

<b>PHYS8551 Graduate Solid State Physics</b>			
Offering Department	Physics		
Course Co-ordinator	Prof J Wang, Physics < jianwang@hku.hk >		
Teachers Involved	Prof J Wang, Physics		
Course Objectives	To provide students with an understanding of more advanced topics in selected areas of solid state physics.		
Course Contents & Topics	Bloch theory. Nearly free electrons and tight binding model. Band structure calculations for realistic systems. The semi-classical model of electron dynamics. Ab initio total energy calculations and other advanced topics.		
Course Learning Outcomes	<p>On successful completion of the course, students should be able to:</p> <ol style="list-style-type: none"> <li>1. discuss various methods to calculate the band structures and the major approximations that have been used</li> <li>2. discuss various minimization methods</li> <li>3. discuss the concepts of density functional theory</li> <li>4. explain the concept of first principle calculation and various approximations used</li> </ol>		
Pre-requisites (and Co-requisites and Impermissible combination)	---		
Offer in 2021 - 2022	N	Examination	---
Course Grade	Pass/Fail		
Grade Descriptors	Pass	<p>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. Apply highly effective lab</p>	

	skills and techniques. Critical use of data and results to draw appropriate and insightful conclusions.												
<b>Fail</b>	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.												
<b>Course Type</b>	Lecture-based elective course												
<b>Course Teaching &amp; Learning Activities</b>	<table border="1"> <thead> <tr> <th><b>Activities</b></th> <th><b>Details</b></th> <th><b>No. of Hours</b></th> </tr> </thead> <tbody> <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> </tbody> </table>	<b>Activities</b>	<b>Details</b>	<b>No. of Hours</b>	Lectures		36	Tutorials		12	Reading / Self study		80
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<b>Assessment Methods and Weighting</b>	<table border="1"> <thead> <tr> <th><b>Methods</b></th> <th><b>Details</b></th> <th><b>Weighting in final course grade (%)</b></th> </tr> </thead> <tbody> <tr> <td>Assignments</td> <td></td> <td>15</td> </tr> <tr> <td>Examination</td> <td>3-hour written examination</td> <td>70</td> </tr> <tr> <td>Test</td> <td></td> <td>15</td> </tr> </tbody> </table>	<b>Methods</b>	<b>Details</b>	<b>Weighting in final course grade (%)</b>	Assignments		15	Examination	3-hour written examination	70	Test		15
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Examination	3-hour written examination	70											
Test		15											
<b>Required/recommended reading and online materials</b>	<p>Lecture notes provided by Course Coordinator</p> <p>C. Kittel: Introduction to Solid State Physics (John Wiley, 1996)</p> <p>N.W. Ashcroft and D.N. Mermin: Solid State Physics (Holt, Rinehart and Winston, 1987)</p>												
<b>Additional Course Information</b>	---												