Information Technology University
Department of Electrical Engineering

PH125: Applied Physics			
Course Code	PH125	**Semester**	1st
Credit Hours	3	**Term**	Fall 2017
Instructor	Usama Bin Sikandar	**Pre-reqs**	None
E-mail	usama.sikandar@itu.edu.pk	**Department**	Electrical Engineering
Office	Room#9, 4th floor	**Discipline**	Physics
Instructor Office Hours	Monday 2-4PM	**Teaching Assistants**	Muhammad Awais, Zaki Ahmad

Course Description:

This course focuses on Newtonian mechanics, electricity and magnetism. The students will learn how to apply vector calculus to solve fundamental conceptual problems from these topics.

Course Outcomes/Objectives:

On the completion of the course, the student will be able to demonstrate the following:

- Set up a problem using free-body diagram and Newton's laws
- Apply concepts of calculus to solve basic problems in Physics
- Get used to the ideas of vector calculus such as gradient, line integrals and surface integrals
- Understand the terms work, energy and power
- Appreciate the knowledge of uncertainty in measurements and consistency with dimensions
- Appreciate why Newton's, Gauss's, Faraday's and Ampere's laws are deeply fundamental to science

Books:

Text Book	1. *Physics for Engineers and Scientists* (3rd edition) by H.C. Ohanian and J. T. Markert a. Volume 1 b. Volume 2 2. *Physics for Scientists and Engineers: A strategic Approach with Modern Physics* (4th edition) by R. D. Knight
Reference Books	1. *Fundamentals of Physics* (10th edition) by D. Halliday, R. Resnick and J. Walker 2. The Feynman Lectures on Physics (Volume I and III)

Weekly Lecture Breakdown :

Week 1:	Introduction, Measurements	Week 10:	Electric Charge
Week 2:	Kinematics	Week 11:	Electric Field
Week 3:	Newton's laws	Week 12:	Electric Potential
Week 4:	Energy	Week 13:	Capacitance, DC circuits
Week 5:	Momentum, Rigid body rotation	Week 14:	Magnetic field
Week 6:	Rigid body dynamics	Week 15:	Magnetic field
Week 7:	Electric charge	Week 16:	Electromagnetic induction
Week 8:	Electric field	Week 17:	**Prep Week**
Week 9:	**Mid-term exam**	Week 18:	**Final exam**

Chapter	Topics	Lectures
	Introduction	1
Ohanian Ch 1	**Measurements** ▪ Units ▪ SI units ▪ Dimensions ▪ Precision ▪ Measurement error	1
Ohanian Ch 3	**Vectors** ▪ Coordinate system · Addition and multiplication	1
Ohanian Ch 2, 4	**Kinematics** ▪ Speed, velocity acceleration · Free-fall, projectile and circular motion	2
Ohanian Ch 5, 6	**Newton's Laws** ▪ 1st law and inertia · 2nd law, free-body diagram and superposition · 3rd law and normal reaction force and friction · Types of forces	3
Ohanian Ch 7, 8	**Energy** ▪ Work ▪ Kinetic and potential energy · Energy conservation · Power	2
Ohanian Ch 10, 11	**Systems of Particles** ▪ Momentum · Center of mass · Elastic and inelastic collisions	2
Ohanian Ch 12	**Rigid Body Rotation** ▪ Rotation about a fixed axis · Kinematics in angular motion · Moment of inertia · Kinetic energy	2
Ohanian Ch 13	**Rigid Body Dynamics** ▪ Work, energy and power · Torque · Angular momentum	2
Mid Term Exam		
Ohanian Ch 22	**Electric Charge** ▪ Electrostatic force · Coulomb's law · Superposition	1
Ohanian Ch 23, 24	**Electric field** ▪ Field lines	3

	▪ Continuous charge distribution ▪ Motion in an electric field ▪ Electric flux ▪ Gauss's law ▪ Conductors	
Ohanian Ch 25	**Electric Potential** ▪ Electrostatic potential ▪ Relationship with electric field ▪ Potential due to charged particles and conductors ▪ Energy	2
Ohanian Ch 26	**Capacitors** ▪ Capacitance ▪ Gauss's law ▪ Combination ▪ Dielectrics ▪ Energy	1
Ohanian Ch 27, 28.1-28.6	**Ohm's Law** ▪ Electric current ▪ Resistance and Resistivity ▪ Resistor combinations ▪ EMF ▪ KCL, KVL ▪ Energy	1
Ohanian Ch 29, 30.1-30.2	**Magnetic Field** ▪ Force on a current-carrying wire ▪ Motion of charged particles ▪ Lorentz Force ▪ Biot-Savart law ▪ Ampere's law ▪ Solenoids ▪ Gauss's law for magnetic field	3
Ohanian Ch 31.1-31.4 33.1	**Electromagnetic Induction** ▪ Induced electric field and EMF ▪ Faraday's law ▪ Lenz's law ▪ Inductance ▪ Ampere's law, with displacement current ▪ Maxwell's Equations	3
Final Exam		

Course Assessment Distribution:	
Quizzes:	15 %
Assignments:	10 %
Mid-term Exam:	30 %
Final Exam:	45 %

Grading Policy:	
Quiz Policy:	At the end of each recitation, there will be a graded quiz. The problems will be framed so as to test the concepts involved in last two lectures. Grading for quizzes will generally be on a scale of 0 to 10. There will be a total of 15 quizzes, 2 of which will be dropped. This means your best 13 quizzes out of 15 will be counted towards your final grade. There will be no make-up quiz whatsoever. So, plan your leaves accordingly.
Assignment Policy:	In order to develop comprehensive understanding of the subject, assignments will be given. Assignments late by one day will be penalized by 20%. After that nothing will be accepted / graded. All assignments will count towards the total (No 'best-of' policy). The students are advised to do the assignment individually. Copying of assignments is highly discouraged and violations will be dealt with severely by referring any occurrences to the disciplinary committee. The problems in the assignment are meant to be challenging to give students confidence and extensive knowledge about the subject matter and enable them to prepare for the exams.
Plagiarism:	ITU maintains a zero-tolerance policy towards plagiarism. While collaboration in this course is highly encouraged, you must ensure that you do not claim other people's work/ ideas as your own. Plagiarism occurs when the words, ideas, assertions, theories, figures, images, programming codes of others are presented as your own work. You must cite and acknowledge all sources of information in your assignments. Failing to comply with the ITU plagiarism policy will lead to strict penalties including a failing grade in the course and referral to the disciplinary committee for a strict action, which may possibly lead to failing grades in all the courses of the semester.