Genetics

Chair
• Daniel Eberl (Biology)

Graduate degree: Ph.D. in genetics
Faculty: http://genetics.grad.uiowa.edu/faculty
Web site: http://genetics.grad.uiowa.edu

Graduate Program of Study
• Doctor of Philosophy in genetics

Doctor of Philosophy
The Doctor of Philosophy program in genetics requires a minimum of 72 s.h. of graduate credit. The Ph.D. program is designed to promote collaborative investigation and intellectual interaction among students and faculty participants affiliated with several different departments. Students who enroll in the program are encouraged to obtain a broad background in genetics, including molecular, population, and human genetics. Within this context, course requirements are flexible enough to permit students to tailor their formal course work to their individual needs.

Students have the option to declare a Ph.D. emphasis in computational genetics.

All students enrolled in the program are required to take the following courses.

All of these:
- GENE:6150 Genetic Analysis of Biological Systems 3 s.h.
- GENE:6200 Special Topics in Genetics (seminar) 1 s.h.
- GENE:6234 Basic Biostatistical Methods with Genetics Applications 1 s.h.
- BISC:5201 Fundamentals of Gene Expression 1 s.h.
- BISC:5203 Fundamentals of Dynamic Cell Processes 1 s.h.

One of these:
- GENE:7191 Human Molecular Genetics 3 s.h.
- BIOL:3172 Evolution 4 s.h.
- BIOL:4333 Genes and Development 3 s.h.

All of these:
- GRAD:7270 Principles of Scholarly Integrity 1 s.h.
- Elective course work in molecular and microbial genetics, cell and development genetics, human genetics, or computational genetics 8 s.h.
- Seminar courses approved by the program 5 s.h.

Even more important than formal course work is the opportunity to do significant research in genetics. Research interests of the participating faculty include virtually all areas of genetics, ranging from bacteriophage genetics to human medical genetics. In each area of genetics, there is a group of faculty members who have closely related interests.

The University is also strong in several related disciplines, including microbial physiology, enzymology, virology, protein biochemistry, computational genetics, and developmental and cell biology, all of which contribute significantly to the overall training program.

In addition to completing research and course work, students must pass a comprehensive examination, usually at the end of their second year in the program.

Joint M.D./Ph.D.
Students may work toward the Doctor of Medicine degree and a Ph.D. in genetics in a joint degree program offered by the Carver College of Medicine and the Graduate College. See Medical Scientist Training Program (Carver College of Medicine) in the Catalog.

Ph.D. and Dental Scientist Training Program
Ph.D. students in genetics who have earned a D.D.S. degree may be candidates for advanced training programs in dentistry. For information, contact the College of Dentistry.

Admission
Prospective doctoral students in genetics should have a strong undergraduate background in science, including courses in general genetics, organic chemistry, biochemistry, introductory physics, and mathematics, as well as a strong commitment to genetic research and teaching. Students can make up deficiencies in a particular area during their first year of graduate study.

Applicants must meet the admission requirements of the Graduate College; see the Manual of Rules and Regulations of the Graduate College.

Admission to the program is based on assessment of an applicants’ undergraduate academic records, performance on the Graduate Record Examination (GRE) General Test, and letters of recommendation. Admission requirements are not rigid. Most students working toward a Ph.D. in genetics at the University of Iowa have an undergraduate g.p.a. above 3.50, and a combined verbal and quantitative score above 310 on the GRE General Test (or 1250 using the old GRE scoring system). Students with lower grade-point averages or GRE scores may be admitted, depending on prior research experience and other indications of academic potential.

Students generally begin graduate work in the fall semester.

Financial Support
All genetics graduate students receive a financial stipend of $26,500 plus tuition for academic year 2015-16.

Financial support comes from training grants, research assistantships, teaching assistantships, scholarships, individual research grants, or other departmental or college funds. All students are required to do some teaching as part of their development as future scientists and faculty members.
Associated Courses

Credit earned in the following courses may be counted toward the Ph.D. in genetics. Not all courses are offered every year.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GENE:5173</td>
<td>Computational Genomics</td>
<td>3 s.h.</td>
</tr>
<tr>
<td>GENE:6150</td>
<td>Genetic Analysis of Biological Systems</td>
<td>3 s.h.</td>
</tr>
<tr>
<td>GENE:6170</td>
<td>Bioinformatics</td>
<td>4 s.h.</td>
</tr>
<tr>
<td>GENE:7191</td>
<td>Human Molecular Genetics</td>
<td>3 s.h.</td>
</tr>
<tr>
<td>BIOL:3172</td>
<td>Evolution</td>
<td>4 s.h.</td>
</tr>
<tr>
<td>BIOL:3713</td>
<td>Molecular Genetics</td>
<td>4 s.h.</td>
</tr>
<tr>
<td>BIOL:4333</td>
<td>Genes and Development</td>
<td>3 s.h.</td>
</tr>
<tr>
<td>BME:5320</td>
<td>Bioinformatics Techniques</td>
<td>3 s.h.</td>
</tr>
<tr>
<td>GRAD:7270</td>
<td>Principles of Scholarly Integrity</td>
<td>1 s.h.</td>
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<tr>
<td>MCB:6215</td>
<td>Transcription and Multi-Functional Regulation by RNA</td>
<td>1 s.h.</td>
</tr>
<tr>
<td>MCB:6220</td>
<td>Mechanisms of Cellular Organization</td>
<td>3 s.h.</td>
</tr>
<tr>
<td>MCB:6225</td>
<td>Growth Factor Receptor Signaling</td>
<td>1 s.h.</td>
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<tr>
<td>MICR:6268</td>
<td>Biology and Pathogenesis of Viruses</td>
<td>2 s.h.</td>
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<tr>
<td>NSCI:4753</td>
<td>Developmental Neurobiology</td>
<td>3 s.h.</td>
</tr>
<tr>
<td>PEDS:8104</td>
<td>Medical Genetics</td>
<td>2 s.h.</td>
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Courses

**GENE:5173 Computational Genomics** 3 s.h.

Introduction to computational methods used in genome analysis and functional genomics; biological sequence analysis, sequence database search, microarray data analysis, biological network analysis; in-depth coverage of principal genome science challenges and recent solutions. Prerequisites: BME:5320 and CS:3110 and (BIOS:4120 or STAT:3510). Same as BIOL:5320, BME:5330, ECE:5220.

**GENE:6150 Genetic Analysis of Biological Systems** 3 s.h.

Genetic techniques and approaches for analysis of biological processes; comparison of strengths, weaknesses of a variety of experimental systems.

**GENE:6170 Bioinformatics** 4 s.h.

Overview of bioinformatics topics, including access to sequence data, pairwise and multiple sequence alignment algorithms, molecular phylogeny, microarray data analysis, protein analysis, proteomics and protein structure analysis; emphasis on each topic includes biological motivation, computational approach (practical and theoretical), and interpretation of output. Prerequisites: BIOL:2512 or BIOC:3120. Recommendations: grade of B+ or higher in BIOL:2512 or BIOC:3120, or graduate standing. Same as BIOL:4213.

**GENE:6200 Special Topics in Genetics** 1 s.h.

Current research in a selected field of genetics; different topic each year. Companion to a genetics seminar series. Same as ACB:6200.

**GENE:6234 Basic Biostatistical Methods with Genetics Applications** 1 s.h.

Introduction to terminology, fundamental concepts, and methods of biostatistics as applied to genetic research; genetic investigation examples used to illustrate statistical approaches.

**GENE:6280 Directed Study in Genetics** arr.

**GENE:7191 Human Molecular Genetics** 3 s.h.

Molecular genetic approaches to human disease; the human genome project, linkage analysis, candidate gene screening, special features of inbred populations, triplet repeat expansions, mitochondrial genetics, genetics of complex traits. Requirements: fundamental genetics and molecular biology.

**GENE:7301 Graduate Research in Genetics** arr.