CLEMSON UNIVERSITY **Curriculum and Course Change System - Print New Course Form**

Course Abbreviation & Number:
X **New Undergraduate Course:** ECE- 4370
.. **New Honors Course:** --
X **New Graduate Course:** ECE- 637

Effective Term: 08/2015
Catalog Title: Microelectromechanical Systems
Transcript Title: Microelectromechanical Systems
Fixed Credit Course: 3 (3,0)
Variable Credit Course: - (-), (-)

Method of Instruction	Course Modifier	General Education Designation
X A-Lecture Only	.. Pass/Fail Only	.. Creative Inquiry
.. B-Lab (w/fee)	X Graded	.. English Composition
.. D-Seminar	.. Variable Title	.. Oral Communication
.. E-Independent Study	.. Creative Inquiry	.. Mathematics
.. F-Tutorial (w/fee)	.. Repeatable	Natural Science No
.. G-Studio	maximum credits:	.. Lab
.. H-Field course		.. Natural Science w/Lab
.. I-Study Abroad		.. Math or Science
.. L-Lab (no/fee)		.. A&H (Literature)
.. N/B-Lecture/Lab(w/fee)		.. A&H (Non-Literature)
.. N/L-Lecture/Lab(no fee)		.. Social Science
		.. CCA
		.. STS

Add cross-listing with the following child course(s):

Catalog Description: This course will introduce the basic materials in current microelectromechanical systems (MEMS) as well as the fundamental sensing and actuation mechanisms therein. It will also explain the basic fabrication techniques for bulk and surface micromachining, discuss the primary forces in MEMS devices, study the basic micro mechanical structures and microfluidics.

Prerequisite(s): ECE 4730 - CH 1020 and PHYS 1220. ECE 6730 - Students are expected to have completed courses comparable to CH 1010 and PHYS 1220 before enrolling in this course.

Projected Enrollment:
Year 1 - 5 Year 2 - 8 Year 3 - 10 Year 4 - 10

Required course for students in:

Statement of need and justification based on assessment results of student learning outcomes: MEMS devices, often in the form of sensors and actuators, are ubiquitous in many high-performance electronics products. The basic knowledge of MEMS, including materials and fabrications, is essential for advanced design, study and research in electronics as well as many other areas. Current hardware engineers and system engineers need to understand the principle that underlie in MEMS, in order to build high-performance systems. Currently, there is no formal MEMS course on Clemson campus.

Textbook(s): S. D. Senturia, Microsystem Design, Kluwer Academics, 2000.

Learning Objectives: Students will be able to understand the basic properties of MEMS materials as well as the fundamental forces and operation mechanisms of a few common MEMS devices and systems. Students will also be able to design basic MEMS fabrication processes, including bulk and surface micromachining processes.

Topical Outline: 1 - Introduction
4 - Bulk material properties in MEMS
10 - Overview of microfabrication in MEMS
4 - Thin-film characteristics and special processes
3 - Process and design integration in MEMS
2 - Transducers by lumped models
2 - Deformable solids by elasticity theory
3 - Beam and plate deformation mechanics
4 - Microfluidics: theory and principles
4 - Microfluidics: electrokinetics
1 - Pressure sensor design
1 - Accelerometer design
2 - Optical and RF MEMS components
2 - Final project presentations
2 - tests
Total: 45 hours

Evaluation: For 6370 students
Homework problems 30%
Design projects 30%
Project presentation 10%
Midterm 10%
Final exam 20%
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Course Grade 100%

Grading Scale: 85 - 100 A
70 - 85 B
60 – 69 C
0 - 59 F

For 4370 students
Homework problems 40%
Design projects 30%
Midterm 10%
Final exam 20%
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Course Grade 100%

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

Form Originator: EBRAD,Gibisch,Elizabeth Bradley **Date Form Created:** 10/29/2014
Form Last Updated by: EBRAD, Gibisch,Elizabeth Bradley **Date Form Last Updated:** 11/20/2014
Form Number: 7711

Approval

Carl Baum	11/20/14	Clarice W. [illegible]	2/6/15
Chair, Department Curriculum Committee	Date	Chair, Undergraduate Curriculum Committee	Date
Daniel L. Noneak	11/21/14		
Department Chair	Date	Chair, Graduate Curriculum Committee	Date
[illegible]	1/16/15	Robert B. Jones	4/3/2015
Chair, College Curriculum Committee	Date	Provost	Date
[illegible]	1/16/15		
College Dean	Date	President	Date
Director, Calhoun Honors College	Date		