

COURSE OUTLINE
Cell and Molecular Biology (Bio 448)

DEPARTMENT: Biology, Chemistry & Environmental Health Science
COURSE NO: Bio 443-01
CREDIT HOURS: 4
INSTRUCTOR: Dr. B Fraij
OFFICE LOCATION: Alumni Hall 104
Email address: fraijb@benedict.edu
OFFICE PHONE: 803-705-4445
LECTURE TIME & PLACE: WF 4: 00-5:15 PM, AH 105
LABORATORY TIME & PLACE: F: 5.30-7.30 PM, AH 316
OFFICE HOURS: MWF 11:00-12:00 AM & TH 11:00-12:00, 1:00-3:30 PM

REQUIRED TEXTBOOK: Molecular Biology by Robert F. Weaver, WCB/McGraw-Hill Publishers, 3rd edition.

Class Attendance: Class attendance is taken on a daily basis. Students are expected to attend all classes. The official college attendance policy is followed.

Attendance in each class is counted from the first day the student is eligible to attend the class as given on the student's assessment sheet "admit to class" registration card or student change notice. Student may obtain an excuse for the emergency absence from the Dean of Students upon presentation of satisfactory documentation. Student is required to present the excused absence to me within one week after he/she returns to class.

EVALUATION: Approximately 4 unit examinations and quizzes will be given during the course. Each exam will consist of both multiple choice and discussion questions. Any student who misses a scheduled exam without a valid excuse will receive a grade of "0" with no opportunity to make up the exam. Students who miss an exam because of a valid reason, such as sickness or family emergency, must make up the exam within one week after returning to school. Failure to do so will result in a grade of "0". The make-up exam will not consist of the same questions used in the missed exam. It is the responsibility of the student, not the instructor, to schedule the make-up exam.

The semester grade is based on the average score of two lecture exams, quizzes, the final exam and lab reports. The letter grade is based on percentage as follows: A: 90-100; B: 80-89; C: 70-79; D: 60-69 and F: 59 and below. Points are not awarded for class attendance. Excessive absences may affect the final grade (see below). There are no extra credit assignments in this course.

The grading scores are given below:

Examinations and quizzes	250 pts
Laboratory and reports	100 pts
Final exam	150 pts

COURSE DESCRIPTION: The principal aim of this course is to introduce the students to classical and modern concepts in cell and molecular biology. The course will emphasize the

importance of both modern and classical biomedical research and medicine of a comprehensive understanding of cell structure and function.

OBJECTIVES: Upon completion of this course, students will be able to demonstrate the competencies in the following subjects:

- cell organization,
- DNA replication, transcription, protein synthesis and enzymology,
- selected topics in molecular genetics including DNA recombination as well as gene structure, function and regulation,
- selected topics related to developmental systems (i.e., skeletal muscle) and the effects of space travel (microgravity) on these systems,
- molecular cloning and molecular tools for studying genes and gene activity.

MAIN TOPICS

- I. Review of cell structure and function
 - a. Life begins with cells
 - b. All cells are prokaryotic or eukaryotic
 - c. Unicellular organisms help and hurt us
 - d. Stem cells, functional to forming tissues
- II. Molecular structure and function of genes
 - a. Structure of nucleic acids
 - b. Gene, genomes, and chromosomes
 - c. DNA replication
 - d. Transcription of protein-coding genes
 - e. Formation of functional mRNA
 - f. The decoding of mRNA by tRNA
 - g. Viruses: parasites of the cellular genetic system. HIV life cycle
- III. Methods and tools for studying genes
 - a. Molecular cloning methods
 - b. cDNA cloning
 - c. Polymerases, polymerase chain reaction-PCR
 - d. PCR cloning
 - e. DNA libraries
 - f. DNA sequencing
- IV. Fine control of transcription
 - a. Promoters
 - b. The lac operon
 - c. The genetic code
 - d. Mutations causes and consequences
 - e. Eukaryotic RNA polymerases and promoters
 - f. Post transcriptional modifications, alternative splicing, capping and polyadenylation
- V. Cloned genes applications
 - a. Mapping gene structure
 - b. Identification of specific DNA sequences
 - c. Identification of gene expression
 - d. Gene microarrays, DNA microarrays