**INTRODUCTION TO DNA CLONING**

**COURSE OUTLINE**

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| Course Title/Number | IST 241 |
| Semester/Year  CRN No.  Credit hours | Spring 2015  3718  4 |
| Days/Time | Section 201  Lectures MWF 1:00-2:00pm  Lab on Wed 11:00 pm -1:00 pm |
| Location | Lectures are in BBSC Room 125  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 | **Tuesday-Thursday 3:00pm-5:00pm and Friday 3:00pm-5:00pm** |
| 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, Microbiology, Genetics, Cell Biology, Gene Regulation and Molecular Biology Applications 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: 30%

Lab Reports 10%

**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 and a materials and methods section followed by results, discussion and the 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 such areas 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 Cloning Vectors; * DNA Cloning; * PCR and DNA sequencing techniques; * Upstream and Down Stream Processing; * 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 12th -16th  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′s Guinea Pigs  **No lab scheduled 1st Week** |
| **Jan 19th**  January 19rh -23th  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 29: DNA Structure, Replication, and Repair  **Lab I- Nucleic Acid Extraction From Plant Tissues** |
| Jan 26th-Jan 30th    **Jan 30th**        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 Jan 30th**  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 29: DNA Structure, Replication, and Repair  **Lab II GAPDH PCR** |
| Feb 2nd -Feb 6th  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 30: RNA structure, Synthesis and Processing  **Lab III- GAPDH PCR** |
| February 9th -13th  **Feb 13th**  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 30: RNA structure, Synthesis and Processing  Chapter 31: Protein Synthesis  **Quiz 2**  **Lab IV- Electrophoresis** |
| February 16th -20th  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 31: Protein Synthesis  **Lab V- Purification of PCR Products** |
| Feb 23rd -Feb 27th        **Feb 27th**    Week 7 | Protein Synthesis Powerpoint IX (cont)  Protein Synthesis and Post translational Modification of Proteins Powerpoint X  Required Reading Assignment in Textbook *titled Biochemistry (Lippincott's Illustrated Reviews* Series: Sixth Edition  Chapter 31: Protein Synthesis  **Exam #1:** Materials from Powerpoint Presentations  Plus Materials from reading assignments  **Lab VI- Ligation** |
| March 2nd -March 6th  Week 8  March 9th -March 13th  **March 13th**    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 1: Amino Acids  **Quiz 3**  **Lab VIII- Plasmid Purification** |
| **March16th –March 20th**  Week 10 | **Spring Vacation** |
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| March 23rd –March 27th  Week 11 | 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 32: Regulation of Gene Expression  **Lab IX- DNA Sequencing (tentative)** |
| Mar 30th –April 3rd  Week 12 | 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 34: Biotechnology and Human Disease  **Lab X- Bioinformatics (tentative)** |
| April 6th-April 10th  **April 10th**  Week 13  April 13th –April 17th  Week 14 | Cloning Vectors Powerpoint XIII B 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 34: Biotechnology and Human Disease  **Lab XI- Immunoassays and ELISA (tentative)**  A Brief Introduction to Proteins Powerpoint XIV Part I  A Brief Introduction to Protein Down Stream Processing Powerpoint XIV Part II  Tertiary and Quaternary Structure of Proteins Powerpoint XIV Part III    Required Reading Assignment in Textbook titled *Molecular Biology Made Simple & Fun* 4th Edition:  Chapter 10. Products from Biotechnology  Chapter 22. The Molecular Defense Initiative: Your Immune System at Work  **No lab Scheduled** |
| April 20th - April 24th  **April 24th**  Week 15 | Tertiary and Quaternary Structure of Proteins Powerpoint XIV Part III (cont)  Introduction to Immunological Methods Powerpoint XV  **Exam #2:** Materials from Powerpoint Presentations Since 1st exam  Plus Reading Assignments  **No Lab Scheduled** |
| April 27th – May 1st      May 1st  Week 16 | Production of Monoclonal Antibodies DVD film/Presentation  Judith Folkman; Discovery of Angiogenic Factor DVD film  **Last Day of Class**  **Dead Week** |

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