \_\_\_\_\_
- BIOL 380 (Senior Seminar) \_\_\_\_\_

CHEMISTRY COURSES (CHEM 109 and 111 also count toward the Common Core):

- CHEM 109 (General Chemistry I) \_\_\_\_\_
- CHEM 111 (General Chemistry II) \_\_\_\_\_
- CHEM 201 (Organic Chemistry I) \_\_\_\_\_
- CHEM 203 (Organic Chemistry II) \_\_\_\_\_

UPPER-LEVEL BIOLOGY (ONE course from each of the following areas):

**Evolution**

- BIOL 230 Evolution \_\_\_\_\_

**Ecology**

- BIOL 201 General Ecology \_\_\_\_\_

OR

- BIOL 202 Conservation Biology \_\_\_\_\_

UPPER-LEVEL BIOLOGY (continued)

**Cell / organismal function**

BIOL 203 Genetics \_\_\_\_\_

OR

BIOL 205 Cell Biology \_\_\_\_\_

OR

BIOL 223 Microbiology \_\_\_\_\_

**Organisms and physiology**

BIOL 211 Plant Biology \_\_\_\_\_

OR

BIOL 221 Vertebrate Physiology \_\_\_\_\_

OR

BIOL 227 Comparative Vertebrate Anatomy \_\_\_\_\_

OR

BIOL 239 Human Anatomy & Physiology II \_\_\_\_\_

ELECTIVES (A minimum of 15 credits in Biology,\* including TWO courses at the 300 level):

Course: BIOL \_\_\_\_\_ Semester: \_\_\_\_\_ Credits: \_\_\_\_\_

Course: BIOL \_\_\_\_\_ Semester: \_\_\_\_\_ Credits: \_\_\_\_\_

Course: BIOL \_\_\_\_\_ Semester: \_\_\_\_\_ Credits: \_\_\_\_\_

\*CHEM 313 may be used as one of these courses, but NOT as a 300-level course.

Two courses at 300 level:

Course: BIOL \_\_\_\_\_ Semester: \_\_\_\_\_ Credits: \_\_\_\_\_

Course: BIOL \_\_\_\_\_ Semester: \_\_\_\_\_ Credits: \_\_\_\_\_

TOTAL ELECTIVE CREDITS: [\_\_\_\_\_]

### A-3. RECOMMENDED COURSE SEQUENCE: **BIOLOGY**

The Department recommends that certain courses be taken during the semesters listed below. The average course load for graduation in 4 years is 15 credit hours per semester. You must earn a minimum of 49 credit hours within the core and 120 total credit hours to graduate.

#### FIRST YEAR:

##### **Fall**

BIOL 128 (4)  
Core (9-11)

##### **Spring**

BIOL 129 (4)  
BIOL 180 (1)  
INTRO/UPPER BIOL (3-4)  
Core (7-10)

BIOL 123 (3) should be taken during the first year (fall or spring)

#### SECOND YEAR:

##### **Fall**

UPPER BIOL (4-8)  
CHEM 109 (4)<sup>1</sup>  
Core (3-7)

##### **Spring**

UPPER BIOL (4-8)  
CHEM 111 (4)<sup>1</sup>  
Core (3-7)

#### THIRD YEAR:

##### **Fall**

UPPER/ELECTIVE BIOL (4-8)  
BIOL 280-287(1)  
CHEM 201 (4)  
Core (3-6)

##### **Spring**

UPPER/ELECTIVE BIOL (4-8)  
BIOL 280-287(1)  
CHEM 203 (4)  
Core (3-6)<sup>2</sup>

#### FOURTH YEAR:

##### **Fall**

UPPER/ELECTIVE BIOL (4-8)<sup>3</sup>  
BIOL 280-287(1)<sup>2</sup>  
BIOL 380 (1)

##### **Spring**

UPPER/ELECTIVE BIOL (4-8)<sup>3</sup>  
BIOL 280-287(1)<sup>2</sup>

<sup>1</sup> Students with a strong background in chemistry, or those interested in applying to medical school, may wish to start the chemistry sequence in the freshman year.

<sup>2</sup> As needed.

<sup>3</sup> At least two Biology courses must be at the 300-level. These courses should be taken no later than the senior year.



#### A-4. UPPER-LEVEL COURSE OFFERINGS: **BIOLOGY**

The following is a general schedule for 200- and 300-level courses in Biology. The schedule may change from semester to semester, so be sure to consult with your Academic Advisor and the Course Offerings booklet each semester. Courses followed by an asterisk (\*) are offered in alternating years.

##### FALL SEMESTER

BIOL 201 General Ecology  
BIOL 202 Conservation Biology  
BIOL 203 Genetics I  
BIOL 205 Cell Biology  
BIOL 207 Developmental Biology  
BIOL 219 Aquatic Biology  
BIOL 223 Microbiology  
BIOL 237 Human Anatomy & Physiology I  
BIOL 239 Human Anatomy & Physiology II  
BIOL 289 History & Nature of Sci. Knowl.\*  
BIOL 305 Plant Communities  
BIOL 325 Ecosystems  
BIOL 334 Animal Behavior  
BIOL 390 Teaching Secondary Biology

##### SPRING SEMESTER

BIOL 200 Natural History in America  
BIOL 201 General Ecology  
BIOL 202 Conservation Biology  
BIOL 208 Marine Biology  
BIOL 210 Histology  
BIOL 211 Plant Biology  
BIOL 223 Microbiology  
BIOL 230 Evolution  
BIOL 233 Environmental Legislation  
BIOL 237 Human Anatomy & Physiology I  
BIOL 239 Human Anatomy & Physiology II  
BIOL 303 Medical Microbiology\*  
BIOL 304 Applied Microbiology\*  
BIOL 313 Immunology\*

##### OTHER COURSES:

BIOL 311 THE SUMMER FLORA is offered during the summer session.

The following courses are offered irregularly. Consult with the course instructor to determine when the course will be offered.

BIOL 212 Mammalogy  
BIOL 217 Invertebrate Biology  
BIOL 221 Vertebrate Physiology  
BIOL 227 Comparative Vertebrate Anatomy  
BIOL 322 Electron Microscopy  
BIOL 336 Molecular Genetics



- NOTES -