

# Genetics (BS)

To see more about what you will learn in this program, visit the Learning Outcomes website (<https://apps.oirp.ncsu.edu/pgas/>)!

The Genetics program offers undergraduate majors classroom training in fundamentals of genetics and other sciences, as well as opportunities for meaningful research experience. The degree in genetics is the only genetics major offered in the UNC system.

The genetics major complements other degree programs in the biological and life sciences at N.C. State, as it prepares students for further graduate study, professional schools (such as medical, dental, veterinary, genetic counseling) or careers in industries whose products are based on biological and agricultural research, including biopharmaceutical and biotechnology companies. Building on the strength of NC State as a leader in science and technology, students in the program can easily earn a concurrent minor in any of the other life sciences curricula, as well as other programs such as statistics or biotechnology.

Responsible conduct as a scientist and citizen are emphasized in the genetics coursework, and students will also have opportunities for public service and engagement through participation in the genetics outreach program. Students will be challenged to master their coursework while practicing hands-on problem-solving in both the classroom and active research settings. Genetics students also will be required to read the primary literature and present papers and their research findings, thus gaining valuable experience in scientific communication.

## Plan Requirements

Code	Title	Hours	Counts towards
<b>Orientation</b>			
LSC 103	Exploring Opportunities in the Life Sciences	1	
<b>Advanced Writing/Communication</b>			
ENG 333	Communication for Science and Research <sup>1</sup>	3	
Select one of the following Communications courses: <sup>1</sup>		3	
COM 110	Public Speaking		
COM 112	Interpersonal Communication		
COM 211	Argumentation and Advocacy		
<b>Mathematical Sciences &amp; Physics</b>			
MA 131	Calculus for Life and Management Sciences A <sup>1</sup>	3	
or MA 141	Calculus I		
MA 231	Calculus for Life and Management Sciences B <sup>1</sup>	3	
or MA 241	Calculus II		
ST 311	Introduction to Statistics <sup>1</sup>	3	

or ST 371	Introduction to Probability and Distribution Theory	
PY 211	College Physics I <sup>1,3</sup>	4
PY 212	College Physics II <sup>1,3</sup>	4
<b>Chemistry</b>		
CH 101	Chemistry - A Molecular Science <sup>1</sup>	3
CH 102	General Chemistry Laboratory <sup>1</sup>	1
CH 201	Chemistry - A Quantitative Science <sup>1</sup>	3
CH 202	Quantitative Chemistry Laboratory <sup>1</sup>	1
CH 221	Organic Chemistry I	3
CH 222	Organic Chemistry I Lab <sup>1</sup>	1
CH 223	Organic Chemistry II <sup>1</sup>	3
CH 224	Organic Chemistry II Lab <sup>1</sup>	1

### Required Life Sciences

LSC 101	Critical and Creative Thinking in the Life Sciences <sup>1</sup>	2
BIO 181	Introductory Biology: Ecology, Evolution, and Biodiversity <sup>1</sup>	4
BIO 183	Introductory Biology: Cellular and Molecular Biology <sup>1</sup>	4
GN 311	Principles of Genetics <sup>1</sup>	4
GN 312	Elementary Genetics Laboratory <sup>1</sup>	1
GN 421	Molecular Genetics <sup>1</sup>	3
GN 423	Population, Quantitative and Evolutionary Genetics <sup>1</sup>	3
GN 425	Advanced Genetics Laboratory <sup>1</sup>	2
BCH 451	Principles of Biochemistry <sup>1</sup>	4

Select one of the following Cell Biology/Physiology courses: <sup>1</sup>	3
BIO 240 Principles of Human Anatomy & Physiology (A): Nervous, Skeletal, Muscular, & Digestive Systems	
BIO 245 Principles of Human Anatomy & Physiology (B): Endocrine, Cardiovascular, Respiratory & Renal Systems	
BIO 414 Cell Biology	
PB 421 Plant Physiology	
<b>Research/Teaching Requirement</b>	
GN 496 Genetics Research Experience (S allowed)	3
or GN 497 Genetics Teaching Experience	
<b>Genetics Electives</b>	
Select two of the following: <sup>1</sup>	6
GN 427 Introductory Bioinformatics	
GN 434 Genes and Development	
GN 441 Human and Biomedical Genetics	
GN 451 Genome Science	
GN 456 Epigenetics, Development, and Disease	
GN 541 Human and Biomedical Genetics	
<b>GEP Courses</b>	
ENG 101 Academic Writing and Research <sup>1</sup>	4
GEP Humanities ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/</a> )	6
GEP Social Sciences ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-social-sciences/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-social-sciences/</a> )	6
GEP Health and Exercise Studies ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/</a> )	2

GEP Additional Breadth ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/</a> ) (Humanities/Social Sciences/Visual and Performing Arts)	3
GEP Interdisciplinary Perspectives ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-interdisciplinary-perspectives/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-interdisciplinary-perspectives/</a> )	3
GEP U.S. Diversity ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-us-diversity/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-us-diversity/</a> ) (verify requirement)	
GEP Global Knowledge ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-global-knowledge/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-global-knowledge/</a> ) (verify requirement)	
Foreign Language Proficiency ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/foreign-language-proficiency/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/foreign-language-proficiency/</a> ) (verify requirement)	
<b>Restricted Electives</b>	
Restricted Electives (p. 2) <sup>1</sup>	8
<b>Free Electives</b>	
Free Electives (12 Hr S/U Lmt) <sup>2</sup>	9
<b>Total Hours</b>	<b>120</b>

<sup>1</sup> A grade of C- or higher is required.

<sup>2</sup> Students should consult their academic advisors to determine which courses fill this requirement.

<sup>3</sup> PY 205 and PY 208 may be substituted for PY 211 and PY 212. PY 205 and PY 208 are calculus-based and may require the MA 141 and MA 241 series of Mathematics. PY 201 and PY 202 also may be substituted for PY 211 and PY 212. PY 201 and PY 202 are calculus-based, require the MA 141 and MA 241 series.

## Restricted Electives

Code	Title	Hours	Counts towards
ANT 370	Introduction to Forensic Anthropology	3	
BIO 270	Introduction to Evolution	3	
BIO 432	Evolutionary Medicine	3	
BIO 434	Hormones and Behavior	3	
BIO 440	The Human Animal: An Evolutionary Perspective	3	
BIO 444	The Biology of Love and Sex	3	
BIO 488	Neurobiology	3	

BIO 588	Neurobiology	3
BIT 410	Manipulation of Recombinant DNA	4
ENT 425	General Entomology	3
GN 450	Conservation Genetics	
MA 331	Differential Equations for the Life Sciences	3
MA 341	Applied Differential Equations I	3
MB 351	General Microbiology	3
MB 352	General Microbiology Laboratory	1
MB 441	Immunology	3
MEA 220	Marine Biology	3
PB 400	Plant Diversity and Evolution	4
PSY 430	Biological Psychology	3
TOX 401	Principles of Toxicology	4
TOX 501	Principles of Toxicology	4
ZO 350	Animal Phylogeny and Diversity	4
ZO 402	Invertebrate Biology	4
ZO 410	Introduction to Animal Behavior	3

## Semester Sequence

This is a sample.

### First Year

Fall Semester		Hours
LSC 101	Critical and Creative Thinking in the Life Sciences <sup>1</sup>	2
BIO 181	Introductory Biology: Ecology, Evolution, and Biodiversity <sup>1</sup>	4
CH 101	Chemistry - A Molecular Science <sup>1</sup>	3
CH 102	General Chemistry Laboratory <sup>1</sup>	1
MA 131	Calculus for Life and Management Sciences A <sup>1</sup>	3
LSC 103	Exploring Opportunities in the Life Sciences <sup>1</sup>	1
GEP Health and Exercise Studies ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/</a> )		1
<b>Hours</b>		<b>15</b>

### Spring Semester

BIO 183	Introductory Biology: Cellular and Molecular Biology <sup>1</sup>	4
CH 221	Organic Chemistry I <sup>1</sup>	3
CH 222	Organic Chemistry I Lab <sup>1</sup>	1
MA 231	Calculus for Life and Management Sciences B <sup>1</sup>	3
ENG 101	Academic Writing and Research <sup>1</sup>	4
<b>Hours</b>		<b>15</b>

### Second Year

#### Fall Semester

CH 223	Organic Chemistry II <sup>1</sup>	3
CH 224	Organic Chemistry II Lab <sup>1</sup>	1
ST 311	Introduction to Statistics <sup>1</sup>	3
Restricted Elective (p. 2) <sup>1</sup>		4
GEP Social Sciences ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-social-sciences/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-social-sciences/</a> )		3
GEP Health and Exercise Studies ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/</a> )		1
<b>Hours</b>		<b>15</b>

#### Spring Semester

GN 311	Principles of Genetics <sup>1</sup>	4
GN 312	Elementary Genetics Laboratory <sup>1</sup>	1
CH 201	Chemistry - A Quantitative Science <sup>1</sup>	3
CH 202	Quantitative Chemistry Laboratory <sup>1</sup>	1
Restricted Elective (p. 2) <sup>1</sup>		4
Communications Requirement (p. 1) <sup>1</sup>		3
<b>Hours</b>		<b>16</b>

### Third Year

#### Fall Semester

GN 421	Molecular Genetics <sup>1</sup>	3
BCH 451	Principles of Biochemistry <sup>1</sup>	4
PY 211	College Physics I <sup>1</sup>	4
ENG 333	Communication for Science and Research <sup>1</sup>	3
GEP Humanities ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/</a> )		3
<b>Hours</b>		<b>17</b>

#### Spring Semester

GN 425	Advanced Genetics Laboratory <sup>1</sup>	2
GN 423	Population, Quantitative and Evolutionary Genetics <sup>1</sup>	3
PY 212	College Physics II <sup>1</sup>	4
GEP Social Sciences ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-social-sciences/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-social-sciences/</a> )		3
GEP Additional Breadth ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/</a> ) (Humanities/Social Sciences/Visual and Performing Arts)		3
<b>Hours</b>		<b>15</b>

### Fourth Year

#### Fall Semester

Genetics Research/Teaching Requirement (p. 1)		3
Select one of the following: <sup>1</sup>		3-4

BIO 414	Cell Biology	
PB 421	Plant Physiology	
GEP Interdisciplinary Perspectives ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-interdisciplinary-perspectives/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-interdisciplinary-perspectives/</a> )		3
Free Elective		4-5
<b>Hours</b>		<b>14</b>
<b>Spring Semester</b>		
Genetics Electives (p. 1) <sup>1</sup>		6
GEP Humanities ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/</a> )		3
Free Elective		4
<b>Hours</b>		<b>13</b>
<b>Total Hours</b>		<b>120</b>

<sup>1</sup> A grade of C- or higher is required.

## Career Opportunities

Many students majoring in the Department of Biological Sciences take advantage of scholarship and honors programs available at NC State, including the University Honors Program and the University Scholars Program. In addition, we offer a discipline-based Undergraduate Honors Program in Biological Sciences (DBS Honors Program). The DBS Honors Program requires students to design a challenging program of advanced study, including eight credits of honors coursework in biology and at least two semesters of research or teaching scholarship.

Participants write an honors thesis and are required to present their scholarly work at a local, regional, or national meeting. Invitations to join the DBS Honors Program are sent in the first three weeks of the Fall and Spring semesters. Students in any major in the Department of Biological Sciences who have earned an overall GPA of 3.60 after completing 30-65 credit hours at NC State will receive an invitation to join the DBS Honors Program; transfer students in any of our majors who have earned an overall GPA of 3.60 in 15 credit hours at NC State also will receive an invitation.

Students who graduate from the Department of Biological Sciences are well prepared for employment in various government agencies and private industries. Graduates may continue their education with studies leading to advanced degrees in many areas of the biological sciences, including cell biology, ecology, microbiology, genetics, zoology, neurobiology, and biomedical disciplines. Many choose to seek advanced degrees in medicine, dentistry, optometry, veterinary medicine, public health, and other health-related fields. Students who plan to seek certification for pre-college teaching may want to pursue a second major in the Department of Science, Technology, Engineering & Mathematics Education.