

Physics for Engineers II, PHYC 10160:

Lecturer: Dr. Ian P. Mercer

Online course resource, as for first semester:

“Fundamentals of Physics” by Halliday, Resnick and Walker
(<https://www.wileyplus.com>)

Course coordinator Engineering II: Ian Mercer

Course flow

Wk	Wk date	Theme	Activity	Assessment deadline Deadlines are strict. Students are encouraged to submit well ahead.
1	20-Jan	Quantum	Reading and quizzes online	
2	27-Jan		Homework online (assessed)	1pm, Mon 3rd Feb
3	03-Feb		Homework written (assessed)	1pm, Mon 10 th Feb, box Phys 1 st floor
4	10-Feb	E&M Elec	Reading and quizzes online	
5	17-Feb		Homework online (assessed)	1pm, Mon 24 th Feb
6	24-Feb		Homework written (assessed)	1pm, Mon 3 rd Mar, box Phys 1 st floor
7	03-Mar	E&M Mag	Reading and quizzes online	
8	10-Mar		Homework online (assessed)	1pm, Mon 24 th Mar
9	24-Mar		Homework written (assessed)	1pm, Mon 31 st Mar, box Phys 1 st floor
10	07-Apr	Nuclear	Reading and quizzes online	
11	14-Apr		Homework online (assessed)	1pm, Mon 21 st Apr
12	21-Apr		Homework written (assessed)	1pm, Mon 28 th Apr, box Phys 1 st floor

1. In-class student notes provide core materials. Notes for students to print out are given on blackboard and students fill in gaps during lectures. Online reading and quizzes (not assessed) reinforces and extends this learning.

2. As a fraction of the module grade, 4 online assessments contribute 8%, 4 written homeworks contribute 16%, labs contribute 26%, and the final exam contributes 50%. The online and written work are essential for learning the course materials, and therefore for also doing well in the final exam.

3. Deadlines for assessments are given above, and are strict. No late submissions are accepted for grading. Students are therefore encouraged to submit a day or more early.

4. Students are encouraged to discuss assigned questions, however, it is imperative that students generate their own solutions as individuals. All assessments are individual assessments only.

5. Assistance. See Ian Mercer after lectures. Very pleased to hear of any questions or problems, physics or otherwise. If physics problem, importantly, discuss the problem

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with colleagues. If the problem survives this (most don't), lay out your attempt at the problem on a piece of A4 and give to the coordinator. This will be addressed either in the class tutorials, or additional time can be arranged if necessary.

Syllabus overview

QUANTUM PHYSICS:

Classical physics is not enough. Photoelectric effect. Einstein's photon theory. Spectrum of Hydrogen. Bohr model of the atom. Energy level diagram. X-rays. Interactions of X-rays with matter. Laser.

ELECTRICITY AND MAGNETISM:

Brief history of electrostatics and electricity. Electric charge. Forces between charges. Electric field. Electric flux and flux density. Gauss's law. Electric potential and its relationship to electric field. Dipoles. Capacitance. Dielectrics. Electric current. Resistance and resistivity. Conductors and insulators.

Brief history of magnetism and electromagnetics. Magnetic field. Magnetic flux density. Magnetic force on a current carrying wire. Hall effect. Biot-Savart law. Ampere's law. Solenoids. Faraday's law. Inductance: self and mutual. AC generator. Transformer. Energy stored in magnetic field. Magnetic materials. Diamagnetism, paramagnetism, ferromagnetism. Hysteresis.

RADIOACTIVITY:

Nucleus. Nuclear properties. Nuclear mass. Binding energy. Mass defect. Strong force. Fission. Fusion. Radioactivity. Law of Radioactive decay. Radiation dosage.