



UNIVERSITI TEKNOLOGI MARA

COURSE INFORMATION

Confidential

Code	: PHY412
Course	: Physics III: Electricity and Mechanism
Level	: Degree
Credit Unit	: 4
Contact Hour/SLT	: F2F-(6hrs-workshop)
Part	: 4
Course Status	: Core
Prerequisite	: Physics III
Course Outcomes	: Upon completion of this course, students will be able to: <ol style="list-style-type: none">1. Explain the conceptual knowledge involved in electrostatics, electricity & magnetism. (LO1-C2)2. Safely manipulate equipments used in electricity and magnetism scientific inquiries (LO2-P3).3. Demonstrate scientific inquiries in electricity and magnetism. (LO3-CTPS3)
Course Description	: This course begins with identifying learner's prior knowledge in electricity and magnetism, their learning preferences and their scientific beliefs via standardized inventories followed by introducing learners to methods of visualizing knowledge via concept mapping. The course learning outcomes support development of the learner's knowledge in physics, their manipulative and science inquiries. Attainment of the learning outcomes is supported by themes inclusive of concepts, laws, principles, qualitative and quantitative reasoning and lab investigative skills. Concepts, principles and laws will be described, discussed and explained interchangeably by instructors and students in an active engagement, learner-paradigm environment after the students have explored and

Nama Fakulti / Pusat Pengajian: Fakulti Sains Gunaan Tahun: 2011

Nama Program: Ijazah Sarjana Muda Pendidikan (Kepujian-Fizik)

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investigated events via simulation and lab inquiries. Evidence FOR learning will be gathered through continuous formative assessment tasks while evidence of outcome attainment and performance will be gathered via summative assessment tasks such as assignments, projects, and written tests. Scoring of the tasks will be based on analytical rubrics and grading of the tasks shall be based on peer, self and instructor's assessment. The face-to-face- teaching & learning activities (TLAs) will be a combination of direct-instruction and active engagement while the non-face-to-face TLAs include learners' engagement with the content via simulation, pre and post learning tasks, pre-assessment activities, assessment activities, informal social network, internet communication and other means of digital communication.

Syllabus Content

1.0 Introduction: Diagnostics and Learning Skills

- 1.1 Learning Styles & Views on Science.
- 1.2 Conceptual Survey in Electricity & Magnetism.
- 1.3 Concept Mapping.

2.0 Electrostatics

- 2.1 Charged objects and electric (Coulomb's) force.
- 2.2 Properties of conductors and insulators.
- 2.3 Charging by contact, induction and friction.

Lab 1:

PHET simulation "Balloons & Static Electricity"

Lab Investigation: "Introduction to Static Electricity".

3.0 Electrostatics

- 3.1 Coulomb's Law.
- 3.2 Electric Field.
- 3.3 Electrical field lines.
- 3.4 Electrical field in conductors.

Lab 2:

PHET simulation

- i. "Electric Field Hockey,
- ii. "Vector-Math"
- iii. "Charges and Fields".

Lab Investigation: "Electrical Force & Electrical Field".

- 4.0 Electric Potential Energy, Electric Potential and Capacitance
 - 4.1 Potential energy
 - 4.2 Electric potential difference
 - 4.3 Electric potential difference created by point charges
 - 4.4 Capacitors and dielectrics
 - 4.5 Capacitors in series and parallel
 - 4.6 *RC* circuits
 - 4.7 Charged objects and electric force

Lab 3:

PHET simulation

- i. "Electric Field Hockey,
- ii. "Charges and Fields".

Lab Investigation: "Introduction to Electric Potential".

- 5.0 Resistance, Resistivity & Ohm's Law
 - 5.1 Electromotive force and current
 - 5.2 Ohm's law
 - 5.3 Resistance and resistivity
 - 5.4 Electric power
 - 5.5 Series and parallel wiring
 - 5.6 Circuits wired partially in series and partially in parallel

Lab 4:

Lab Investigation: "Capacitors, Capacitance, Series & Parallel Circuit".

- 6.0 Electric Circuits & Kirchoff's Laws
 - 6.1 Simple circuit & Ohm's Law
 - 6.2 Complex 3-loop circuit & Kirchoff's laws

Lab 5:

PHET simulation: "Circuit Construction Kit (DC Only)"

Lab Investigation: "Batteries & Bulbs: Voltage, Current & Resistance".

- 7.0 Magnetic Field & Magnetic Forces
 - 7.1 Magnetic field lines of permanent magnets.
 - 7.2 Magnetic force that a magnetic field exerts on moving charges.

- 7.3 Motion of a charged particle in a magnetic field.
- 7.4 Motion of charges in magnetic & electric fields.
- 7.5 Mass spectrometer & velocity selectors.
- 7.6 Force on a current-carrying conductor in a magnetic field.

Lab 6:

PHET simulation: "Circuit Construction Kit (DC Only)"

Lab Investigation: "Resistance, Ohm's Law & Kirchoff's Law".

- 8.0 Magnetic force on current-carrying conductors & magnetic field produced by current-carrying conductors
 - 8.1 Torque on a current-carrying coil.
 - 8.2 Electric motors.
 - 8.3 Magnetic fields infinitely long wire.
 - 8.4 Magnetic field produced at the centre of circular wires.
 - 8.5 Magnetic field of solenoids.
 - 8.6 Force between current-carrying wires.

Lab 7:

PHET simulation: "Faraday's Electromagnetic Lab"

Lab Investigation: "Magnetic Field & Magnetic Force on Electric Charges".

- 9.0 Electromagnetic Induction
 - 9.1 Magnetic flux
 - 9.2 Faraday's Law of electromagnetic induction
 - 9.3 Motional emf
 - 9.4 Lenz's Law of electromagnetic Induction
- 10.0 Electric Generators, Inductors and Transformers
 - 10.1 Induced current in coils moving in magnetic field.
 - 10.2 Electric generators.
 - 10.3 Self and Mutual Inductance
 - 10.4 Transformers.
- 11.0 Alternating Current Circuits and Electromagnetic
 - 11.1 Resistors in an AC Circuits
 - 11.2 Capacitors in an AC Circuit
 - 11.3 Inductors in an AC Circuit
 - 11.4 The RLC Series Circuit Power in an AC Circuit

11.5 Resonance in a series RLC Circuit

Instructional Strategy:	Predict → Observe → Do → Synthesize (PODS) Cycle																	
Active Learning	:	i. Scientific investigation via simulations and laboratories experiences.																
Instructional Methods:		ii. Active engagement via lecture-discussion & cooperative group discussion.																
Workshop, interactive lecture, labs and		iii. Critical assessment of findings.																
Cooperative group discussion		iv. Synthesising of results with existing laws, theories and principles.																
Assessment	:	Continuous Assessment (Formative & Summative): 70%																
		<table border="0" style="width: 100%;"> <tr> <td style="padding-left: 20px;">CLO1: Cognitive Assessment Tasks 30%</td> </tr> <tr> <td style="padding-left: 40px;"> <table border="0"> <tr> <td>▪ Formative: (Concept Maps, Letter to a friend, quizzes)</td> </tr> <tr> <td style="padding-left: 20px;">▪ Summative: Test 20%</td> </tr> <tr> <td style="padding-left: 20px;">▪ Summative: Assignment 10%</td> </tr> </table> </td> </tr> <tr> <td style="padding-left: 20px;">CLO2: Practical Skills Assessment Tasks 20%</td> </tr> <tr> <td style="padding-left: 40px;"> <table border="0"> <tr> <td>▪ Formative: 3 Lab Journals</td> </tr> <tr> <td style="padding-left: 20px;">▪ Summative: 2 Lab Journals 10%</td> </tr> <tr> <td style="padding-left: 20px;">▪ Summative: Lab Performance Exam 10%</td> </tr> </table> </td> </tr> <tr> <td style="padding-left: 20px;">CLO3: Science & Reasoning Skills 20%</td> </tr> <tr> <td style="padding-left: 40px;"> <table border="0"> <tr> <td>Formative: Assignment</td> </tr> <tr> <td>Summative: Assignment 10%</td> </tr> <tr> <td>Summative: Lab Performance Exam 10%</td> </tr> </table> </td> </tr> <tr> <td style="padding-left: 20px;">CLO1: Final exam 30%</td> </tr> </table>	CLO1: Cognitive Assessment Tasks 30%	<table border="0"> <tr> <td>▪ Formative: (Concept Maps, Letter to a friend, quizzes)</td> </tr> <tr> <td style="padding-left: 20px;">▪ Summative: Test 20%</td> </tr> <tr> <td style="padding-left: 20px;">▪ Summative: Assignment 10%</td> </tr> </table>	▪ Formative: (Concept Maps, Letter to a friend, quizzes)	▪ Summative: Test 20%	▪ Summative: Assignment 10%	CLO2: Practical Skills Assessment Tasks 20%	<table border="0"> <tr> <td>▪ Formative: 3 Lab Journals</td> </tr> <tr> <td style="padding-left: 20px;">▪ Summative: 2 Lab Journals 10%</td> </tr> <tr> <td style="padding-left: 20px;">▪ Summative: Lab Performance Exam 10%</td> </tr> </table>	▪ Formative: 3 Lab Journals	▪ Summative: 2 Lab Journals 10%	▪ Summative: Lab Performance Exam 10%	CLO3: Science & Reasoning Skills 20%	<table border="0"> <tr> <td>Formative: Assignment</td> </tr> <tr> <td>Summative: Assignment 10%</td> </tr> <tr> <td>Summative: Lab Performance Exam 10%</td> </tr> </table>	Formative: Assignment	Summative: Assignment 10%	Summative: Lab Performance Exam 10%	CLO1: Final exam 30%
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Recommended Text (if any)	:	Physics by Cutnell & Johnson 7 th edition (algebra based); John Wiley & Sons, Inc.																
References	:	Fundamental of Physics by Halliday, Resnick, Walker; 6 th or 7 th Ed., John Wiley & Sons, Inc.																

COURSE OUTCOMES

COURSE CODE	PHY407	CENTRE OF STUDY	FACULTY OF APPLIED SCIENCES
COURSE NAME	PHYSICS II	PREPARED BY	ASSOC .PROF. DR. JAAFAR JANTAN
CREDIT HOURS	3	DATE	15 th MAY 2009

COURSE OUTCOMES	PROGRAMME OUTCOMES											Teaching & Learning Activities	Assessment Tasks
	LO 1	LO 2	LO 2	LO 3	LO 4	LO 4	LO 5	LO 6	LO 7	LO 8	LO 9		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11		
1. Explain the concepts, laws and theories in electrostatics, electricity and magnetism. (LO1-C2)	3											a. Independent Learning (pre-class reading) b. Lecture-discussion c. Simulations d. Active learning (self & peer dialogue) e. Modelling	<ul style="list-style-type: none"> ▪ Diagnostic Test (CSEM) ▪ Formative Tasks: (Concept Mapping, Quiz, ▪ Summative Tasks: Tests, Final Exam)
2. Safely manipulate equipments used in electricity and		3										a. Independent Learning (pre-class reading) b. Active learning (self	<ul style="list-style-type: none"> ▪ Lab Journal ▪ Lab Examination

Nama Fakulti / Pusat Pengajian:

Fakulti Sains Gunaan

Tahun: 2009

Nama Program:

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COURSE OUTCOMES	PROGRAMME OUTCOMES											Teaching & Learning Activities	Assessment Tasks
	LO 1 PO 1	LO 2 PO 2	LO 2 PO 3	LO 3 PO 4	LO 4 PO 5	LO 4 PO 6	LO 5 PO 7	LO 6 PO 8	LO 7 PO 9	LO 8 PO 10	LO 9 PO 11		
magnetism scientific inquiries. (LO2-P3)												& peer dialogue) c. Simulations d. Lab investigations	
3. Demonstrate scientific inquiries in electricity and magnetism. (LO3-CTPS3)			3									a. Active learning (self & peer dialogue) in lab & classroom b. Discussion	<ul style="list-style-type: none"> ▪ Assignment ▪ Lab Examination

Program Outcomes:

- PO1 (LO1) Able to analyze problems by applying knowledge and understanding of laws, theories and principles of science and mathematics.
- PO2 (LO2) Able to safely prepare sample, operate and use laboratory equipments.
- PO3 (LO2, LO3) Able to identify problems, design an experiment, process, interpret and analyze experimental data.
- PO4 (LO3) Able to apply the scientific reasoning in solving authentic problems.
- PO5 (LO4) Able to verbally express and articulate scientific ideas effectively.
- PO6 (LO4) Able to express and articulate scientific ideas in written form.
- PO7 (LO5) Able to effectively work in a multidisciplinary team.
- PO8 (LO6) Able to apply values, ethics, morality and professionalism in their scientific pursuit.
- PO9 (LO7) Able to manage information and engage in life-long learning.
- PO10 (LO8) Able to apply managerial and entrepreneurial skills.
- PO11 (LO9) Able to demonstrate leadership skills.

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