

1. Maklumat Kursus / Course Info

Nama Kursus: Course Name:	Fizik Moden dan Fizik Kuantum / Modern and Quantum Physics		
Kod Kursus: Course Code:	SFT3093	Nilai Kredit: Credit Value:	3

2. Sinopsis / Synopsis

Kursus ini membincangkan Fizik Moden dan Fizik Kuantum, mengandungi topik-topik berikut: Relativiti, Foton, Elektron dan Atom, Tabii Gelombang Zarah, Mekanik Kuantum, Struktur Atom & Molekul dan Jirim Terkondensi.

The course discusses Modern Physics and Quantum Physics consists of the following topics: Relativity, Photons, Electrons and Atoms, The Wave Nature of Particles, Quantum Mechanics, Atomic Structure & Molecules and Condensed Matter.

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

1. Profesor Madya Dr. Faridah Lisa binti Supian
2. Dr. Mohd Faudzi bin Umar

4. Semester dan Tahun / Semester and Year Offered

Semester: Semester:	1	Tahun: Year:	3
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5. Prasyarat (jika ada) / Prerequisite (if any)

1. Mekanik (SFT3033)
2. Getaran, Gelombang dan Optik (SFT3023)
3. Keelektromagnetan (SFT3013)

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

CLO1	Menganalisa konsep dan hukum asas fizik bagi teori kerelatifan khas, fizik kuantum, fizik atom dan jirim pepejal <i>Analyse the concepts and fundamental physical laws of the special theory of relativity, quantum physics, atomic physics, and condensed-matter physics</i>	C4
CLO2	Menghubungkan kemahiran dan pengetahuan saintifik hasil daripada perkembangan ilmu fizik moden abad ke-21 <i>Relate the use of scientific skills and knowledge brought about by the advancement of modern physics in the 21st century</i>	C5
CLO3	Mempamerkan kemahiran berkomunikasi ketika sesi perbincangan penyelesaian masalah dan tugas <i>Demonstrate communication skills in discussion of problems solving and assignments</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		✓									- e-Pembelajaran / e-Learning - Perbincangan / Discussion - Kuliah / Lecture	- Kuiz Dalam Talian / Online Quiz - Ujian / Test - Peperiksaan Akhir / Final Examination
CLO2									✓		- e-Pembelajaran / e-Learning - Perbincangan / Discussion - Kuliah / Lecture	- Penulisan Ilmiah / Academic Writing - Peperiksaan Akhir / Final Examination
CLO3				✓							- e-Pembelajaran / e-Learning - Perbincangan / Discussion - Kuliah / Lecture	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 (MQF2).</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 menyelesaikan masalah <i>Problem solving skill</i>
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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	
1-3	<u>Relativiti</u> Relativiti Galilean-Newtonian, relativiti khas, pemanjangan masa, pengecutan panjang, kesan Doppler, tenaga relativistik. <u>Relativity</u> <i>Galilean-Newtonian relativity, Special relativity, Time dilation, Length contraction, Doppler effect, Relativistic energy.</i>	✓	✓	✓	6	0	0	0	0	6	3	3	0	0	18

4-6	Fizik Kuantum Sinaran jasad hitam & hipotesis Planck, kesan fotoelektrik, panjang gelombang de Broglie, kesan Compton, belauan Davisson-Germer, penghasilan sinar x, penghasilan laser, penghasilan pasangan, prinsip ketakpastian Heisenberg.	✓	✓		7	0	0	0	0	7	2	2	0	0	18
	Quantum Physics <i>Blackbody radiation & Planck hypothesis, Photoelectric effect, de Broglie wavelength, Compton effect, Davisson-Germer diffraction, x-ray production, laser production, pair production, Heisenberg uncertainty principle.</i>														
7-9	Mekanik Kuantum Gelombang dan fungsi gelombang, tafsiran Born, persamaan Schrodinger; zarah bebas, keupayaan kotak, dan pengayun harmonik.	✓		✓	7	0	0	0	0	8	2	2	0	0	19
	Quantum Mechanics <i>Wave, and wavefunction, Born interpretation, Schrodinger equation; free particles, box potential, harmonic oscillator.</i>														
10-12	Fizik atom Model atom Thompson, Rutherford. Penyelesaian Schrodinger bagi atom Hidrogen, nombor kuantum n, l, m. Spin elektron dan kesan Zeemann, Atom elektron banyak dan prinsip pengecualian Pauli.	✓	✓		7	0	0	0	0	7	2	2	0	0	18
	Atomic physics <i>Thompson, Rutherford' model. Bohr's Hydrogen atom. Schrodinger solution for Hydrogen atom, quantum number n, l, m. Electron spin and Zeeman Effect. Many electrons atom, Exclusion principle.</i>														
13-14	Fizik Molekul Jenis ikatan molekul, struktur pepejal, tenaga jalur, Model Elektron bebas logam, ketumpatan keadaan dan semikonduktor.	✓	✓		4	0	0	0	0	3	2	2	0	0	11
	Molecule Physics <i>Types of Molecular Bonds, Structure of Solids, Energy Bands, Free-Electron Model of Metals, Density of states, Semiconductors,</i>														

TOTAL						31	0	0	0	0	31	11	11	0	0	84
Continuous Assessment						Percentage (%)		Conventional			Online		SLT			
								F2F		NF2F						
1	Kuiz Dalam Talian (<i>Online Quiz</i>)					20						9		9		
2	Ujian (<i>Test</i>)					20		2		3				5		
3	Penulisan Ilmiah (<i>Academic Writing</i>)					10						4		4		
4	Persembahan (<i>Presentation</i>)					10						4		4		
TOTAL						60		2		3		17		22		
Final Assessment						Percentage (%)		Conventional			Online		SLT			
								F2F		NF2F						
1	Peperiksaan Akhir (<i>Final Examination</i>)					40		3		11				14		
TOTAL						40		3		11		0		14		
GRAND TOTAL														120		

10. Keperluan Khas / *Special Requirement*

Tiada.

None.

11. Rujukan / *Reference*

Main References:

Young, H.D. & Freedman, R.A. (2014). University Physics with Modern Physics (14th ed). Singapore : Pearson Addison Wesley.

Young, H.D. & Freedman, R.A. (2020). University Physics (15th ed). Singapore : Pearson Addison Wesley

Additional References:

Giancoli, D. C. (2014) Physics: Principles with Applications, 7th Edition. Singapore: Pearson Addison Wesley.

Knight, R.D. (2013). Physics for Scientists and Engineers with Modern Physics: A strategic approach. San Francisco: Pearson Addison Wesley.

12. Maklumat Tambahan Lain / Others Additional Information

Tiada.

None.

13. Pengesahan / Verification

	Disediakan/ Dikemaskini oleh: <i>Prepared/ Updated by:</i>	Disemak oleh: <i>Checked by:</i>
Nama: Name:	DR. MOHD FAUDZI BIN UMAR	PROFESOR MADYA DR. SOM CIT A/P SI NANG
Jawatan: Designation:	Penyelaras Kursus <i>Course Coordinator</i>	TIMBALAN DEKAN (AKADEMIK DAN ANTARABANGSA)
Tarikh: Date:	26 MARCH 2024	02 APRIL 2024

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