BME 5303/6303: Research and Lab Methods
CRN: 12568/15624
Fall 2023

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Office Hours: In person M201J or virtually by appointment

Course Information:

COURSE DESCRIPTION

BME 5303/6303 is an introductory course to biomedical engineering research laboratory principles and procedures involving living systems with emphasis on lab safety, experimental design, data collection, analysis, and interpretation; and ethical issues including scientific integrity and use of human and animal subjects in research experiments.

This course consists of a weekly 3-hour lecture; and *ad hoc* 2-hour specialty lab or seminar programming.

COURSE OBJECTIVES OR EXPECTED LEARNING OUTCOMES

At the end of this course, students will be able to:

- Develop a graduate-level research project plan in biomedical engineering
- Author a graduate-level fellowship application or research grant
- Critique scientific manuscripts and IRB/IACUC applications
- Understand and interpret commonly reported statistical measures published in healthcare and biomedical research
- Analyze common types of healthcare and biomedical research data using statistical software and graphical tools

REQUIRED MATERIALS

There is no required textbook for this course. Lecture notes will be supplied as each topic is covered.

COURSE ASSIGNMENTS AND GRADING

Homework: Weekly homework or assignments will be given. Please refer to the course schedule for detailed due dates and final grade contributions.

Tests: There will be no midterms or examinations for this course.

Course participation: Regular class attendance and participation is expected. Students who do not attend and participate actively in class are inviting scholastic difficulty. Course participation will be evaluated throughout the semester and a grade will be provided holistically. Successful course participation is defined as consistently engaging

in group or other activities during class that solicit feedback on homework assignments, readings, and/or materials covered in lecture or seminars.

Grading policy: There will be no curving of grades in this course. Your grade will be determined by homework (70%) and course participation (30%). Final grades will be determined using the 100 point scale below, with conversions from the percentages as indicated.

Letter grade	Percentages	Meaning
A	90 – 100	Excellent
B	80 – 89	Good
C	70 – 79	Average
D	60 – 69	Below average
F	< 60	Unsatisfactory

TECHNOLOGY REQUIREMENTS

Course content is delivered via the Internet through the Blackboard learning management system. Ensure your UTEP e-mail account is working and that you have access to the Web and a stable web browser. Google Chrome and Mozilla Firefox are the best browsers for Blackboard; other browsers may cause complications. When having technical difficulties, update your browser, clear your cache, or try switching to another browser.

You will need to have access to a computer/laptop. You will need to download or update the following software: Microsoft Office, and Adobe Acrobat Reader. Check that your computer hardware and software are up-to-date and able to access all parts of the course.

If you do not have a word-processing software, you can download Word and other Microsoft Office programs (including Excel, PowerPoint, Outlook and more) for free via UTEP's Microsoft Office Portal. Click the following link for more information about Microsoft Office 365 and follow the instructions.

IMPORTANT: If you encounter technical difficulties beyond your scope of troubleshooting, please contact the UTEP Help Desk as they are trained specifically in assisting with technological needs of students. Please do not contact me for this type of assistance. The Help Desk is much better equipped than I am to assist you!

Course Communication:

There are a number of ways we can keep the communication channels open:

- **Office Hours**: I will be available in my office in Metallurgy Building, Room M201J for office hours in-person. You may request alternative times or virtual office hours by appointment and dependent on my availability. Scheduled office hours will take place at the following times (excluding holidays or otherwise notified in class or on Blackboard):
  Tuesdays and Thursdays: 10:30am-12pm
- **Email**: UTEP e-mail is the best way to contact me. I will make every attempt to respond to your e-mail within 24-48 hours of receipt. When e-mailing me, be sure to email from

your UTEP student account and please put the course number in the subject line. In the body of your e-mail, clearly state your question. At the end of your e-mail, be sure to put your first and last name, and your university identification number.

- **Discussion Board**: If you have a question that you believe other students may also have, please post it in the Help Board of the discussion boards inside of Blackboard. Please respond to other students' questions if you have a helpful response.
- **Announcements**: Check the Blackboard announcements frequently for any updates, deadlines, or other important messages.

NETIQUETTE

As we know, sometimes communication online can be challenging. It's possible to miscommunicate what we mean or to misunderstand what our classmates mean given the lack of body language and immediate feedback. Therefore, please keep these netiquette (network etiquette) guidelines in mind. Failure to observe them may result in disciplinary action.

- Respect and courtesy must be provided to classmates and to the instructor at all times. No harassment or inappropriate postings will be tolerated.
- Blackboard is not a public internet venue; all postings to it should be considered private and confidential. Whatever is posted on in these online spaces is intended for classmates and professor only. Please do not copy documents and paste them to a publicly accessible website, blog, or other space.

Course Policies:

ATTENDANCE AND PARTICIPATION

Attendance in the course is determined by participation in the learning activities of the course. The importance of attending every class cannot be over emphasized. Your participation in the course is vital not only for your own learning and success, but also to your fellow peers to create a community of learners. Participation is determined by completion of the following activities:

- Reading / viewing all course materials to ensure understanding of assignment requirements
- Participating in discussion and peer review of course deliverables with your peers
- Participating in panels and asking engaging questions to invited presenters

Due to the fact that these activities are designed to contribute and build upon learning each week, they cannot be made up after due date has passed.

EXCUSED ABSENCES AND/OR COURSE DROP POLICY

According to UTEP Curriculum and Classroom Policies, "When, in the judgment of the instructor, a student has been absent to such a degree as to impair his or her status relative to credit for the course, the instructor may drop the student from the class with a grade of "W" before the course drop deadline and with a grade of "F" after the course drop deadline." See academic regulations in the UTEP Undergraduate Catalog for a list of excuse absences. Therefore, if I find that, due to non-performance in the course, you are at risk of failing, I will drop you from the course. I will provide 24 hours advance notice via email. However, if you feel that you are unable to complete the course successfully, please let me know and then contact the Registrar's Office to initiate the drop process. If you do not, you are at risk of receiving an "F" for the course.

DEADLINES, LATE WORK, AND ABSENCE POLICY

Homework assignments will be due on Thursday at midnight (11:59pm) unless otherwise stated in class or by notice on Blackboard. No late work will be accepted if the reason is not considered excusable.

MAKE-UP WORK

Make-up work will be given *only* in the case of a *documented* emergency. Note that make-up work may be in a different format than the original work, may require more intensive preparation, and may be graded with penalty points. If you miss an assignment and the reason is not considered excusable, you will receive a zero. It is therefore important to reach out to me—in advance if at all possible—and explain with proper documentation why you missed a given course requirement. Once a deadline has been established for make-up work, no further extensions or exceptions will be granted.

ACCOMMODATIONS POLICY

The University is committed to providing reasonable accommodations and auxiliary services to students, staff, faculty, job applicants, applicants for admissions, and other beneficiaries of University programs, services and activities with documented disabilities in order to provide them with equal opportunities to participate in programs, services, and activities in compliance with sections 503 and 504 of the Rehabilitation Act of 1973, as amended, and the Americans with Disabilities Act (ADA) of 1990 and the Americans with Disabilities Act Amendments Act (ADAAA) of 2008. Reasonable accommodations will be made unless it is determined that doing so would cause undue hardship on the University. Students requesting an accommodation based on a disability must register with the UTEP Center for Accommodations and Support Services (CASS). Contact the Center for Accommodations and Support Services at 915-747-5148, or email them at cass@utep.edu, or apply for accommodations online via the CASS portal.

SCHOLASTIC INTEGRITY

Academic dishonesty is prohibited and is considered a violation of the UTEP Handbook of Operating Procedures. It includes, but is not limited to, cheating, plagiarism, and collusion. Cheating may involve copying from or providing information to another student, possessing unauthorized materials during a test, or falsifying research data on laboratory reports. Plagiarism occurs when someone intentionally or knowingly represents the words or ideas of another as ones' own. Collusion involves collaborating with another person to commit any academically dishonest act. Any act of academic dishonesty attempted by a UTEP student is unacceptable and will not be tolerated. All suspected violations of academic integrity at The University of Texas at El Paso must be reported to the Office of Student Conduct and Conflict Resolution (OSCCR) for possible disciplinary action. To learn more, please visit HOOP: Student Conduct and Discipline.

GUIDANCE ON ARTIFICIAL INTELLIGENCE

The use of generative AI tools such as ChatGPT is not permitted in this course. Students must cite any borrowed content sources to comply with all application citation guidelines, copyright

law, and avoid plagiarism. Instances that violate these guidelines will be referred to the Office of Student Conduct and Conflict Resolution.

PLAGIARISM DETECTING SOFTWARE

Some of your course work and assessments may be submitted to SafeAssign, a plagiarism detecting software. SafeAssign is used review assignment submissions for originality and will help you learn how to properly attribute sources rather than paraphrase.

COPYRIGHT STATEMENT FOR COURSE MATERIALS

All materials used in this course are protected by copyright law. The course materials are only for the use of students currently enrolled in this course and only for the purpose of this course. They may not be further disseminated.

Course Resources: Where you can go for assistance

UTEP provides a variety of student services and support:
Technology Resources

- Help Desk: Students experiencing technological challenges (email, Blackboard, software, etc.) can submit a ticket to the UTEP Helpdesk for assistance. Contact the Helpdesk via phone, email, chat, website, or in person if on campus.

Academic Resources

- UTEP Library: Access a wide range of resources including online, full-text access to thousands of journals and eBooks plus reference service and librarian assistance for enrolled students.
- Math Tutoring Center (MaRCS): Ask a tutor for help and explore other available math resources.

Individual Resources

- Military Student Success Center: Assists personnel in any branch of service to reach their educational goals.
- Center for Accommodations and Support Services: Assists students with ADA-related accommodations for coursework, housing, and internships.
- Counseling and Psychological Services: Provides a variety of counseling services including individual, couples, and group sessions as well as career and disability assessments.

WEEKLY CALENDAR

This calendar provides an overview draft of the course. More details and a weekly checklist will be updated and made available in the weekly modules on Blackboard. The due date for major writing assignments is always Thursday at 11:59pm (MT). No late work will be accepted.

Date	Topic	Homework assigned
Sept 1	• Syllabus • Ice breakers • Choosing an advisor or project • Graduate school expectations	EH&S Lab safety modules: • Biosafety and bloodborne pathogens • Laboratory safety for

	• Lab safety & behavior	ENG/CHEM/GEO/ART
Sept 8	• Finding articles using databases, Google Scholar, or at the library • How to read scientific articles • Plagiarism and Research Ethics	• Literature review article list
Sept 15	• Citations and citation software • Writing effectively – Literature Review	• Literature review draft (2.5%)
Sept 22	• Writing effectively – Thesis and Fellowship applications • Identifying funding sources and opportunities: NSF vs NIH and other agency proposal formats • Project management	• Specific aims draft (2.5%)
Sept 29	• Experimental design • Common biostatistics (Descriptive statistics, distributions, hypothesis testing)	• Personal statement / future goals draft (2.5%)
Oct 6	• How to write an IRB / IACUC application • Common biostatistics (Confidence intervals, Kaplan-Meier, and power analysis)	• Elevator pitch and presentation
Oct 13	• Elevator pitch competition (5%)	• Scientific approach draft (2.5%)
Oct 20	• Publication process: Submission, pre-prints, and peer review • Intellectual property and patenting • Academia panel discussion	• Cover letter of a preprint manuscript (2.5%)
Oct 27	• Figure and graphical abstract design • Startup panel discussion	• Peer review report of a preprint manuscript (2.5%)
Nov 3	• High dimensional data representation and visualization • Imaging and microscopy data representation and visualization • Industry panel discussion	• Fellowship application draft (10%)
Nov 10	• Professionalism, mentoring, and social media • ChatGPT and Generative AI in biomedical research • Other professional careers panel discussion	• Fellowship application peer review reports (10%)
Nov 17	• NSF Fellowship application mock review session (10%)	• Final fellowship application report (15%)
Nov 24	• THANKSGIVING (NO CLASSES)	
Dec 1	• Final presentations (15%) • End of semester celebration	