UNIVERSITI TEKNOLOGI MARA

PHY098: FOUNDATION PHYSICS II

Course Name (English)	FOUNDATION PHYSICS II APPROVED
Course Code	PHY098
MQF Credit	5
Course Description	This is the second of the two-semester course in Foundation Physics for students at the Centre of Foundation Studies. This 5 credit course is focuses on the basic knowledge in areas of electricity & magnetism, geometrical & physical optics, atomic physics and nuclear science.Applications in various areas will be discussed. The purpose of this course is to provide students with strong physics concepts, analytical and problem-solving skills and to expose students to the scientific analytical analysis in order to develop long-term retention of principles and practice needed in their future studies by thorough guidance methods, in-class exercises, group project and lab work. By the end of this course, students are expected to acquire and apply knowledge of physics to respective fields of medicine, health, environment, agriculture, industry and engineering.
Transferable Skills	Students demonstrate ability to identify and articulate self skills, knowledge and understanding confidently in a variety of contexts.
Teaching Methodologies	Lectures, Lab Work, Tutorial, Web Based Learning, Presentation, Small Group Sessions , Peer Practice, Collaborative Learning
CLO	CLO1 Use the knowledge, utilizing algebraic approach, the behaviour of matter interacting with energy in the fields of electricity, magnetism, optics, atomic physics and nuclear science CLO2 Display basic scientific skills in the fields of electricity, magnetism and optics CLO3 Demonstrate positive values and attitudes in basic scientific investigation in the fields of electricity, magnetism and optics CLO4 Deconstruct issues and propose solutions scientifically using the knowledge in the fields of electricity, magnetism, optics, atomic physics and nuclear science.
Pre-Requisite Courses	No course recommendations

Topics
1. Electric charges, forces and fields 1.1) Electric charges 1.2) Insulators and conductor 1.3) Coulomb's law 1.4) Electric fields 1.5) Electric field lines 1.6) Shielding and charging by induction 1.7) Electric flux and gauss's law
2. Electric potential and electric potential energy 2.1) Electric potential energy and the electric potential 2.2) Energy conservation 2.3) The electric potential of point charges 2.4) Equipotential surfaces and the electric field 2.5) Capacitors and dielectrics 2.6) Electrical energy storage

3. Electric current and direct-current circuits 3.1) Electric current 3.2) Resistance and ohm's law 3.3) Energy and power in electric circuits 3.4) Resistors in series and parallel 3.5) Kirchhoff's Rules 3.6) Circuits containing capacitors 3.7) RC circuits 3.8) Ammeters and Voltmeter
4. Magnetism 4.1) The magnetic field 4.2) The magnetic force on moving charges 4.3) The motion of charged particles in a magnetic field 4.4) The magnetic exerted on a current carrying wire 4.5) Loops of current and magnetic torque 4.6) Electric currents, magnetic fields, and ampere's law 4.7) Current loops and solenoids
5. Magnetic flux and Faraday's law of induction 5.1) Induced electromotive force 5.2) Magnetic flux 5.3) Faraday's law induction 5.4) Lenz's law 5.5) Generators and motors 5.6) Inductance 5.7) Transformers
6. Alternating-current circuits 6.1) Alternating voltage and currents 6.2) Capacitors in ac circuits 6.3) RC circuits 6.4) Inductance in ac circuits 6.5) RLC circuits 6.6) Resonance 6.7) Magnetic field near a straight wire and solenoid
7. Electromagnetic waves 7.1) Introduction to electromagnetic waves 7.2) Polarization
8. Geometrical optics 8.1) The reflection of light 8.2) Forming image with a plane mirror 8.3) Spherical mirrors 8.4) Ray tracing and the mirror equation 8.5) The refraction of light 8.6) Ray tracing of lenses 8.7) The thin-lens equation
9. Physical optics: interference and diffraction 9.1) Superposition and interference 9.2) Young's two-slit experiment 9.3) Diffraction
10. Quantum physics 10.1) Blackbody radiation and Planck's hypothesis of quantized energy 10.2) Photons and the photoelectric effect 10.3) The mass and momentum of a photon 10.4) The de Broglie hypothesis and wave-particle duality
11. Atomic physics 11.1) Early models of the atom 11.2) The spectrum of atomic hydrogen 11.3) Bohr's model of the hydrogen atom
12. Nuclear physics and nuclear radiation 12.1) The constituents and structure of nuclei 12.2) Radioactivity 12.3) Half-life and radioactive dating 12.4) Nuclear binding energy 12.5) Nuclear fission 12.6) Nuclear fusion

Assessment Breakdown	%
Continuous Assessment	100.00%

Details of Continuous Assessment

Assessment Type	Assessment Description	% of Total Mark	CLO
Assignment	Group or individual assignment to emphasize problem solving skills in the field of electricity, magnetism, optics, atomic and nuclear science (MQF 3).	10%	CLO4
Final Test	Online assessment with 25 MCQ and 4 structure questions via Google Classroom. 3 hours	50%	CLO1
Lab Exercise	Individual performance of student based on two scientific investigations to emphasize the attribute of proficiency (MQF 2).	10%	CLO2
Presentation	Individual performance of student based on scientific investigation by group presentation to emphasize the attribute of values and attitudes (MQF 4).	10%	CLO3
Quiz	Quiz which requires students use algebraic approach to solve the problems involved matter interacting with energy in the fields of electricity, magnetism, optics, atomic physics and nuclear science which emphasize the attribute of knowledge (MQF 1) Quiz 1: Chapter 15 Quiz 2: Chapter 19 & 20	5%	CLO1
Test	Mid–term test which require students use algebraic approach to solve the problems involved matter interacting with energy in the fields of electricity, magnetism, optics, atomic physics and nuclear science which emphasize the attribute of knowledge (MQF 1).	15%	CLO1

Reading List

Recommended Text	• **Raymond A. Serway,Chris Vuille, *College Physics*, 11th Ed., 30, Cengage Learning [ISBN: 9781337620338]**
Reference Book Resources	• **Walker, J.S. 2015, *Physics*, 5th Ed., Pearson [ISBN: 978-032197644]** • **Douglas C. Giancoli 2013, *Physics for Scientists and Engineers with Modern Physics*, 7th Ed., Pearson Education [ISBN: 0131495089]** • **John D. Cutnell, Kenneth W. Johnson 2013, *Physics*, 9th Ed., Wiley [ISBN: 9780470879528]** • **Randall D. Knight 2012, *Physics for Scientists and Engineers: A Strategic Approach, Vol. 1*, 3rd Ed., Addison-Wesley [ISBN: 0321752910]**

Article/Paper List	This Course does not have any article/paper resources
Other References	This Course does not have any other resources