

BIOL-242 GENETICS

B. In the laboratory portion of the course, students will utilize molecular and cell culture techniques essential for the analysis of gene cloning and to determine modes of inheritance of traits.

C. This course generally transfers as a program requirement and/or a free elective.

IV. Place of Course in College Curriculum

A. Free elective

B. This course does not satisfy a general education requirement.

C. This course meets a program elective for the AS Biology as a 200 level Biology course and in the AS Environmental Science as an Environmental Science elective.

D. Course transferability; for New Jersey schools go to the NJ Transfer website, www.njtransfer.org. For all other colleges and universities go their individual websites.

V. Outline of Course Content

A. Heredity and Phenotype

1. Mitosis and Meiosis
2. Mendelian Genetics
3. Modifications of Mendelian Ratios
4. Sex, Determination, Sex Differentiation, and Sex Linkage
5. Linkage, Crossing Over, and Chromosome Mapping.
6. Quantitative Inheritance, Phenotypic Expression and Heritability

B. The Chemical Basis of Heredity

1. DNA – The Genetic Material
2. Nucleic Acids
3. Replication and Synthesis of DNA
4. The organization of DNA in Chromosomes

C. Genetic Variation

1. Variations in Chromosome Number and Arrangement
2. Mutation and Mutagenesis
3. Bacterial and Viral Genetics
4. Epigenetic Inheritance

D. Gene Structure, Function, and Regulation

1. Genes and Proteins

2. The Genetic Code
3. Synthesis of RNA and Protein: Transcription and Translation
4. Gene Structure and Organization
5. Regulations of Gene expression

VI. General Education and Course Learning Outcomes

A. General Education Learning Outcomes:

At the completion of this course, students will be able to:

1. Demonstrate the ability to synthesize and integrate biological information and ideas. (GE-NJ3)>(*Embedded Critical Thinking)
2. Demonstrate the use of quantitative skills to analyze experimental data accurately and reproducibly. (GE-NJ2)
3. Develop an informed understanding of the role of science and technology in society (GE-NJ3-ER)
4. Produce accurate lab reports (GE-NJ1)(*Embedded Critical Thinking)

B. Course Learning Outcomes:

At the completion of this course, students will be able to:

1. accurately interpret and analyze genetic data
2. synthesize research results for the purposes of discussion and written work;
3. conceive reasonable inferences in response to observations;
4. operate molecular data bases;
5. analyze genetics problems systematically and logically.

C. Assessment Instruments

Given the outcomes described above, the following assessment methods may be used:

1. production of laboratory reports
2. analysis of data
3. analysis of primary literature
4. laboratory quizzes
5. semester examinations

VII. Grade Determinants

- A. Analysis of current scientific literature
- B. Quizzes
- C. Lecture exams
- D. Laboratory notebooks and reports

Given the goals and outcomes described above, LIST the primary formats, modes, and methods for teaching and learning that may be used in the course:

- A. lecture/discussion
- B. small-group work
- C. computer-assisted instruction
- D. laboratory
- E. student oral presentations
- F. student collaboration
- G. independent study

VIII. Texts and Materials

- A. suggested textbook
- B. primary sources
- C. web sources

Sample of specific text that may be featured:

Sanders. (2019) *Genetic Analysis, An Integrated Approach* Pearson, Inc.

(Please Note: The course outline is intended only as a guide to course content and resources. Do not purchase textbooks based on this outline. The RVCC Bookstore is the sole resource for the most up-to-date information about textbooks.)

IX. Resources

Students may need to use library databases and other library resources for research assignments and/or computers.

X. Honors Options

Prerequisites: Minimum GPA of 3.5 and permission of the instructor.

The Honors option for the course will require students to participate in projects that will engage students at a deeper level than the regular coursework and require that students independently research and execute the completion of the project.

A. General Education and Course Learning Outcomes:

Upon completing the honors option, students will be able to:

1. Display competency in a literature search, and demonstrate the ability to summarize, evaluate, and properly cite sources (NJ GE IL).
2. Develop and present a research project in the area of genomics or a topic related to course content. (NJ GE 1).

B. Honors Option Content: (3 options at discretion of instructor)

- a. Students will be given an independent gene annotation project supported by the Genomics Education Partnership (GEP). The GEP introduces students to research in genomics by engaging them in projects for which careful annotation of genes from recently sequenced species provides important data. Students will have the opportunity to present their findings at the Annual Student Poster Session.
- b. Sciworthy offers students a chance to take a self-paced, online science writing course. At the completion of the course, students will submit a summary of a scientific study that will be edited by the Sciworthy team for publication on the site as a course assignment.

- c. Students will implement the CREATE method in order to simplify and understand a scientific journal article. The CREATE method requires students to Consider, Read, Elucidate the hypothesis, Analyze and interpret the data, and Think of the next Experiment. This models the authentic practices that scientists themselves use when reading and writing papers. Students will present their work in a blog post or infographic.

C. Assessment Instruments for Honors Option Work

- a. Weekly progress updates/timeline
- b. Drafts/feedback on project
- c. Final project

D. Grade Determinants for Honors Option Work

- a. Ability to meet progress deadlines through the semester
- b. Final project/paper/presentation