

**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, Description, Content, and References

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

Mark Smith, Head  
School of Electrical & Computer Engineering

## **ECE 606 – Solid State Devices I**

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

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

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

<i>Week</i>	<i>Principal Topics</i>
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