Engineering Faculty Document No. 48-06
May 8, 2007

TO: The Faculty of the College of Engineering
FROM: The Faculty of the School of Electrical and Computer Engineering
RE: ECE 526 Changes in Course Title, Prerequisites, Course Description and Content

The faculty of the School of Electrical and Computer Engineering has approved the following changes in ECE 526. This action is now submitted to the Engineering Faculty with a recommendation for approval.

From: **ECE 526 – Fundamentals Of MEMS And Micro-Integrated Systems**
Sem. 1. Class 3, cr. 3. (Offered in alternate years.)
Prerequisite: First Semester Senior Standing or higher or Masters Student Standing or higher. Authorized equivalent courses or consent of instructor may be used in satisfying course pre- and co-requisites. Instructor approval required.

(BME 581) Key topics in micro-electro-mechanical systems (MEMS) and biological micro-integrated systems; properties of materials for MEMS; microelectronic process modules for design and fabrication. Students will prepare a project report on the design of a biomedical MEMS-based micro-integrated system.

To: **ECE 526 – Fundamental of BioMEMS and Micro-Integrated Systems**
Sem. 1, Class 3, cr. 3
Prerequisite(s): Chem 115 and Phys 261 or equivalent. Senior standing in an Engineering discipline.

Key topics in biomedical micro-electro-mechanical systems (Bio-MEMS) and micro-integrated systems are covered. Biological concepts related to the BioMEMS are reviewed. Silicon process modules and soft-lithography processes used in the design and fabrication of BioMEMS and micro-integrated systems are presented. Applications of these systems in a variety of sensors and transducers are described. Recent advances in BioMEMS, Lab-on-a-Chip, and related advanced topics are discussed.

Reason: The course description and content have been changed to reflect the updated content of the course.

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Mark Smith, Head
School of Electrical & Computer Engineering

ECE 526 – Fundamental of BioMEMS and Micro-Integrated Systems

Recommended References:

S. Senturia, *Microsystem Design*, Kluwer Academic Pres, 2000;
Elwenspoek and Jensen, *Silicon Micromachining*, Cambridge University Press, 1999;
R. S. Muller, R. T. Howe, S. D. Senturia, R. L. Smith, and R. M. White, *Microsensors*, IEEE Press. 1991;
S. A. Campbell, *The Science and Engineering of Microelectronic Fabrication*, Oxford University Press, 1996;
R. C. Jaeger, *Introduction to Microelectronic Fabrication*, Volume V in the Modular Series on Solid State Devices, Prentice-Hall, 2002.

Course Outline:

Lectures	*Principal Topics*
2	Introduction to MEMS/BioMEMS/BioSensors
5	Device Fabrication (Silicon Processing including Lithography, Etching, Deposition, Bonding; Soft Lithography and Other Topics)
3	Biology/Chemistry Fundamentals (Cells, DNA, Proteins)
2	Microfluidics
6	BioMEMS and Detection Methods
2	Microarrays
5	Lab-on-a-chip Device
3	Presentations/Advanced Topics

Course Outcomes: A student who successfully fulfills the course requirements will have demonstrated:

1) an ability to apply interdisciplinary principles from chemistry and biology, materials and mechanics, and micro/nano-fabrication to Bio-MEMS (1,2,3, a, j).
2) a basic knowledge of BioMEMS processing steps and processing modules (3,4, j, k).
3) an understanding of basic design and operation of BioMEMS sensors and transducers, a

Outcome Assessment Method: The course outcomes will be assessed by homework assignments, a project report, and exams.