

# Genetics, PhD

## Learning Outcomes

The PhD in genetics will:

- develop students' ability to learn relevant literature, and to design and complete successful experiments with rigor and reproducibility;
- develop students' ability to communicate concepts, present and publish scientific data, and interact with diverse audiences;
- facilitate students as they acquire teaching skills and develop teaching effectiveness in the classroom and in the laboratory; and
- prepare students for diverse careers in the discipline.

## Requirements

The Doctor of Philosophy program in genetics requires a minimum of 72 s.h. of graduate credit. Students must maintain a cumulative grade-point average of 3.00. The 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 PhD 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 coursework to their individual needs. All students are required to do some teaching as part of their development as future scientists and faculty members.

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

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

Course #	Title	Hours
All of these:		
GENE:6150	Genetic Analysis of Biological Systems	3
GENE:6200	Current Topics in Genetics (seminar)	1
GENE:6210	Seminars in Genetics	1
GENE:6234	Basic Biostatistical Methods With Genetics Applications	1
BMED:5207	Principles of Molecular and Cellular Biology	3
BMED:7270	Scholarly Integrity/Responsible Conduct of Research I	0
BMED:7271	Scholarly Integrity/Responsible Conduct of Research II	0
One of these:		
GENE:7191	Human Molecular Genetics	3
BIOL:3172	Evolution	4
BIOL:3713	Molecular Genetics	4
BIOL:4333	Genes and Development	3

And these:

Elective coursework in molecular and microbial genetics, cell and development genetics, human genetics, or computational genetics	8
Seminar courses approved by the program	5

**Total Hours** **36**

Even more important than formal coursework 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 strong in several related disciplines, including microbial physiology, enzymology, virology, protein biochemistry and molecular biology, computational genetics, and developmental and cell biology, all of which contribute significantly to the overall training program.

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

## Associated Courses

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

Course #	Title	Hours
GENE:4213	Bioinformatics	4
BIOL:4386	Introduction to Scientific Computing for Biologists	3
BIOS:7330	Advanced Biostatistical Computing	3
BIOS:7700	Problems/Special Topics in Biostatistics	arr.
BMB:4310	Computational Biochemistry	3
BME:5335	Computational Bioinformatics	3
CS:5430	Machine Learning	3
EPID:5241	Statistical Methods in Epidemiology	4
FRRB:7001	Molecular and Cellular Biology of Cancer	3
IGPI:6480	Knowledge Discovery	3
MICR:6268	Biology and Pathogenesis of Viruses	2
MMED:6220	Mechanisms of Cellular Organization	3
MMED:6226	Cell Cycle Control	1
MMED:6227	Cell Fate Decisions	1
NSCI:7235	Neurobiology of Disease	3
PCOL:6225	Growth Factor Receptor Signaling	1
STAT:4580	Data Visualization and Data Technologies	3

**Total Hours** **43**

## PhD and Dental Scientist Training Program

PhD students in genetics who have earned a DDS degree may be candidates for advanced training programs in dentistry. For information, contact the College of Dentistry.

## Combined Programs

### PhD/MD

Students may work toward the Doctor of Medicine degree and a PhD in genetics in a combined degree program offered by the Carver College of Medicine and the Graduate College. Applicants must be admitted to both programs before they may be admitted to the combined degree program. See the Medical Scientist Training Program (Carver College of Medicine) in the catalog.

### Admission

Prospective students should have a strong undergraduate science background and a strong commitment to research in genetics. Previous coursework should include general genetics, biochemistry, organic chemistry, and introductory physics and mathematics. However, deficiencies can be rectified during the first year as a graduate student.

Students who want to apply online should view the Interdisciplinary Graduate Program in Genetics website. For additional information, see the program website.

Students generally begin graduate work in the fall semester.

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

### Academic Plans

### Sample Plan of Study

Sample plans represent one way to complete a program of study. Actual course selection and sequence will vary and should be discussed with an academic advisor. For additional sample plans, see MyUI.

### Genetics, PhD

Course	Title	Hours
<b>Academic Career</b>		
<b>Any Semester</b>		
72 s.h. must be graduate level coursework; graduate transfer credits allowed upon approval. More information is included in the General Catalog and on department website. <sup>a</sup>		
Graduate College program GPA of at least 3.00 is required. <sup>b</sup>		
<b>Hours</b>		<b>0</b>
<b>First Year</b>		
<b>Fall</b>		
BMED:5207	Principles of Molecular and Cellular Biology	3
GENE:6150	Genetic Analysis of Biological Systems	3
GENE:6210	Seminars in Genetics	1
GENE:7301	Graduate Research in Genetics <sup>c</sup>	8
<b>Hours</b>		<b>15</b>
<b>Spring</b>		
GENE:6200	Current Topics in Genetics <sup>d</sup>	1
GENE:6210	Seminars in Genetics	1
GENE:7301	Graduate Research in Genetics <sup>c</sup>	6

GENE:6234	Basic Biostatistical Methods With Genetics Applications	1
Core Genetics course <sup>e</sup>		3 - 4
Elective course <sup>f</sup>		3
<b>Hours</b>		<b>15-16</b>
<b>Second Year</b>		
<b>Fall</b>		
BMED:7270	Scholarly Integrity/Responsible Conduct of Research I	0
GENE:6210	Seminars in Genetics	1
GENE:7301	Graduate Research in Genetics <sup>c</sup>	11
Elective course <sup>f</sup>		3
<b>Hours</b>		<b>15</b>
<b>Spring</b>		
BMED:7271	Scholarly Integrity/Responsible Conduct of Research II	0
GENE:6200	Current Topics in Genetics <sup>d</sup>	1
GENE:6210	Seminars in Genetics	1
GENE:7301	Graduate Research in Genetics <sup>c</sup>	11
Elective course <sup>f</sup>		2
<b>Hours</b>		<b>15</b>
<b>Third Year</b>		
<b>Fall</b>		
Exam: Doctoral Comprehensive Exam		
GENE:6210	Seminars in Genetics	1
GENE:7301	Graduate Research in Genetics	1
<b>Hours</b>		<b>2</b>
<b>Spring</b>		
GENE:6200	Current Topics in Genetics <sup>d</sup>	1
GENE:6210	Seminars in Genetics	1
<b>Hours</b>		<b>2</b>
<b>Fourth Year</b>		
<b>Fall</b>		
GENE:6210	Seminars in Genetics	1
GENE:7301	Graduate Research in Genetics	1
<b>Hours</b>		<b>2</b>
<b>Spring</b>		
GENE:6200	Current Topics in Genetics <sup>d</sup>	1
GENE:6210	Seminars in Genetics	1
<b>Hours</b>		<b>2</b>
<b>Fifth Year</b>		
<b>Fall</b>		
GENE:6210	Seminars in Genetics	1
GENE:7301	Graduate Research in Genetics	1
<b>Hours</b>		<b>2</b>
<b>Spring</b>		
GENE:6200	Current Topics in Genetics <sup>d</sup>	1
GENE:6210	Seminars in Genetics	1
Exam: Doctoral Final Exam <sup>g</sup>		
<b>Hours</b>		<b>2</b>
<b>Total Hours</b>		<b>72-73</b>

a Students must complete specific requirements in the University of Iowa Graduate College after program admission. Refer to the Graduate College website and the Manual of Rules and Regulations for more information.

b Graduate College program GPA is comprised of all courses that are approved degree requirements. If a student takes

more than the minimum required number of semester hours to complete the degree, but all courses taken are eligible to count toward the degree, those courses will be included in the Graduate College program GPA.

- c If needed, adjust the number of semester hours for GENE:7301 so total enrollment equals 15 s.h.
- d Counts toward the 5 s.h. seminar degree requirement.
- e Choose from: BIOL:3172, BIOL:3713, BIOL:4333, GENE:7191, or take an equivalent course with advisor approval.
- f Take 8 s.h. from coursework in molecular and microbial genetics, cell and development genetics, human genetics, or computational genetics. Work with faculty advisor to select appropriate courses from approved list.
- g Program seminar followed by the dissertation defense.