

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 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 VIII.***

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

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

Chemistry (choose one option) (15-27 credits) 1. CHEM 120, 220, 221 (5,5,5) 2. CHEM 142/143, 152/153(5,5) and CHEM 223, 224 (4,4) (<i>O Chem labs are not required for major</i>) 3. CHEM 142, 152, 162 (5,5,5) and CHEM 237, 238, 239 (4,4,4) (<i>O Chem labs are not required for major</i>)
Physics (choose one option): (8-10 credits) 1. PHYS 114, 115 (4,4) Algebra based physics (<i>labs are not required for the major</i>) 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. Combine 1 Stats and 1 Calculus class (4/5,5) Statistics (381,311 or BIOST. 310) and Calculus (124 or 291)

II. INTRODUCTORY BIOLOGY: (15 credits)

BIOL 180 200, 220 (5,5,5)	<i>CHEM 152, 153, or 220 can be a co-requisite of 200</i>
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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 (<i>Autumn only</i>)	

IV. LAB, RESIDENCY AND 400 LEVEL BIOLOGY REQUIREMENTS:

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

- **15 credits** must be 400 level with the **BIOL** department prefix. Courses such as Biochemistry (BIOC) and Microbiology (MICROM) are from other departments and **will not** count toward this requirement.
- **15 credits** of 300 and 400 level **BIOL** Electives must be taken in residency at the University of Washington-Seattle campus. **This requirement can overlap with the departmental 400 level requirement above.**
- **Two** laboratory courses at a minimum. One course from Area VII noted as a MCD lab and a 2nd lab that can overlap with other requirements from any course marked with an “**L**” on the handout. A minimum of four credits of 499 (*please read approval process in end notes*) can substitute for only one laboratory.

V. BREADTH REQUIREMENT:**(3 credits)**

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.

Select **one** of the following courses: *Breadth is a separate requirement from your Advanced Electives.*

BIOL	313L	(4)	Civilizational Biology (<i>Summer Only</i>)
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	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)	Arctic Vertebrate Ecology

VI. NATURAL HISTORY/BIODIVERSITY:**(3 credits)**

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.

Select **one** of the following courses: *Natural History is a separate requirement from your Advanced Electives.*

BIOL	280	(4)	The History of Life
BIOL/FISH	311L	(5)	Biology of Fishes
BIOL/ESRM	331	(3)	Landscape Plant Recognition
<i>BIOL/FHL</i>	<i>430L</i>	<i>(5)</i>	<i>Marine Zoology (FHL)</i>
<i>BIOL/FHL</i>	<i>432L</i>	<i>(9)</i>	<i>Marine Invertebrate Zoology (FHL)</i>
BIOL	433L	(5)	Marine Ecology
BIOL	434L	(5)	Invertebrate Zoology
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
<i>BIOL/FHL</i>	<i>445L</i>	<i>(5)</i>	<i>Marine Botany (FHL)</i>
BIOL	446L	(5)	Plant Identification and Classification
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	450	(3)	Salmonoid Behavior and Life History
FISH	475L	(5)	Marine Mammalogy

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VII. 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 <u>one</u> option:			
1. BIOC	405, 406	(3,3)	Introduction to Biochemistry ²
2. BIOC	440, 441	(4,4)	Biochemistry ²
Developmental Biology Courses – select <u>one</u> course:			
BIOL	411	(4)	Developmental Biology
BIOL	413L	(4)	Molecular Development of Genetics*
BIOL	415	(3)	Evolution & Development
BIOL	416	(3)	Molecular Genetics of Plant Development
BIOL	459	(3)	Developmental Neurobiology
Molecular, Cellular, Developmental Lab requirement – select <u>one</u> 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
BIOL	495L	(3)	Biology of Fermentation
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 (<i>Must be Approved, see notes</i>)**
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 <i>Natural History/Biodiversity</i> 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	426	(3)	Comparative Immunology
BIOL	427L	(5)	Biomechanics
BIOL	431	(1)	Biology of Cannabinoids Seminar
BIOL	454	(3)	Somatosensation
BIOL	455	(4)	Human Immunology & Pathology of Infectious Diseases
BIOL	457	(3)	Chemical Communication
BIOL	460	(3)	Mammalian Physiology
BIOL	461	(3)	Neurobiology

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VII. MCD ELECTIVES, continued:

BIOL	463	(3)	Advanced Animal Physiology
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	469	(3)	Evolution & Medicine+
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
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

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, check the catalog.**
- **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!**

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VIII. DEPARTMENTAL HONORS REQUIREMENTS

Janet Germeraad, janetjg@uw.edu coordinates the requirements and application

General Requirements for completing Departmental Honors include:

- Applying for Departmental Honors 1 year prior to graduation.
- UW Cumulative GPA: 3.3 and a 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 by the start of the final quarter
- Present your research work at the Undergraduate Research Symposium or other approved venue

IX. ADDITIONAL NOTES:

- A cumulative GPA of a 2.0 is required for all classes counting toward the major and 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.
- **Experiential 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.
- **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.
- *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.

* 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

Remember!

- You're in charge! Take responsibility for your education by understanding your degree requirements. Reflect on the course choices available to you. Will your courses help you in preparation for a career or do they teach skills? Will they allow you to explore your interests or equip you for graduate or professional schools?
- Explore the course choices prior to an academic planning session or walk in drop in session. Ask fellow biology majors what courses they have enjoyed. Read the course descriptions on the course catalog. To make your advising appointment beneficial, advisors will need an idea of content that interests you and why.
- If you want to know if you're "on track" or will graduate "on time", you will need to create a full academic plan to be reviewed during an advising appointment. By developing your plan, you'll be able to develop a sense of how much time it will take to complete your degree requirements.
- Do you plan on incorporating service learning? A study abroad program? Internships or volunteer experience? How will that fit with your academics and which opportunities are best for you? Your education goes beyond just what courses you take.
- Biology Student Services are available to assist in many ways. Come visit Hitchcock 318 – Academic Services Office.

Speaking of Study Abroad!

- Do you know that UW has an entire office dedicated to sending you to study across the globe.
- There are several programs that might fit your needs! Wants to be gone a quarter? An entire year? Just three weeks? No problem, there are options!
- Work with the Study Abroad in 459 Schmitz Hall as well as a Biology advisor to ensure you choose a program which meets your educational goals and academic plans. There are limited departmental options associated with BIOL, so direct exchanges or external programs are your best bet.
- Visit <https://www.washington.edu/studyabroad/> to get started!
- Check out the Study Abroad blog to hear from Huskies who have gone out exploring in the world!
<https://uwabroad.wixsite.com/blog>

Getting Involved

- Research is one of the best ways of applying what you are learning in classes to real world situations. You can use the Undergraduate Research Program (URP) <https://www.washington.edu/undergradresearch/students/find/> to find open positions or you can contact a faculty whose research interests you directly. Check out the Research Symposium that happens every May in Mary Gates to see what students are doing throughout campus!
- Did you know that there are over 700 registered student organizations (RSO)? Find one that suits you, or if you can't find one, create one!
<https://huskylink.washington.edu/organizations>
- Check in with the Carlson Center and Public Service Center in MGH 171 for service learning and volunteer opportunities.
- Want to gain some hands on experience? Consider an internship. <https://careers.uw.edu/internships/>
- Think about other ways to connect your academics to exploring careers! Volunteering, job shadows, informational interviews, etc.

The Career Center

- Concerned about Careers for your specific major? The UW Career Center is located in MGH 134!
- The Career Centers counselors are available for one on one appointments, resume editing, and they host several workshops each quarter on how to make a resume, how to apply to graduate school, preparing for interviews for jobs and professional schools and more!
- Check out the Career Center website: <https://careers.uw.edu/>
- Think about other ways to connect your academics to exploring careers! Volunteering, job shadows, informational interviews, etc.
- Use Handshake to look for jobs and opportunities: <https://careers.uw.edu/resources/handshake/>

AUT		WIN		SPR		SUM	
Course	Cr	Course	Cr	Course	Cr	Course	Cr
Quarter Total		Quarter Total		Quarter Total		Quarter Total	

Goals, Courses, Ideas:

AUT		WIN		SPR		SUM	
Course	Cr	Course	Cr	Course	Cr	Course	Cr
Quarter Total		Quarter Total		Quarter Total		Quarter Total	

Goals, Courses, Ideas:

AUT		WIN		SPR		SUM	
Course	Cr	Course	Cr	Course	Cr	Course	Cr
Quarter Total		Quarter Total		Quarter Total		Quarter Total	

Goals, Courses, Ideas:

AUT		WIN		SPR		SUM	
Course	Cr	Course	Cr	Course	Cr	Course	Cr
Quarter Total		Quarter Total		Quarter Total		Quarter Total	

Goals, Courses, Ideas:

Freshman Year Goals:
 Explore Majors! Get Involved!

- Meet with advisers in various departments or UAA.
- Join a student club, participate in tutoring/study groups
- Volunteer
- Create a pattern of attending office hours of your professors and TA's
- Investigate undergrad research, internships and/or study abroad.

Sophomore Year Goals:
 Be more focused.

- Meet with Dept. advisors in majors you are most interest in
- Find a mentor (upper level student, professor or professional)
- Investigate professional exams: GRE, PCAT, DAT, MCAT
- Pursue undergrad research
- Create and refine your Resume or C.V.
- Start doing informational interviews

Junior Year Goals:
 Define and Clarify Future Goals

- Develop your leadership by being a campus leader or club officer
- Identify 2 faculty members who can recall your name
- Evaluate and assess strengths and weaknesses in your resume
- Consider whom you would like a letter of reference from
- Review your progress on your freshmen and sophomore goals

Senior Year Goals:
 Wrap up and Final Activities

- Use the career center to create your resume/C.V. and various alternative versions.
- Participate in some mock interviews
- Begin your job hunt or applications for grad programs
- Gather your persons for your letters of rec