University of Macau
Faculty of Science and Technology
PHYS204 – Physics Laboratory
Syllabus
2nd Semester 2011/2012
Part A – Course Outline

Compulsory course in Civil Engineering

Course description:
This is a laboratory course of general physics for engineering students. Students are required to conduct experiments of electromagnetism, geometric optics and wave optics.

Prerequisite:
PHYS203

Reference:
"*Fundamentals of Physics*", David halliday, Robert Resnick, Jearl Walker, 9th ed. John Wiley & Sons, Inc.

Major prerequisites by topic:
1. Electricity including concepts of electric filed, electric potential and basic circuit theory.
2. Magnetism including concepts of magnetic field and magnet induction.
3. Image formation by lenses.
4. Properties of light wave.

Course objectives:
1. Learning to apply physics theory in conducting experiment. [a, e, k]
2. Develop experimental skill. [b, c, e, k]
3. Learning data analysis and interpretation. [a, b, k]

Topics covered:
1. The Wheatstone bridge
2. Electric field and potentials in plate capacitor
3. Internal resistance and matching in voltage sources
4. Magnetic induction
5. The speed of light
6. Diffraction at a slit
7. Michelson interferometer
8. Laws of lenses and optical instruments

Class/laboratory schedule:

Timetabled work in hour per week			No of teaching weeks	Total hours	Total credits	No / Duration of exam papers
Lecture	Tutorial	Practice				
0	0	2	14	28	1	0/0

Contribution of course to meet the professional component:

This course prepares students to work professionally in engineering area.

Relationship to program objective and outcomes:
This course primarily contributes to program outcomes that develop student abilities to:
(a) an ability to apply knowledge of mathematics, science and engineering.
(b) an ability to conduct experiments, as well as to analyze and interpret data
(e) an ability to identify, formulate, and solve engineering problems.
(k) an ability to use techniques, skills, and modern engineering tools necessary for engineering practice.

The course secondarily contributes to program outcomes that develop student abilities to:
(c) an ability to design electrical circuit and optical system.

Course content:

Maths	Basic Science	Engineering Science	Engineering Design and Synthesis	Complementary Studies	Computer Studies	Total 100 %
10	90	0	0	0	0	100

Persons who prepared this description:
Dr. Ho Sut Kam

Par B – General Course Information

2nd Semester 2011/2012

Instructor: Dr. Ho Sut Kam
Office: N312
Office Hour: by appointment
Phone: (853) 83974362
Email: phoebeho@umac.mo

Time/Venue:

Assessment:

Final assessment will be determined on the basis of

In-class performance 60%

Laboratory report 40%

Grading System:

Grades are awarded according to the following system:

Letter Grades	Grade Points	Percentage
A	4.0 (Excellent)	93-100
A-	3.7 (Very good)	88-92
B+	3.3	83-87
B	3.0 (Good)	78-82
B-	2.7	73-77
C+	2.3	68-72
C	2.0 (Average)	63-67
C-	1.7	58-62
D+	1.3	53-57
D	1.0 (Pass)	50-52
F	0 (Fail)	Below 50

Comment:

The objective of the course is to apply physics theories in conducting experiments. Students must prepare each experiment by physics laboratory manual and are encouraged to review the reference prior to the class.

Note

- No experiment is allowed if you are 15 minutes late. Even you are late in class, you must finish experiment at the due time.
- No make-up experiment is allowed without rational reason.
- Detailed guidelines for laboratory class will be distributed with physics laboratory manual and students must follow the guidelines strictly.
- Course materials will be uploaded in webcourse and it can be accessed by *https://ummoodle.umac.mo/login*

Appendix - Rubric for Program Outcomes

Rubric for (a)	5 (Excellent)	3 (Average)	1 (Poor)
Understand the theoretic background	Students understand theoretic background and the limitations of the respective applications.	Students have some confusion on some background or do not understand theoretic background completely	Students do not understand the background or do not study at all
Use a correct model and formulation correctly	Students choose a model correctly and properly apply correct techniques	Students choose a wrong model sometime, use a wrong formula, or a different technique	Students use a wrong model and wrong formula, or do not know how to model
Compute the problem correctly	Students use correct techniques, analyze the problems, and compute them correctly	Students sometime solve problem mistakenly using wrong techniques	Students do not know how to solve problems or use wrong techniques completely

Rubric for (b)	5 (Excellent)	3 (Average)	1 (Poor)
Conduct experiments	Student successfully completes the experiment, records the data, analyzes the experiment's main topics, and explains the experiment concisely and well.	Student successfully completes the experiment, records the data, and analyzes the experiment's main topics.	Student either does not complete the experiment successfully, or completes it successfully but does not record the correct data.
Design experiments	Student understands what needs to be tested and designs an appropriate experiment that takes into account the limitations of the equipment and measurement accuracy.	Student understands what needs to be tested and designs an appropriate experiment, but may not fully understand the limitations of the measurements.	Student does not understand what needs to be tested and/or does not design an appropriate experiment.

Rubric for (c)	5 (Excellent)	3 (Average)	1 (Poor)
Design capability and design constraints	Student understands very clearly what needs to be designed and the realistic design constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.	Student understands what needs to be designed and the design constraints, but may not fully understand the limitations of the design constraints	Student does not understand what needs to be designed and the design constraints.
Process to meet desired needs	Student understands very clearly the process of the design	Student understands what the needs of the process design, but may not fully understand the limitations of the design constraints	Student does not understand the process.

Rubric for (e)	5 (Excellent)	3 (Average)	1 (Poor)
Identify applications in engineering systems	Students understand problem and can identify fundamental formulation	Students understand problem but cannot apply formulation, or cannot understand problem	Students cannot identify correct terms for engineering applications
Modeling, problem formulation and problem solving	Students choose and properly apply the correct techniques	Students model correctly but cannot select proper technique or model incorrectly but solve correctly accordingly	Students at loss as to how to solve a problem

Rubric for (k)	5 (Excellent)	3 (Average)	1 (Poor)
Use suitable technique in engineering practice	Student uses the technique to correctly analyze engineering problems, and understands the limitations of the technique.	Student uses the technique to correctly analyze engineering problems.	Student does not use the technique correctly and/or does not correctly interpret the results.