# Biology Major - Genetics Option Guide 2022-23

Document available online at https://ib.oregonstate.edu/advising/planners.

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. 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). 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.**

## Core Coursework

| Course | Description (Credits) | Term(s) | Pre-/co-requisites | Comments |
|---|---|---|---|---|
| BB 315 | Molecular Biology Laboratory (3cr) | F, SP | BB 314 (C-) | - |
| BDS 310 | Foundations of Biological Data Science (4cr) | F | MTH 251 (C-) or MTH 227 (C-) | - |
| BDS 311 | Computational Approaches for 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 | Critical Thinking & Comm. in the 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) | - |
| ST 411 | Methods of Data Analysis* (4cr) | F, W, SU | ST 351 | *Instead of ST 352 |
| ST 412 | Methods of Data Analysis* (4cr) | W, SP | ST 411 | *Instead of ST 352 |
| Z 425 | Embryology and Development (5cr) | F | BI 311, BB 314 | - |

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

| Course | Description (Credits) | Term(s) | Pre-/co-requisites | Comments |
|---|---|---|---|---|
| BB 485 | Applied Bioinformatics (3cr) | W | BI 221 (C-), BDS 310 (C-)* | *Will need an override for BDS 310 |
| BB 486 | Advanced Molecular Genetics (3cr) | W | BB 314 (C-) or BB 451 (C-) | - |
| BDS 474 | Introduction to Genome Biology (3cr) | SP | BI 311* (C-) or BB 314* (C-) | *May be taken concurrently |
| BDS 475 | Comparative Genomics (4cr) | W* | BI 311, BB 314 | *Alternate years |
| BDS 477 | Population Genomics (3cr) | Sp | BDS 310 (C-) | - |
| 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 |
| MB 420 | Microbial Genome Evolution & Diversity (3cr) | W* | MB 302 (C) or BB 314 (C) | *Alternate even years |

## Experiential Learning or Science Elective Course

Complete one of two tracks below

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

| Course | Description (Credits) | Term(s) | Pre-/co-requisites | Comments |
|---|---|---|---|---|
| BI 309 **or** BI 409 | Teaching Practicum or Advanced Practicum (1-3cr) | F, W, SP | By approval required* | *See online forms here |
| BI 401 | Research and Scholarship (1-3cr) | All | By approval required* | *See online forms here |
| BI 406 | Projects: Curatorial Assistant (1-3cr) | All Terms | By approval required* | *See online forms here |
| BI 410 | Internship (1-3cr) | All Terms | By approval required* | *See online forms here |

**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. 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