
ECE 8920 Section 001
Modeling and Simulation of Microelectromechanical systems based Sensors

Class Location/Time: ___Duke Energy Building Main Conference Room_____

Instructor: Goutam Koley Email: gkoley@clermson.edu Office: C104 Duke Energy Building
Office Hours: By appointment.

Teaching Assistant/Grader (if applicable): _____ N/A _____
Email: _____ Office and Office Hours: _____

Course Prerequisites/Co-requisites:

None

Course Description

Study of principles of finite element simulation of microelectromechanical systems for detection of photoacoustic signals; Design methodologies for high performance strain and pressure sensors.

Course Objectives

This course develops students' understanding of Finite Element Simulation based design and simulation of microelectromechanical sensors. It also develops students' ability to design high performance microelectromechanical systems based sensors.

Required Materials

Required Textbook:

No fixed text book, materials mostly based on research papers and technical notes.

Topical Outline

This can be organized by weeks (15 weeks for fall/spring semesters) or hours (3 hours per credit hour).

Course Outline:

- Introduction to Finite Element Simulation using COMSOL (3 weeks)
- Modeling and performance estimation of Microelectromechanical sensors (6 weeks)
- Design methodologies of high performance strain and pressure sensors (4 weeks)

Grading

Grading scale:

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

Presentation 1: 50 %

Presentation 2: 50 %

Additional Policies

- **Attendance Policy:** Unless otherwise stated on the course specific syllabus, students are expected to attend class, and to arrive on time.

In the event of an emergency, students should contact the course instructor, preferably before class or the exam. Students should speak with instructors regarding any scheduled absence as soon as possible and develop a plan for any make-up work, if allowed by the instructor. It is the student's responsibility to secure documentation of emergencies, if required by the instructor. A student with an excessive number of absences may be withdrawn at the discretion of the course instructor.

If the instructor is late, students are expected to wait 15 minutes for the instructor to arrive.

Any further attendance policies in place will be listed on the course specific syllabus, and will serve to supplement these policies.

Inclement Weather Policy: Any exam that was scheduled at the time of a class cancellation due to inclement weather will be given at the next class meeting unless contacted by the instructor. Any assignments due at the time of a class cancellation due to inclement weather will be due at the next class meeting unless contacted by the instructor. Any extension or postponement of assignments or exams must be granted by the instructor via email or Canvas within 24 hours of the weather related cancellation.

- **Homework Policy:** N/A
- **Late Assignments and Missed Exams:** N/A
- **Collaboration:** You are required to do the homework assignments by yourself; copying their work will not be tolerated. Anyone found copying or using another person's work will be dealt with under Clemson's policy on academic dishonesty. The consequences range from receiving a failing grade for the assignment to expulsion. However, we do strongly encourage students to discuss the materials covered in class. There is a fine line between discussion and cheating. If you feel

uncertain about whether you are crossing the line, feel free to discuss these issues with the instructor before you do so.

- 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 to charges of violations of academic integrity.

Further information on Academic Integrity can be found in the Undergraduate Announcements and in the Graduate School Policy Handbook.

Title IX Statement: The Clemson University Title IX (Sexual Harassment) statement: 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 (e.g., opposition to prohibited discrimination or participation in any complaint process, etc.) 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. The policy is located at <http://www.clemson.edu/campus-life/campus-services/access/non-discrimination-policy.html>. Jerry Knighton serves as Clemson's Title IX coordinator and he may be reached at knightl@clemson.edu or 656-3181.

Students with disabilities: "It is University policy to provide, on a flexible and individualized basis, reasonable accommodations to students who have disabilities. Students are encouraged to contact Student Disability Services to discuss their individual needs for accommodation." Any student with an official Clemson University recognized learning disability must inform the instructor within the first week of class meetings so that arrangements can be made to meet the student's needs. Details on policies and procedures are available at www.clemson.edu/sds.

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 an ECE class should let the professor know, and make an appointment with a staff member in Student Accessibility Services as soon as possible. Student Accessibility Services coordinates the provision of reasonable accommodations for students with specific physical, emotional, or learning needs. Accommodations are individualized, flexible, and confidential and are based on the nature of the student's needs and the academic environment, in compliance with Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990.

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 at all 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 instructors 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: <http://www.clemson.edu/campus-life/campus-services/sds/>.

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 (e.g., opposition to prohibited discrimination or participation in any complaint process, etc.) 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. The policy is located at <https://www.clemson.edu/campus-life/campus-services/access/title-ix/policies.html>. Alesia Smith serves as the Title IX Coordinator and the Executive Director of Equity Compliance and may be reached at alesias@clemson.edu or 864-656-3181.

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.

Copyright Statement: Materials in some of the courses are copyrighted. They are intended for use only by students registered and enrolled in a particular course and only for instructional activities associated with and for the duration of the course. They may not be retained in another medium or disseminated further. They are provided in compliance with the provisions of the Teach Act. Students should be reminded to refer to the Use of Copyrighted Materials and “Fair Use Guidelines” policy in on the Clemson University website for additional information: <https://www.clemson.edu/library/>.