MECA 380: MEASUREMENTS AND INSTRUMENTATION
FALL 2020

COURSE INFORMATION

Measurement of steady-state and dynamic phenomena using common laboratory instruments. Calibration of instruments, dynamic response of instruments, and statistical treatment of data. 2 hours discussion, 3 hours laboratory.

Prerequisites: EECE 211, EECE 211L; either CSCI 111 or MECH 208.

MEETING TIMES

DISCUSSION

- Section 1: MW 4-4:50PM, Online/Synchronous

Discussion sections will be held online and students will be expected to join meetings at the scheduled time to participate in discussion topics.

LAB

- Section 2: M 5-7:50PM, PLMS 112
- Section 3: W 5-7:50PM, PLMS 112
- Section 4: T 5-7:50PM, PLMS 112

Lab sections will be held on campus, students will be required to follow University COVID-19 safety protocols.

INSTRUCTOR

JEREMY A. FISHEL, PHD

- Email: jafishel@csuchico.edu
- Phone: (530) 898-5320 ***
- Office: O’Connell 416 ***
- Office Hours: Tuesday: 2-3PM, Friday: 10AM-Noon via zoom: https://csuchico.zoom.us/j/8629078218?pwd=bXpoV0Y3ZjR4bFFtMTFYTDNWjhBdz09

*** Due to University COVID-19 policies, I will have limited access to my office and phone this semester.

TEXTBOOK


5th and 6th edition are suitable alternatives.

You are welcome to use either the print version or the enhanced e-book version, which is available for purchase or rental from the publisher. If you decide to rent, it is recommended that you delay the start date of your rental until the first day of class.
SOFTWARE

Students will be required to bring a laptop with the below software to lab sections.

REQUIRED

- National Instruments LabVIEW 2015 or newer with NI-ELVISmx and NI-DAQmx drivers. It is recommended that students install the “NI ELVISmx Software Suite”. Please see course information for additional details.

RECOMMENDED

- Mathworks MATLAB
- Microsoft Excel

LEARNING PROCESS

STUDENT LEARNING OUTCOMES

Through this course, students are expected to acquire core knowledge in:

- Basic Concepts of Measurement
- Calibration Methods
- Application of Probability and Statistics to Measurement
- Measurement Errors and Uncertainty
- Basic Spectral Analysis
- Characterizing 1st and 2nd order systems
- Electrical Measurements
- Sampling and Data Acquisition
- Sources of Electrical Noise
- Aliasing and Sampling Considerations
- Fundamentals of Signal Conditioning
- Temperature Measurement
- Strain Measurement
- Common Sensors and Transducers

Upon successful completion of this course, students will be able to:

- Measure static and dynamic signals using common laboratory instruments
- Understand basics of calibration of instruments and statistical treatment of data
- Use a computer-controlled system to automate measurement process
- Conduct experiments, analyze and interpret data
- Write technical reports

COURSE TOPICS / APPROXIMATE SCHEDULE (SUBJECT TO CHANGE)

<table>
<thead>
<tr>
<th>WEEK</th>
<th>LECTURE SECTION / DISCUSSION TOPICS</th>
<th>LAB SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2</td>
<td>Course Overview, Basic Concepts of Measurement Methods, Sensors</td>
<td>LabVIEW Fundamentals</td>
</tr>
<tr>
<td>Date</td>
<td>Topic</td>
<td>Lab</td>
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</tr>
<tr>
<td>6-8</td>
<td>Strain Gages &amp; Installation, Wheatstone Bridge, Probability &amp; Statistics, Error Propagation, Normal Distribution, Sample Mean, Standard Deviation, Z-Test, SD of the Means, t-test, Uncertainty, Outliers, Loading Error. FINAL EXAM PROJECT PROPOSAL DUE, MIDTERM.</td>
<td>Static Strain Measurement Lab</td>
</tr>
<tr>
<td>FINALS</td>
<td>FINAL EXAM</td>
<td></td>
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</tbody>
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Please see academic calendar for holiday schedule.

**GRADING**

- 15% - Attendance, Conduct, and Participation
- 10% - Homework and Assignments
- 30% - Lab Reports (3 total)
- 15% - Midterm Exam
- 20% - Final Project
- 10% - Final Exam

**COURSE USAGE OF BLACKBOARD LEARN**

The course syllabus and other material will be posted on Blackboard Learn. You are responsible for regularly checking the online resources, which can be accessed through the Chico State Portal.

**ATTENDANCE AND CLASSROOM ETIQUETTE**

During class, please do not engage in any activities that are not related to the class (e.g. personal web surfing, online shopping, e-mail, texting, or social media).

Students will receive credit for active and engaged participation in the course. If you are unable to attend a class due to an emergency, please notify the instructor.

**DROPPING AND ADDING**

Students are responsible for understanding the policies and procedures about add/drops, academic renewal, etc., found in the CSU Chico University Catalog. You should be aware of the new deadlines and penalties for adding and dropping classes.

**SPECIAL NOTES AND INFORMATION RELATING TO CORONAVIRUS/COVID-19**

Students are encouraged to regularly consult the university website for the latest information and policies here: [https://www.csuchico.edu/coronavirus/](https://www.csuchico.edu/coronavirus/)

**COVID-19 FACE MASK REQUIREMENT (TEXT PROVIDED BY THE UNIVERSITY)**

In compliance with the California Department of Public Health state mandate, Chico State requires that all students, staff, and faculty, wear a face covering in all indoor spaces on campus, including classrooms, labs, studios, and offices, and outside when physical distancing is not possible. Accordingly, all students are required to wear a face...
mask covering the nose and mouth in order to participate in this course. Failure to comply with this requirement will result in a referral to Student Conduct, Rights, and Responsibilities and disciplinary action being taken against you by the University.

Individuals unable to wear a face covering due to a medical condition should contact the Accessibility Resource Center by phone at (530) 898-5959 or by email at arcedpt@csuchico.edu.

For more information about the state mandate, please visit the Chico State COVID-19 News & Information page.

**ADDITIONAL SAFETY GUIDANCE FOR OUR LAB SECTIONS**

Due to the importance of hands-on training relating to this course content, the University has authorized our course lab sections to meet in person. Safety protocols will be strictly enforced, which will include wearing face masks at all times inside the lab, and maintaining physical distancing of at least six feet. Additional safety protocols will be discussed at the first lab section meeting. If you are unable or unwilling to meet these requirements, you must notify me immediately and we will make arrangements for you to participate in these labs remotely.

**IF YOU FEEL SICK, HAVE BEEN AT RISK OF EXPOSURE, OR HAVE ANY OTHER CONCERNS REGARDING COVID-19**

Please notify me immediately and do not come to campus if any of the following apply to you:

- You have tested positive for COVID-19 or are being tested for COVID-19.
- You have been exposed to someone who has either tested positive or has been at risk of exposure to COVID-19.
- You have any other concerns whatsoever regarding COVID-19 and your participation in class.

You are not required to tell me which of the above reasons apply to you or any other health or personal information you wish to keep private. You can simply tell me that you will not be coming to campus due to COVID-19 related concerns. If you have received a positive COVID-19 test result, you should notify the Campus COVID Hotline at 530-898-2222 who is implementing contact tracing and taking measures to keep our campus safe. If you do choose to tell me that you have received a positive result, I am required to notify the Campus COVID Hotline.

I have designed the lab assignments to accommodate occasional absences and groups to collaborate remotely for any reasons above to mitigate risk of exposure to fellow classmates. Please be respectful of the health of your colleagues and let’s all work together to keep the classroom safe. If you have any other questions, please feel free to email me or come to office hours.

**OTHER RESOURCES FOR STUDENTS**

Specific services for students related to coronavirus/COVID-19 can be found here: https://www.csuchico.edu/coronavirus/students.shtml, two notable resources to highlight include:

- **KEEP LEARNING WEBSITE** (https://www.csuchico.edu/keep-learning/index.shtml) with advice, tips, information, and resources for online learning from experienced distance learners. There is also a support team to answer any questions or provide guidance in using these tools.
- **IT SUPPORT SERVICES** (https://www.csuchico.edu/itss/) which offers comprehensive technology support, including laptop loans and virtual technology assistance.
UNIVERSITY POLICIES AND CAMPUS RESOURCES

ACADEMIC INTEGRITY

Students are required to be familiar with the University’s Academic Integrity Policy. This requires a commitment, even in the face of adversity, to the fundamental values of: honesty, trust, fairness, respect, and responsibility. Strength in these values will pay dividends in your professional development and personal life. There will be zero tolerance for cheating, unauthorized collaboration, or plagiarism.

STUDENT LEARNING CENTER

The mission of the Student Learning Center (SLC) is to provide services that will assist CSU, Chico students to become independent learners. The SLC prepares and supports students in their college course work by offering a variety of programs and resources to meet student needs. The SLC facilitates the academic transition and retention of students from high schools and community colleges by providing study strategy information, content subject tutoring, and supplemental instruction. You can also visit the student learning website here: https://www.csuchico.edu/slc/

AMERICAN WITH DISABILITIES ACT

If you need course adaptations or accommodations because of a disability or chronic illness, or if you need to make special arrangements in case the building must be evacuated, please make an appointment with me as soon as possible, or see me during office hours. Please also contact Accessibility Resource Center (ARC) as they are the designated department responsible for approving and coordinating reasonable accommodations and services for students with disabilities. ARC will help you understand your rights and responsibilities under the Americans with Disabilities Act and provide you further assistance with requesting and arranging accommodations.

Accessibility Resource Center -- Website: http://www.csuchico.edu/arc, phone: 530-898-5959, address: Student Services Center 170, email: arcdept@csuchico.edu

A NOTE ON EQUITY, DIVERSITY, AND INCLUSION

It is important to me that this course is accessible to each and every one of you. If there is any reason why the format of the course creates difficulties, please find time to talk with me. This includes those that have a physical or learning disability, those who have other emotional or physiological challenges, those of you who have past experiences that make college attendance or class context anxiety producing, those of you whose parents did not go to college (and may not understand the system as well), those of you who feel you can’t actively participate, those of you who have more responsibility than the typical college student (such as dependent parents, children, or an especially heavy workload outside of school), those of you with financial hardships, and any other situations that I cannot anticipate. My objective in this course is to assess your ability to learn and apply knowledge related to the subject matter and this should never be influenced by anything other than your own talents and efforts. The earlier you come and see me, the more I can do to try to work with you to alleviate the unique disadvantages you might face. I would prefer that you come to speak with me in the first two weeks.