

1. Maklumat Kursus / Course Info

Nama Kursus: Course Name:	Solid State Physics / Solid State Physics		
Kod Kursus: Course Code:	SFT3053	Nilai Kredit: Credit Value:	3

2. Sinopsis / Synopsis

Kursus ini membincangkan konsep asas fizik keadaan pepejal meliputi topik-topik berikut: struktur pepejal, tenaga ikatan, getaran kekisi dan ciri- ciri berkaitan dengan pepejal. Penekanan adalah kepada ciri- ciri terma, elektrik, magnetik, dielektrik dan optikal.

This course discusses the basic concepts in solid-state physics such as structure of solids, binding energy, lattice vibrations and the properties associated with the solids. The emphasis is on thermal, electrical, magnetic, dielectric and optical properties.

3. Nama Staff Akademik / Name(s) of Academic Staff

1. Profesor Madya Dr. Faridah Lisa binti Supian

4. Semester dan Tahun / Semester and Year Offered

Semester: Semester:	1	Tahun: Year:	4
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5. Prasyarat (jika ada) / Prerequisite (if any)

Tiada / None

6. Hasil Pembelajaran Kursus / Course Learning Outcomes (CLO)

CLO1	Menghubungkan konsep fizik keadaan pepejal untuk aplikasi dalam industri <i>Relate the concept of solid state physics for industrial application</i>	C3
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CLO2	Menganalisis struktur kristal dan ikatan kristal bahan fizik pepejal <i>Analyze the crystal structure and the crystal binding of solid-state materials</i>	C4
CLO3	Berkomunikasi dengan jelas dan yakin semasa sesi pembentangan <i>Communicate clearly and convincingly during presentation session</i>	A3

7. Pemetaan Hasil Pembelajaran Kursus kepada Hasil Pembelajaran Program / Mapping of the Course to the Programme Learning Outcomes

CLO	Program Learning Outcomes (PLO)										Teaching Methods	Assessment
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10		
CLO1	✓										• Kuliah / Lecture	• Peperiksaan Akhir / Final Examination
CLO2		✓									• Kuliah / Lecture	• Kuiz Dalam Talian / Online Quiz • Ujian / Test
CLO3				✓							• Kerja Lapangan / Field Work	• Persembahan / Presentation

(Deskripsi ini mesti dibaca bersama dengan Standard 2.1.2, 2.2.1 dan 2.2.2 di Area 2 - muka surat 16 & 18 / This description must be read together with Standards 2.1.2, 2.2.1 and 2.2.2 in Area 2 - pages 16 & 18)

Hasil Pembelajaran Program / Programme Learning Outcomes	
PLO1	Menerangkan pengetahuan teoretikal dan teknikal dalam bidang pendidikan dan fizik (MQF1). <i>Explain the theoretical and technical knowledge in education and physics (MQF1).</i>
PLO2	Menyelesaikan masalah atau isu luar jangka secara kreatif dan inovatif (MQF2). <i>Solving problems or unexpected issues creatively and innovatively (MQF1)</i>
PLO3	Menggunakan pelbagai kaedah dan kemahiran teknikal serta manipulatif untuk menyelesaikan masalah fizik (MQF3). <i>Use various technical and manipulative methods and skills to solve physics problems (MQF3).</i>
PLO4	Berkomunikasi secara bertulis dan lisan melalui pelbagai media penyampaian (MQF4). <i>Communicate in written and oral through various media presentations (MQF4).</i>
PLO5	Bekerja bersama pelbagai komuniti pembelajaran dan pekerjaan (MQF4) <i>Working with various learning and employment communities (MQF4)</i>
PLO6	Menjalankan penyelidikan dalam pendidikan fizik (MQF5). <i>Conduct research in physics education (MQF5)</i>
PLO7	Menggunakan pelbagai maklumat, media dan teknologi untuk menyokong pengajaran dan pembelajaran fizik (MQF5). <i>Utilize variable information, media and technologies to support teaching and learning in physics (MQF5)</i>

PLO8	Bekerja berautonomi dan menunjukkan kepimpinan semasa aktiviti social dan kemasyarakatan (MQF6). <i>Work autonomously by showing leadership during social activities (MQF6)</i>
PLO9	Melibatkan diri dengan pembelajaran terarah sendiri dan sepanjang hayat serta menunjukkan kompetensi keusahawanan dalam projek terpilih (MQF7). <i>Involve in directed self-learning and lifelong learning through competence entrepreneurship in selected projects (MQF7)</i>
PLO10	Berpegang kepada etika dan kod amalan profesional serta menunjukkan pengetahuan yang jelas terhadap isu tempatan dan global (MQF8). <i>Adhere to professional ethics and codes of practice and demonstrate clear knowledge of local and global issues (MQF8)</i>

8. Kemahiran yang boleh dipindahkan (jika berkaitan) / *Transferable Skills (if applicable)*

1	Kemahiran siasat <i>Investigative skills</i>
2	Kemahiran berkumpulan <i>Team work skills</i>
3	Kemahiran menyelesaikan masalah <i>Problem-solving skill</i>

9. Pengagihan Jam Pembelajaran Pelajar / *Distribution of Student Learning Time (SLT)*

Week	Course Content Outline	CLO			Conventional						Online				SLT
					Guided Learning (F2F)				Guided Learning (NF2F)	Independent Learning (NF2F)	Learning Material		Activities		
		CLO1	CLO2	CLO3	L	T	P	O			Guided	Non Guided	Guided	Non Guided	
1-2	Struktur pepejal Susunan Atom Berkala Atom, Jenis Kisi Fundamental, Sistem Indeks Untuk Pesawat Kristal, struktur Kristal Sederhana, Pencitraan Langsung Struktur Atom, dan Struktur Kristal Nonideal. Structure of solids <i>Periodic Arrays of Atoms, Fundamental Types of Lattices, Index System For Crystal Planes, Simple Crystal structures, Direct Imaging of Atomic Structure, and Nonideal Crystal Structure.</i>	✓	✓	✓	6	0	0	0	1	1	0	2	0	0	10

3-4	Pembelauan gelombang dan kekisi timbalbalik Difraksi gelombang Oleh Kristal, Amplitud Gelombang Tersebar, Zon Brillouin, dan Analisis Fourier dari Asas. Wave Diffraction & Reciprocal Lattice <i>Diffraction of wave By Crystal, Scattered Wave Amplitude, Brillouin Zones, and Fourier Analysis of The Basis</i>	✓	✓		0	0	0	0	0	2	0	6	0	6	14
5	Ikatan Kristal Kristal Gas Inert, Kristal Ionik, Kristal & Logam Kovalen, Ikatan Hidrogen, Sinaran Atom, Analisis Strain Elastik, Pematuhan Elastik & Pemalar Kekakuan, dan Gelombang Elastik Dalam Kristal Kubik Crystal binding <i>Crystal of Inert Gases, Ionic Crystal, Covalent Crystal & Metal, Hydrogen Bonds, Atomic Radii, Analysis of Elastic Strains, Elastic Compliance & Stiffness Constants, and Elastic Waves In Cubic Crystals</i>	✓	✓		0	0	0	0	1	1	0	5	0	6	13
6-7	Getaran Kristal Getaran Kristal dengan Asas Monatom, Dua Atom setiap Asas Primitif, Kuantasi Gelombang Elastik, Momentum Fonon, Penyerakan Inelastik Oleh Fonon Crystal Vibrations <i>Vibrations of Crystals with Monatomic Basis, Two Atoms per Primitive Basis, Quantization of Elastic Waves, Phonon Momentum, Inelastic Scattering By Phonons</i>	✓	✓		0	0	0	0	0	1	0	6	0	6	13
8	Pencirian terma Kapasiti Haba Fonon, Interaksi Kristal Anharmonik, Kekonduksian Termal, Kekonduksian Elektrik Thermal Properties <i>Phonon Heat Capacity, Anharmonic Crystal Interactions, Thermal Conductivity, Electrical Conductivity</i>	✓	✓		0	0	0	0	1	1	0	4	0	5	11

9-10	Kekonduksian Elektrik: Gas Fermi Elektron Bebas Tahap Tenaga Dalam Satu Dimensi, Kapasiti Haba Gas Elektron, Kekonduksian Elektrik, dan Gerakan Di Medan Magnetik (Kesan Hall). Electrical Conductivity: Free Electron Fermi Gas <i>Energy Levels In One Dimension, Heat Capacity of The Electron Gas, Electrical Conductivity, and Motion In Magnetic Fields (Hall Effect).</i>	✓	✓		1	0	0	0	0	1	0	2.5	0	2.5	7
11-12	Jalur tenaga Model Elektron Hampir Bebas, Fungsi Bloch & Model Kronig-Penney, Persamaan Gelombang Elektron Dalam Potensi Berkala, dan Bilangan Orbital Dalam Pita. Energy band <i>Nearly Free Electron Model, Bloch Functions & Kronig-Penney Model, Wave Equation of Electron In a Periodic Potential, and Number of Orbitals In a Band.</i>		✓		2	0	0	0	0	0	0	0	0	0	2
13-14	Kristal Semikonduktor Jurang Band, Persamaan Gerakan, Kepekatan Pembawa Intrinsik, Kekonduksian Kekotoran, Kesan Thermoelectric dan Semimetals & Superlattices. Semiconductor Crystals <i>Band Gap, Equations of Motion, Intrinsic Carrier Concentration, Impurity Conductivity, Thermoelectric Effects and Semimetals & Superlattices.</i>	✓		✓	2	0	0	0	0	2	0	3	0	3	10
TOTAL					11	0	0	0	3	9	0	28.5	0	28.5	80
Continuous Assessment					Percentage (%)					Conventional		Online	SLT		
										F2F	NF2F				
1	Kuiz Dalam Talian (<i>Online Quiz</i>)				20						0	10	10		
2	Ujian (<i>Test</i>)				20					2	4		6		
3	Persembahan (<i>Presentation</i>)				20					2	5	5	12		
TOTAL					60					4	9	15	28		

Final Assessment		Percentage (%)	Conventional		Online	SLT
			F2F	NF2F		
1	Peperiksaan Akhir (<i>Final Examination</i>)	40	3	9		12
TOTAL		40	3	9	0	12
GRAND TOTAL						120

10. Keperluan Khas / *Special Requirement*

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11. Rujukan / *Reference*

Sharon Ann Holgate. (2021). Understanding Solid State Physics. Florida, United States: CRC Press

Luciano Colombo. (2021). Solid State Physics: A Primer. Bristol, United Kingdom: IOP Publishing.

David W. Snoke. (2020). Solid State Physics: Essential Concepts. Cambridge, United Kingdom: Cambridge University Press.

Joginder Singh Galsin. (2019). Solid State Physics: An Introduction to Theory. Massachusetts, United States: Academic Press.

Sharma, K. K. & Satyal, B. S. (2018). Solid State Physics. New Delhi, India: Kalyani Publishers.

Amnon Aharony & Ora Entin-Wohlman. (2018). Introduction to Solid State Physics. Singapore: World Scientific Publishing.

12. Maklumat Tambahan Lain / *Others Additional Information*

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13. Pengesahan / *Verification*

	Disediakan/ Dikemaskini oleh: <i>Prepared/ Updated by:</i>	Disemak oleh: <i>Checked by:</i>
Nama: <i>Name:</i>	PROFESOR MADYA DR. FARIDAH LISA BINTI SUPIAN	DR. MOHD FAUDZI BIN UMAR
Jawatan: <i>Designation:</i>	Penyelaras Kursus <i>Course Coordinator</i>	KETUA JABATAN
Tarikh: <i>Date:</i>	13 MARCH 2024	13 MARCH 2024

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