



مدونة المناهج السعودية

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الموقع التعليمي لجميع المراحل الدراسية

في المملكة العربية السعودية

مختصر توصيف المقرر

(Course Information)

معلومات المقرر \*

اسم المقرر:	أشباه الموصلات
رقم المقرر:	فيز 4732
اسم ورقم المتطلب السابق:	فيز 3712
اسم ورقم المتطلب المرافق:	--
مستوى المقرر:	السابع
الساعات المعتمدة:	3 (0+0+3)
<b>Module Title:</b>	Semiconductors
<b>Module ID:</b>	PHYS 4732
<b>Prerequisite :</b>	PHYS 3712
<b>Co-requisite :</b>	--
<b>Course Level:</b>	Seventh
<b>Credit Hours:</b>	3 (3+0+0)

**Module Description**

وصف المقرر :

Semiconductor Fundamentals: Carrier distribution functions, Carrier densities, Carrier Transport, Carrier recombination and generation, Continuity equation, The drift-diffusion model.  
P-N Junctions: Electrostatic analysis of a P-N diode, The P-N diode current, Reverse bias breakdown.  
Bipolar Junction Transistors: Structure and principle of operation, Ideal transistor model, Non-ideal effects, Base and collector transit time effects, BJT circuit models, BJT Technology.  
MOS Capacitors: Structure and principle of operation, MOS analysis.  
MOS Field-Effect-Transistors: Structure and principle of operation, MOSFET models, Threshold voltage, MOSFET Circuits and Technology.

**Module Aims**

أهداف المقرر :

<p><b>Aim of this course is to provide a base to students for his future research and study planning. After successful completion of this course student will be able to understand</b></p> <p>Fundamentals of Semiconductors, Physics and working principle of P-N Junctions, Bipolar Junction Transistors, MOS Capacitors and MOS Field-Effect-Transistors.</p>
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**Learning Outcomes:**

مخرجات التعليم:

<p>Outcome of this course will be the transfer of knowledge of Physics of semiconductors its working principle and applications in real word.</p> <p>Fundamentals of Semiconductors, Physics and working principle of P-N Junctions, Bipolar Junction Transistors, MOS Capacitors and MOS Field-Effect-Transistors.</p>
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**Course Contents:**

محتوى المقرر:

ساعات التدريس (Hours)	عدد الأسابيع (Weeks)	قائمة الموضوعات (Subjects)
6	2	Semiconductor Fundamentals:
6	2	Carrier distribution functions, Carrier densities, Carrier Transport,
6	2	Carrier recombination and generation, Continuity equation, The drift-diffusion model.
6	2	P-N Junctions: Electrostatic analysis of a P-N diode, The P-N diode current, Reverse bias breakdown.
9	3	Bipolar Junction Transistors: Structure and principle of operation, Ideal transistor model, Non-ideal effects, Base and collector transit time effects, BJT circuit models, BJT Technology.
3	1	MOS Capacitors: Structure and principle of operation, MOS analysis.
6	2	MOS Field-Effect-Transistors: Structure and principle of operation, MOSFET models, Threshold voltage, MOSFET Circuits and Technology.

**Textbook and References:**

المقرر والمراجع المساندة:

سنة النشر Publishing Year	اسم الناشر Publisher	اسم المؤلف (رئيسي) Author's Name	اسم الكتاب المقرر Textbook title
(1998) ISBN: 012752116X	Academic Press	Robert Willardson and A. C. Beer	Semiconductors and semimetals
سنة النشر Publishing Year	اسم الناشر Publisher	اسم المؤلف (رئيسي) Author's Name	اسم المرجع Reference
(2011); 4 <sup>th</sup> edition ISBN-10: 0071317082	McGraw-Hill Higher Education	Donald A Neamen	Semiconductor Physics and Devices
(2006) ISBN-10: 8126517026	Wiley student edition	Simon M. Sze, Kwok K. Ng	Physics of Semiconductor Devices