Course Code	PHYS8751 (RPG)		
Title	Device Physics		
Offering Department	Physics		
Course Co-ordinator	Prof M H Xie Physics		
Course Co-ordinator Email	mhxie@hku.hk		
Teachers Involved	Name	Department	Percentage
	Prof M H Xie	Physics	100
Course Objectives	The growth in the past 70 years of modern electronics industry has had great impact on society and everyday life, the foundation of which rests upon the semiconductor physics and devices. This course aims at presenting a comprehensive introductory account of the physics and operational principles of some selected and yet classic semiconductor devices, microelectronic and optoelectronic. The text is primarily designed for postgraduates but can be of interest to senior undergraduates in physics, electrical and electronic engineering and materials science. Students are assumed to have acquired some basic knowledge of quantum mechanics, statistical mechanics, and solid state physics, though a review of the physics of semiconductors will be given in the beginning of the course.		
Course Contents & Topics	This course begins by giving a review of solid state physics, particularly of the physics of semiconductors. It is then followed by discussions of the fundamentals and practical aspects of PN-junctions and rectifying diodes, amplifying and switching devices like bipolar and field-effect transistors (e.g., MOSFET), light-emitting and detection devices such as LEDs, laser diodes, and photodetectors. If time allows, a brief discussion of some special devices will be presented.		
Course Learning Outcomes (CLO)	On successful completion of this course, students should be able to: CLO 1 understand basic working principles of selected devices CLO 2 understand the device performance merits and their characterization methods CLO 3 be acquainted with the processing technology and steps of device fabrications		
Pre-requisites (and Co-requisites and Impermissible combinations)	Nil		
Offer in 2025 - 2026	Y 2nd sem	Examination	May
Course Grade	A+ to F		
Grade Descriptors	A: Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. B: Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. C: Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge		

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<tr><td></td><td colspan="3">to most familiar situations. Apply moderately effective organizational and presentational skills.
D: Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail: Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.</td></tr>
<tr><td>Course Type</td><td colspan="3">Lecture-based elective course</td></tr>
<tr><td rowspan="4">Course Teaching & Learning Activities</td><td>Activities</td><td>Details</td><td>No. of Hours</td></tr>
<tr><td>Lectures</td><td></td><td>36</td></tr>
<tr><td>Tutorials</td><td></td><td>12</td></tr>
<tr><td>Reading/Self study</td><td></td><td>80</td></tr>
<tr><td rowspan="4">Assessment Methods and Weighting</td><td>Methods</td><td>Details</td><td>Weighting in final course grade (%)</td></tr>
<tr><td>Assignments</td><td></td><td>20</td></tr>
<tr><td>Examination</td><td>2-hour written exam</td><td>50</td></tr>
<tr><td>Test</td><td></td><td>30</td></tr>
<tr><td>Quota</td><td colspan="3">9999 (9999 if no quota)</td></tr>
<tr><td>Required/recommended reading and online materials</td><td colspan="3">1. Solid State Electronic Devices (5th ed.), by B.G. Streetman and S. Benerjee
2. Semiconductor Physics and Devices, Basic Principles (3rd ed.), by D.A. Neamen
3. Physics of Semiconductor Devices (2nd ed.), by S.M. Sze</td></tr>
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