Course Number and Title: BIO 263 Molecular Biology

Campus Location:
Georgetown, Stanton

Effective Date:
2018-51

Prerequisite:
BIO 262

Co-Requisites:
None

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

Course Description:
This course focuses on the structure and function of DNA, RNA, and protein and the importance of their interactions in cellular processes. Students apply molecular biology techniques to laboratory investigations.

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. Correlate the structure of proteins with their functions. (CCC 2, 5, 6 ; PGC 1)
2. Describe the role of RNA in gene expression (CCC 2, 5, 6 ; PGC 1)
3. Explain epigenetic regulation of gene expression and phenotype. (CCC 1, 2,5,6 ; PGC 1)
4. Interpret data from defining classical and current experiments. (CCC 1, 2, 5, 7 ; PGC 2,3,7)
5. Employ bioinformatics software to analyze protein structure and function. (CCC 1, 2, 3, 4, 6, 7: PGC 2, 3)
6. Use RNA and protein techniques for laboratory investigations. (CCC 2, 3, 5, 7; PGC 2, 3, 5, 7)

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. Correlate the structure of proteins with their functions.
    1. Review the synthesis of proteins, including posttranslational modifications.
    2. Compare the hierarchical structures of proteins.
    3. Explain the role of proteins in the cellular processes of gene regulation, signal transduction, and transport.
    4. Describe protein separation and characterization techniques and their diagnostic application.
2. Describe the role of RNA in gene expression.
    1. Review transcription in eukaryotic cells and pre-mRNA processing.
    2. Summarize the regulatory role of riboswitches and miRNA.
    3. Evaluate the use of research tools such as siRNA, TALEN, and CRISPR/Cas9.
3. Explain epigenetic regulation of gene expression and phenotype.
    1. Review histone acetylation and DNA methylation.
    2. Summarize epigenetic control on pluripotency, genomic imprinting, and X-chromosome inactivation.
    3. Correlate changes in environmental variables and epigenetic regulation.
4. Interpret data from defining classical and current experiments.
    1. Distinguish between different molecular techniques that are used to understand cellular processes.
    2. Identify appropriate experiments to answer molecular biology questions.
    3. Predict outcomes based upon a stated hypothesis and experimental design.
5. Employ bioinformatics software to analyze protein structure and function.
    1. Select appropriate software to analyze protein structure.
    2. Compare results after varying parameters in bioinformatics tools.
    3. Develop strategies for interpreting results from bioinformatics software.
6. Use RNA and protein techniques for laboratory investigations.
    1. Use molecular techniques such as protein purification, electrophoresis, Westerns, and ELISA.
    2. Quantitate RNA and protein concentration and quality.
    3. Maintain a laboratory notebook.
    4. Analyze data to form sound scientific conclusions.

Evaluation Criteria/Policies:
Students must demonstrate proficiency on all CCPOs at a minimal 75 percent level to successfully complete the course. The grade will be determined using the Delaware Tech grading system:

92	–	100	=	A
83	–	91	=	B
75	–	82	=	C
0	–	74	=	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):

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.

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.