

Advisor: Dr. Jessica Allen, Dr. Rebecca Brown, & Dr. Robin O'Quinn

### **GENERAL INFORMATION**

Botanists study a wide range of topics related to plants, other photosynthetic organisms (algae), and fungi. Because it encompasses the study of such a wide range of organisms, many sub-disciplines exist within botany. Botanists may specialize in the ecology, physiology, pathology, genetics, anatomy, systematics, taxonomy, or molecular biology of plants. They may also focus their studies on specific groups of plants, such as aquatic plants, crop species, forest or rangeland plants, or they may study algae or fungi. Regardless of their specialized interests, botanists are well served by first developing a broad understanding of general biological principles, and of the diversity of plants and related organisms.

### **CHOOSING COURSE WORK**

With a wide range of specializations within botany available, undergraduate students who are interested in plants may choose from a variety of plant related careers. The BS degree in Biology offered at EWU can provide students with broad training in botany as preparation for entry level jobs in government and private industry, and for more specialized graduate education in plant ecology, forestry, agronomy, horticulture, range science, weed science, mycology, algology, plant pathology, plant molecular biology and plant genetics. In addition to completing the requirements for a BS in Biology with an emphasis on plants, students interested in botany as a profession should take courses in Molecular Biology, Chemistry, Geography, Geology, Statistics, and Physics depending on their specialized interests. Students should also take advantage of the many opportunities to participate in research projects through Directed Studies with individual faculty members, and through internships with various local businesses and government agencies.

### **WHERE THE JOBS ARE**

Botanists find employment in a variety of government agencies, at universities, and in private industry. Within the federal government, many branches of the US Department of Agriculture and the Department of Interior, including the Forest Service, the Park Service, the Bureau of Land Management, and the Environmental Protection Agency as well as state and local conservation agencies, parks, and departments of ecology and natural resource management also hire botanists. Employers in the private sector include companies involved in research and development of agricultural products and plant-derived pharmaceuticals, the forest products industry, plant nurseries, biological supply companies, mining and oil companies, biotechnology firms, and private conservation groups. Among many possibilities, botanists may find themselves surveying for rare plant species, developing new strains of crops, working on habitat restoration, testing plants as sources of useful drugs, monitoring forest harvest practices, conducting research on the relationships among groups of plants, developing strategies to manage crop or forest pathogens, monitoring water quality, running their own native plant nursery, designing city landscaping programs or running their own landscaping business, preparing environmental impact statements, or developing conservation awareness programs in parks. The website produced by the Botanical Society of America (<http://www.plant-biology.net/bsa/careers/opportunities.php>) is one of many sources of information on how to search for jobs in the plant sciences.

***BS IN BIOLOGY WITH ELECTIVES RECOMMENDED FOR  
BOTANY AND PLANT SCIENCES***

**Required Biology Courses: 28 credits**

BIOL 171 Biology I	(5)
BIOL 172 Biology II	(5)
BIOL 173 Biology III	(5)
BIOL 270 Biological Investigation	(3)
BIOL 310 Fundamentals of Genetics	(5)
BIOL 490 Department Senior Capstone (Plant Physiology)	(5)

**Select one of the following courses: 5 credits**

BIOL 301 Microbiology	(5)
<b>BIOL 302 Botany - Recommended</b>	<b>(5)</b>
BIOL 303 Invertebrate Zoology	(5)
BIOL 304 Vertebrate Zoology	(5)

**Select one of the following courses: 4-5 credits**

BIOL 423 Evolution	(5)
BIOL 440 Ecology	(4)

**[Note: Both are recommended, additional course will count towards elective credit for Biology BS (see below)]**

**Select one of the following courses: 5 credits**

BIOL 436 Cell Biology	(5)
BIOL 438 Molecular Biology	(5)

**[Note: Both are recommended, additional course will count towards elective credit for Biology BS (see below)]**

**Select one of the following courses (4–5 credits)**

BIOL 334 Human Anatomy and Physiology III for Biology Majors	(5)
BIOL 351 Principles of Animal Physiology	(4)
BIOL 352 Principles of Plant Physiology	(4)
BIOL 353 Principles of Microbial Physiology	(4)

**Required Supporting Courses: 20 credits**

CHEM 171 General Chemistry	(4)
CHEM 171L General Chemistry Lab	(1)
CHEM 172 General Chemistry	(4)
CHEM 172L General Chemistry Lab	(1)
CHEM 173 General Chemistry	(4)
CHEM 173L General Chemistry Lab	(1)
MATH 161 Calculus I or MATH 380 Elementary Probability and Statistics or BIOL 380 Data Analysis for Biologists	(5)

**ELECTIVE COURSES:** 36 credits (21 must be Biology electives, and can include directed study or internship credit, e.g. BIOL 399, 395, 499, 495) of upper division (300- or 400-level) courses **with advisor's consent**. The electives recommended for botany vary depending on the student's career interests but may include many of the following BIOL courses:

BIOL 301 Microbiology	(5)
BIOL 303 Invertebrate Zoology	(5)
BIOL 304 Vertebrate Zoology	(5)
BIOL 306/GEOG 306 Natural Veg Ecol of N America	(5)
BIOL 411 Field Botany	(5)
BIOL 312/GEOG 312 Fundamentals of Soil Science	(5)
BIOL 324 Entomology	(5)
BIOL 409 Mycology	(5)
BIOL 441 Ecology Lab	(2)
BIOL 442 Conservation Biology	(4)
BIOL 446 Riparian Ecology	(5)

**In addition to the above BIOL courses, the following courses offered by other departments provide useful background for students interested in various aspects of Botany:**

CHEM 304 Quantitative Analysis	(6)
CHEM 316 Environmental Chemistry	(5)
CHEM 351 Organic Chemistry	(4)
CHEM 352 Organic Chemistry	(4)
CHEM 353 Organic Chemistry	(3)
CHEM 372 Organic Chemistry Lab	(3)
CHEM 480 Biochemistry	(5)
CHEM 481 Intermediary Metabolism	(5)
GEOG 315 Surface Hydrology	(4)
GEOG 323 GIS for the Environmental Sciences	(3)
GEOG 325 Wetland Sciences	(4)
GEOL 360 Geologic Hazards	(4)
GEOL 463 Environmental Geochemistry	(5)
PLAN 430 Environmental Planning	(5)
PLAN 431 Environmental Impact Statements	(3)

**Biology ETS Field Exam required for graduation.**

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## PREPARING FOR GRADUATE SCHOOL

Many careers in botany require specialized training beyond the undergraduate level. Students who are interested in careers in botany should seriously consider graduate school while planning their undergraduate curriculum. Many graduate programs in botany require a year of Organic Chemistry, and a year of Physics is also recommended. Students are urged to begin to look for potential graduate schools early in their junior year, and to find out specific undergraduate requirements for graduate schools that interest them. Many graduate programs in botany require that applicants submit scores from the Graduate Record Exam (GRE) general test, and some require scores from the GRE Biology subject test as well. Students should plan to take the GRE early in their senior year, typically in fall quarter.

### Potential Course Schedule

This is a sample course schedule for an incoming freshman intending to complete a biology major with an emphasis in botany. This schedule includes all EWU GEGR requirements and assumes that all pre-college level math requirements are met and competence in chemistry and computer literacy has already been demonstrated in high school. Many permutations on this sample schedule are possible.

	Fall	Winter	Spring
Year 1	Biol 171 Chem 171 Chem 171L Engl 201 (14 cr)	Biol 172 Chem 172 Chem 172L Math 106 (14 cr)	Biol 173 Biol 270 Chem 173 Chem 173L Humanities or Social Science GEGR (17 cr)
Year 2	Biol 302 (Botany) Math 161 or 380 or Biol 380 Humanities or Social Science GEGR (15 cr)	Biol 310 (Genetics) Math 161 Humanities or Social Science GEGR (15 cr)	Biol 440/441* (Ecology/Lab) Biol 311 (Field Botany) Humanities or Social Science GEGR (16 cr)
Year 3	Biol 409 (Mycology) Biol or related elective Humanities or Social Science GEGR (15 cr)	Biol 436** Biol or related elective Cultural Diversity GEGR (15 cr)	Biol or related elective Biol or related elective International Studies GEGR (15 cr)
Year 4	Biol or related elective Biol or related elective Biol or related elective (15 cr) or BIOL 490 (Capstone)	Biol or related elective Biol or related elective (15 cr) Biol 352 (Plant Physiology)	Electives or Biol 490 (Capstone) (15 cr)

\* or Biol 423 may be taken winter quarter

\*\* or Biol 438 may be taken spring quarter