

GENETICS & GENOMICS, BACHELOR OF SCIENCE

College of Biological Sciences

The Genetics & Genomics Major Program

The Genetics & Genomics major provides a broad background in the biological, mathematical, and physical sciences basic to the study of heredity, gene expression and evolution. The major is sufficiently flexible to accommodate students interested in the subject either as a basic discipline in the biological sciences or in terms of its applied aspects such as biotechnology, medicine, and agriculture.

The Program

The upper division curriculum in the Genetics & Genomics program begins with the four-course, upper-division core curriculum that provides an introduction to the principles of genetics, biochemistry, and cell biology. Students then take additional upper-division courses in specialized areas of modern genetics including gene expression, evolution, development, human genetics, and genomics, as well as laboratory courses in the principles of genetics and genomics. Additional upper-division courses in biological sciences, as well as internship/research coursework, can be chosen to fulfill required elective units.

Career Alternatives

The Genetics & Genomics degree provides suitable preparation for a wide variety of careers, including teaching, research, work with biotechnology companies, medicine, and all the health sciences. It is also an excellent background for students wishing to continue their education in a graduate program, a teacher-training program, medical school, veterinary school, or other professional schools.

Faculty Advisor

Ted Powers, (erpowers@ucdavis.edu) Ph.D.

Advising

Biology Academic Success Center (BASC) in 1023 Katherine Esau Science Hall (formerly Sciences Laboratory Building); 530-752-0410, cbsundergrads@ucdavis.edu.

Graduate Study

See Integrative Genetics & Genomics (Graduate Group) (<https://catalog.ucdavis.edu/departments-programs-degrees/integrative-genetics-genomics-graduate-group/>).

Code	Title	Units
Preparatory Subject Matter		
<i>Biological Science</i>		18
BIS 002A & BIS 002B & BIS 002C & BIS 002D	Introduction to Biology: Essentials of Life on Earth and Introduction to Biology: Principles of Ecology & Evolution and Introduction to Biology: Biodiversity & the Tree of Life and Introduction to Biology: Principles of Cell Biology & Physiology	
<i>Chemistry</i>		
Choose CHE 002 series or CHE 004 series: ¹		15

CHE 002A & CHE 002B & CHE 002C	General Chemistry and General Chemistry and General Chemistry	
OR		
CHE 004A & CHE 004B & CHE 004C	General Chemistry for the Physical Sciences & Engineering and General Chemistry for the Physical Sciences & Engineering and General Chemistry for the Physical Sciences & Engineering	
Choose CHE 008 series or CHE 118 series or CHE 128 series & CHE 129A-CHE 129B: ²		6-13
CHE 008A & CHE 008B	Organic Chemistry: Brief Course and Organic Chemistry: Brief Course	
OR		
CHE 118A & CHE 118B & CHE 118C	Organic Chemistry for Health & Life Sciences and Organic Chemistry for Health & Life Sciences and Organic Chemistry for Health & Life Sciences	
OR		
CHE 128A & CHE 128B & CHE 128C	Organic Chemistry and Organic Chemistry and Organic Chemistry	
CHE 129A & CHE 129B	Organic Chemistry Laboratory and Organic Chemistry Laboratory	
<i>Mathematics</i>		
Choose MAT 017 series or MAT 021 series: ³		8-12
MAT 017A & MAT 017B & MAT 017C	Calculus for Biology & Medicine and Calculus for Biology & Medicine and Calculus for Biology & Medicine	
OR		
MAT 021A & MAT 021B & MAT 021C	Calculus and Calculus and Calculus (Recommended)	
<i>Physics</i>		
Choose PHY 007 series or PHY 009 series: ⁴		12-15
PHY 007A & PHY 007B & PHY 007C	General Physics and General Physics and General Physics	
OR		
PHY 009A & PHY 009B & PHY 009C	Classical Physics and Classical Physics and Classical Physics	
Preparatory Subject Matter Subtotal		59-73
Depth Subject Matter		
<i>Biological Science</i>		
BIS 101	Genes & Gene Expression	4
BIS 104	Cell Biology	3
BIS 105	Biomolecules & Metabolism	3-6
or BIS 102 & BIS 103	Structure & Function of Biomolecules and Bioenergetics & Metabolism	
<i>Molecular & Cellular Biology</i>		
MCB 121	Advanced Molecular Biology	3
MCB 182	Principles of Genomics	3

Choose one:	3-4
EVE 100 or BIS 181	Introduction to Evolution Comparative Genomics

Choose one:	3
MCB 164 or BIS 183	Advanced Eukaryotic Genetics Functional Genomics

Choose MCB 160L or BIS 180L:	5
MCB 160L or BIS 180L	Principles of Genetics Laboratory Genomics Laboratory

Choose STA 100 or CHE 130A & CHE 130B:	4-8
STA 100 or STA 130A & STA 130B	Applied Statistics for Biological Sciences Mathematical Statistics: Brief Course and Mathematical Statistics: Brief Course

Restricted Electives

Choose at least 9 additional units:	9
-------------------------------------	---

BIS 181	Comparative Genomics
BIS 183	Functional Genomics
BIT 150	Applied Bioinformatics
ECS 124	Theory & Practice of Bioinformatics
EVE 100	Introduction to Evolution
EVE 102	Population & Quantitative Genetics
EVE 103	Phylogeny, Speciation & Macroevolution
EVE 131	Human Genetic Variation & Evolution
EVE 161	Microbial Phylogenomics; Genomic Perspectives on the Diversity & Diversification of Microbes
MIC 105	Microbial Diversity
MIC 170	Yeast Molecular Genetics
MIC 172	Host-Parasite Interactions
MIC 175	Cancer Biology
MCB 150	Developmental Biology
MCB 162	Human Genetics & Genomics
MCB 163	Developmental Genetics
MCB 164	Advanced Eukaryotic Genetics
PLB 112	Plant Growth & Development
PLB 113	Molecular & Cellular Biology of Plants
PLS 154	Introduction to Plant Breeding

OR

Upper division courses in genetics or other fields relevant to the student's interest chosen in consultation with the GGN master and BASC advisor. No more than 4 units of 192, 193, 194H, 198, or 199 may be used for credit in this category.

Depth Subject Matter Subtotal	40-48
-------------------------------	-------

Total Units	99-121
--------------------	---------------

CHE 118A-CHE 128B-CHE 128C-CHE 129A-CHE 129B;
CHE 118A-CHE 118B-CHE 128C-CHE 129B.

³ With BASC advisor approval, this combination also satisfies the Mathematics requirement: MAT 021A-MAT 017B-MAT 017C; MAT 017A-MAT 021B.

⁴ With BASC advisor approval, these combinations also satisfy the Physics requirement: PHY 007A-PHY 009A-PHY 049*-PHY 007C; PHY 009A-PHY 009B-PHY 049*-PHY 007C. *PHY 049 requires approval from the PHY Department to enroll.

¹ With BASC advisor approval, these combinations also satisfy the Chemistry requirement: CHE 004A-CHE 002A (3 units with no lab)-CHE 002B-CHE 002C; CHE 004A-CHE 004B-CHE 002C.

² With BASC advisor approval, these combinations also satisfy the Organic Chemistry requirement: CHE 118A-CHE 008B; CHE 128A-CHE 128B-CHE 008B; CHE 128A-CHE 118B-CHE 118C; CHE 128A-CHE 128B-CHE 129A-CHE 118C;