

# GENE-GENETICS

## GENE 1110. Experimental Systems in Genetics

### 1 Credit (1)

Survey of molecular, biochemical, organismal, and computer science based approaches to investigate how genes determine important traits. Historical development and topics of current interest will be discussed.

#### Learning Outcomes

1. To give the students a historical perspective on the field of genetics.
2. To familiarize the students to introductory concepts and vocabulary to the field of genetics.
3. Introduce experimental systems within the field of genetics and to give perspective to current genetic research.
4. As this course is designed for beginning students as an overview of faculty and research labs on campus. The students majoring in genetics are encouraged to meet with faculty and to explore opportunities available to them on campus

## GENE 305. Principles of Genetics

### 3 Credits (3)

Covers fundamental principles of reproduction, variation, and heredity in plants and animals. May be repeated up to 3 credits.

**Prerequisite:** (BIOL 2610G, BIOL 2110G and either CHEM 1215G or CHEM 1216).

#### Learning Outcomes

1. To provide an introduction to the basic concepts, methods, and terminology of genetics. Introduction to genomics and bioinformatics.
2. To develop a working understanding of genetics and heredity
3. To understand in some depth, the mechanism of DNA replication, transcription and protein synthesis. To understand the regulation of gene expression.
4. To examine the impact of genetics on both basic and applied aspects of the biological sciences, as well as its effects on our everyday lives.

## GENE 305 L. Genetic Techniques

### 1 Credit (3P)

Experimental procedures used in genetic research including: sexual transmission genetics, eukaryotic DNA isolation, DNA marker development and genotyping, polymerase chain reaction, and cytogenetics.

**Prerequisite(s)/Corequisite(s):** GENE 315, or AGRO/ANSC/BIOL/HORT 305.

## GENE 315. Molecular Genetics

### 3 Credits (3)

Covers fundamental principles of DNA structure and replication, transcription, translation, gene regulation, recombinant DNA technology, and a survey of genomics and bioinformatics. Recommend CHEM 313.

**Prerequisite(s):** CHEM 1225G and BIOL 2110G.

## GENE 320. Hereditary and Population Genetics

### 3 Credits (3)

Covers fundamental principles of reproduction, variation, and heredity in plants and animals including: Mendelian inheritance, mitosis, meiosis, genetic linkage, random mating, genetic drift, natural selection, inbreeding, migration, mutation, interrelationships between individuals, populations and communities and the environment.

**Prerequisite(s):** CHEM 1215G & BIOL 2110G.

## GENE 391. Genetics Internship

### 1-6 Credits (1-6)

Professional work experience in genetics under the joint supervision of an employer and a faculty member. Documentation of proposed internship activities must be submitted prior to the start of the internship. A written report is required after the internship is completed. No more than 6 credits toward a degree. May be repeated up to 6 credits. Graded: S/U Grading (S/U, Audit).

## GENE 440. Genetics Seminar

### 1 Credit (1)

Organization, preparation, and presentation of genetic studies in model microorganism, plant, or animal systems that have been used to solve problems in molecular, cellular, and developmental biology. Consent of instructor required.

**Prerequisite(s):** Seniors only; GENE 315 & GENE 320.

## GENE 449. Special Problems

### 1-3 Credits (1-3)

Research problem, experience training, or other special study approved by a faculty adviser. Maximum of 3 credits per semester and a grand total of 3 credits toward a degree. Consent of instructor required.

## GENE 450. Special Topics

### 1-3 Credits (1-3)

Specific subjects to be announced in the schedule of classes. Maximum of 3 credits per semester and a total of 3 credits toward a degree. Consent of instructor required.

## GENE 452. Applied Bioinformatics

### 3 Credits (3)

Survey and application of publicly available bioinformatic tools that treat genomic DNA, cDNA, and protein sequences, RNA abundance, as well as tools that allow inference based on phylogenetic relationships.

**Prerequisites:** AGRO/ANSC/BIOL/HORT 305 or GENE 315 and GENE 320, and BCHE 341, or BCHE 395.

## GENE 486. Genes and Genomes

### 3 Credits (3)

Extensive coverage of nuclear and organelle genome structure in plants and animals, genome restructuring including duplication, aneuploidy, chromosome translocations and inversions, comparative genomics, and molecular systematics.

**Prerequisites:** AGRO/ANSC/BIOL/HORT 305 or GENE 315, and GENE 320.

## GENE 488. Gene Regulation

### 3 Credits (3)

Extensive coverage of signal transduction processes and approaches used to monitor large scale changes in gene regulation and protein synthesis that occur during development and in response to environmental changes.

**Prerequisites:** AGRO/ANSC/BIOL/HORT 305 or GENE 315.