
SYLLABUS

Date/ Revision	10 June 2015
Faculty	Engineering
Approval	Dean of Engineering Faculty

SUBJECT : PHYSICS 2

1. Identification of Subject:

Name of Subject	: Physics 2
Code of Subject	: PHYS-1120
SKS	: 3
Semester	: 2
Study Program	: B-AVE, B-EE, B-MTE, B-MEE, B-INE
Lecturer	: Alexander Iskandar, PhD.

2. Competency

After taking this course, students are expected to be able to:

- Explain the fundamental concepts, laws and theories of Physics as a basis for students to engineering study;
- Apply these principles to realistic situations;
- Develop a sense of logic that will benefit students in their future professional pursue;
- Develop skills and understanding in attacking mechanical problems by solving and analyzing problems given in the book.

3. Description of Subject:

The purpose of this course is to introduce fundamental concepts of Physics with an emphasis on electricity and magnetism, waves and quantum physics phenomena. The following topics are included; the fundamental concepts and theory of electricity and magnetism, propagation of mechanical wave, electromagnetic wave phenomena, interference and diffraction, wave-particle duality, along with their applications, with emphasis on problem solving. Laboratory experiments supporting the topics are included.

4. Learning Approach

Approach	: Combination of Expository - inquiry and collaborative
Method	: Discussion, question answer, sample problem, group work
Student Task	: Home work, presentation
Media	: LCD projector, film.

5. Evaluation

- a) Absence maximum : 25%
 b) Participation in discussion : 5 points
 c) Homework, Classwork : 5 points
 d) Presentation, Simulation : 10 points
 e) Daily Quiz : 20 points
 f) Final Examination : 60 points

Total : 100 points

6. Contents/ Topics of Lecturing:

Week	Content/ Topics of Lecturing	Text Book Chapter	Remark
1	Coulomb's Law <ul style="list-style-type: none"> • Coulomb's Law • Charge is Quantized • Charge is Conserved • Exercises 	Ch21 Sec. 21.1 Sec. 21.2 Sec. 21.3	Homework
2	Electric Fields: <ul style="list-style-type: none"> • Electric Field • Electric Field due to a Charged Particles • Electric Field due to a Dipole • Electric Field due to a Line Charge • Electric Field due to a Charged Disk • A Point Charge in an Electric Field • A Dipole in an Electric Field • Exercises 	Ch22 Sec. 22.1 Sec. 22.2 Sec. 22.3 Sec. 23.4 Sec. 23.5 Sec. 22.6 Sec. 22.7	Homework
3	Gauss' Law: <ul style="list-style-type: none"> • Electric Flux • Gauss' Law • A Charged Isolated Conductor • Electric Field due to a Line Charge • Applying Gauss' Law : Cylindrical Symmetry • Applying Gauss' Law : Planar Symmetry • Applying Gauss' Law : Spherical Symmetry • Exercises 	Ch23 Sec. 23.1 Sec. 23.2 Sec. 23.3 Sec. 23.4 Sec. 23.5 Sec. 23.6 Sec. 23.7	Quiz
4	Electric Potential: <ul style="list-style-type: none"> • Electric Potential • Equipotential Surfaces and the Electric Field • Potential due to a Charged Particle • Potential due to a Dipole 	Ch24 Sec. 24.1 Sec. 24.2 Sec. 24.3 Sec. 24.4	Homework

	<ul style="list-style-type: none"> • Potential due to Continuous Charge Distribution • Calculating the Field from the Potential • Electric Potential Energy of a System of Particles • Exercises <p>Capacitors:</p> <ul style="list-style-type: none"> • Capacitance • Calculating the Capacitance • Capacitors in Parallel and in Series • Energy Stored in an Electric Field • Capacitors with a Dielectric • Exercises 	<p>Sec. 24.5 Sec. 24.6 Sec. 24.7</p> <p>Ch25 Sec. 25.1 Sec. 25.2 Sec. 25.3 Sec. 25.4 Sec. 25.5</p>	
5	<p>Current and Resistance:</p> <ul style="list-style-type: none"> • Electric Current • Current Density • Resistance and Resistivity • Ohm's Law • Power • Exercises <p>Circuits:</p> <ul style="list-style-type: none"> • Single Loop Circuits • Multi-loop Circuits • The Ammeter and the Voltmeter • RC Circuit • Exercises 	<p>Ch26 Sec. 26.1 Sec. 26.2 Sec. 26.3 Sec. 26.4 Sec. 26.5</p> <p>Ch27 Sec. 27.1 Sec. 27.2 Sec. 27.3 Sec. 27.4</p>	Quiz
6	<p>Magnetic Fields:</p> <ul style="list-style-type: none"> • Magnetic Fields and Definition of B • Crossed Fields • A Circulating Charged Particle • Magnetic Force on a Current-Carrying Wire • Torque on a Current Loop • Magnetic Dipole Moment • Exercises 	<p>Ch28 Sec. 28.1 Sec. 28.2 Sec. 28.4 Sec. 28.6 Sec. 28.7 Sec. 28.8</p>	Homework
7	<p>Magnetic Fields due to Currents:</p> <ul style="list-style-type: none"> • Magnetic Fields due to a Current • Force Between Two Parallel Currents • Ampere's Law • Solenoids and Toroids • A Current-Carrying Coil as a Magnetic Dipole • Exercises. 	<p>Ch29 Sec. 29.1 Sec. 29.2 Sec. 29.3 Sec. 29.4 Sec. 29.5</p>	Quiz
8	MIDTERM SEMESTER BREAK		
9	<p>Induction and Inductance:</p> <ul style="list-style-type: none"> • Faraday's Law and Lenz's Law • Induction and Energy Transfer 	<p>Ch30 Sec. 30.1 Sec. 30.2 Sec. 30.4</p>	Homework

	<ul style="list-style-type: none"> • Inductors and Inductance • Self-Induction • RL Circuits • Energy Stored in a Magnetic Field • Energy Density of a Magnetic Field • Mutual Inductance • Exercises. 	<p>Sec. 30.5 Sec. 30.6 Sec. 30.7 Sec. 30.8 Sec. 30.9</p>	
10	<p>Electromagnetic Oscillations and Alternating Current:</p> <ul style="list-style-type: none"> • Electromagnetic Oscillations • Damped Oscillation in an RLC Circuit • Forced Oscillations of Three Simple Circuits • The Series RLC Circuits • Power in Alternating Current Circuits • Transformer • Exercises. 	<p>Ch31 Sec. 31.1 Sec. 31.2 Sec. 31.3 Sec. 31.4 Sec. 31.5 Sec. 31.6</p>	Homework
11	<p>Waves I:</p> <ul style="list-style-type: none"> • Transverse Wave • Wave Speed on a Stretch String • Energy and Power of a Wave on a String • Interference of Waves • Phasors • Standing Waves and Resonance • Exercises; 	<p>Ch16 Sec. 16.1 Sec. 16.2 Sec. 16.3 Sec. 16.5 Sec. 16.6 Sec. 16.7</p>	Quiz
12	<p>Waves II:</p> <ul style="list-style-type: none"> • Speed of Sound • Travelling Sound Waves • Interference • Intensity and Sound Level • Sources of Musical Sound • Doppler Effect • Exercises; 	<p>Ch17 Sec. 17.1 Sec. 17.2 Sec. 17.3 Sec. 17.4 Sec. 17.5 Sec. 17.7</p>	Homework
13	<p>Electromagnetic Waves:</p> <ul style="list-style-type: none"> • Electromagnetic Waves • Energy Transport and the Poynting Vector • Reflection and Refraction • Total Internal Reflection • Polarization • Exercises. 	<p>Ch33 Sec. 33.1 Sec. 33.2 Sec. 33.5 Sec. 33.6 Sec. 33.4</p>	Quiz
14	<p>Interference:</p> <ul style="list-style-type: none"> • Light as a Wave • Young's Interference • Interference and Double Slits Intensity • Exercises. <p>Diffraction:</p>	<p>Ch35 Sec. 35.1 Sec. 35.2 Sec. 35.3</p> <p>Ch36</p>	Homework

	<ul style="list-style-type: none"> • Single Slit Diffraction • Intensity in Single Slit Diffraction • Diffraction by a Double Slits • Exercises. 	<p>Sec. 36.1 Sec. 36.2 Sec. 36.4</p>	
15	<p>Photons and Matter Waves:</p> <ul style="list-style-type: none"> • The Photons, the Quanta of Light • The Photoelectric Effect • Photons have Momentum, the Compton Effect • Light as a Probability Wave • Electrons and Matter Waves • The Schrodinger Equation • Heisenberg’s Uncertainty Principle • Exercises; 	<p>Ch38 Sec. 38.2 Sec. 38.3 Sec. 38.4 Sec. 38.5 Sec. 38.6 Sec. 38.7 Sec. 38.8</p>	Quiz
16	FINAL EXAMINATION		

7. Book Reference:

a) **Main Text Book:** “Principles of Physics 10th Edition”, **Authors:** Halliday, Resnick, and Walker, **Publisher:** John Wiley & Son Inc.; **ISBN:** 978-1-118-23072-5

b) **Supplementary Textbooks:**

- “Physics for Scientists and Engineers 9th Edition”, Author: Serway Jewett, Publisher: Thomson Brooks/Cole; ISBN: 978-1133947271
- “General Physics”, **Author:** D.C. Giancoli, **Publisher:** Prentice Hall Inc; ISBN: 978-0133509847