University of Wisconsin - Madison  
College of Engineering [EGR]  
Last Offered: 2011-2012 Spring [1124]  
Direct Link to this Syllabus:  
1. E C E 543, Numerical Modeling of Semiconductor Devices and Processing  
2. Credits: 3  
    Contact Hours: 2.5  
3. Textbook and Materials:  
    Franco Cerrina. ECE 543 Course Notes.  
   a. Other Supplemental Materials: None  

- Specific Course Information:  
   a. Brief description of the content of the course (Course Catalog Description): Study of semiconductor devices fabrication processes using advanced computer simulation tools. Specific devices are modeled from fabrication to electrical properties and parameters extraction. Deposition, lithography, etching, implant processes are discussed. Statistical methods are used to study the effect of process parameters (and variations) on device electrical properties.  
   b. Pre-requisites or Co-requisites: ECE 335  
   c. This is a Selected Elective course.  

- Specific Goals for the Course:  
   a. Course Outcomes:  
      1. Students will learn the physical models which describe the stages in processing and fabrication of semiconductor devices and the functioning of the semiconductor devices as circuit elements.  
      2. State of the art computer simulation tools which embody these models will be used.  
      3. Students will learn to use these tools to simulate device fabrication, to extract device
parameters from the fabrication simulations, and to simulate the device function in circuits.

- **ABET Student Learning Outcomes:**

  (a) Ability to apply mathematics, science and engineering principles.
  (c) Ability to design a system, component, or process to meet desired needs.
  (d) Ability to function on multidisciplinary teams.
  (e) Ability to identify, formulate and solve engineering problems.
  (g) Ability to communicate effectively.
  (h) The broad education necessary to understand the impact of engineering solutions in a global and societal context.
  (i) Recognition of the need for and an ability to engage in life-long learning.
  (j) Knowledge of contemporary issues.
  (k) Ability to use the techniques, skills and modern engineering tools necessary for engineering practice.

- **Brief List of Topics to be Covered:**
  1. Study of semiconductor device fabrication processes using advanced computer simulation tools.
  2. Specific devices are modeled from fabrication to electrical properties and parameter extraction. Deposition, lithography, etching and implant processes are discussed.
  3. Statistical methods are used to study the effect of process parameters (and variations) on device electrical properties.