

**Special Topic: MEMS Design and Fabrication**  
EE4390 – CRN 27275 – Undergraduate Level  
EE5390 – CRN 27614 – Graduate Level  
**Fall 2024 Syllabus**

**Monday & Wednesday 1:30-2:50pm – Classroom C304**

**Instructor: Dr. Robert C. Roberts**  
**Engineering A310**  
**rcroberts@utep.edu**  
**915-747-6959**

**Weekly Office Hours:**  
**Th 1:30pm – 3:30pm**  
**or by appointment**  
<http://teamschat.robertcroberts.com>

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**Course Description:** The goal of this course is to introduce students to the theory, design, simulation, fabrication, and characterization of microsystems. This semester, the class will focus on micro-electro-mechanical systems (MEMS) where students will learn about fundamental fabrication techniques, design of MEMS devices, and simulation of MEMS devices. For part of the course students will also work in the semiconductor cleanroom at UTEP where they will learn the processes and fabricate their MEMS devices. After fabrication, students will perform characterization of their designs to be presented to the class.

**Pre-requisites for Course:** (EE 3325 w/C or better and EE 3329 w/C or better)

**EE5390 – Graduate Level Students:** Students enrolled in the graduate section of the course will be expected to complete an additional report, due at the end of the semester.

**Course Website:** Blackboard will be utilized for sharing electronic copies of the presentations and handouts.

**Textbook:**

Eun Sok Kim, Ph.D., Fundamentals of Microelectromechanical Systems (MEMS), 1st Edition, McGraw Hill, ISBN: 9781264257584

An electronic version of this textbook appears to be available for UTEP students on VPN at: [www.accessengineeringlibrary.com/content/book/9781264257584](http://www.accessengineeringlibrary.com/content/book/9781264257584)

Handouts will be provided and/or posted onto the course Blackboard site, as this course will pull material from multiple sources including textbooks and research publications. The following textbooks may also serve as useful references:

- Gregory Kovacs, "Micromachined Transducers Sourcebook," McGraw-Hill, 1998, ISBN: 978-0072907223
- Stephen D. Senturia, "Microsystem Design," Springer, 2004, ISBN: 978-0792372462
- Marc J. Madou, "Fundamentals of Microfabrication: The Science of Miniaturization," CRC Press, 2002, ISBN: 978-0849308260
- Richard C. Jaeger, "Introduction to Microelectronic Fabrication: Volume 5 of Modular Series on Solid State Devices," Pearson, 2001, ISBN: 978-0201444940
- Simon M. Sze, "Semiconductor Sensors," Wiley-Interscience, 1994, ISBN: 978-0471546092
- Simone Cirani, et. al., "Internet of Things: Architectures, Protocols and Standards," Wiley, 2019, ISBN: 978-1119359678

**Attendance:** In order to be successful in the course, attendance is highly recommended every day. Should a situation arise when a student is unable to attend class, they should communicate with the instructor to ensure they do not miss any important information.

**Course Grading:** Students will be evaluated in the following manner:

Midterm Examination	25%
Homework and Problem Sets:	25%
Hands-on Fabrication Attendance	20%
Technical Presentation	15%
Final Report ( <b>EE5390 students only</b> )	<b>15%</b>
TOTAL	100% ( <b>85% for EE4395 students</b> )

**Course Drop Deadline:** March 28<sup>th</sup>

**Drop Policy:** Students can drop the course before March 28<sup>th</sup> with a grade of "W". Students who drop the course after March 28<sup>th</sup> will be assigned the grade earned in the course.

**Scholastic Integrity:** As an entity of The University of Texas at El Paso, the Department of Electrical and Computer Engineering is committed to the development of its students and to the promotion of personal integrity and self-responsibility. The assumption that a student's work is a fair representation of the student's ability to perform forms the basis for departmental and institutional quality. All students within the Department are expected to observe appropriate standards of conduct. Acts of scholastic dishonesty such as cheating, plagiarism,

collusion, the submission for credit of any work or material that are attributable in the whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student, or the attempt to commit such acts will not be tolerated. Any case involving academic dishonesty will be referred to the Engineering Dean's Office and the Office of the Dean of Students. The Dean of Students will assign a Student Judicial Affairs Coordinator who will investigate the charge and alert the student as to its disposition. Consequences of academic dishonesty may be as severe as dismissal from the University. See the Office of the Dean of Students' home page at [www.utep.edu/dos/acadintg.htm](http://www.utep.edu/dos/acadintg.htm) for more information.

**Policy relating to Disability / CASS:** In Section 504 of the Vocational Rehabilitation Act of 1973 and the Americans with Disabilities Act (ADA) of 1990, if a student needs an accommodation then the Office of Disabled Student Services located at UTEP need to be contacted. If you have a condition, which may affect your ability to perform successfully in this course, you are encouraged to discuss this in confidence with the instructor and/or the director of the Disabled Student Services. Written guidelines r/t accommodations from CASS must be submitted to the course manager PRIOR to the start of the course. If you have a disability and need classroom accommodations, please contact CASS at 747-5148, or by email to [cass@utep.edu](mailto:cass@utep.edu), or visit their office located in UTEP Union East, Room 106. For additional information, please visit the CASS website at [www.sa.utep.edu/cass](http://www.sa.utep.edu/cass). *CASS' Staff are the only individuals who can validate and if need be, authorize accommodations for students with disabilities.*