**Introduction to DNA Cloning**

**Course Outline**

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| Course Title/Number | IST 241 |
| Semester/Year  Credit hours | Spring 2013  4 |
| Days/Time | Section 201  T and Th 11:00 am-12:15pm  Labs on Wednesday 3:00 pm -4:50 pm |
| Location | Lectures in BBSC Room 125  Labs in BBSC Room 211 |
| Instructor  Textbook | 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  Lippincott’s Illustrated Reviews Biochemistry 6th Edition Authors Richard Harvey, Denise Ferrier  ISBN**-13: 978-1451175622** |
| Office | BBSC Room 241 H |
| Phone | 304-696-2697 |
| E-Mail | Cohenford@marshall.edu |
| \*Office/Hours | T: 2 pm-3 pm  Th: 10 am-11 am, and 2 pm to 3 pm  F: 9 am to 10 am, 4 pm-5 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, 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

**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:   * Biotechnology and of its impacts in general * Structure of DNA and RNA. * Chemistry of Nucleic Acids * DNA Structure, properties and purification. * DNA Replication in Prokaryotic and Eukaryotic Cells. * RNA Structure and Function. * Protein Synthesis. * Protein Post translational Modifications | In-class examples, discussions, problem solving, reading materials in textbook and supplementary reading materials provided by instructor. | Quizzes 1 and 2  **Exam 1:** Chapters 1, 2, and 4-7 in textbook and supplementary reading materials and powerpoint presentations provided by instructor.  Performance in lab as judged by attendance and student lab reports |
| Students will get introduced to:   * Amino acid structure and nomenclature. * Regulation of Gene Expression * Restriction Enzymes * Cloning Vectors * PCR and DNA sequencing * An Introduction to Protein Down Stream Processing * Tertiary and Quaternary Structure of Proteins. * Introduction to antibodies and immunological methods Development of polyclonal and monoclonal antibodies * DNA cloning | In-class examples, discussions, videos, supplementary reading materials provided by instructor, review problems and materials covered in Chapters 4- 7. | Quizzes 3 and 4  **Exam II:** Chapters 8-10, 16, 17, 19, 22 and 23 in textbook and supplementary reading materials and powerpoint presentations provided by instructor.  Performance in lab as judged by attendance and student lab reports |

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

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| January 13th -17th  Week 1  **January 21st** | Introduction to Biotechnology Powerpoint 1  Structure of DNA and RNA Powerpoint II  Required Reading Materials in Textbook:  Chapter 1: Introduction  Chapter 2: Bacteria: The Molecular Biologists′s Guinea Pigs  **No lab scheduled 1st Week**  **MARTIN LUTHER KING DAY** |
| January 20st -24th  Week 2 | Structure of DNA Powerpoint III  Structure of DNA and Chemistry of Nucleic Acids Powerpoint IV  Required Reading Assignments:  Materials Provided by Instructor and Chapter 4: The Molecular Basis of Heredity  **Lab I- Nucleic Acid Extraction From Plant Tissues** |
| January 27th –Jan 31st  **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**  Required Reading Assignments:  Materials Provided by Instructor and  Chapter 5: Duplicating the DNA-Replication  **Lab II-GAPDH PCR** |
| Feb 3rd -Feb 7th  Week 4 | DNA Replication in Prokaryotic and Eukaryotic Cells Powerpoint VI (Cont)  RNA Structure and Function Powerpoint VII  Required Reading Assignments:  Materials Provided by Instructor and  Chapter 6: Getting the Message Out: Transcription of Genes to Produce Messenger RNA    **Lab III- GAPDH PCR** |
| February 10th -14th  **Feb 13th**  Week 5 | RNA Structure and Function Powerpoint VII (Cont.)  RNA Structure and Transcription Powerpoint VIII  Required Reading Assignments:  Materials Provided by Instructor and  Chapter 7 Proteins: The Buck Stops Here  **Quiz 2**  **Lab IV- Electrophoresis** |
| February 17th -21st  Week 6 | RNA Structure and Transcription Powerpoint VIII (cont)  Protein Synthesis Powerpoint IX  **Lab V- Purification of PCR Products** |
| Feb 24th  -Feb 28th      **Feb 27th**  Week 7 | Protein Synthesis Powerpoint IX (cont)  Protein Synthesis and Post translational Modification of Proteins Powerpoint X  **Exam #1:** Materials from Powerpoint Presentations  Plus Reading Materials Provided by Instructor  **Lab VI- Ligation** |
| March 3rd -March 7th  Week 8 | Protein Synthesis Powerpoint X (Cont.)  Introduction to Amino Acids Part 1 Powerpoint X1 A  Reading Assignment:  Chapter 8. Sex Among the Low-Lifes and Its Exploitation by Molecular Biologists: Gene Transfer in Bacteria  **Lab VII-Transformation** |
| March 10th -14th  March 14th  Week 9 | Introduction to Amino Acids Part 1 Powerpoint X1 A  Introduction to Amino Acids Part 2 Powerpoint X1 B  **Quiz 3**  **Lab VIII- Plasmid Purification** |
| **March 17th -21st**  Week 10 | **Spring Vacation** |
| March 24th –March 28th  Week 11 | Regulation of Gene Expression Powerpoint XII A  Regulation of Gene Expression Powerpoint XII B  Reading Assignment: Material Provided by Instructor  **Lab IX- DNA Sequencing (tentative)** |
| March 31st –April 4th  Week 12 | Regulation of Gene Expression Powerpoint XII B  Restriction Enzymes Powerpoint XIII A  Reading Assignments:  Chapter 9. Messing About with DNA  Chapter 16. Just Do It! Techniques of Molecular BIology  **Lab X- Bioinformatics (tentative)** |
| April 7th –April 11th  April 12th  Week 13  April 14th-April 18th  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**  Reading Assignments:  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  **Lab XI- Immunoassays and ELISA**  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    Reading Assignment:  Chapter 10. Products from Biotehnology  Chapter 22. The Molecular Defense Initiative: Your Immune System at Work  **No lab Scheduled** |
| April 21st –April 25th  **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 Materials Provided by Instructor  **No Lab Scheduled** |
| April 28 th- May 2nd  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.