

BIOLOGY MAJOR—Genetics Option 2021-22

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/Computer Science/Quantitative and Experiential Learning or Integrative Biology Elective requirements for the Biology major. The statistics courses in the Genetics option also completes half of the Biology major statistics requirement (ST 411 and 412 are taken instead of ST 352). Up to three credits of approved BI 401 Research or 410 Internship credit may be used as electives in the option. Other coursework taken abroad may be approved by the IB lead advisor. 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.

Required Core Coursework (30 credits)

Course	Pre(Co)requisites	Term	Credits
BB 315 Molecular Biology Laboratory	BB 314 (C-)	F, SP	3
BB 345 Introduction to Biological Sequence Analysis	Sophomore standing	F	2
BB 494 Biochemistry Laboratory in Molecular Techniques II	BB 315 or BB 493; completed in last winter term	W	3
BI 319 Critical Thinking & Communication in the Life Sciences	BI 221, 222, 223; ST 351	F, W, SP	3
BI 483 Population Biology	BI 370 or BI 311, 352 or 411, MTH 251 or 227	W	3
ST 411 Methods of Data Analysis (instead of ST 352)	ST 351	F, W, SU	4
ST 412 Methods of Data Analysis (instead of ST 352)	ST 411	W, SP	4
Z 425 Embryology and Development	BI 311 and BB 314	F	5

Genetics\Genomics Elective (select two courses from the following)

BB 486 Advanced Molecular Genetics	BB 314 (C-) and BB 451 (C-)	W	3
BI 454 Evolutionary Genomics	BI 311	Alt W	3
BI 456 Phylogenetics	ST 351 and (ST 352 or 411) and (BI 311)	Alt. W	4
BOT/BDS 474 Introduction to Genome Biology	BI 311 (C-) or BB 314 (C-)	SP	3
BDS/BOT 475 Comparative Genomics	BI 311 and BB 314	Alt. W	4
BDS/BOT 478 Functional Genomics	BB 314 (C-)	W	3

Bioinformatics Elective (select one course from the following)

BB 485 Applied Bioinformatics	BI 221 (C-) and (CS 201 or CS 161 or BB 345) (C-)	W	3
BOT/BDS 470 Introduction to Computing in the Life Sciences	BB 345	F, SP	3

Experiential Learning or Science Electives (Complete one of the two tracks below)

Track I: Experiential Learning Credits (complete any combination of the three credits below)

BI 309 Teaching Practicum or BI 409 Advanced Practicum	Departmental Approval— See online forms here	F, W, SP	1-3
BI 401 Research and Scholarship	Departmental Approval— See online forms here	All terms	1-3
BI 406 Projects: Curatorial Assistant	Departmental Approval— See online forms here	All terms	1-3
BI 410 Internship	Departmental Approval— See online forms here	All terms	1-3

Track II: Complete one 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. See <http://ib.oregonstate.edu/professional/research-internships> for more information on how to find a mentor, as well as possible departments to look in for faculty mentors.

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. See <http://www.nsf.gov/home/crssprgm/reu/> for details.

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 at <http://ib.oregonstate.edu/professional/internship-research/intern-volunteer-list>. Students can receive BI 410 Internship credit for approved projects – see <http://ib.oregonstate.edu/professional/research-internships>.

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 bachelors 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.

<https://ib.oregonstate.edu/professional/international>

Career Resources

Genetics Professional Societies:
<https://www.genome.gov/11510374/genetics-professional-groups-online>

Oregon Biosciences Association:
<https://www.oregonbio.org/>

Society for the Study of Evolution:
<http://www.evolutionsociety.org/>

Society for Integrative and Comparative Biology:
<https://sicb.burkclients.com/>

Integrative Biology careers website:
<https://ib.oregonstate.edu/professional/careers>

American Society of Human Genetics: Careers in Human Genetics
<https://www.ashg.org/careers-learning/career-flowchart/>