

ECE 4320/6320: Instrumentation

Objective

ECE 4320/6320 will cover the science and technology of modern instruments especially focusing on the sensors/transducers involved and their operating principles

Instructor:

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Class time: 2.00 pm – 3.15 pm (TTh)

Office Hours: 3.30pm – 4.30 pm (TTh); also by appointment.

Prerequisites:

Preq: ECE 321. *Coreq:* MTHSC 311 or 434

Course Outline:

- Fundamentals of sensors/transducers and sensing methodologies
- Physical sensors (flow, pressure, temperature, strain, charge, electric and magnetic field, humidity)
- Chemical sensors (toxic gases and vapors, explosives, etc.)
- Biomedical sensors (including glucose, pH, blood oxygen, and other physiological parameters)
- Micro and nanoscale sensors (including sensors based on nanowires, nanotubes, graphene, and micro/nanoelectromechanical systems)
- Sensors for IoT applications

Required Textbook:

No fixed text book, materials mostly based on class notes and the reference textbook given below.

References:

- Handbook of Modern Sensors: Jacob Fraden, Fourth Edition, Springer. ISBN: 978-1-4419-6465-6

Grading:

Graduate students: G and Undergraduate students: UG

Assignments: 15%

Quizzes: 10% (UG: Best 2 of 4 will be considered; G: All 4 will be considered)

Midterm: 25%

Final exam: 25%

Project: 25% (UG: Project report 5 pages; G: Project report 10 pages)

Grading scale (UG):

A: [90-100] B: [80-89] C: [70-79] D: [60-69] F: [0-59]

Grading scale (G):

A: [90-100] B: [80-89] C: [70-79] D: [60-69] F: [0-59]

Policies

- **Attendance Policy:** Regular attendance and participation in the class is strongly encouraged. If you cannot attend the class for some reason please notify me in advance. Also, if the instructor is more than 15 minutes late to class, students may leave. In case of inclement weather, all exams and due materials will be postponed till the next class.
- **Homework Policy:** All homework assignments are due in class in paper form on the submission due date. Electronic submission may be permissible with my advance approval. Homework submitted the day after will have a 20% penalty. No homework will be accepted that are late by more than one day.
- **Exam policy:** All exams will be closed book, but you are allowed formula sheets (without any diagrams or circuits). Make-up exam are generally not permitted, except in emergency and with my prior approval.
- **Collaboration:** You are required to do the homework assignments by yourself. Anyone found copying or using another person's work will be dealt with under Clemson's policy on academic dishonesty. However, students are encouraged to discuss the materials covered in class, even those pertaining to homework assignments, but the homework problems/questions must be solved/answered by each student on his/her own.
- **Cheating:** For the purposes of this class, **cheating** is defined as:
 - Copying all or part of another student's homework
 - Allowing another student to copy all or part of your homework
 - Copying all or part of code found in a book, magazine, the internet, or other resource

Academic Integrity: As members of the Clemson University community, we have inherited Thomas Green Clemson's vision of this institution as a 'high seminary of learning.' Fundamental to this vision is a mutual commitment to truthfulness, honor, and responsibility, without which we cannot earn the trust and respect of others. Furthermore, we recognize that academic dishonesty detracts from the value of a Clemson degree. Therefore, we shall not tolerate lying, cheating, or stealing in any form. In instances where academic standards may have been compromised, Clemson University has a responsibility to respond appropriately and expeditiously to charges of violations of academic integrity.

Please refer to the graduate academic integrity policy, approved March 26, 2007 by the Provost's Advisory Council, at:

<http://gradspace.editme.com/AcademicGrievancePolicyandProcedures#integritypolicy>

Each student should read this policy annually to be apprised of this critical information.

Anti-Harassment and Non-Discrimination: Clemson University is committed to a policy of equal opportunity for all persons and does not discriminate on the basis of race, color, religion, sex, sexual orientation, gender, pregnancy, national origin, age, disability, veteran's status, genetic information or protected activity in employment, educational programs and activities, admissions and financial aid. This includes a prohibition against sexual harassment and sexual violence as mandated by Title IX of the Education Amendments of 1972. This policy is located at <http://www.clemson.edu/campus-life/campus->

[services/access/title-ix/](#). Ms. Alesia Smith is the Clemson University Title IX Coordinator, and the Executive Director of Equity Compliance. Her office is located at 110 Holtzendorff Hall, 864.656.3181 (voice) or 864.656.0899 (TDD).

Access Accommodations: Clemson University values the diversity of our student body as a strength and a critical component of our dynamic community. Students with disabilities or temporary injuries/conditions may require accommodations due to barriers in the structure of facilities, course design, technology used for curricular purposes, or other campus resources. Students who experience a barrier to full access to this class should let the professor know, and make an appointment to meet with a staff member in Student Accessibility Services as soon as possible. You can make an appointment by calling 864-656-6848, by emailing studentaccess@lists.clemson.edu, or by visiting Suite 239 in the Academic Success Center building. Appointments are strongly encouraged – drop-ins will be seen if possible, but there could be a significant wait due to scheduled appointments. Students who receive Academic Access Letters are strongly encouraged to request, obtain and present these to their professors as early in the semester as possible so that accommodations can be made in a timely manner. It is the student’s responsibility to follow this process each semester. You can access further information here: <https://www.clemson.edu/academics/studentaccess/index.html>.

Emergency Procedures: Emergency procedures have been posted in all buildings and on all elevators. Students should review these procedures for their own safety. Students are required to monitor their university email (see <https://www.clemson.edu/studentaffairs/student-handbook/universypolicies/email-communications.html>) thus establishing this as a convenient method for official communication to students. Students are also encouraged to enroll in CU-Safe alerts. See <https://www.clemson.edu/cusafety> for more information.