City University of Hong Kong
Course Syllabus

offered by School of Energy and Environment
with effect from Semester A 2018/19

Part I Course Overview

Course Title:	Electromagnetic Principles for Energy Engineers
Course Code:	SEE2001
Course Duration:	One semester
Credit Units:	3
Level:	B2
Proposed Area: *(for GE courses only)*	☐ Arts and Humanities ☐ Study of Societies, Social and Business Organisations ☐ Science and Technology
Medium of Instruction:	English
Medium of Assessment:	English
Prerequisites: *(Course Code and Title)*	Nil
Precursors: *(Course Code and Title)*	PHY1201 General Physics I; MA1200 Calculus and Basic Linear Algebra I or MA1300 Enhanced Calculus and Linear Algebra I; AND MA1201 Calculus and Basic Linear Algebra II or MA1301 Enhanced Calculus and Linear Algebra II
Equivalent Courses: *(Course Code and Title)*	Nil
Exclusive Courses: *(Course Code and Title)*	Nil

Part II Course Details

1. Abstract

This course aims to lay down the basic knowledge of electricity, magnetism, waves, optics and modern physics related to energy science. Upon successful completion of the course, students are expected to have enhanced ability in comprehending technical information, reasoning through scientific questions and analysis, and applying physics principles to solve problems related to energy issues.

2. Course Intended Learning Outcomes (CILOs)

(CILOs state what the student is expected to be able to do at the end of the course according to a given standard of performance.)

No.	CILOs[#]	Weighting* (if applicable)	Discovery-enriched curriculum related learning outcomes (please tick where appropriate)		
			A1	*A2*	*A3*
1.	Recognize basic laws and principles of electricity and apply such concepts in problem solving.	20%		√	
2.	Identify underlying physical principles of magnetism.	20%		√	
3.	Apply the basic concepts and theories on electricity, magnetism and wave to explain and predict phenomena related to energy science.	20%		√	
4.	Analyse and solve problems involving electromagnetic radiation and physical optics.	20%		√	
5.	Describe fundamentals of quantum physics and applications of the Schrodinger Equation.	20%		√	
		100%			

** If weighting is assigned to CILOs, they should add up to 100%.*

[#] Please specify the alignment of CILOs to the Gateway Education Programme Intended Learning outcomes (PILOs) in Section A of Annex.

A1: Attitude
Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability
Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to self-life problems.

A3: *Accomplishments*
Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

3. Teaching and Learning Activities (TLAs)

(TLAs designed to facilitate students' achievement of the CILOs.)

TLA	Brief Description	CILO No.						Hours/week (if applicable)
		1	2	3	4	5		
Lectures	Explain theories and concepts	√	√	√	√	√		2
Tutorials	Apply theories and concepts on practical examples	√	√	√	√	√		1

4. Assessment Tasks/Activities (ATs)

(ATs are designed to assess how well the students achieve the CILOs.)

Assessment Tasks/Activities	CILO No.						Weighting*	Remarks
	1	2	3	4	5			
Continuous Assessment: _50_%								
Assignments	√	√	√	√	√		25%	
Midterm test/Quizzes	√	√	√	√			25%	
Examination: _50_% (duration: 2 hours)								
** The weightings should add up to 100%.*							100%	

Examination duration: 2 hrs
Percentage of coursework, examination, etc.: 50% by coursework; 50% by exam

To pass a course, a student must do ALL of the following:
1) obtain at least 30% of the total marks allocated towards coursework (combination of assignments, pop quizzes, term paper, lab reports and/ or quiz, if applicable);
2) obtain at least 30% of the total marks allocated towards final examination (if applicable); and
3) meet the criteria listed in the section on Assessment Rubrics.

5. Assessment Rubrics

(Grading of student achievements is based on student performance in assessment tasks/activities with the following rubrics.)

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B, B-)	Fair (C+, C, C-)	Marginal (D)	Failure (F)
1. Assignments	Ability to analyse and solve problems related to application of electromagnetic principles in energy engineering	High	Significant	Moderate	Basic	Not even reaching marginal levels
2. Midterm test /Quizzes	Ability to analyse and solve problems related to application of electromagnetic principles in energy engineering	High	Significant	Moderate	Basic	Not even reaching marginal levels
3. Examination	Ability to analyse and solve problems related to application of electromagnetic principles in energy engineering	High	Significant	Moderate	Basic	Not even reaching marginal levels

Part III Other Information (more details can be provided separately in the teaching plan)

1. Keyword Syllabus

OSCILLATIONS AND WAVES
- Oscillations
- Traveling Waves
- Superposition and Standing Waves

ELECTRICITY AND MAGNETISM
- The Electric Field
- Discrete Charge Distributions
- Continuous Charge Distributions
- Electric Potential
- Capacitance
- Electric Current and Direct-Current Circuits
- The Magnetic Field
- Sources of the Magnetic Field
- Magnetic Induction
- Alternating-Current Circuits
- Maxwell's Equations and Electromagnetic Waves

LIGHT
- Properties of Light
- Optical Images
- Interference and Diffraction

MODERN PHYSICS
- Wave-Particle Duality and Quantum Physics
- Applications of the Schrodinger Equation
- Atoms
- Molecules
- Solids

2. Reading List

2.1 Compulsory Readings

(Compulsory readings can include books, book chapters, or journal/magazine articles. There are also collections of e-books, e-journals available from the CityU Library.)

Nil

2.2 Additional Readings

(Additional references for students to learn to expand their knowledge about the subject.)

1.	*Physics for Scientists and Engineers* by Paul A. Tipler and Gene Mosca, *5th edition (Extended version)*, W. H. Freeman, 2004.
2.	*Physics for Scientists and Engineers with Modern Physics* by Raymond A. Serway, *4th Edition*, Saunders College Pub, 1996.