

1. Maklumat Kursus / Course Info

Nama Kursus: Course Name:	Topik-topik Khas Fizik / Special Topics in Physics		
Kod Kursus: Course Code:	SFU3063	Nilai Kredit: Credit Value:	3

2. Sinopsis / Synopsis

Kursus ini mendedahkan pelajar kepada perkembangan ilmu terkini dalam bidang Fizik antaranya, pendidikan fizik, fizik asas dan fizik gunaan yang menggalakkan Kemahiran Berfikir Aras Tinggi (KBAT). Kursus ini juga meneroka isu-isu semasa dan terkini dalam topik-topik berikut: Pendidikan Fizik, Sumber Tenaga, Fizik Zarah dan Kosmologi serta Fizik Bahan.

This course exposes students with the latest advancement in the field of Physics such as frontier in physics, physics education, fundamental and applied physics that promotes Higher Order Thinking Skills (HOTS). This course also explores current issues and advancement in the following topics: Physics Education, Energy Sources, Particle Physics and Cosmology and Materials.

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

1. Dr. Siti Nursaila Binti Alias
2. Dr. Anis Diyana Bt Halim

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	Menganalisa perkembangan dan trend terkini dalam ilmu fizik <i>Analyze the current interest and trend in the field of physics</i>	C4
CLO2	Mempamerkan kemahiran berkomunikasi dalam perbincangan penyelesaian masalah dan tugas <i>Demonstrate communication skills in discussion of problem solving and assignments</i>	A3
CLO3	Melaksanakan aktiviti sosial dan kemasyarakatan bagi kepimpinan pelajar <i>Organize community and social activities for students leadership</i>	A4

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 - Kuliah / Lecture	- Peperiksaan Akhir / Final Examination - Kuiz / Quiz
CLO2				✓							- Projek / Project - Pembentangan / Presentation	- Pentaksiran Persembahan / Presentation Assessment - Tugasan (Individu) / Assignment (Individual)
CLO3								✓			Projek / Project	Tugasan (Berkumpulan) / Assignment (Group)

(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 berkomunikasi <i>Communication skills</i>
2	Bekerja dalam kumpulan <i>Work in team</i>
3	Kemahiran menyelesaikan masalah <i>Problem solving skills</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	<u>Pendidikan Fizik</u> -Kenapa belajar Fizik? -Apa itu Fizik? -Bagaimana Fizik dilakukan? -Bagaimana untuk mempelajari Fizik? -Skop Fizik. -Peranan Matematik dan pengiraan dalam Fizik. -Fizik dan fenomena dalam kehidupan harian. <u>Physics Education</u> -Why Learn Physics? -What is Physics? -How is Physics done? -How do you learn Physics? -The scope of Physics. -The role of Mathematics and measurements in Physics. -Physics and everyday phenomena	✓		✓	0	0	0	0	2	8	4	0	0	0	14
3	<u>Pendidikan Fizik</u> -Pengajaran dan Pembelajaran (PdP) Fizik. -Kajian Pendidikan Fizik (KPF) – Bagaimana KPF membantu untuk menambah baik PdP? -Pengetahuan Kandungan Teknologi dalam PdP Fizik. -Inovasi dalam PdP. <u>Physics Education</u> -Physics Teaching and Learning (T&L). -Physics Education Research (PER) – How PER helps improve T&L? -Technology Content Knowledge in T&L Physics. -Innovation in T&L.	✓	✓	✓	0	0	0	0	2	4	1	0	0	0	7

4	Pendidikan Fizik -Fizik melalui gambar rajah – ilustrasi: Daripada teks kepada ringkasan topik dan kunci konsep/idea-idea. -Peta konsep. -Makmal mini, penyelesaian masalah, Sains dan masyarakat, projek. -Kemahiran Sains dalam masalah-masalah Fizik GCSE. -Sains, seni dan agama.	✓	✓	✓	0	0	0	0	2	4	1	0	0	0	7
	Physics Education -Physics through diagram – illustrations: From text to topic summary and key concept/ideas. -Concepts maps. -Mini-labs, Problem solving, Science and society, projects. -Science skills in GCSE Physics problems. -Science, art and religion.														
5	Sumber-Sumber Tenaga -Reaktor nuklear: pembelahan dalam uranium semulajadi. -Jenis reaktor – Kawalan, kestabilan dan kemalangan-kemalangan. -Bom atom. -Loji-loji tenaga nuklear berbanding loji-loji bahan api fosil. -Sisa dan pengawalan nuklear.	✓	✓		1	0	0	1	1	3	0	0	0	0	6
	Energy Sources -Nuclear reactor: Fission in natural uranium. -Reactor types – Control, stability and accidents. -Atomic bomb. -Nuclear power plants versus fossil fuel plants. -Nuclear wastes and proliferation.														
6	Sumber-Sumber Tenaga -Pelakuran nuklear: keratan rentas pelakuran. -Pelakuran dan pencucuhan termonuklear. -Kritikan dan kriteria Lawson. -Prospek-prospek luar biasa untuk penjanaan kuasa.	✓	✓		1	0	0	1	1	3	0	0	0	0	6
	Energy Sources -Nuclear fusion: fusion cross sections. -Thermonuclear fusion and ignition. -Confinement and Lawson criterion. -Stellar prospects for power generation.														

7	Sumber-Sumber Tenaga -Sumber tenaga boleh diperbaharui: Pengenalan kepada proses pemindahan tenaga. -Tenaga-tenaga solar, geoterma, angin, ombak dan biofuel. Energy Sources -Renewable energy sources: Introduction to energy transfer process. -Solar, geothermal, wind, wave and bio-fuel energies.	✓	✓		1	0	0	1	1	3	0	0	0	0	6
8-10	Fizik Zarah dan Kosmologi -Daya-daya asas dan zarah-zarah pertukaran. -Zarah-zarah asas. -Model-model Quarks. -Teori-teori penyatuan daya. -Model standard dan alam semesta awalan. -Atom nuklear. -Jasad hitam. Particle Physics and Cosmology -Fundamental forces and exchange of particles. -Elementary particles. -The Quarks models. -Force unification theories. -The standard model and the early universe. -Nuclear atom. -Dark matter.	✓	✓		3	0	0	3	3	9	0	0	0	0	18
11	Pengenalan Kepada Sains dan Kejuruteraan Bahan -Sains dan kejuruteraan bahan: Perspektif sejarah. -Sains dan kejuruteraan bahan. -Kenapa belajar Sains dan kejuruteraan bahan? -Pengelasan bahan-bahan. -Bahan-bahan termaju. -Keperluan bahan-bahan moden. Introduction to Materials Science and Engineering -Materials science and engineering: Historical perspective. -Materials science and engineering. -Why study materials science and engineering? -Classification of materials. -Advanced materials. -Modern materials' needs.	✓	✓		1	0	0	1	1	4	0	0	0	0	7

12	Pengenalan Kepada Sains dan Kejuruteraan Bahan -Sains dan kejuruteraan bahan: Korelasi-kolerasi pemprosesan/struktur/sifat-sifat/prestasi. -Sepuluh bahan-bahan ajaib yang akan mengubah dunia. Introduction to Materials Science and Engineering -Materials Science and Engineering: Processing/structure/properties/performance correlations. -Ten wonder materials that will change the world.	✓	✓		1	0	0	1	1	4	0	0	0	0	7
13-14	Bahan-bahan dan Masyarakat -Pertimbangan ekonomi – Reka bentuk komponen, bahan-bahan, teknik-teknik pembuatan. -Pertimbangan alam sekitar dan sosial – Isu-isu kitar semula dalam sains dan kejuruteraan bahan. -Bahan-bahan yang penting. Materials and Society -Economic consideration – Component design, materials, manufacturing techniques. -Environmental and societal Considerations – Recycling issues in materials science and engineering. -Materials of importance.	✓	✓	✓	2	0	0	2	2	8	0	0	0	0	14
TOTAL					10	0	0	10	16	50	6	0	0	0	92

Continuous Assessment		Percentage (%)	Conventional		Online	SLT
			F2F	NF2F		
1	Kuiz (Quiz)	20	2	4	0	6
2	Pentaksiran Persembahan (Presentation Assessment)	5	1	1	0	2
3	Tugasan (Individu) (Assignment (Individual))	15	0	4	0	4
4	Tugasan (Berkumpulan) (Assignment (Group))	20	0	6	0	6
TOTAL		60	3	15	0	18
Final Assessment		Percentage (%)	Conventional		Online	SLT
			F2F	NF2F		
1	Peperiksaan Akhir (Final Examination)	40	2	8	0	10

TOTAL	40	2	8	0	10
GRAND TOTAL					120

10. Keperluan Khas / *Special Requirement*

Tiada

None

11. Rujukan / *Reference*

Main Reference

Ostdiek, V.J. & Bord, D.J. (2018). Inquiry into Physics (8th ed). Belmont, CA: Brooks/Cole Cengage Learning.

Additional References

Beiser, A. (2008). Concepts of Modern Physics (7th ed). ISE: McGraw Hill

Bennetts, J. Milner. B. & Sang, D. (1992). Science Skills – Problems in GCSE Physics. London: Hodder & Stoughton

Callister, W.D. & Rethwisch, D.G. (2011). Materials Science and Engineering (8th ed). Singapore: John Wiley & Sons.

Giancoli, D.C. (2011). Physics for Scientists and Engineers with Modern Physics (4th ed). Singapore: Prentice-Hall.

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

Young, H.D. & Freedman, R.A. (2020). University Physics with Modern Physics (15th ed). United States of America: Pearson Education, Inc.

12. Maklumat Tambahan Lain / *Others Additional Information*

Kursus ini menerapkan salah satu elemen *High-Impact Educational Practices* (HIEPs) iaitu *Service Learning Malaysia - University For Society* (SULAM).

This course embeds one of the High-Impact Educational Practices (HIEPs) elements which is Service Learning Malaysia - University For Society (SULAM).

13. Pengesahan / Verification

	Disediakan/ Dikemaskini oleh: <i>Prepared/ Updated by:</i>	Disemak oleh: <i>Checked by:</i>
Nama: <i>Name:</i>	DR. SITI NURSAILA BINTI ALIAS	DR. MOHD FAUDZI BIN UMAR
Jawatan: <i>Designation:</i>	Penyelaras Kursus <i>Course Coordinator</i>	KETUA JABATAN
Tarikh: <i>Date:</i>	22 MARCH 2024	23 MARCH 2024

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