Course Description:
Experimental measurement of electromechanical systems, sensors for measuring strain, force, pressure, displacement, acceleration and temperature will be introduced, as well as data acquisition and signal processing techniques. Student teams will design, analyze and document an experimental procedure. All procedures will result in a professional quality laboratory report. Prerequisite: ENGR 2401 or PHYS 2401

Prerequisites: MATH 3330

Co-Requisites: None

Credits: 1 Hour (Lecture: 0 Hours, Laboratory: 1 Hour)

Instructor: Christopher J. Aul


Supplemental Materials: None

Topics Covered:
Basic concepts in heat transfer, introductory analysis for conduction, 1D and 2D steady-state heat conduction, transient heat conduction, introductory analysis for heat convection, external and internal flow heat convection, natural heat convection, heat exchangers, introductory analysis for radiation heat transfer.

Course Learning Outcomes
By the end of the course, a successful student will be able to:
1. Work as an effective teammate. (SO-5)
2. Write a comprehensive technical report on engineering subject matter. (SO-3)
3. Research independently on engineering measurement methods using external resources. (SO-7)
4. Develop an engineering test plan. (SO-6)

Understand and apply experimentation methods for the following subject areas:
5. Stress and strain relationship. (SO-6)
8. Strain measurement. (SO-6)
9. Pressure measurement. (SO-6)
10. Fluid mechanics. (SO-6)

Student Outcomes
Graduates of the program will show:
1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3. an ability to communicate effectively with a range of audiences
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
Course Outline

Engineering 4145 – Fall 2023
Mechanical Engineering Lab 1
Department of Physics, Engineering, and Astronomy; Stephen F. Austin State University

Instructor: Christopher J. Aul, PhD
Email: aulcj@sfasu.edu
Office: Cole STEM Building, 207D
Phone: 936-468-1512

Student Hours: Mon Wed & Thur: 12-1pm, Tues: 12-2pm, or by appointment
Class Meetings: MW 3:45pm, STEM 306 in-person only
Course Home Page: http://d2l.sfasu.edu

Course Description
Experimental measurement of electromechanical systems, sensors for measuring strain, force, pressure, displacement, acceleration and temperature will be introduced, as well as data acquisition and signal processing techniques. Student teams will design, analyze and document an experimental procedure. All procedures will result in a professional quality laboratory report. Prerequisite: ENGR 2401 or PHYS 2401

Text and Materials
Recommended:
Theory and Design for Mechanical Measurements
Figliola and Beasley, Wiley, 7th Edition

Other materials will be provided to the student in the class

Grading Policy

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lab Reports</td>
<td>70%</td>
</tr>
<tr>
<td>In-Class Activities</td>
<td>15%</td>
</tr>
<tr>
<td>Lecture Quizzes</td>
<td>15%</td>
</tr>
</tbody>
</table>

Letter grades are based on the following ranges:

A  90.0 – 100%  B  80.0 - 89.9%  C  70.0 - 79.9%  D  60.0 - 69.9%  F  < 60.0%

Attendance Policy
Attendance will be taken at the beginning of class by instructor. If you have 3 unexcused absences then your final grade will be reduced one letter grade. If you have 4 unexcused absences, you will receive an “F” in the course. A written and signed notice is required for an excused absence within three class days of the absence. Instructor checks for attendance at the beginning of class according to the official NIST US CST time: http://www.time.gov/. Failure to show up to class on time results in a tardy (which can be excused if you show excuse for your tardy to instructor that day). Accruing 2 tardy marks results in an unexcused absence.

Students who miss class without approval of their instructor will receive a grade of zero on the missed assignment. Authorized absences must be approved by your instructor in advance of the absence, unless you have an emergency or illness. Make-up work must be completed outside of normal class hours within one week following an excused absence. It is your responsibility to see the instructor to make arrangements for make-up work if you have an excused absence.
Course Requirements

This class assumes that you will be spending at least 2 hours per week outside of course time working on course material. A required 150 minutes of asynchronous material will be covered using course lectures and a course project.

Laboratory Reports
There will be multiple laboratories throughout the entirety of the semester. Each laboratory will require a submitted lab report approximately two weeks after the student completes the lab. There will be a posted rubric for the laboratory report and a grade will be determined from the assessed rubric. As per the attendance policy any missed work as a result of an unexcused absence will result in a zero for that laboratory. In general, the laboratory itself will be completed along with a team but each student is responsible for their own report. The grades for all laboratory reports will be averaged together for the final grade in the class. Please see the course calendar for tentative dates for each of the laboratories.

In-Class Activities
All in-class assignments must be completed by the end of the class period. This may include working out example or homework problems. Grading of these activities will be at the discretion of the instructor and objectives will be made known to the student within the class time. Missed activities due to an unexcused absence will receive a zero. The grade for these assignments and participation will be averaged together to give your final grade. It is the discretion of the instructor to grant additional time if deemed necessary.

Lecture Quizzes
It is imperative that you take notes and study for this course. There will be a series of lecture quizzes posted on D2L covering material discussed in class. The due dates for these quizzes will be communicated to the student in class and on D2L. The grades for these quizzes will be averaged together to give your final grade.

Email Communication
All official course communication will be made using your SFA email account. You must use your SFA email account for all communications. You will be notified via your SFA email account about grades and attendance. You can look up your SFA email account or setup email forwarding using this link: http://www.sfasu.edu/mysfa/o365/forwarding-email/

It is important to practice good email communications in college courses. Use "ENGR 4145" in the subject of your email messages. Use complete sentences and capitalization when appropriate. The body of your email messages should begin with your instructor's name and end with your name. The following is required as per policy:

Academic Integrity (4.1)
The Code of Student Conduct and Academic Integrity outlines the prohibited conduct by any student enrolled in a course at SFA. It is the responsibility of all members of all faculty, staff, and students to adhere to and uphold this policy.

Articles IV, VI, and VII of the new Code of Student Conduct and Academic Integrity outline the violations and procedures concerning academic conduct, including cheating, plagiarism, collusion, and misrepresentation. Cheating includes, but is not limited to: (1) Copying from the test paper (or other assignment) of another student, (2) Possession and/or use during a test of materials that are not authorized by the person giving the test, (3) Using, obtaining, or attempting to obtain by any means the whole or any part of a non-administered test, test key, homework solution, or computer program, or using a test that has been administered in prior classes or semesters without permission of the Faculty member, (4) Substituting for another person, or permitting another person to substitute for one's self, to take a test, (5) Falsifying research data, laboratory reports, and/or other records or academic work offered for credit, (6) Using any sort of unauthorized resources or technology in completion of educational activities.

Plagiarism is the appropriation of material that is attributable in whole or in part to another source or the use of one’s own previous work in another context without citing that it was used previously, without any indication of the original source, including words, ideas, illustrations, structure, computer code, and other expression or media, and presenting that material as one’s own academic work being offered for credit or in conjunction with a program course or degree requirements.
Collusion is the unauthorized collaboration with another person in preparing academic assignments offered for credit or collaboration with another person to commit a violation of any provision of the rules on academic dishonesty, including disclosing and/or distributing the contents of an exam.

Misrepresentation is providing false grades or résumés; providing false or misleading information in an effort to receive a postponement or an extension on a test, quiz, or other assignment for the purpose of obtaining an academic or financial benefit for oneself or another individual or to injure another student academically or financially.

**Withheld Grades Semester Grades Policy (5.5)**
Ordinarily, at the discretion of the instructor of record and with the approval of the academic chair/director, a grade of WH will be assigned only if the student cannot complete the coursework because of unavoidable circumstances. Students must complete the work within one calendar year from the end of the semester in which they receive a WH, or the grade automatically becomes an F. If students register for the same course in future terms the WH will automatically become an F and will be counted as a repeated course to compute the grade point average. For additional information, go to [https://www.sfasu.edu/policies/course-grades-5.5.pdf](https://www.sfasu.edu/policies/course-grades-5.5.pdf).

**Students with Disabilities**
To obtain disability-related accommodations, alternate formats, and/or auxiliary aids, students with disabilities must contact the Office of Disability Services (ODS), Human Services Building, and Room 325, 468-3004 / 468-1004 (TDD) as early as possible in the semester. Once verified, ODS will notify the course instructor and outline the accommodation and/or auxiliary aids to be provided. Failure to request services promptly may delay your accommodations. For additional information, go to [http://www.sfasu.edu/disabilityservices/](http://www.sfasu.edu/disabilityservices/).

**Student Wellness and Well-Being**
SFA values students’ overall well-being, mental health and the role it plays in academic and overall student success. Students may experience stressors that can impact both their academic experience and their personal well-being. These may include academic pressure and challenges associated with relationships, emotional well-being, alcohol and other drugs, identities, finances, etc.

If you are experiencing concerns, seeking help, SFA provides a variety of resources to support students’ mental health and wellness. Many of these resources are free, and all of them are confidential.

**On-campus Resources:**

**The Dean of Students Office** (Rusk Building, 3rd floor lobby)
[www.sfasu.edu/deanofstudents](http://www.sfasu.edu/deanofstudents)
936.468.7249
dos@sfasu.edu

**SFA Human Services Counseling Clinic** Human Services, Room 202
[www.sfasu.edu/humanservices/139.asp](http://www.sfasu.edu/humanservices/139.asp)
936.468.1041

**The Health and Wellness Hub** “The Hub”
Location: corner of E. College and Raguet St.

To support the health and well-being of every Lumberjack, the Health and Wellness Hub offers comprehensive services that treat the whole person – mind, body and spirit. Services include:

- Health Services
- Counseling Services
- Student Outreach and Support
- Food Pantry
- Wellness Coaching
- Alcohol and Other Drug Education

[www.sfasu.edu/thehub](http://www.sfasu.edu/thehub)
936.468.4008
thehub@sfasu.edu

**Crisis Resources:**
- Burke 24-hour crisis line: 1.800.392.8343
- National Suicide Crisis Prevention: 9-8-8
- Suicide Prevention Lifeline: 1.800.273.TALK (8255)
- johCrisis Text Line: Text HELLO to 741-741
# ENGR 4145 – Mechanical Engineering Lab 1 Class Schedule

Course schedule is *tentative* and subject to change depending on pace of the class.

<table>
<thead>
<tr>
<th>Week</th>
<th>Date (Monday)</th>
<th>Topic</th>
<th>Lab</th>
<th>Chapter</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8/28/2023</td>
<td>Introduction and technical report writing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>9/4/2023</td>
<td>Measurement methods, test plans, error</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>9/11/2023</td>
<td>Units, standards and codes, significant digits</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>9/18/2023</td>
<td>Characteristics of signals</td>
<td>2</td>
<td>2</td>
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<tr>
<td>5</td>
<td>9/25/2023</td>
<td>Probability and statistics</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>10/2/2023</td>
<td>Error in engineering measurements</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>7</td>
<td>10/9/2023</td>
<td>Uncertainty</td>
<td></td>
<td>5</td>
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<tr>
<td>8</td>
<td>10/16/2023</td>
<td>Analog electrical devices and measurements</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>9</td>
<td>10/23/2023</td>
<td>Data Acquisition</td>
<td></td>
<td>7</td>
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<tr>
<td>10</td>
<td>10/30/2023</td>
<td>Measurement systems: Temperature</td>
<td>5</td>
<td>8</td>
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<tr>
<td>11</td>
<td>11/6/2023</td>
<td>Measurement systems: Pressure and velocity</td>
<td></td>
<td>9</td>
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<tr>
<td>12</td>
<td>11/13/2023</td>
<td>Measurement systems: Flow</td>
<td>6</td>
<td>10</td>
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<tr>
<td></td>
<td>11/20/2023</td>
<td>Thanksgiving Break</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>11/27/2023</td>
<td>Measurement systems: Strain</td>
<td></td>
<td>11</td>
</tr>
<tr>
<td>14</td>
<td>12/4/2023</td>
<td>Measurement methods review</td>
<td></td>
<td></td>
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