MOLECULAR, CELLULAR AND DEVELOPMENTAL BIOLOGY

BACHELOR OF SCIENCE IN BIOLOGY

The ***Molecular, Cellular,*** and ***Developmental Biology*** option is for students seeking undergraduate training in the molecular, genetic, and cellular basis of life. These topics will assist students in understanding the complex biological processes that underlie cellular function, disease processes and embryonic development.

Each option is complemented by the College of Arts and Sciences general educational requirements such as English Composition, Writing, Foreign Language, QSR, VLPA, and I&S.

Biology Department Admission Requirements

This competitive admission process is designed not to limit access to the major but to assist students in careful planning and preparation for success in the Biology Major. An electronic application can be found on the biology website and will be due the second Friday of Autumn, Winter, Spring, & Summer quarters by 11:59pm.

To apply for a Biology Major you must meet these minimum application requirements:

1. **Be a matriculated student at the UW Seattle Campus and in good academic standing.**
2. **Complete the Introductory Biology series or equivalent courses to UW BIOL 180, 200, 220 and have a minimum grade of 2.0 in EACH course.**
3. **Have a minimum 2.5 Cumulative GPA for any supporting Chemistry, Physics, Math, Biology or other courses intended for use in the Biology major that are complete at the time of application.**

Meeting these minimum requirements does not guarantee admission to the Biology major. Other factors in admission include review of essay questions, space availability in the major, and time to degree set by UW Satisfactory Progress Policy. We strongly encourage students who do not meet the minimum application requirements to meet with a Department of Biology Academic Adviser to discuss their options. If you plan to pursue a double major or degree, a detailed plan for all requirements is required upon admission.

Academic Advisers	EMAIL	PHONE	Biology Undergraduate Office
Jason Patterson	**patterj@uw.edu**	(206) 543-7767	318 Hitchcock Hall, Box 355320
Sheryl Medrano	**smedrano@uw.edu**	(206) 616-8147	University of Washington
Janet Germeraad	**janetjg@uw.edu**	(206) 543-6647	Office Phone 206-543-9120
Visit the Biology website for dept. info, scholarships, research, etc.: http://www.biology.washington.edu/			

Appointments: Email adviser directly; each adviser makes their own appointments.

Walk In Advising Hours: **Monday,Tuesday,Wednesday, Friday *9:00AM-12:00PM* and *1:00PM-4:00PM***
Thursday *9:00AM-12:00PM* and *1:30PM-4:00 PM* in 318 Hitchcock Hall

List Serv: Join the Biology listserv: *https://mailman2.u.washington.edu/mailman/listinfo/biostudent*

Must be a UW address

Departmental Honors in Biology

Departmental honors allow students seeking extra challenges and opportunities to do so while completing a Biology Degree. Students may request an invitation to departmental honors in Biology once they and have been admitted to the Biology Major. The request **must** be submitted *3 quarters* prior to graduation; requests made later will not be reviewed. ***More details about honors can be found in Section VII.***

Option Requirements. A minimum of **90 credits** to be distributed as follows:

I. SUPPORTING COURSES IN CHEMISTRY, PHYSICS, AND MATHEMATICS:

Chemistry (choose **one** option) (18-27 credits)

1. CHEM 142/143, 152/153^ (5,5) ***and*** CHEM 223, 224 (4,4) *(O Chem labs are not required for major)*
2. CHEM 142, 152^, 162 (5,5,5) ***and*** CHEM 237, 238, 239 (4,4,4) *(O Chem labs are not required for major)*

Physics (choose **one** option): (8-10 credits)

1. PHYS	114, 115	(4,4)	Algebra based physics (*labs are not required for the major*)
2. PHYS	121, 122	(5,5)	Calculus based physics

Mathematics (choose **one** option): (9-10 credits)

1. MATH	124, 125	(5,5)	Calculus with Analytic Geometry
2. QSCI	291, 292	(5,5)	Calculus for Biologists
3a. QSCI	381, 482	(5,5)	Quantitative Statistical Reasoning
3b. STATS/QSCI	311, 482	(5,5)	Introductory Statistics and Quantitative Statistical Reasoning
4. Combine1 Stats and 1 Calculus class			Calculus (*124 or 291*) and Statisics (*381,311 or BIOST 310*)

A third quarter of calculus or a course in probability and statistics is strongly recommended.

II. INTRODUCTORY BIOLOGY: (15 credits)

BIOL 180, 200^, 220 (5,5,5) *^CHEM 152, 153 or 220, can be a co-requisite of 200*

III. GENETICS REQUIREMENT: (3-5 credits)

Select **one** of the following courses:

1. GENOME	361	(3)	Fundamentals of Genetics and Genomics
2. GENOME	371	(5)	Introductory Genetics (*Autumn*)

IT IS YOUR RESPONSIBILITY TO REGULARLY ASSESS YOUR DEGREE PROGRESS BY REFRESHING AND CHECKING YOUR DEGREE AUDIT. SHOULD YOU HAVE A QUESTION OR NOTICE A DISCREPANCY, IT IS YOUR RESPONSIBILITY TO ADDRESS THIS WITH A DEPARTMENT OF BIOLOGY ACADEMIC ADVISER.

For scheduling future classes:

- **Many elective courses have pre-requisite courses.**
- **In planning your courses, be sure to use the course catalog and matrix to plan schedules that include the necessary pre-requisites so you are able to register for your chosen selections!**

IV. BREADTH REQUIREMENT:

Biologists often concentrate on one level of biological organization, but it is important to know about broader biological topics that can be studied. To broaden your perspective, you are required to take at least one biologically based course that provides breadth outside your area of concentration that will explore the realm of macro science. ***Breadth is a separate requirement from your Advanced Electives.***

Select **one** of the following courses : (3 credits minimum)

BIOL	313L	(4)	Civilizational Biology (*Summer Only*)
BIOL	315	(3)	Biological Impacts of Climate Change
BIOL	354	(3)	Foundations in Evolution and Systematics
BIOL	356L	(3)	Foundations in Ecology
BIOL/BIO A	385/355	(3)	Evolutionary Medicine and Public Health
BIOL	420	(4)	Game Theory in Biology
BIOL	423	(3)	Marine Ecological Processes
BIOL	438L	(5)	Analytical Paleobiology
BIOL	469	(3)	Evolution and Medicine+
BIOL	470	(4)	Biogeography
BIOL	473	(3)	Limnology
BIOL	476L	(5)	Conservation Biology
BIOL	478	(3)	Topics in Sustainable Fisheries
BIOL	480L	(4)	Field Ecology
BIOL	481L	(5)	Experimental Ecology and Evolution
ESRM	350	(5)	Wildlife Biology and Conservation
ESRM	465	(3)	Economics of Conservation
FISH/ENVIR	330	(5)	Climate Change Impacts on Marine Ecosystems
FISH	444L	(5)	Conservation Genetics
FISH	464	(4)	Artic Vertebrate Ecology

V. NATURAL HISTORY/BIODIVERSITY:

Natural History is the study of the characteristics, life cycles, and biological background of a particular taxonomic group. Biodiversity deals with a whole suite of organisms that inhabits a particular environment. These classes are often field oriented, in which students both observe and/or analyze both the organisms and their interactions in their natural habitats. ***Natural history is a separate requirement from your advanced electives***.

Select **one** of the following courses: (3 credits minimum)

BIOL	280	(4)	The History of Life
BIOL/FISH	311L	(3/5)	Biology of Fishes#
BIOL	317L	(5)	Plant Identification and Classification
BIOL/ESRM	331	(3)	Landscape Plant Recognition
BIOL/FHL	***430L***	***(5)***	***Marine Zoology (FHL)***
BIOL/FHL	***432L***	***(9)***	***Marine Invertebrate Zoology (FHL)***
BIOL	433L	(5)	Marine Ecology
BIOL	434L	(5)	Invertebrate Zoology
BIOL	437	(5)	Herpetology
BIOL	438L	(5)	Quantitative Approach to Palebio,Morph, & Systematics
BIOL	439L	(5)	Functional Morphology
BIOL	440L	(5)	General Mycology
BIOL	441L	(5)	Trends in Land Plant Evolution
BIOL	443L	(5)	Evolution of Mammals and Their Ancestors
BIOL	444L	(5)	Ornithology
BIOL/FHL	***445L***	***(5)***	***Marine Botany (FHL)***
BIOL	448L	(5)	Mammalogy
BIOL/ESS	450/452L	(5)	Vertebrate Paleontology
BIOL/ESS	451L	(5)	Invertebrate Paleontology
BIOL	452L	(5)	Vertebrate Biology
BIOL	453L	(5)	Comparative Vertebrate Anatomy
ENVIR	280	(5)	Natural History of the Puget Sound Region
ESRM	435/436L	(3/2)	Insect Ecology
ESRM	452L	(3)	Field Ornithology
ESRM	453	(3)	Biology & Ecology of Mammals
ESRM	456	(3)	Biology and Conservation of Birds
FISH	450L	(3/5)	Salmonoid Behavior and Life History#
FISH	475L	(5)	Marine Mammalogy

VI. ADVANCED MCD ELECTIVES: (31 credits)

- You are required to have a minimum of **31 credits** from the selection below.
- Within these 31 credits students must select one **Biochemistry** option, one **Developmental Biology** course, one **Molecular, Cellular, Developmental Laboratory**:

Biochemistry – select **one** option:			
1. BIOC	405, 406	(3,3)	Introduction to Biochemistry[2]
2. BIOC	440, 441	(4,4)	Biochemistry[2]
Developmental Biology Courses – select **one** course:			
BIOL	411	(4)	Developmental Biology
BIOL	413L	(4)	Molecular Development of Genetics*
BIOL	415	(3)	Evolution & Developement
BIOL	416	(3)	Molecular Genetics of Plant Development
BIOL	459	(3)	Developmental Neurobiology
Molecular, Cellular, Developmental Lab requirement – select **one** course:			
BIOL	302L	(4)	Laboratory Techniques in Cell and Molecular
BIOL	400L	(4)	Experiments in Molecular Biology
BIOL	402L	(4)	Functional Genomics
BIOL	407L	(4)	Molecular Cell Biology of Neural Stem Cells
BIOL	413L	(4)	Molecular Development of Genetics*
BIOL	425L	(5)	Adv. Plant Physiology & Development Lab
BIOL	428L	(5)	Sensory Neurophysiology and Ecology Lab
BIOL	463L	(3)	Adv. Animal Physiology Lab
BIOC	426L	(4)	Basic Techniques in Biochemistry
MICROM	402L	(3)	Fundamentals of Microbiology Lab
MICROM	431L	(3)	Prokaryotic Recombinant DNA Techniques
Various DEPT	**499L**	**(4)**	**Undergraduate Research** (*Must be Approved, see notes*)**
Electives: All remaining upper division electives may be chosen from the list below, or from courses listed above as Advanced Electives, or additional classes from the ***Natural History/Biodiversity*** list.			
BIOL	305	(3)	Science Communication: Video Storytelling in Biology
BIOL	310L	(5)	Survey of Human Anatomy
BIOL	350	(3)	Foundations in Physiology
BIOL	355	(3)	Foundations in Molecular Cell Biology
BIOL	359	(3)	Foundations of Quantitative Biology
BIOL	380	(3)	Biomedical Advances and Society
BIOL	396	(1-4)	Peer Facilitation in Biology[1]
BIOL	399	(2-12)	Biology Internship Program
BIOL	401	(3)	Advanced Cell Biology
BIOL	404	(3)	Animal Physiology: Cellular Aspects
BIOL	405	(3)	Cell and Molecular Biology of Human Disease
BIOL	410	(2)	Current Topics in Molecular & Cellular Biology Research
BIOL	417	(4)	Comparative Reproductive Physiology of Vertebrates
BIOL	418	(4)	Biological Clocks and Rhythms
BIOL	419	(4)	Data Science for Biologists
BIOL/GENOME	414L	(5)	Molecular Evolution
BIOL	421L	(4)	Ecological and Evolutionary Physiology of Animals
BIOL	422	(3)	Physiology of Plant Behavior
BIOL/ESRM	424/478L	(5)	Plant Eco-Physiology
BIOL	427L	(5)	Biomechanics
BIOL	431	(1)	Biology of Cannabinoids Seminar
BIOL	449	(5)	Applied Phylogenetics
BIOL	455	(4)	Human Immunology & Pathology of Infectious Diseases
BIOL	457	(3)	Chemical Communication
BIOL	460	(3)	Mammalian Physiology
BIOL	461	(3)	Neurobiology
BIOL	462	(3)	Advanced Animal Physiology

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VI. MCD ELECTIVES, continued:

BIOL	464	(2)	Molecular Mechanisms of Cancer Seminar
BIOL	465	(3)	Comparative Endocrinology
BIOL	466	(3)	Pathobiology of Emerging Diseases
BIOL	467	(3)	Comparative Reproductive Physiology
BIOL	468	(3)	Medical Physiology
BIOL	469	(3)	Evolution & Medicine+
BIOL	475L	(3-5)	Intensive Field Experience in Biology
BIOL	485	(1-3)	Sr. Seminar in Molecular, Cellular & Developmental Biol
BIOL	488	(1-3)	Sr. Seminar in Physiology
BIOL	492	(3)	Teaching Biology Inclusively to Diverse Audiences
BIOL	494	(3)	Controversies in Biology
BIOL	495L	(3)	Biology of Fermentation
BIOC	442	(4)	Biochemistry
ESRM	404L	(5)	Plant Microbiology Laboratory
FISH	406L	(5)	Parasite Ecology
GENOME	372	(5)	Genomics and Proteomics
GENOME	373	(4)	Genomic Informatics
GENOME	453	(3)	Genetics of the Evolutionary Process
GENOME	465	(4)	Advanced Human Genetics
GENOME	466	(3)	Cancer Genetics
GENOME	475	(3)	Debates in Genetics
GENOME	490	(2)	Genetics Undergraduate Seminar
IMMUN	441	(4)	Introduction to Immunology
MICROM	410	(3)	Fundamentals of Microbiology I
MICROM	411L	(4)	Bacterial Genetics
MICROM	412	(3)	Prokaryotic Diversity
MICROM	442	(3)	Medical Bacteriology
MICROM	445	(3)	Medical Virology
MICROM	450	(3)	Molecular Biology of Viruses
MICROM	460	(3)	Medical Mycology and Parasitology

VII. LAB, RESIDENCY AND 400 LEVEL BIOLOGY REQUIREMENTS:

These requirements may overlap with other requirements such as Breadth, Natural History/Biodiversity, or Advanced Electives.

- A minimum of ***15 credits*** must be 400 level through the **Department of BIOLOGY**. Courses such as Biochemistry (BIOC) and Microbiology (MICROM) are from other departments and ***will not*** count toward this requirement.
- A minimum of ***15 credits*** of 300 and 400 level Advanced **BIOL** Electives must be taken in residency at the University of Washington-Seattle campus. This requirement ***can be shared*** with the departmental 400 level requirement above.
- At least **two** laboratory courses, chosen from any course marked with an "***L***", must be taken. A minimum of four credits of 499 (***please read end note about approval process***) can substitute for one laboratory.
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VIII. DEPARTMENTAL HONORS REQUIREMENTS:

General Requirements for completing Departmental Honors include:

- UW Cumulative GPA: 3.3
- Major Cumulative GPA: 3.4
- Complete two 400 level BIOL courses for Ad Hoc credit (*Requires online agreement form*)
- Complete two approved Senior level BIOL Seminars
- Complete 9 credits of Undergraduate Research (*Research approval form required*)
- Complete a research paper based on approved research credits
- Present your research work at the Undergraduate Research Symposium or other approved venue

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IX. ADDITIONAL NOTES:

- **Undergraduate Research:** Any 499 credit ***must*** be approved by petition; see a Biology Adviser or visit the website for a Research Approval Form. A minimum of 4 credits on the same project are required for a petition to count towards a lab.
- A cumulative GPA of a 2.0 is required for all classes counting toward the major that are taken at the University of Washington.
- Courses listed in more than one category **can only count for one area requirement.**
- **Cross Campus equivalencies are not guaranteed for BIOL 180/200/220 registration purposes.** Complications may arise during registration if you have taken courses at other campuses and it is up to the student to inquire and be prepared. You will need to submit a petition for any other courses from the other campuses.
- **Experential learning:** A maximum of 10 credits of a combined***396/399/498/499*** can be applied to your degree. You will need a faculty code from your faculty sponsor to sign up for any of these credits.
- *For other classes of interest that are not listed, please contact an advisor about the possibility of petitioning. The course will need to be at the 300 to 400 level and have a biological basis to be considered.*

X. SYMBOLS:

(***FHL***) Indicates course taught at Friday Harbor Labs.

[1] 396 is regulated and administered by professor permission. To Peer facilitate an introductory course, contact the lab coordinator of the specific class. For other courses, prior experience with the class and permission of acting instructor is necessary for enrollment.

# Indicates a class that has a lecture only (3 credits) or a lecture and lab component (5 credits).

* May count as your developmental class and MCD lab.

+ May count as breath or elective, not both

[2] Only 1 class per pair can count as an elective from 405/440 and 406/441