# Course Number and Title: BIO 262 Genetics

**Campus Location:**
Georgetown, Stanton

**Effective Date:**
2021-51

**Prerequisite:**
BIO 250, CHM 150

**Co-Requisites:**
None

**Course Credits and Hours:**
4.00 credits
3.00 lecture hours/week
3.00 lab hours/week

**Course Description:**
This course covers basic principles of prokaryotic and eukaryotic genetics, including Mendelian and non-Mendelian inheritance, structure and function of chromosomes and genomes, and genotype: phenotype associations. Students use bioinformatics software and DNA techniques such as cloning, PCR, and sequencing.

**Required Text(s):**
Obtain current textbook information by viewing the campus bookstore - https://www.dtcc.edu/bookstores online or visit a campus bookstore. Check your course schedule for the course number and section.

**Additional Materials:**
None

**Schedule Type:**
Classroom Course

**Disclaimer:**
None

**Core Course Performance Objectives (CCPOs):**

1. Apply the chromosomal basis of inheritance to describe passage of genetic traits across generations. (CCC 2, 6; PGC 1)
2. Review information flow in prokaryotic and eukaryotic cells. (CCC 2, 6; PGC 1)
3. Interpret data from defining classical and current experiments. (CCC 2, 5, 6; PGC 1)
4. Employ bioinformatics software to analyze nucleic acid and protein structure and function. (CCC 1, 2, 4, 5, 6; PGC 1, 9)
5. Use DNA techniques for laboratory investigations. (CCC 1, 2, 3, 4, 6; PGC 1, 2, 3, 4, 5, 6 7, 9)

See Core Curriculum Competencies and Program Graduate Competencies at the end of the syllabus. CCPOs are linked to every competency they develop.

**Measurable Performance Objectives (MPOs):**
Upon completion of this course, the student will:

1. Apply the chromosomal basis of inheritance to describe passage of genetic traits across generations.
    1. Compare Mendelian and non-Mendelian modes of inheritance.
    2. Apply the Hardy-Weinberg equilibrium equation to explain the inheritance of traits in populations.
    3. Describe the basic structure and function of chromosomes and how they move through meiosis and mitosis.
    4. Describe how genomes are mapped using classical linkage studies and genetic markers.
2. Review information flow in prokaryotic and eukaryotic cells.
    1. Summarize the mechanism of DNA replication.
    2. Compare initiation, elongation, and termination of transcription in prokaryotic and eukaryotic cells.
    3. Describe the roles of RNA and proteins in translation and RNA processing.
    4. Correlate changes in DNA sequence and expression with altered cell function.
    5. Analyze the molecular mechanisms behind different modes of gene regulation in prokaryotes and eukaryotes.
    6. Explain how DNA topology and chromatin structure affect replication and transcription.
3. Interpret data from defining classical and current experiments.
    1. Distinguish between different molecular techniques that are used to understand modes of inheritance.
    2. Identify appropriate experiments to answer genetics questions.
    3. Predict outcomes based upon a stated hypothesis and experimental design.
4. Employ bioinformatics software to analyze nucleic acid and protein structure and function.
    1. Select appropriate software to find information about specific genomes.
    2. Compare results after varying parameters in bioinformatics tools.
    3. Develop strategies for interpreting results from bioinformatics software.
    4. Discuss ethical issues associated with genetics.
5. Use DNA techniques for laboratory investigations
    1. Employ DNA techniques to construct a recombinant vector.
    2. Utilize molecular techniques such as electrophoresis, PCR, and sequencing to analyze construct.
    3. Quantitate DNA concentration and quality.
    4. Maintain a laboratory notebook.
    5. Analyze data to form sound scientific conclusions.

**Evaluation Criteria/Policies:**
The grade will be determined using the Delaware Tech grading system:

| | | | | |
|---|---|---|---|---|
| 90 | – | 100 | = | A |
| 80 | – | 89 | = | B |
| 70 | – | 79 | = | C |
| 0 | – | 69 | = | F |

Students should refer to the Student Handbook - https://www.dtcc.edu/handbook for information on the Academic Standing Policy, the Academic Integrity Policy, Student Rights and Responsibilities, and other policies relevant to their academic progress.

**Core Curriculum Competencies (CCCs are the competencies every graduate will develop):**

1. Apply clear and effective communication skills.
2. Use critical thinking to solve problems.
3. Collaborate to achieve a common goal.
4. Demonstrate professional and ethical conduct.
5. Use information literacy for effective vocational and/or academic research.
6. Apply quantitative reasoning and/or scientific inquiry to solve practical problems.

**Program Graduate Competencies (PGCs are the competencies every graduate will develop specific to his or her major):**
BITAASBIS

1. Apply knowledge of the theories and principles of biology and biotechnology.
2. Employ good laboratory practices (GLP) and safety guidelines to conduct common laboratory operations.
3. Employ standard laboratory documentation practices for data management and laboratory notebooks.
4. Utilize chemical principles and apply mathematics in the preparation of laboratory solutions.
5. Analyze samples by common quantitative and qualitative techniques.
6. Perform separation techniques on biological samples and interpret results.
7. Perform laboratory techniques used in microbiology, immunology and biotechnology.
8. Apply calculus in the solution of problems.
9. Demonstrate professional behavior and communication skills.

BITAASBIT

1. Apply knowledge of biology and chemistry to solve problems in biotechnology.
2. Integrate biological knowledge with the regulatory, ethical and business perspectives relevant to the biotechnology industry.
3. Apply quantitative and computational skills and tools to analyze problems in biology and chemistry.
4. Demonstrate good laboratory practices that are required by a person working as a biotechnology technician including laboratory safety and documentation.
5. Demonstrate laboratory skills relevant to biotechnology including recombinant DNA techniques, PCR, DNA sequence analysis, and current analytical chemistry techniques.
6. Work independently and collaboratively to create scientific oral presentations and written documents that are standard to the discipline.

**Disabilities Support Statement:**
The College is committed to providing reasonable accommodations for students with disabilities. Students are encouraged to schedule an appointment with the campus Disabilities Support Counselor to request an accommodation needed due to a disability. A listing of campus Disabilities Support Counselors and contact information can be found at the disabilities services - https://www.dtcc.edu/disabilitysupport web page or visit the campus Advising Center.