

TO: The Faculty of the College of Engineering
FROM: The Faculty of the School of Electrical and Computer Engineering
RE: ECE 606 Changes in Course Title, Terms Offered, Requisite, and Description

The faculty of the School of Electrical and Computer Engineering has approved the following changes in ECE 606. This action is now submitted to the Engineering Faculty with a recommendation for approval.

From: **ECE 606 Solid State Devices**
Sem.1 and 2. Class 3, cr. 3. (Offered in alternate years.)
Prerequisite: Masters Student Standing or higher. Authorized equivalent courses or consent of instructor may be used in satisfying course pre- and co-requisites.

A relatively-broad, moderate-depth coverage of semiconductor devices and related topics. The first portion of the course presents and examines semiconductor fundamentals required in the operational analysis of solid state devices. A detailed examination of the PN junction diode and PN junction devices follows. The final portion of the course treats heterojunction surface devices including the Schottky diode, the MOS capacitor and the MOSFET.

To: **ECE 606 Solid State Devices I**
Sem.1 and 2. Class 3, cr. 3
Prerequisite: Graduate Standing.

A relatively-broad moderate-depth coverage of semiconductor devices and related topics. The first portion of the course presents and examines semiconductor fundamentals required in the operational analysis of microelectronic devices. Next, PN junction and Metal-Semiconductor diode theory is reviewed, followed by analyses of the Bipolar Junction Transistor (BJT) and Heterojunction Bipolar Transistor (HBT). The final portion of the course treats the Metal-Oxide-Semiconductor Capacitor (MOS-C) and Field Effect Transistor (MOSFET).

Reason: The course title, description, and requisites have been changed to reflect the updated content of the course. The terms offered has been changed to meet the needs of the school.

M. J. T. Smith, Head
School of Electrical & Computer Engineering

ECE 606 Solid State Devices I

Required Texts:

R. F. Pierret, *Advanced Semiconductor Fundamentals*, Vol. VI in the Modular Series on Solid State Devices, 2nd edition, Prentice-Hall, © 2003; ISBN 0-13-061792-X.

R. F. Pierret, *Semiconductor Device Fundamentals*, Addison-Wesley, © 1996; ISBN 0-201-54393-1.

Recommended Reference:

S. M. Sze and K. K. Ng, *Physics of Semiconductor Devices*, 3rd edition, Wiley Interscience, © 2007; ISBN 978-0-471-14323-9

Week Principal Topics

- 1 Basic Semiconductor Properties
- 2 Elements of Quantum Mechanics
- 3 Energy Band Theory
- 4 Equilibrium Carrier Statistics
- 5 Recombination-Generation
- 6 Carrier Transport
- 7 p-n junctions
- 8 MS Contacts and Diodes, Midterm Exam
- 9 Bipolar Junction Transistors
- 10 Heterojunction Bipolar Transistors
- 11 Metal-Oxide-Semiconductor (MOS) Fundamentals
- 12 MOS Capacitor C-V Characteristics
- 13 MOS Field-Effect Transistors (MOSFETs)
- 14 Nonideal MOS
- 15 Small-Dimension MOS