**Introduction to DNA Cloning**

**COURSE OUTLINE**

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| Course Title/Number | IST 241 |
| Semester/Year  CRN No.  Credit hours | Spring 2016  3685  4 |
| Days/Time | Section 201  Lectures MWF 1:00 pm -1:50 pm  Lab on F 11:00 am -12:50 pm |
| Location | Class Meeting @ WAEC RM 1203, Labs are in BBSC Room 211 |
| Instructor  Textbooks | Menashi Cohenford, BSc., MT, Ph.D.  Molecular Biology Made Simple & Fun 4th Edition  Publisher: Cache River Press  Author: David P. Clark  Copyright Year:2010  ISBN:9781889899091  Biochemistry (Lippincott's Illustrated Reviews Series)  Sixth Edition  Author: Dennis R. Ferrier  ISBN: 9781451175622 / 1451175620 |
| Office | BBSC Room 241 H |
| Phone | 304-696-2697 |
| E-Mail | [Cohenford@marshall.edu](mailto:Cohenford@marshall.edu) |
| \*Office/Hours | Tue and Thurs: 10:00 am-12:00 pm and 2:00 pm-4:00 pm F 8:50 am-9:50 am and 2:00 am-3:00 pm  Or by appointment |
| University Policies | By enrolling in this course, you agree to the University Policies listed below. Please read the full text of each policy be going to [www.marshall.edu/academic-affairs](http://www.marshall.edu/academic-affairs) and clicking on “Marshall University Policies.” Or, you can access the policies directly by going to <http://www.marshall.edu/academic-affairs/?page_id=802> Academic Dishonesty/ Excused Absence Policy for Undergraduates/ Computing Services Acceptable Use/ Inclement Weather/ Dead Week/ Students with Disabilities/ Academic Forgiveness/ Academic Probation and Suspension/ Academic Rights and Responsibilities of Students/ Affirmative Action/ Sexual Harassment. |

**Course Description:** This course covers a broad range of topics including DNA, RNA, Protein Structure and Function, Cell Biology, Gene Regulation and concepts relating to the applications of molecular biology in agriculture, medicine and industry.

**Prerequisites:** None

**Additional Study Aids:** Instructor provided reading materials, protocols and laboratory notes.

The lab portion of this course focuses primarily on DNA cloning techniques, and on hands on use of these techniques to genetically engineer microbial cells.

**Grades:** Your grade will be calculated as follows:

Exam 1: 30%

Exam II: 30%

Quizzes: 15%

Lab Reports 25%

**Total 100%**

Your final grade in the class will be measured as follows:

A: 90-100

B: 80-89

C: 70-79

D: 60-70

F: Below 60

**Exams:** The exams will focus on materials presented in class. All PowerPoint presentations will be made available on WebCT. Each exam will be based on multiple choice questions and descriptive essays. These essays are at times thought provoking requiring you to apply learned concepts in simulated situations.

**Make-up Exams and Penalty***:* Make-up exams will be granted only in cases recognized by the University through an excused absence; the policy on excused absences can be found on pp. 79–81 of the 2010–2011 undergraduate catalog: <http://www.marshall.edu/catalog/undergraduate/ug_10-11_published.pdf>. Students without a valid excuse will receive an F (zero) for the exam.

**Quizzes:** There will be several quizzes during the semester. The quiz dates will be announced in advance to allow for adequate preparation. The quizzes may vary in format and may include both multiple choice and short answer questions. Quizzes ***may not be made up for any reason***.

**Lab Reports:** Following the completion of each lab, students are required to submit a report of their findings. Each report must include an abstract, an introduction, a materials and methods section followed by results, discussion and any references used. The submission date for each report will be announced in advance.

**Attendance:** Student attendance and participation will be required. Punctual attendance to lectures and labs will be considered in the final grade. For example, if a student with a 68 average has a full attendance record and has actively participated, that student may receive a grade of C for the course.

**Other Policies:** The use of cell phones is prohibited in class. Any student using a cell phone will be asked to leave the class room.

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| **Course Student Learning Outcomes** | **How Practiced in this Course** | **How Assessed in this Course** |
| Students will gain an understanding of:   * What is meant by *Biotechnology* and of the impacts of the field on areas such as medicine; agriculture, and environment; * Chemistry of nucleic acids; * Structure and role of DNA; * DNA Replication; * RNA Structure and function; * Chemistry and Structure of Amino Acids; * Protein Synthesis, and Protein Post Translational Modifications; * Regulation of Gene Expression; * Restriction Enzymes and DNA Cloning; * PCR and standard methods of DNA sequencing; * Primary, Secondary, Tertiary and Quaternary Structure of Proteins; and * Development of polyclonal and monoclonal antibodies | In-class lectures, examples, discussions, videos, and labs. | Quizzes, exams, and performance in lab as judged by attendance, ability to follow procedures and protocols and by quality of lab reports. |

***\** DATES \* CHAPTERS**

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| January 9th -13th  Week 1 | Introduction to Biotechnology Powerpoint 1  Structure of DNA and RNA Powerpoint II  Required Reading Assignment in Textbook titled *Molecular Biology Made Simple & Fun* 4th Edition:  Chapter 1: Introduction  Chapter 2: Bacteria: The Molecular Biologists′ Guinea Pigs  **No lab scheduled 1st Week** |
| January 16th -20th    Week 2 | **MARTIN LUTHER KING DAY- No Class**  Structure of DNA Powerpoint III  Structure of DNA and Chemistry of Nucleic Acids Powerpoint IV  Required Reading Assignment in Textbook titled *Molecular Biology Made Simple & Fun* 4th Edition:  Chapter 4: The Molecular Basis of Heredity  Required Reading Assignment in Textbook *titled Biochemistry (Lippincott's Illustrated Reviews* Series: Sixth Edition  Chapter Entitled: DNA Structure, Replication, and Repair  **Lab I- Nucleic Acid Extraction From Plant Tissues** |
| January 23rd -27th  **Jan 27th**  Week 3 | Structure of DNA and Chemistry of Nucleic Acids Powerpoint IV (Cont.)  DNA Structure, properties and purification Powerpoint V  DNA Replication in Prokaryotic and Eukaryotic Cells Powerpoint VI    **Quiz 1**  Required Reading Assignment in Textbook titled *Molecular Biology Made Simple & Fun* 4th Edition:  Chapter 5: Duplicating the DNA-Replication  Required Reading Assignment in Textbook *titled Biochemistry (Lippincott's Illustrated Reviews* Series: Sixth Edition  Chapter Entitled: DNA Structure, Replication, and Repair  **Lab II GAPDH PCR** |
| Jan 30th -Feb 3rd  Week 4 | DNA Replication in Prokaryotic and Eukaryotic Cells Powerpoint VI (Cont)  RNA Structure and Function Powerpoint VII  Required Reading Assignment in Textbook titled *Molecular Biology Made Simple & Fun* 4th Edition: Chapter 6: Getting the Message Out: Transcription of Genes to Produce Messenger RNA  Required Reading Assignment in Textbook *titled Biochemistry (Lippincott's Illustrated Reviews* Series: Sixth Edition  Chapter Entitled: RNA structure, Synthesis and Processing  **Lab III- GAPDH PCR** |
| February 6th -10th  **Feb 10th**  Week 5 | RNA Structure and Function Powerpoint VII (Cont.)  RNA Structure and Transcription Powerpoint VIII  Required Reading Assignment in Textbook titled *Molecular Biology Made Simple & Fun* 4th Edition:  Chapter 7 Proteins: The Buck Stops Here  Required Reading Assignment in Textbook *titled Biochemistry (Lippincott's Illustrated Reviews* Series: Sixth Edition  Chapter Entitled: RNA structure, Synthesis and Processing  Chapter Entitled: Protein Synthesis  **Quiz 2**  **Lab IV- Electrophoresis** |
| February 13th -17th  Week 6 | RNA Structure and Transcription Powerpoint VIII (cont)  Protein Synthesis Powerpoint IX  Required Reading Assignment in Textbook *titled Biochemistry (Lippincott's Illustrated Reviews* Series: Sixth Edition  Chapter Entitled: Protein Synthesis  **Lab V- Purification of PCR Products** |
| Feb 20th  -Feb 24th            Feb 24th  Week 7 | Protein Synthesis Powerpoint IX (cont)  Protein Syn. & Post translational Mod. of Proteins Powerpoint X  Required Reading Assignment in Textbook *titled Biochemistry (Lippincott's Illustrated Reviews* Series: Sixth Edition  Chapter Entitled: Protein Synthesis  **Exam #1:** Materials from Powerpoint Presentations  Plus Materials from reading assignments  **Lab VI- Ligation** |
| Feb 27th -March 3rd  Week 8  March 6th -10th      March 10th  Week 9 | Protein Synthesis Powerpoint X (Cont.)  Introduction to Amino Acids Part 1 Powerpoint X1 A  Required Reading Assignment in Textbook titled *Molecular Biology Made Simple & Fun* 4th Edition:  Chapter 8. Sex Among the Low-Lifes and Its Exploitation by Molecular Biologists: Gene Transfer in Bacteria  Required Reading Assignment in Textbook *titled Biochemistry (Lippincott's Illustrated Reviews* Series: Sixth Edition  Chapter 1: Amino Acids  **Lab VII-Transformation**  Introduction to Amino Acids Part 1 Powerpoint X1 A  Introduction to Amino Acids Part 2 Powerpoint X1 B  Required Reading Assignment in Textbook *titled Biochemistry (Lippincott's Illustrated Reviews* Series: Sixth Edition  Chapter Entitled: Amino Acids  **Quiz 3**  **Lab VIII- Plasmid Purification** |
| Mar13h –Mar 17th  Week 10 | Regulation of Gene Expression Powerpoint XII A  Regulation of Gene Expression Powerpoint XII B  Required Reading Assignment in Textbook *titled Biochemistry (Lippincott's Illustrated Reviews* Series: Sixth Edition  Chapter Entitled: Regulation of Gene Expression  **Lab IX- DNA Sequencing (tentative)** |
| March 20th –March 24th  Week 11 | **Spring Vacation** |
| Mar 27th –Mar 31st  Week 12 | Regulation of Gene Expression Powerpoint XII A  Regulation of Gene Expression Powerpoint XII B  Required Reading Assignment in Textbook *titled Biochemistry (Lippincott's Illustrated Reviews* Series: Sixth Edition  Chapter Entitled: Regulation of Gene Expression  **Lab IX- DNA Sequencing (tentative)** |
| April 3rd -April 7th  Week 13 | Regulation of Gene Expression Powerpoint XII B  Restriction Enzymes Powerpoint XIII A  Required Reading Assignment in Textbook titled *Molecular Biology Made Simple & Fun* 4th Edition:  Chapter 9. Messing About with DNA  Chapter 16. Just Do It! Techniques of Molecular BIology  Required Reading Assignment in Textbook *titled Biochemistry (Lippincott's Illustrated Reviews* Series: Sixth Edition  Chapter Entitled: Biotechnology and Human Disease  **Lab X- Bioinformatics (tentative)** |
| April 10th –April 14th  April 14th    Week 14 | PCR and DNA Sequencing Part I Powerpoint XIII C  PCR and DNA Sequencing Part II Powerpoint XIII D  **Quiz 4**  Required Reading Assignment in Textbook titled *Molecular Biology Made Simple & Fun* 4th Edition:  Chapter 17. PCR: The Polymerase Chain Reaction and Its Many Uses  Chapter 19. Gene Creatures, Part I: Viruses, Viroids and Plasmids  Chapter 23. Sequencing DNA  Required Reading Assignment in Textbook *titled Biochemistry (Lippincott's Illustrated Reviews* Series: Sixth Edition  Chapter Entitled: Biotechnology and Human Disease  **Lab XI- Immunoassays and ELISA (tentative)** |
| April 17th - April 21st  Week 15 | A Brief Introduction to Proteins |
| April 24th-April 28th  **April 24th**  **April 26th**  Week 16 | **Exam #2:** Materials from PowerPoint Presentations Since 1st Exam  **Last Day of Class**  **No lab Scheduled** |

\*Denotes that this syllabus is presented as a guide only and may be changed at any time by the instructor.