ECE 530-1 ENGINEERING DATA ACQUISITION

Instructor: Dr. Hassan Zargarzadeh  
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Office Phone: 453-7025

Credits and contact hours: 3 credits, three 50-minute sessions per week  
Office Hours: M to F; 09:45am-11:00am; or by appointment  
Lecture: Applied Sciences & Arts 0014B; MWF, 3:00 – 3:50 pm  
Help Section: TBA  
Graduate Assistant: TBA  
Prerequisites: Electrical Circuits and Programming Skills

1- Course Description

Widespread need continues across aerospace, biomedical, commercial, and federal domains for the systematic design of instrumented processes aided by advanced decision-and-control methodologies. Realizations have evolved beneficially incorporating defined accuracy data with process automation designs that enable effective attainment of system goals with nominal variability. In this course, real-world applications are accordingly covered, illustrated by a dozen case studies performed for technology enterprises, including the Air Force Materials and Manufacturing Directorate, General Electric Aviation, General Motors Technical Center, Goodyear Tire & Rubber, U.S. Environmental Protection Agency, and Wheeling-Pittsburgh Steel.

2- Course Goals

1. To expose students to the data acquisition systems field with emphasis on principle and applications.
2. To understand the traditional and modern sensors and instrumentation for engineering applications.
3. To cover topics related to sampled data acquisition systems, transducer and sensors, amplifier and signal processing, design of filters, and basic error considerations in a data acquisition system.

3- Recommended Textbook:


Other References:

Test and Measurement: Know It All, by Jon Wilson, Walt Kester, etc., Elsevier, 2009 (ISBN: 978-1-85617-530-2)  

1 Subject to change at the instructor’s discretion. Students are responsible for announcements made in class and/or on D2L.
4- Instructional Objectives

- Understand the general concepts and applications of data acquisition systems.
- Understand basic principles of different sensors and transducers.
- Understand the concepts of amplification and data conditioning.
- Use computer programming to analyze data and simulate basic data acquisition systems.

5- Course Topics

- Thermal, Mechanical, Quantum, and Analytical Sensors
- Instrumentation Amplifiers and Parameter Errors
- Filters for Measurement Signals
- Signal Conditioning Design and Instrumentation Errors
- Data Conversion Devices and Parameters
- Sampled Data and Reconstruction with Intersample Error
- Instrumentation Analysis Suite, Error Propagation, Sensor Fusion, and Interfaces
- Instrumented Processes Decision and Control
- Process Automation Applications

6- Grading

Grades will be computed based on the following:

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<thead>
<tr>
<th>Important Information</th>
<th>Max. Grades</th>
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<tbody>
<tr>
<td>Exam 1</td>
<td>17%</td>
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<tr>
<td>Exam 2</td>
<td>17%</td>
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<tr>
<td>Homework</td>
<td>25%</td>
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<td>Projects</td>
<td>36%</td>
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<td>Attendance</td>
<td>05%</td>
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7- Classroom and Exams Policies:

A. Attendance Policy: Attendance will be taken at random throughout the semester, and it will be counted toward the final grade. Students are responsible for all announcements made in class and/or posted to D2L.

B. Late Homework/Missed Exams: Late homework will be accepted under certain conditions. If an exam is missed for a legitimate reason, a grade will be assigned based on the student’s remaining homework/exams.

C. Mobile Technology Policy: All devices in a student’s possession should be set so that they will not cause a disturbance within the classroom. During an exam or quiz, students may not use any device with communication abilities.