

BME 110: Introduction to Biomedical Engineering (3 credits)

West Chester University of PA, Fall 2020

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| Instructor | Dr. Zhongping Huang, Dr. Jesse Placone |
| Office Room | MER 130, 103 |
| Office Phone | 610 – 430 – 6932; 610 – 436 - 2832 |
| Email Address | zhuang2@wcupa.edu ; jplacone@wcupa.edu |
| Office Hours | Dr. Huang: M-11:00am-12:00pm; W-3:00pm-5:00pm; F-10:00am-11:00am Dr. Placone: W-12:00pm-2:00pm; Th-11:00am-1:00pm; F-12:00pm-1:00pm |
| WCU Emergency Number | 610 – 436 – 3311 |
| Zoom Meeting Room | Meeting ID : 969 2580 4301; Passcode : 791269 |

TEXTBOOK: Suggested textbook: *Introduction to Biomedical Engineering*, 4th edition, 2017, by Enderle, J.D., and Bronzino, J.D.

COURSE DESCRIPTION: Introduction to the development of biomedical engineering or bioengineering using fundamental concepts and tools from physics, mechanical, chemical, electrical engineering and biology. Topics may include: biomaterials, biomechanics, bioinstrumentation, biotransport and artificial organs, cell and tissue engineering, systems and signals, biochemical engineering, bioelectric phenomenon, and biomeasurements. Additional topics include developing engineering tools for use in advanced courses and problem-solving skills.

COVID-19 STATEMENT: Part of West Chester University's response to the COVID-19 pandemic was to switch the vast majority of instruction to remote. This decision was made out of an abundance of caution to protect the health of all members of the WCU community. Faculty have been asked to make every effort to adapt their courses to this novel situation while still meeting the critical learning outcomes of the course. Students are asked to discuss any problems with the new course format and schedule directly with their instructors. Patience and flexibility on everyone's behalf are critical to our community's navigation of this public health crisis.

For this particular course, the following alternative modalities are being utilized: Zoom meetings for all remote lectures. It is expected that the students enrolled in this course will have access to a computer, the internet, and a word processing program. The university has resources available through a loaner program for students that need computer or internet access. Additionally, all students have Office 365 available through the university (<https://www.wcupa.edu/infoServices/office365/>).

PREREQUISITES: No.

COURSE STUDENT LEARNING OUTCOMES:

| Upon completion of this course, students will be able to: | As measured by: |
|--|---|
| 1. Understand the broad aspect of Biomedical Engineering. | Semester Exams Homework Assignments Final Project Report/Presentation |
| 2. Identify their interesting area in Biomedical Engineering for their study and career development. | Semester Exams Homework Assignments Final Project Report/Presentation |
| 3. Understand and analyze literature on healthcare related technologies. | Semester Exams Homework Assignments Final Project Report/Presentation |
| 4. Understand the ethical and legal issues related to Biomedical Engineering technologies. | Semester Exams Homework Assignments Final Project Report/Presentation |

| | |
|--|---|
| 5. Understand how to apply basic principles of science and engineering (trigonometry, circuit analysis, statics, fluid mechanics) to study living functions. | Semester Exams Homework Assignments Final Project Report/Presentation |
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Program Goals / ABET Student Outcomes:

This course will contribute to developing the following program goals / ABET student outcomes:

- 3. an ability to communicate effectively with a range of audiences (Final project presentation)
- 4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts (Homework assignments, Exams, Final report)
- 7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies. (assignments, final report)

ATTENDANCE POLICY: Attendance is crucial to success in this course. Come to class prepared to learn and take good notes. Please refrain from answering phone calls or text messaging while in class. Please set all electronics to silent or “vibrate mode” and put them away.

D2L: All course materials including homework assignments and solutions, grades, and important communications will be posted on WCU's D2L website at <https://d2l.wcupa.edu>. *You may want to set D2L to notify you when new content is posted.*

EVALUATION & GRADING

Homework: Homework assignments will be announced in class and posted on the course website hosted on D2L with the due date and time noted. Homework assignments are to be submitted electronically through D2L course website typically one week after giving assignments. Homework assignment will be graded as follows: 60% for completeness and 40% for accuracy on randomly selected problems.

Late homework will not be accepted unless prior permission is granted. No homework assignments are accepted after the graded assignments have been returned. If you want your homework grade reconsidered, you must see me within one week of the original grade being given.

Exams: The three midterms and the final exam are closed-book tests for which you are only required to bring a calculator and a pen. The final exam covers all course material during the entire semester (that is, it is a cumulative test). All four tests use the multiple-choice format and the short essay/problem format. Students who are not able to attend a test (medical or other emergency) must notify their instructor by email before the test.

Final Report: All students will be required to prepare a final report discussing the state-of-art in one area of medical technology; the final report should have a section on ethical/regulatory concerns and another on the future of the medical technology being reviewed. The final report for the projects will be due at the end of the semester. Final reports are to be **submitted electronically through D2L course web page**. The final report should be prepared as a manuscript according to the instructions posted on course web site. The report should be at least 8 pages (double spaced) with at least 8 citations to papers published in reputable journals (e.g. Scientific American, New York Times, etc.).

Make-up Policy: In the case of a University sanctioned event, please schedule a makeup exam with me in advance. If you should miss an examination due to a certifiable emergency or illness, please notify me as soon as possible providing appropriate documentation and either a makeup exam will be arranged or your score on the final exam will replace the missed exam. All unexcused absences will result in a grade of zero.

Evaluation: Your grade in the class is calculated as follows:

- Homework: 10%
- Exams (15% each): 45%
- Cumulative Final Exam: 30%

Final Project: 15%

A letter grade will be assigned based on performance in the course according to the following scale:

| Grade | Quality Points | Percentage Equivalents | Interpretation |
|-------|----------------|------------------------|----------------|
| A | 4.00 | 93-100 | Excellent |
| A- | 3.67 | 90-92 | |
| B+ | 3.33 | 87-89 | Superior |
| B | 3.00 | 83-86 | |
| B- | 2.67 | 80-82 | |
| C+ | 2.33 | 77-79 | Average |
| C | 2.00 | 73-76 | |
| C- | 1.67 | 70-72 | |
| D+ | 1.33 | 67-69 | Below Average |
| D | 1.00 | 63-66 | |
| D- | 0.67 | 60-62 | |
| F | 0 | < 60% | Failure |

Refer to the Undergraduate Catalog for description of NG (No Grade), W, Z, and other grades.

CLASS CANCELLATION: In the event that I am unable to meet a class, I will: a) notify you in person at a prior meeting to that effect or b) send an email notification. All other postings announcing the cancellation of this class are to be considered unofficial and are to be ignored.

IMPORTANT DATES:

Labor Day (no classes): 9/7

Last day to drop/add: 8/31

Exam 1: TBD

Exam 2: TBD

Last day to withdraw: 10/23

Exam 3: TBD

Reading/Writing Days (no classes): 12/5-12/6

Fall/Thanksgiving Break (no classes): 11/23-11/29

Final Exam: 12/9/2020

TENTATIVE COURSE OUTLINE: The following schedule is subject to change at the discretion of the instructor. Every effort will be made to announce changes in advance, but students are responsible for changes.

| Week | Topic | Notes |
|--------|--|-------------------|
| 1 | Introduction and History of Biomedical Engineering | |
| 2 | Ethics | |
| 3 | Biomechanics | |
| 4 | Biomechanics | |
| 5 | Biotransport and Artificial Organs | Exam 1 |
| 6 | Biotransport and Artificial Organ | |
| 7 | Biomaterials | |
| 8 | Biomaterials | |
| 9 | Tissue Engineering | Exam 2 |
| 10 | Tissue Engineering | |
| 11 | Bioinstrumentation | |
| 12 | Bioimaging | Exam 3 |
| 13, 15 | Final project Presentation | |
| 14 | <i>Reading/Writing Days, Fall/Thanksgiving Break</i> | No classes |
| 16 | Review for Final | Final Exam |

Tentative BME 110 guest speakers schedule (all are on Wednesday):

1. Dr. Cathy Unrich, 9/9
2. Mr. Marc Duey, 9/30
3. Dr. Amy Chaya, 10/7
4. Dr. Sanggeeta Abraham, 11/11

Statements Common to All WCU Undergraduate Syllabi



COVID-19 STATEMENT

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ACADEMIC & PERSONAL INTEGRITY

It is the responsibility of each student to adhere to the university's standards for academic integrity. Violations of academic integrity include any act that violates the rights of another student in academic work, that involves misrepresentation of your own work, or that disrupts the instruction of the course. Other violations include (but are not limited to): cheating on assignments or examinations; plagiarizing, which means copying any part of another's work and/or using ideas of another and presenting them as one's own without giving proper credit to the source; selling, purchasing, or exchanging of term papers; falsifying of information; and using your own work from one class to fulfill the assignment for another class without significant modification. Proof of academic misconduct can result in the automatic failure and removal from this course. For questions regarding Academic Integrity, the No-Grade Policy, Sexual Harassment, or the Student Code of Conduct, students are encouraged to refer to the Department Undergraduate Handbook, the Undergraduate Catalog, the Ram's Eye View, and the University website at www.wcupa.edu.

STUDENTS WITH DISABILITIES

If you have a disability that requires accommodations under the Americans with Disabilities Act (ADA), please present your letter of accommodations and meet with me as soon as possible so that I can support your success in an informed manner. Accommodations cannot be granted retroactively. If you would like to know more about West Chester University's Services for Students with Disabilities (OSSD), please visit them at 223 Lawrence Center. Their phone number is 610-436-2564, their fax number is 610-436-2600, their email address is ossd@wcupa.edu, and their website is at <https://www.wcupa.edu/universityCollege/ossd/>. In an effort to assist students who either receive or may believe they are entitled to receive accommodations under the Americans with Disabilities Act and Section 504 of the Rehabilitation Act of 1973, the University has appointed a student advocate to be a contact for students who have questions regarding the provision of their accommodations or their right to accommodations. The advocate will assist any student who may have questions regarding these rights. The Director for Equity and Compliance/Title IX Coordinator has been designated in this role. Students who need assistance with their rights to accommodations should contact them at 610-436-2433.

EXCUSED ABSENCES POLICY

Students are advised to carefully read and comply with the excused absences policy, including absences for university-sanctioned events, contained in the WCU Undergraduate Catalog. In particular, please note that the "responsibility for meeting academic requirements rests with the student," that this policy does not excuse students from completing required academic work, and that professors can require a "fair alternative" to attendance on those days that students must be absent from class in order to participate in a University-Sanctioned Event.

REPORTING INCIDENTS OF SEXUAL VIOLENCE

West Chester University and its faculty are committed to assuring a safe and productive educational environment for all students. In order to comply with the requirements of Title IX of the Education Amendments of 1972 and the University's commitment to offering supportive measures in accordance with the new regulations issued under Title IX, the University requires faculty members to report incidents of sexual violence shared by students to the University's Title IX Coordinator. The only exceptions to the faculty member's reporting obligation are when incidents of sexual violence are communicated by a student during a classroom discussion, in a writing assignment for a class, or as part of a University-approved research project. **Faculty members are obligated to report sexual violence or any other abuse of a student who was, or is, a child (a person under 18 years of age) when the abuse allegedly occurred to the person designated in the University Protection of Minors Policy.** Information regarding the reporting of sexual violence and the resources that are available to victims of sexual violence is set forth at:

<https://www.wcupa.edu/admin/diversityEquityInclusion/sexualMisconduct/default.aspx>

EMERGENCY PREPAREDNESS

All students are encouraged to sign up for the University's free WCU ALERT service, which delivers official WCU emergency text messages directly to your cell phone. For more information, visit www.wcupa.edu/wcualert. To report an emergency, call the Department of Public Safety at 610-436-3311.

ELECTRONIC MAIL POLICY

It is expected that faculty, staff, and students activate and maintain regular access to University provided e-mail accounts. Official university communications, including those from your instructor, will be sent through your university e-mail account. You are responsible for accessing that mail to be sure to obtain official University communications. Failure to access will not exempt individuals from the responsibilities associated with this course.