

Summarized Course Description

Course number: ECE 240	Course name: Semiconductor Devices
لغة تدريس المقرر: English	Pre-requisites: PHYS103
Credit hours: 3 (3-0-0)	Course level: Level - 5

Course Description

وصف المقرر :

Principal classes of semiconductor devices in modern microelectronics and photonics. Charge carrier statistics and transport, luminescence, photoconductivity, p-n junctions, metal- semiconductor junctions, diodes, field-effect transistor (MOSFET), bipolar junction transistor (BJT), photodiodes, Light-emitting diodes (LED), laser diodes (LD).

Course objectives

أهداف المقرر :

1. Explain the basic theory and operation of semiconductor devices used for integrated circuit applications.
2. Describe the techniques used in optimizing semiconductor device design. Provide the students with a basic understanding of forming the most important semiconductor devices in modern microelectronics and photonics.

Course Outcomes

مخرجات التعليم:

Upon completing the course, the student should be able to:

1. Understand electronic structure, charge carrier statistics, and transport properties in semiconductors
2. Realize the different fabrication technology for semiconductor devices and integrated circuits
3. Explain charge transport in p-n junctions and metal-semiconductor contacts
4. Apply the principles of field effect (MOSFET) and bipolar junction (BJT) transistors
5. Apply the principles of light-emitting diodes (LED) and laser diodes (LD), photoconductors/photodiodes, and photovoltaic solar cells.

Textbook and references

الكتاب المقرر والمراجع المساندة:

Text Book: B.G. Streetman and Sanjay Banerjee: Solid State Electronic Devices, 6th edition (or later), Prentice Hall, 2006.

References:

Muller, Richard S., Theodore I. Kamins, and Mansun Chan. Device Electronics for Integrated Circuits. 3rd ed. New York, NY: John Wiley & Sons, 2002. ISBN: 9780471593980.

D.A. Neamen, "Semiconductor Physics and Devices", McGraw-Hill, 4th, 2011, Holger T. Grahn, "Introduction to Semiconductor Physics", World Scientific, 1st, 1999.

G. Parker, "Introductory Semiconductor Device Physics", Prentice Hall, 1994

Kanaan Kano, "Semiconductor Devices", Prentice Hall, 1998