# 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 a 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) (https://basc.biology.ucdavis.edu/) in 1023 Sciences Laboratory Building; 530-752-0410.

### Graduate Study

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

## Code | Title | Units
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### Preparatory Subject Matter

#### Biological Science


#### Chemistry

Choose the 002 or 004 series: 1

### Depth Subject Matter

#### Biological Science

- BIS 101: Genes & Gene Expression
- BIS 104: Cell Biology
- BIS 105: Biomolecules & Metabolism or BIS 102: Structure & Function of Biomolecules & Bioenergetics & Metabolism

#### Molecular & Cellular Biology

- MCB 121: Advanced Molecular Biology
- MCB 182: Principles of Genomics

Choose one: 3-4

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CHE 002A & CHE 002B & CHE 002C & CHE 002D: 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 the 008 series or 118 series or 128 series & 129A-B: 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 129A & CHE 129B: Organic Chemistry Laboratory and Organic Chemistry Laboratory

#### Mathematics

Choose the 017 series or 021 series: 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)

#### Physics

Choose the 007 series or 009 series: 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 Subtotal: 12-15
EVE 100  Introduction to Evolution
or BIS 181  Comparative Genomics

Choose one: 3

- MCB 164  Advanced Eukaryotic Genetics
  or BIS 183  Functional Genomics

Choose MCB 160L or BIS 180L: 5

- MCB 160L  Principles of Genetics Laboratory
  or BIS 180L  Genomics Laboratory

Choose STA 100 or 130A & 130B: 4-8

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

**Restricted Electives**

Choose at least 9 additional units:

- 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

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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; 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. Students may be able to complete their Physics requirement by blending the PHY 007 & PHY 009 series. For more details about how to do so and course placement, students will need to follow up with the PHY department. Students will also need to follow up with a BASC advisor to discuss their plans.