**COURSE OUTLINE**

**Biosciences Research Methods**

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| Course Title/Number  | IST 342 CRN 3698Biosciences Research Methods  |
| Semester/Year Credit hours | Spring 2017 3 |
| Days/Time | Mondays and Wednesdays 4:00 pm - 5:15 pm |
| Location | WAEC Rm 1101 |
| InstructorTextbook | Menashi Cohenford, BSc., MT, Ph.DBasic Laboratory Methods for Biotechnology: Textbook and Laboratory Reference 2nd Edition by Lisa Seldman and Cynthia Moore (Pearson)ISBN:9780321570147 |
| Office | BBSC Room 241 H |
| Phone | 304-696-2697 |
| E-Mail | cohenford@marshall.edu |
| \*Office/Hours | T and Th: 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 pmOr 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. |

This course focuses on laboratory calculation methods and techniques used in biosciences, with the overall objective, to prepare students for successful internships and advanced courses in biotechnology and environmental sciences.

**Grades:** Student **grades** will be calculated as follows:

Quizzes: 20%

Exam 1: 35%

Exam II: 35%

Project 10%

**Total Points:**  100%

**Final grade** in the class will be based on the following criteria:

A: 90-100

B: 80-89

C: 70-79

D: 60-70

F: Below 60

**Exams:** The exams in this course focus on materials presented in class. All PowerPoint presentations will be made available on WebCT. Each exam will place major emphasis on problem solving skills by relying on multiple choice questions and/or descriptive essays. These essays will be, at times, thought provoking requiring you to apply learned concepts in simulated situations. There will be **no** final exam for the course.

**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 pages 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 at least two 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 multiple choice questions and/or short answer problems. Quizzes *may not be made up for any reason.*

**Projects**

Each student will be assigned a topic for presentation to the class in PowerPoint format. The date for each presentation will be announced in advance to allow for adequate preparation. In addition, each student must submit a written report about his/her presentation. The format for the written reports will be discussed in class.

**Attendance**: Student attendance and participation will be required. Punctual attendance to lectures 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.

**Students Requiring Special Needs**: Students with disabilities who require special accommodations should refer to this link <http://www.marshall.edu/disabled> which provides information for the educational and physical accessibility support at the university.

**Other Policies:** The use of cell phones is prohibited in class. Any student using a cell phone will be asked to leave the lecture 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:* Units of measurement and conversions;
* Mathematical calculations employed in biotechnology laboratories;
* Buffer solutions and their preparation;
* Dilutions and dilution calculations;
* Qualitative and quantitative methods for data analysis;
* An Introduction to Basic Statistical Analysis and Plotting techniques;
 | In-class examples, discussions, problem solving and reading assignments.  | By Quiz 1 and Exam 1 covering PowerPoint presentations: 1A,1B, 2, 3, 4, 5,6,7,8A,8B,8C |
| Students will learn about:* Measurements involving UV and Visible spectrometry with emphasis on Beer’s law and its applications;
* Various chromatographic techniques and their application for protein and nucleic acid purification;
* DNA and RNA Amplification Techniques.

Methods to calculate the sensitivity, specificity, positive and negative predictive values for an assay | In-class lectures, videos, problem solving and reading materials recommended by instructor. | By Quiz II, Quiz 3 and Exam II Exam II: Covers PowerPoint Presentations: 1A,1B, 2, 3, 4, 5,6,7,8A,8B,8C,9,10A,10B,10C, 14A, and 14B, NA amplification, Common Immunological Methods, Sequencing Technologies and MicroarraysStudent Projects |

**Dates: Lectures and Reading Assignments**

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|  January 9th -13th Week 1 | **Topic**: A Review of Basic Concepts in Chemical Calculations**Reading Assignment**: * Chapters 13 and 14 in Basic Laboratory Methods for Biotechnology

**PowerPoint Presentations**: 1A and 1B |
| Jan 16th  | **Martin Luther King’s Day** |
| January 16th -20th Week 2 | **Topic**: A Review of Basic Concepts in Chemical Calculations **Reading Assignment:*** Chapter 26 in ‘Basic Laboratory Methods for Biotechnology’

 **PowerPoint Presentations**: 2 and 3 |
| January 23rd -27th Week 3 | **Topic:** Significant figures and a Brief Discussion ofAcids, Bases and Buffers**Reading Assignments**: * Chapter 17 pages 308-310 and Chapter 27 in ‘Basic Laboratory Methods for Biotechnology’.

**Powerpoint Presentation 4:** Significant Figures**Powerpoint Presentation 5**: A Short Review of Acids, Bases and Buffers |
| Jan 30th -Feb 3rd Week 4 | **Topic:** Acids, Bases and Buffers (continued)**Powerpoint Point Presentation:** 5 (continued)**Quiz No. 1** |
| February 6th -10thWeek 5 | **Topic:** Dilutions, Buffers and An Introduction to Gaphing**Reading Assignments**: 1. Chapter 14 pages 241-250 and Chapter 15 pages 254-270 in ‘Basic Laboratory Methods for Biotechnology’.
2. Chapters 16 in ‘Basic Laboratory Methods for Biotechnology’.
3. Calculating the Line of Best Fit 270 in ‘Basic Laboratory Methods for Biotechnology’ pages 490-491

**Powerpoint Presentation 6**: Dilution and Buffer Preparation **Powerpoint Presentation 7**: Basic Techniques of Graphing Data |
| February 13th -17th Week 6 | **Topic:** A Review of Basic Statistical Methods & Basic Techniques of Graphing Data**Reading Assignment:** 1. Chapters 16 in ‘Basic Laboratory Methods for Biotechnology’.

**PowerPoint Presentation 8A:** A Review of Basic Statistical Methods & Basic Techniques of Graphing Data**PowerPoint Presentation 8B:** T-test**Quiz No. 2** |
| Feb 20th  -Feb 24th    Week 7 | **Topic:** Statistical Parameters of an Assay and Measurements involving Light**Reading Assignment**: Chapters 23 in ‘Basic Laboratory Methods for Biotechnology’ **PowerPoint Presentation 8C**: Statistical Parameters of An Assay**PowerPoint Presentation 9:** Measurements Involving Light**Quiz 2** |
| Feb 27th -March 3rd Week 8 | **Topic:** Measurements involving Light (continued) **Reading Assignments**: 1. Chapters 25 in ‘Basic Laboratory Methods for Biotechnology’
2. Chapters 31-33 in ‘Basic Laboratory Methods for Biotechnology’

**PowerPoint Presentation 9** **Exam 1:** PowerPoint Presentations 1A,1B, 2, 3, 4, 5,6,7,8A, 8B, and 8C |
| March 6th -10thWeek 9 | **Student Presentations** |
| Mar13h –Mar 17th Week 10 | **Student Presentations** |
| March 20th –March 24th Week 11 | **Spring Break** |
| Mar 27th –Mar 31stWeek 12 | **Topic:** An Introduction to RNA and DNA Purification and Amplification**PowerPoint Presentations:** 14 A and14B  |
| April 3rd -April 7th Week 13 | **Topic:** Introduction to antibodies and Immunological Methods**Topic:** Sequencing Techniques and Microarrays**PowerPoint Presentation:** Common Immunological MethodsPowerPoint Presentation: Sequencing Techniques and Microarrays |
| April 10th –April 14thWeek 14 | **Topic:** Introduction to Protein Purification and Characterization **Reading Assignments** 1. Chapters 31-33 in ‘Basic Laboratory Methods for Biotechnology’
2. Reading Material provided by Instructor

**PowerPoint Presentation:** 10 A**PowerPoint Presentation**:10 B |
| April 17th - April 21st Week 15April 24th-April 28th  **April 26th** Week 16 | **PowerPoint Presentation**:10 C**Class Project:** An exercise in protein purification**Exam II:** Includes PowerPoint Presentations: 1A,1B, 2, 3, 4, 5,6,7,8A,8B,8C,9,10A,10B, 10C, 14A, and 14B, Common Immunological Methods, Sequencing Methods and Microarrarays**Topic:** What is Misconduct in Science? **Last Day of Class (Review of Exam II** |

\* This syllabus is presented as a guide only and may be subject to change at the instructor’s discretion.