BMEG 350 – Biomedical Engineering Laboratory

Course Format	Laboratory, 3 hours per week
Credit Hours	2 credits
Class hours	Thursday 2-4.50 p.m.
Pre-requisites	BMEG 201 and BIOL 235 or BIOL 117

Instructors (alphabetical order):
Dr. Cerasela Zoica Dinu: Cerasela-Zoica.Dinu@mail.wvu.edu
Dr. Robin Hissam: Robin.Hissam@mail.wvu.edu
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Lab teaching assistant:
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Course Description:
This laboratory course is designed to provide students with the ability to work in teams to make measurements on and interpret data from living and non-living systems. The experimental modules reinforce concepts from the curriculum associated with the Biomedical Engineering Program (i.e., Introduction to Biomedical Engineering, Materials Science and Human Physiology) and expose students to three areas of biomedical engineering i.e., biomaterials, biomechanics, and lab on a chip. Further, the course motivates students to be involved in critical thinking as well as experimental design through testing their ability to perform an independent experiment that mimics function and structure in a biosystem and how such characteristics could be affected by external factors. This will be another direct application (i.e., in addition to the listed module) to understanding what biomedical engineering is and how could be related to healthcare applications.

Student Learning Objectives:
Students will be able to:

1. Understand and follow guidelines regarding biological safety
2. Maintain a laboratory notebook that follows the guidelines given in class and is pertinent to the individual lab module as listed above
3. Perform a literature search pertinent to the individual lab module/ subject being addressed

4. Describe and demonstrate understanding of basic concepts as related to the individual modules (e.g., biomaterial preparation, biomechanical testing, bionanotechnology development, etc.)
5. Collect, analyze and interpret measurements used for the biomedical engineering processes as presented in the individual modules (please see instructions provided with each module)
6. Prepare laboratory reports that clearly and concisely present the details of the experiments being performed as well as a critical analysis of the data/ their interpretation.

Grading:		
	Lab Notebook Review	5 %
	Pre-laboratory Reports (3)	30 %
	Final Lab Report (3)	45 %
	Class participation	5%
	Presentation	15 %
		100 %

Grade Assignment:	
	100 – 90 A
	89 – 80 B
	79 – 70 C
	69 – 60 D
	59 – 0 F

Attendance Policy: Attendance at all labs is required. Consistent with WVU guidelines, students absent from regularly scheduled sessions because of authorized University activities will have the opportunity to take them at an alternate time. Make-up sessions for absences due to any other reason will be at the discretion of the instructor.

Textbook: No textbook is required for this course; relevant reference and classroom materials will be provided by the individual instructor.

Class Website: All registered students will have access to the class website via eCampus (https://ecampus.wvu.edu/webapps/login/). Course information, class announcements, course documents, and assignments are included on the website.

Laboratory Notebooks: Each student will be required to maintain a laboratory notebook during this course; notebooks will be provided during the first class. Notebooks should have numbered pages and a duplicate set of papers. The duplicate pages will be collected for grading and course documentation at the end of the semester. The format for keeping a laboratory notebook will be covered in detail during the first lab session. Notebooks will be checked for format and completeness while students are performing experiments, and students with incomplete notebooks will be penalized with 5% of their individual grades.

Assignments and Due Dates: Pre-laboratory report, final lab reports, and laboratory notebooks are to be submitted as shown in the schedule (see last page). Late assignments will not receive credit but may be submitted for correction.

Pre-laboratory Report:
All aspects of the experiment will be introduced by the instructor however individual student planning is required to perform the experiments. Pre-laboratory planning requires a review of literature and an inspection of the apparatus in the laboratory. The pre-laboratory report is individual and should include the experimental design, the number of data points to be acquired, range of data points, variables to be measured and/or fixed as well as safety measure pertinent to the experiment itself; specific details are included below. Note that an experiment will not be permitted until an acceptable pre-laboratory plan is approved for each individual enrolled in this class. Pre-lab reports are to be graded for the individual student.

The following specific information should be included in the report

A. Overall Objective
    1. Summarize the goals of the experiment, and your proposed approach to achieve those goals.
B. Details of Experimental Work
    1. Outline the experiment and identify important process variables and measurements. Relate them briefly to important theoretical concepts.
    2. Speculate on the more difficult aspects of the experiment and what challenges you could be facing.
    3. Quantify the range of the more important process variables that you intend to cover/measure/evaluate in the experiment.
    4. Summarize the safety and ethical considerations where applicable and outline emergency procedures for the particular experiment to be performed.
C. Summary of Calculations
    1. Outline procedures for data reduction and calculations needed to transform experimental information into a useful form to answer the question(s) being posed by the individual instructor.
    2. Outline how you intend to assess the quality of the experimental information.

3. Discuss how you will assess quantitatively the impact of errors in experimental data on your conclusions and recommendations.

D. Appearance and Exposition

The report should have a neat appearance and should be free of grammatical errors. It should be written in Times 12, with 1" margins, 1.5 line spacing and should clearly identify the title of the experiment and the name of the author of the report. Report length: minimum 2 pages or a maximum of 3 pages. One figure allowed for no more than 1/3 of a page (included in the page requirements stipulated above).

Final Lab Report:

Laboratory reports will be completed as a group following each laboratory module. Each member will lead one module report writing effort, to ensure all grading is for the group efforts. Peer evaluation forms are implemented/ included in grading to assess involvement of individual student.

The reports should contain the following components:

Cover Page (Title of the module, Group members, Submission date)
Abstract
Introduction and Theory
Methods and Materials
Results
Discussion
Conclusions
References
Appendices (with safety concerns covered)

Appearance and Exposition of the Final report.

- The report should have a neat appearance and should be free of grammatical errors. It should be written in Times 12, with 1" margins, 1.5 line spacing, and should clearly identify the title of the experiment and the names of the authors. Report length: minimum 5 pages or a maximum of 7 pages (does not include the cover page or references/ appendices).

Class Participation

Although experiments will be run in teams, all students must be involved in performing the experiment. This requires that all group members be present for experiments, be knowledgeable about the experiment being performed, and help set-up equipment, collect and

analyze the data respectively. Team members not working on the experiment will lose the class participation points; instructor and peer review evaluations will be applied. Examples of unacceptable behavior include, but are not limited to checking email, playing on a cell phone, working on other homework etc..

Civility in the Classroom: In this course, you are expected to act in a manner consistent with the behavior expected in the professional workplace. Respect each other, come to class prepared, be supportive of others, be attentive, contribute when appropriate, and be engaged in your learning. Civility is expected and assumed. In order for everyone to have the opportunity to maximize learning, inappropriate or disruptive behavior is prohibited and may result in a request to leave the classroom at a minimum. Examples include, but are not limited to, using cell phones in class, texting in class, excessive tardiness or late arrivals, demanding special treatment, challenges to the instructor's authority, leaving class early, shuffling backpacks and book bags, using offensive language or remarks, chewing gum, wearing caps, prolonged side discussions, playing games in class, sleeping, overt inattentiveness, and using a laptop during class unless instructed to do so.

Academic Policies and Syllabus Statements:
All statements, including Academic Integrity and Inclusivity, established by the University can be found at https://tlcommons.wvu.edu/qualitymatters/syllabus-policies-and-statements. Additional information about academic integrity issues and sanctions for the Statler College can be found in the Undergraduate Catalog at http://catalog.wvu.edu/undergraduate/collegeofengineeringandmineralresources/#policiestext. These University and College policies will be followed for this course. If you have questions on these policies, please do not hesitate to ask.

BMEG 350 Fall 2019 Schedule

This is an approximate schedule and is subject to change at the discretion of the instructor.

Date	Class	Instructor	Theme
22-Aug	1	Robin Hissam	Course Intro: syllabus and class structure discussion
29-Aug	2	Cerasela Dinu	Intro biomechanics
5-Sep	3	Cerasela Dinu	Experiments biomechanics
12-Sep	4	Cerasela Dinu	Class discussion/ data analysis
19-Sep	5	Robin Hissam	Intro biomaterials
26-Sep	6	Robin Hissam	Experiments biomaterial
3-Oct	7	Robin Hissam	Experiments biomaterial
10-Oct		**No class**	**Fall Break**
17-Oct	8	Robin Hissam	Class discussion/ data analysis
24-Oct	9	Cerasela Dinu Huy Pham	Independent project intro
31-Oct	10	Huy Pham	Independent project experiment
7-Nov	11	Available instructors	Independent project presentations
14-Nov	12	Yuxin Liu	Intro lab on chip
21-Nov	13	Yuxin Liu	Experiments lab on chip
28-Nov		**No Class**	**Fall Recess**
5-Dec	14	Yuxin Liu	Class discussion/ data analysis
12-Dec	15	Robin Hissam	Course Wrap-up