

## University of California Davis Directed Group Study: Research Methodology & Graduate Preparation in STEM

- **Course:** ENG 198
- **Units:** 2
- **LECTURE:** Monday 6:00 – 7:00pm PST, live-streamed remote instruction
- **Discussion:** Time TBD

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### Instructor

- **Dr. Tingrui Pan**  
Biomedical Engineering; UC Davis College of Engineering

### Description

This course provides an excellent opportunity to engage with UC Davis professors in the fields of Science, Technology, Engineering, and Math (STEM). You will be able to learn about their research projects as well as receive their expert advice on being a successful researcher and graduate school candidate. The course will foster the development of technical, communication, and critical thinking skills; all of which are important attributes that employers and graduate schools seek when evaluating new college graduates. But, the main focus of the course is on introducing you to the culture of science in academia and connecting you with leaders in the field. Topics and assignments are designed to help you develop confidence as a research scientist and scholar, write personal statements for applications, prepare for presentations, communicate your research, and network with faculty and other professionals in your field. In addition, site visits to UC Davis labs and facilities will be part of the educational program.

### Seminar Goals

In this seminar, students will:

1. Meet prestigious UC Davis faculty and learn about the research that they are doing
2. Learn about research and lab culture at an American Tier 1 research university
3. Learn how to prepare for international graduate schools and careers in scientific fields
4. Develop a knowledge of global issues and strategies to address them
5. Learn how to search and analyze research articles in their field
6. Develop effective science communication and writing skills

### Assignments

Activities and assignments in the course will include (1) Five journal reflections on course topics (of about 250 words per reflection), (2) Significant participation in a 10-minute, team presentation about research subject of your choice\* (teams will be composed of 3 – 4 members/team); (3) interviewing a graduate student or faculty in the student's scientific area of interest, and (4) writing a personal statement. We will also have short, periodic readings of about 5 pages per week. Keep in mind that, in accordance with the required workload for a 2-unit course, you are expected to do 4 hours of coursework outside of class per week.

\*Each presentation will be assessed based on the level of clarity, the quality of information, and the level of organization. Presentations will need to include information from course topics. Questions to be addressed in the presentation will include: What subject are you researching?; What does a brief literature review tell you about this subject?; What research question does this raise?; Why did you choose this subject?; How does this topic relate to you and your culture and how will you explain that in your personal statement?; How does this topic relate to the UN Sustainable Development Goals?; What professor is best suited to support you on this topic and how does this topic fit that professor's university's mission, structure, and resources?; What skills or resources will you need to be an effective researcher about this topic?

## Grading

Pass/No Pass. Attendance each week is expected. A grade of "pass" will be awarded to undergraduate students for work that would receive a grade of C– or better. Grading will be based on the following percentage breakdown: weekly attendance (20%), journal prompts/reflections (20%), quizzes (20%) personal statement (15%), and team presentation (25%)

## Instructor Bio

Dr. Pan's [Micro-Nano Innovations Laboratory \(MiNI Lab\)](#) researches a wide range of topics in cutting-edge bioengineering, including flexible electronics, wearable sensors, digital microfluidics and lab-on-a-chip devices. Dr. Pan is best known for inventing a new category of tactile/force sensors, known as Flexible Ion Tronic Sensing (FITS). Among all the flexible tactile sensors, the FITS device exhibits the highest reported device sensitivity and the largest signal-to-noise ratio, both essential to flexible sensing, by first introducing an angstrom-level supercapacitive interface. Its medical use has been extended to non-invasive hemodynamic monitoring, continuous tracking of compression therapy and tactile feedbacks for prosthetics.

## SCHEDULE (Tentative and Subject to Change)

Week	Lecture Topic <i>As large group All students must attend all</i>	Discussions <i>Groups of 15 Must attend all</i>	Activities <i>Preregister to attend Must attend 3 sessions</i>
1	Syllabus overview/research planning and what is research	discuss academic/career goals	
2	Research seminar – Professor of Biological Science	Scientific Writing: Writing a Personal Statement	picking a research topic
3	Lab visit	Cultural dimensions related to research	
4	Mentorship in the research environment – Tingrui Pan	UN Sustainable Development Goals related to campus procedures	Introduction to UCD Graduate Programs and grad panel
5	Research seminar – Professor of Engineering	what skills make a great researcher	

6	Lab culture: Lab Visit	talk about your interview with faculty	Science Presentation Skills
7	Research Seminar: Professor Biochemical and Molecular Medicine	Tour of campus (life at UC Davis)	
8	Research Seminar: Professor of Mechanical & Aerospace Engineering	discuss writing and applying for a fellowship	Guest faculty – experience as an international researcher/grad student
9	Scientific Conduct in a Collaborative Environment – Tingrui Pan	Group presentation prep	Fellowships, awards, scholarships, grants
10		Group Presentations	