

Research Methods

Department of Electrical and Computer Engineering Engineering

SYLLABUS

Instructor:

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Office Hours:

9:00am – 1:00pm Tuesday/Thursday

Prerequisites:

This course requires the desire to learn, enjoy challenges, ability to work in a team, curiosity, and knowledge of basic mathematics, physics, Matlab, or consent of the instructor.

Reference Textbooks for Research Methodology for Electrical and Biomedical Engineering

Research Methodology: An Introduction for Science & Engineering Students

Author: Stuart Melville, Wayne Goddard

Publisher: Juta & Co Ltd **Paperback:** 167 pages

ISBN-13: 9780702135620 (978-0-7021-3562-0) **ISBN-10:** 0702135623 (0-7021-3562-3)

Introduction to Biomedical Engineering: an ... - John Denis Enderle, Joseph D Bronzino, ... - 2005 - 1141 pages

Essentials of Writing Biomedical Research Papers - Mimi Zeiger - 2000 - 470 pages

Topics covered

WEEKS

Description

Think big, think fast, think ahead and **Think Different**

- 1, 2 **Research Methodology in Electrical Engineering:**
- **Introduction to** research tools, such as Matlab,....**Big Data Analytics, Machine learning, Deep learning, CNN and Artificial Intelligence: This is called “The Sexiest Job of the 21st Century: Data Analyst” We will discuss it a lot.**
 - **Advice for** reading research papers, reviewing literature, collaborating students and professors, writing papers, writing a review, writing author responses/rebuttals, preparing for an oral presentation, preparing a poster, and writing a research proposal.
 - **How to evaluate** the Journal Quality and Academic Conference Quality.
- 3, 4 **Studies on Paper Review and Paper Writing based on IEEE Transactions Publication Requirements**
- Papers for IEEE Conference Series; Quality, Style and Format.
 - IEEE Transaction Paper requirement: Quality, Style and Format.
 - To study review criteria from IEEE Conferences.
 - To study review criteria from IEEE Transactions on Signal Processing
 - How to write a successful Paper to submit to IEEE Conferences.
 - How to write a successful Paper to submit to IEEE Transactions.
- 5, 6 **Research Methodology in Biomedical Engineering:**
- **Introduction to** biomedical research tools, such as pacemakers, heart-lung machines, dialysis machines, implants, artificial organs and imaging modalities,....
 - **Advice for** reading biomedical engineering research papers, reviewing biomedical engineering literature, collaborating biomedical students and physicians, writing papers related to biomedical engineering topics, writing author responses/rebuttals, preparing for an oral presentation, preparing a poster for biomedical engineering conferences, and writing a research proposal in NIH required format, DoD required format, ACS required format, NSF required format, and so on.
- 7, 8 **Studies on Paper Review and Paper Writing based on Biomedical**

Engineering Journals, such as Annals of Biomedical Engineering, Medical Physics, Academic Radiology and IEEE Transactions on Biomedical Engineering and on Medical Imaging: Publication Requirements

- Papers for Biomedical Engineering Conferences; Quality, Style and Format.
- Journals Paper requirement: Quality, Style and Format.
- To study review criteria from Biomedical Engineering Conferences.
- To study review criteria from different Journals on Biomedical Engineering.
- How to write a successful Paper to submit to Biomedical Engineering Conferences
- How to write a successful Paper to submit to Biomedical Engineering Journals.

9, 10

Studies on Proposal Review and Proposal Writing based on NSF, NIH and DoD Funding Requirements

- Proposals for NSF; Requirement, Quality, Style and Format.
- To study review criteria from NSF Proposals, such as Career Development Award.
- Proposals for NIH; Requirement, Quality, Style and Format.
- To study review criteria from NIH Proposal, such as RO3 and R21 Award.
- Proposals for DoD; Requirement, Quality, Style and Format.
- To study review criteria from DoD Proposal, such as Pre-doctoral Award.
- To study review criteria in common for different foundations.
- How to write a successful Proposal such as DoD Pre-doctoral Award.

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How to Succeed in Graduate School

- **Overview** Grad Schools in UTEP, USA and in the World.
- **Setting** your goal (long term and short term)
- **Choosing** a Research Project
- **Managing** your time balancing your course studies and project efforts
- **Starting to** do research and **finding** a right Advisor
- **Looking for** financial supports, Scholarship, TA, RA, Government grant, Endowment, Industry collaboration, and so on.

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Discuss How to Choose a Research Area

Decide which area(s) interested you, how to judge the classes in those areas, talk to students who work in those areas, go to as many (relevant) talks as possible, read a lot on the topics you are interested in, and down-select to a few faculty members --- learn about their projects and determine how you might fit in.

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Discuss How to find an "Idea" Advisor

To find an "Idea" Advisor with good fit and matching your interests: Read research summaries, published papers, go to talks, classes and get involved in ongoing research projects.

What you should expect from an idea Advisor is: **1).** How to build your dream and track your progress -- Help you to set and achieve realistic short and long goals. **2).** Provide references, pointers to people doing related research. **3).** Help you find (realistic, useful) research topics. **3).** Encourage your own interests, rather than promoting his/her own. **4).** Encourage you to publish and present your ideas publicly. **5).** Introduce you to people; get involved with the research community. **6).** help you find not only a job, but a career as well.

14 **Summary for students how to balance:**

- READING and THINKING
- SKETCHING OUT IDEAS
- COMMUNICATING COLLEAGUES/ADVISOR
- IMPLEMENTING/BUILDING SYSTEMS
- EMPIRICAL EVALUATION
- THEORETIC ANALYSIS
- WRITING
- SUCCEEDING A CAREER

15 **Summary**

- All work and no play
- Staying motivated
- Networking
- Publishing papers
- Preparing your thesis topic presentation, you should have a
 - a. 1 -minute,
 - b. 5 -minute, and
 - c. 15 -minute presentation,
- Useful experience for job interviews, valuable job skills for your whole life.

Grading & Evaluation

The course grade will be determined by paper writing assignment (30%), proposal writing assignment (40%), and Presentation assignment (30%).

Academic Integrity

The University of Texas at El Paso prides itself on its standards of academic excellence. In all matters of intellectual pursuit, UTEP faculty and students must strive to achieve based on the quality of the worked produced by the individual. In the classroom and in all other academic activities, students are expected to uphold the highest standards of academic integrity. Any form of scholastic dishonesty is an

affront to the pursuit of knowledge and jeopardizes the quality of the degree awarded to all graduates of UTEP. Any student who commits an act of scholastic dishonesty is subject to discipline. Scholastic dishonesty includes, but is not limited to, cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, any act designed to give unfair advantage to a student or the attempt to commit such acts. Proven violations of the detailed regulations, as printed in the Handbook of Operating Procedures (HOP) and available in the office of the Dean of Students, may result in sanctions ranging from disciplinary probation, to failing grades on the work in question, to failing grades in the course, to suspension or dismissal, among others.

Students with Disabilities

If you believe you may have a disability that requires accommodations, contact the Disabled Student Services Office at 747-5148, go to room 306 E. Union, or email: dss@utep.edu.

Student Responsibility

Individual students must operate with integrity in their dealings with faculty and other students; engage the learning materials with appropriate attention and dedication; maintain their engagement when challenged by difficult learning activities; contribute to the learning of others; and perform to standards set by the faculty

Policies & Procedures

1. The instructor reserves the right to change the class schedule as needed during the semester.
2. All students are expected to arrive in class prepared, i.e., assigned readings completed and homework ready to turn in for grading.
3. If there is a problem taking an exam at the assigned time, students **MUST** contact the instructor **PRIOR** to the day of the exam or **NO** make-up test will be allowed and the student will receive a zero for the missed exam.
4. **NO** projects and/or homework will be accepted after the due date and time.
5. Project and/or homework material left with the instructor at the end of the semester will be retained only four (4) weeks into the next semester, after which they will be destroyed.
6. There will be no make-ups for missed quizzes.
7. Cell phones, beepers and other electronic devices must be turned off during class.
8. Please see attached sheet on UTEP policy on academic dishonesty.

ATTENDANCE

You are expected to attend classes regularly and on time. You take full responsibility when you miss class or come to class late. If you miss class, it is your responsibility to find out about new assignments/exercises and pick up missed handouts.

EXAMINATION POLICIES:

The midterm and final exams will be essay and short answer. Both exams will be closed book, open notes, and you are required to do your own work on the exams. University policy states that missed exams receive a grade of 0. If you miss the midterm exam, the weight of the mid-term exam will be placed on the final. If you miss the final exam, you will receive a 0.