Course Staff

- **Instructor:**
  - Dr. Noha Korany
  - Dr. Mohammed M. Farag (mmorsy@ieee.org)
  - 4th Floor ECE Building

- **TA:**
  - Eng. Mohamed Megahed

- **Office hours:**
  - Thursday 2:00-3:20PM
Course Text

- **Textbook**
  - “Semiconductor Devices – Physics and Technology”, S. M. Sze, M. K. Lee

- **Reference books**
Learn and understand the following topics:

- **Semiconductor physics**
  - Energy bands and carrier transportation in semiconductors

- **Semiconductor Devices**
  - pn-Junction Diode, Bipolar Junction Transistor (BJT), Metal Oxide Semiconductor Field Effect Transistor (MOSFET)

- **Semiconductor Technology**
  - Material growth, film formation, photolithography, and fabrication process.

Learn to use Spice to model and simulate semiconductor devices and circuits.
Outcome

- Describe fundamental principles of wafer fabrication processes in semiconductor technology
- Understand fundamental concepts of solid state physics applied to the semiconductor devices
- Explain general electrical behaviors of semiconductor devices and construct appropriate physical models
- Illustrate structural details and current-voltage characteristics of diode, BJT, and MOSFET devices
- Apply the fundamental understanding of semiconductor devices with knowledge on the limitations of physical models
- Practice modeling and simulation SPICE CAD tools to increase understanding of semiconductor devices taught in the course
Course Organization

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- Semiconductor physics:
  - Energy Bands and Carrier Concentration in Thermal Equilibrium
  - Carrier Transport Phenomena
- Mid-term Exam
- Semiconductor Devices:
  - p-n Junction
  - Bipolar Transistors and Related Devices

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- Semiconductor Technology:
  - Crystal Growth and Epitaxy
  - Film Formation
  - Lithography and Etching
  - Impurity Doping
  - Integrated Devices
- Mid-term Exam
- Semiconductor Devices:
  - MOS Capacitor and MOSFET
  - MESFET and Related Devices
Course Work

- 5-6 Labs
- A Midterm exam
- A Final Exam
- Tools:
  - Pspice
Steady and persistent effort is rewarded

- Labs: 30 marks
  - Attendance: 10 marks
  - Lab work: 10 marks
  - Lab exam: 10 marks
- Midterm exam: 30 marks (Equally distributed over the two parts)
- Final exam: 90 marks (Equally distributed over the two parts)
About the Lectures

- Lectures will make use of slides
  - Slides are great!
    - Nice pictures to explain concepts
    - Good addition for course text
    - I can annotate them with a tablet PC
    - I can switch to the tools and listings mid-lecture
  - Slides are horrible!
    - They make me teach 30% faster (really)
    - They give you the sense that this is all easy stuff (it's not)
    - They make you fall a sleep
    - They make me lazy
    - They make me waste time looking for clipart
  - Slides are a two-edged sword
    - I encourage you to be active and take notes
    - I may fall back to blackboard-based teaching occasionally