

# Theory and Application of Contemporary Devices

EE4350 – CRN 17412 – Undergraduate Level

EE5390 – CRN 19994 – Graduate Level

## Fall 2022 Syllabus

Tuesday & Thursday 1:30-2:50pm - Education Building 309

**Instructor: Dr. Robert C. Roberts**

Engineering A310

rcroberts@utep.edu

915-747-6959

**Weekly Office Hours:**

W 9:00am – 11:00am

R 9:00am – 11:00am

or by appointment

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**Course Description:** The goal of this course is to introduce students to the theory and application of contemporary devices based on electronic, optoelectronic, electro-mechanical, and other operating principles for analog, digital and quantum applications. This semester, the class will focus on the world of sensors, micro-electro-mechanical systems (MEMS), and to explore applications of these devices in the burgeoning area of the Internet-of-Things (IoT). The fundamental electronic transduction techniques will be covered, along with a survey across the spectrum of sensors. Detailed analysis and design of select examples will be presented, as well as exploring recent developments in the field. Students will also be given the opportunity to learn of a specific sensing topic of interest, and present the topic professionally in both an oral and written format to refine their skills.

**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 project, 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%
Technical Paper	20%
Technical Presentation	15%
Final Project ( <b>EE5390 students only</b> )	<b>15%</b>
TOTAL	100% ( <b>85% for EE4395 students</b> )

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

**Drop Policy:** Students can drop the course before October 28<sup>th</sup> with a grade of "W". Students who drop the course after October 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.*