

# Biology Major - Genetics Option Guide 2023-24

Document available online at <https://ib.oregonstate.edu/undergraduate/advising/college-advising-guide>.

The Genetics option provides students with a rigorous background in the application of genetics theory and methods to evolutionary questions. It is an excellent way to prepare for graduate programs in genetics and evolutionary biology. It is not designed for students interested in genetic counseling, and these students would need to seek out significant counseling experience that is not required for this option. Courses used to satisfy the Genetics option also count for the Physiology, Writing Intensive, the Physics or Computational and Quantitative Applications and Experiential Learning or Integrative Biology Elective requirements for the Biology major. BB 493 may be taken by approval to substitute for BB 315. **Previous versions of this option are different and tracked in MyDegrees. All courses and prerequisites are subject to change, and the listing of term is based on projected Corvallis campus offerings.**

## Core Coursework

Course	Description (Credits)	Term(s)	Pre-requisites	Comments
BB 315	Molecular Biology Laboratory (3cr)	F, SP*	BB 314 (C-)	*Take BB 315 the first possible spring term to avoid Z 425
BDS 310	Foundations of Biological Data Science (4cr)	F	MTH 251 (C-) or MTH 227 (C-)	-
BDS 311	Computational Approaches Biological Data (3cr)	W	BDS 310 (C-)	-
BB 494	Biochemistry Lab in Molecular Techniques II (3cr)	W	BB 315; completed in final winter term	-
BI 319	Theory, Practice, Discourse Life Sciences (3cr)	F, W, SP	BI 221, 222, 223, (C-) & ST 351	-
BI 483	Population Biology (3cr)	W	(BI 370 or BI 311) & (ST 352 or 411) & (MTH 251 or 227)	-
Z 425	Embryology and Development (5cr)	F	BI 311, BB 314	-

## Genetics/Genomics Elective (select three courses from the following)

Course	Description (Credits)	Term(s)	Pre-requisites	Comments
BB 485	Applied Bioinformatics (3cr)	W*	BI 221 (C-), BDS 310* (C-)	*Will need an override for BDS 310; not offered winter 2024
BB 486	Advanced Molecular Genetics (3cr)	W	BB 314 (C-) or BB 451 (C-)	-
BDS 446*	Networks in Computational Biology (3cr)	W	BDS 310, 470 or 476 (C-)	*Also listed as CS 446
BDS 472	Adv. Computing for Biol. Data Analysis (3cr)	Sp	BDS 311 and BI 221, 222, 223 (C-)	
BDS 474	Introduction to Genome Biology (3cr)	F	BI 311* (C-) or BB 314* (C-)	*May be taken concurrently
BDS 475	Comparative Genomics (4cr)	W*	BI 311 and BB 314	*Alternate years
BDS 477*	Population Genomics (3cr)	Sp	BDS 310 (C-)	*Also listed as BOT 477
BDS 478	Functional Genomics (3cr)	W	BB 314 (C-)	-
BI 454	Evolutionary Genomics (3cr)	Sp*	BI 311	*Alternate odd years
BI 456	Phylogenetics (4cr)	W*	(ST 352 or 411*) & BI 311	*Alternate even years; may be taken concurrently
MB 420	Microbial Genome Evolut. & Diversity (3cr)	W*	MB 302 (C) or BB 314 (C)	*Alternate odd years

## Experiential Learning or Science Elective Course

Complete one of the two tracks below. Experiential learning is not required.

### Track I: Experiential Learning Credits (complete any combination of three credits if taking only one course below)

Course	Description (Credits)	Term(s)	Pre-requisites	Comments
BI 309 <u>or</u> BI 409	Teaching Practicum or Advanced Practicum (1-3cr)	F, W, SP	By approval required*	<a href="#">*See form here</a>
BI 401	Research and Scholarship (1-3cr)	All	By approval required*	<a href="#">*See form here</a>
BI 406	Projects: Curatorial Assistant (1-3cr)	All Terms	By approval required*	<a href="#">*See form here</a>
BI 410	Internship (1-3cr)	All Terms	By approval required*	<a href="#">*See form here</a>

**Track II:** Select one additional 3+ credit upper division (300-400 level) Biology or Zoology Course not used for the major or any other options requirements above.

# OSU Genetics and Evolution Resources

**Professional Experience:** Students are strongly encouraged to use the information below early in their careers as a starting point for exploring their interests in genetics and evolutionary biology.

## Undergraduate Research

Students can get involved with research in any department at OSU, and research in genetics and evolution takes place in Integrative Biology and many other units on campus. The best way to get involved in research is to approach a faculty member you would like to work with after reviewing their website. Faculty research interests can be found on all department websites, though it is easier to find on some than others. Positions generally require volunteering initially, but they can develop in to paid opportunities and BI 401 Research credit is also available for approved projects. You can find more information on how to find a mentor, as well as possible departments to look in for faculty mentors [here](#). Students can also find excellent opportunities for research at other institutions. The [NSF REU](#) (Research Experiences for Undergraduates) program is an excellent and nationally competitive program that generally requires students have some experience.

## Volunteering and Internships

Genetics opportunities exist in a variety of contexts in both the government and private sectors, though many of them are outside of Corvallis. For opportunities beyond campus, students should see the Biomedical, Cell and Molecular Biology, Genetics and Genomics section of the [Integrative Biology website](#). Students can receive [BI 410 Internship credit](#) for approved projects.

## Genetics Careers

Genetics is an expanding field with varied employment opportunities in the public and private sectors. Because genetic techniques and theory can be applied to many areas in biotechnology, agriculture, medicine and the other life sciences, students interested in genetics are advised to explore diverse experiences as undergraduates. Students serious about a genetics career should consider graduate work to increase opportunities, particularly if they are interested in a focus on evolutionary biology where fewer opportunities exist for students with bachelor's degrees. Computing and quantitative expertise is increasingly important in genetics and many other areas of biology. Additional background in math, statistics and computer science is advantageous, and students interested in genetics can consider additional OSU coursework or minors in these areas to complement their Genetics option.

**International Opportunities:** Many [international programs](#) are available through OSU, some of which include specific genetics opportunities in the form of internships. These programs can be integrated into a four-year plan with the Genetics option.

## Career Resources

- [Genetics Professional Societies](#)
- [Oregon Biosciences Association](#)
- [Society for the Study of Evolution](#)
- [Society for the Integrative and Comparative Biology](#)
- [Integrative Biology Careers](#)
- [American Society of Human Genetics: Careers in Human Genetics](#)