Class time and location:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Time</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>MECA 380-01-(3059)</td>
<td>Mo Fr 09:00 AM – 09:50 AM</td>
<td>OCNL 254</td>
</tr>
<tr>
<td>MECA 380-02-(3060)</td>
<td>Mo Fr 01:00 PM – 01:50 PM</td>
<td>Glenn 212</td>
</tr>
<tr>
<td>MECA 380-Lab</td>
<td>TBD (Dr. Watkins)</td>
<td>PLMS 112</td>
</tr>
<tr>
<td>MECA 380-Lab</td>
<td>TBD (Dr. Watkins)</td>
<td>PLMS 112</td>
</tr>
</tbody>
</table>

Discussions:
Instructor: H. Sinan Bank, hsbank@mail.csuchico.edu, 530-898-4619
Office: Zoom
Office Hrs.: Tu Th 2:00 pm– 4:00 pm

Lab Sessions:
Instructor on Record: Greg Watkins, gkwatkins@csuchico.edu
Instructional Student Assistants (ISAs):
Shelby Bartlett, srbartlett@mail.csuchico.edu
Mitchel Cabral, mcabral5@mail.csuchico.edu
Nate Hilal, nhilal@mail.csuchico.edu
Cat De Vito, cdevito@mail.csuchico.edu

Prerequisites: EECE 211/211L (Linear Circuits) plus, one of the following: CSCI 111 (Programming and Algorithms), MECH 208 (Introduction to Technical Computing), or AMAR 300 (Applied Mathematics and Programming for Advanced Manufacturing).

Course Usage of Blackboard Learn:
The course syllabus and other material will be posted on Blackboard Learn. You are responsible for regularly checking the on-line resources, which is accessed through the Chico State Portal.
We will also use a course webpage to show off some of the details for the class publicly.

Course Objectives:
After completion of this course, students will be able to:
• Measure resistance, temperature, acoustic, strain and other measurements using common laboratory and data acquisition instruments, including development of virtual instruments in LabVIEW.
• Analyze characteristics of, design, and calibrate measurement systems consisting of sensors, transducers, signal conditioning, data acquisition, and output stages.
• Conduct experiments implementing methods to reduce errors from noise and interference, apply statistical treatment, analyze, and interpret data.
• Apply signal conditioning techniques to improve measurement quality focusing on excitation signals, amplification/attenuation, buffering, filtering, linearization, scaling, and additional application-specific methods.
• Evaluate signals in the frequency domain, including optimization of sampling frequencies to avoid aliasing and other measurement errors.
• Gain understanding of common noise and mitigation strategies to reduce measurement errors from common sources intrinsic and extrinsic noise.
• Calculate instrument uncertainty and apply strategies to design instruments with sufficient accuracy for any given application.
• Write convincing technical reports and instrument specification sheets.
Core Knowledge Development
• Basic Concepts of Measurement and Measurement Instruments
• Sensors and Characteristics of Sensors
• Calibration Errors and Methods to Minimize
• Experiment Design
• Temperature Measurements
• LabVIEW Fundamentals
• Application of Probability and Statistics to Measurement
• Regression, Correlation and Causation, and Correlation Coefficients
• Characterizing 1st and 2nd Order Systems
• Electrical Measurements and Basic Lab Instrumentation
• Signal Conditioning Fundamentals
• Filtering Methods
• Scaling and Linearization
• Frequency Domain and Basic Spectral Analysis
• Aliasing and Sampling Considerations
• Analog-to-Digital and Digital-to-Analog Conversions
• Strain Measurements
• Sources of Electrical Noise & Mitigation Strategies
• Determining Instrument Uncertainty

Equipment/ Textbook/ Additional Resources

Computer and Software (Required)
You are required to have a PC-based laptop capable of running LabVIEW’s NI ELVIS Mx Software Suite 2019 (a student software license will be provided to you for the duration of this course). You will need to bring your laptop to all lab sections. MATLAB and/or Excel are also highly recommended software for this course.

Course Textbook (Required)
Recommended book for electronics (Optional)

Exams:
There will be take home exams. Each successive exam may include prior course material.

Assignments and Grading Policies

<table>
<thead>
<tr>
<th>Assignments</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exams*</td>
<td>30 %</td>
</tr>
<tr>
<td>Participation/Assignments/ Quizzes**</td>
<td>15 %</td>
</tr>
<tr>
<td>(Group) Project</td>
<td>25 %</td>
</tr>
<tr>
<td>Lab Reports</td>
<td>30 %</td>
</tr>
</tbody>
</table>

* There will be online exams. Each successive exam may include prior course material.
Participation Credit
The participation credit relates to the following pointers:
- The constructive (+ point) or non-constructive (- points) behavior in the class to improve the learning outcome of everyone,
- The addressed relevant questions during the class,
- Your answers to the questions during the class session,
- The outcome of quizzes,
- Outstanding final project delivery which positively affects the future semesters of the class,
as many points as you check in the list above, you will guarantee higher points.

Late Assignments
Late assignments will lose 20% of the full credit for each day they are late. Always upload any assignments as indicated and make sure they are submitted properly to avoid late penalties due to submission errors.

Generic Rubric

<table>
<thead>
<tr>
<th>Expert</th>
<th>Proficient</th>
<th>Apprentice</th>
<th>Novice</th>
</tr>
</thead>
<tbody>
<tr>
<td>A+</td>
<td>A</td>
<td>A</td>
<td>A-</td>
</tr>
</tbody>
</table>

- **Technical Content (Equations, Numerical Usage, and Illustrations)**
  - All equations are clear, accurate, and labeled. All variables are defined and units specified. Discussion regarding the equation development and use has been stated.
  - All figures, graphs, charts, and drawings are accurate, consistent with the text, and of good quality. They enhance understanding of the text.
  - All items are labeled in accordance with engineering standards and are referred to in the text.

- **Visual Format and Organization**
  - The document is visually appealing and easily navigated.
  - Appropriate typography and usage of white space are used as appropriate to separate blocks of text and add emphasis.
  - The document is organized.
  - Use of white space and typography help the reader navigate the document, although the layout could be more effective.

- **Language (Word Choice, Grammar)**
  - Sentences are complete and grammatical. They flow together easily.
  - Words are chosen for their precise meaning.
  - Engineering terms and jargon are used correctly.
  - No misspelled words are present.
  - For the most part, sentences are complete and grammatical, and they flow together easily. Any errors are minor and do not distract the reader.
  - Repetition of words and phrases is mostly avoided.
  - For the most part, terms and jargon are used correctly with some attempt to define them.
  - There are one or two misspelled words.

- **Use of appendices**
  - Information is placed appropriately either in the main text or as an appendix.
  - Appendices are documented and referenced in the text.
  - Appendices are used when appropriate.
  - Selection and/or extent of material in appendix may not be optimal.

- **Outstanding final project delivery which positively affects the future semesters of the class,**
as many points as you check in the list above, you will guarantee higher points.

**Late Assignments**
Late assignments will lose 20% of the full credit for each day they are late. Always upload any assignments as indicated and make sure they are submitted properly to avoid late penalties due to submission errors.

**Generic Rubric**

- All of the exams will be online (most probably from Friday evening until Sunday midnight), and the students will have 48 hours+ to upload their solutions to provided Google Form. Late uploads of the exams will NOT be accepted.
- Please be aware that you MUST use your student email address (student_email_id@mail.csuchico.edu) and make sure that you logged out from other Gmail addresses while using the resources from Google Drive.
You will also receive an email regarding a shared folder Fall_2021_MECA_482_student_email_id where I will share with you any documents (e.g., exam or HW results). You need to use the name of the folder with the suffix of the assignment dedicated to you to upload your work.

**Topics/ Tentative Schedule** (Please note that the topics are subject to change with a fair notification.)

<table>
<thead>
<tr>
<th>Week Starting</th>
<th>Reading</th>
<th>Monday Discussion</th>
<th>Lab</th>
<th>Friday Discussion</th>
<th>Assignments Due</th>
<th>Assignments Due</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/23/2022</td>
<td>Class Introduction</td>
<td>LabVIEW Introduction</td>
<td>LabVIEW</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1/30/2022</td>
<td>Ch. 1</td>
<td>Sensors &amp; Calibration</td>
<td>LabVIEW Programming Exercise</td>
<td>Errors and Experiment Design</td>
<td>Sensors List</td>
<td></td>
</tr>
<tr>
<td>2/6/2022</td>
<td>Ch. 8</td>
<td>Thermal Measurement</td>
<td>Thermistor Lab (Verification)</td>
<td>Thermal Meas. (cont.)</td>
<td>LabVIEW Programming</td>
<td></td>
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<tr>
<td>2/13/2022</td>
<td>Ch. 4</td>
<td>Probability &amp; Statistics</td>
<td>Thermistor Lab (Calibration)</td>
<td>Regression</td>
<td></td>
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</tr>
<tr>
<td>2/20/2022</td>
<td>Ch. 3.1-3.3</td>
<td>System Order</td>
<td>Thermistor Lab (Implementation)</td>
<td>Exam Prep</td>
<td>Sensor Report</td>
<td></td>
</tr>
<tr>
<td>2/27/2022</td>
<td>Exam I</td>
<td></td>
<td>Thermistor Lab (Extra Week)</td>
<td>Signal Conditioning Intro</td>
<td></td>
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</tr>
<tr>
<td>3/6/2022</td>
<td>Ch. 6.8</td>
<td>Filters</td>
<td>Filters Mini-Lab</td>
<td>Active Filters, Equipment</td>
<td>Thermistor Lab</td>
<td></td>
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<tr>
<td>3/13/2022</td>
<td>Spring Break, No Classes or Labs</td>
<td></td>
<td>Filters Mini-Lab</td>
<td></td>
<td></td>
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<tr>
<td>3/20/2022</td>
<td>Ch. 2, 7.1-7.7</td>
<td>Frequency Domain</td>
<td>Acoustics Mini-Lab</td>
<td>Sampling</td>
<td></td>
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<tr>
<td>3/27/2022</td>
<td>Analog to Digital Conversion</td>
<td>Cesar Chavez Day - No Labs</td>
<td>Scaling</td>
<td>Acoustics Mini-Lab</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4/3/2022</td>
<td>Ch. 6.5-6.7</td>
<td>Linearization</td>
<td>Linearization Lab</td>
<td>Analog to Digital Conversion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4/10/2022</td>
<td>Exam Prep</td>
<td>Linearization Lab</td>
<td>Exam II</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>4/17/2022</td>
<td>Ch. 11.1-11.6</td>
<td>Strain I</td>
<td>Strain Lab (Noise)</td>
<td>Strain II</td>
<td>Linearization Lab</td>
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<tr>
<td>4/24/2022</td>
<td>Ch. 6.9, 7.8</td>
<td>Strain III</td>
<td>Strain Lab (Implementation)</td>
<td>Noise &amp; Mitigation</td>
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<tr>
<td>5/1/2022</td>
<td>Ch. 5</td>
<td>Uncertainty / Accuracy</td>
<td>Strain Lab (Extra Week)</td>
<td>Uncertainty / Accuracy Pt. 2</td>
<td></td>
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<tr>
<td>5/8/2022</td>
<td>Dead Week / Review</td>
<td>Open - Make-Up Labs</td>
<td>Dead Week / Review</td>
<td>Final Project</td>
<td>Strain Lab</td>
<td></td>
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<tr>
<td>5/15/2022</td>
<td>FINALS WEEK</td>
<td></td>
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</tbody>
</table>

The students are **NOT** allowed to record any classes without permission by following rules and regulations.
The details of the Evaluation for the (Group) Projects:
The student(s) might complete the project individually or up to five students, and you will fill requested Google Spreadsheets (e.g., the description of the project and problem, team members, project milestone, etc.) that provided during the semester.
The project consists of the presentation and a concise documentation similar to provided examples on Blackboard. The overall evaluation criteria for the projects are as follows:
- Theoretical rigor (20%)
- Complexity of application (15%)
- Documentation and presentation (25%) - the presentations are limited to 5 mins
- Results and final implementation (40%)
- The vote from other groups/ group members - if the students give free points the instructor has the veto and change power for fairness. Your project is 20% of the total grade of the class. The groups can ask more questions during the office hours. Following the provided procedure will assist you to gain easier credits. From each percentage, the appropriateness of the content will result in the corresponding grade. For example, a documentation with a lot of typos and unstructured text will be graded poorly from the corresponding percentage 5 out of 25.

Irrespective the percentages above, incomplete projects will be evaluated by 60% of the total -in other words, starting from 60.

Projects should be extra work to support as pre- or post- learning activities. You don’t need to expect finishing the corresponding chapters to start working on the project. Hence, in your assignments there will be questions regarding the projects.

Dropping and Adding:
You 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.

Classroom Protocol:
Needlessly to highlight, during class, please do not engage in any activities that are not related to the class, i.e., personal web surfing, online shopping, e-mail, Facebook, LinkedIn, Snap Chat, Kik, etc.

University Policies and Campus Resources
Academic Integrity
Students are expected to be familiar with the University’s Academic Integrity Policy. Your own commitment to learning, as evidenced by your enrollment at California State University, Chico, and the University’s Academic Integrity Policy requires you to be honest in all your academic course work. Faculty members are required to report all infractions to the Office of Student Judicial Affairs (Office of Student Conduct, Rights & Responsibilities). The policy on academic integrity and other resources related to student conduct can be found on the Student Judicial Affairs (Office of Student Conduct, Rights & Responsibilities) web site.

Student Services
Student services are designed to assist students in the development of their full academic potential and to motivate them to become self-directed learners. Students can find support for services such as skills assessment, individual or group tutorials, subject advising, learning assistance, summer academic preparation and basic skills development. Student services information can be found on the current students’ page of the CSU Chico web site.
Americans 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
530-898-5959, Student Services Center 170, arcdept@csuchico.edu

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. The University Writing Center has been combined with the Student Learning Center. You can also visit the Student Learning Center web site.

COVID–19 Vaccination and Face Mask Requirements
In compliance with the California Department of Public Health state mandate and the CSU System COVID–19 Vaccination Interim Policy, vaccinations against COVID–19 are required for students, faculty, and staff to access campus facilities and participate in in–person learning and activities. The CSU System requires booster shots for the Spring 2022 semester.

Chico State requires everyone on campus to wear an approved face covering in all indoor campus spaces. Accordingly, all students are required to wear a face mask covering the nose and mouth in order to participate in this course. Policies and requirements regarding COVID–19 are subject to change pursuant to campus, local, state and/or federal guidelines. Please note that dishonesty relating to the vaccination policy and/or your failure to comply with any other COVID–19 related safety policy or mandate, including the face covering requirement, may result in disciplinary action against you through our campus office of Student Conduct, Rights, and Responsibilities, which can include suspension or expulsion from the California State University system. Failure to comply with this requirement will result in a referral to our campus Student Conduct, Rights, and Responsibilities office and disciplinary action being taken against you by the University.

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

For more information about COVID–19 mandates, see the Chico State COVID-19 News & Information page.

Note: Students who require online instruction need to inform the instructor within the first week of classes. The instructor will try to accommodate such requests on a case–by–case basis.