

SYLLABUS

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

SUBJECT : PHYSICS 1

1. Identification of Subject:

Name of Subject	: Physics 1
Code of Subject	: PHYS-1110
SKS / ECTS	: 3 / 5
Semester	: 1
Study Program	: B-AVE, B-EE, B-MTE, B-MEE, B-INE
Lecturer	: Alexander Iskandar, PhD.

2. Competency

After having the course, students are expected 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 mechanics. The following topics are included; the principles and applications of classical mechanics kinematics and dynamics of a particle, work, energy, momentum, harmonic motion, gravitation, and circular orbits 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	Measurement: - Measurements, International System of Units, Changing Units, Length, Time, Mass; - Exercises	Ch1	
2	Motion Along a Straight Line: - Motion, Position & Displacement, and Average Velocity - Instantaneous Velocity and Speed - Acceleration, - Constant Acceleration and - Free Fall Acceleration - Exercises	Ch2 Sec. 2.1 Sec. 2.2 Sec. 2.3 Sec. 2.4 Sec. 2.5	Quiz
3	Vectors and their components: - Vectors and Scalars, Vectors addition, Vectors components, Unit Vectors, Vectors and the Law of Physic, - Multiplying Vectors - Exercises	Ch3 Sec. 3.1 Sec. 3.2 Sec. 3.3	Quiz
4	Motion in Two and Three Dimensions : - Position and Displacements, - Average velocity and instantaneous velocity, - Average acceleration and instantaneous acceleration; - Projectile motion, - Uniform circular motion, - Relative motion in one dimensions, - Relative motion in two dimensions. - Exercises	Ch4 Sec. 4.1 Sec. 4.2 Sec. 4.3 Sec. 4.4 Sec. 4.5 Sec. 4.6 Sec. 4.7	Quiz
5	Force and Motion - I: - Newton's First and second Laws, - Some Particular Forces, - Applying Newton's Laws.	Ch5 Sec. 5.1 Sec. 5.2 Sec. 5.3	Quiz

	Exercises		
6	Force and Motion - II: - Friction - The Drag Force and terminal Speed, - Uniform circular motion; - Exercises	Ch6 Sec. 6.1 Sec. 6.2 Sec. 6.3	Quiz
7	Kinetic Energy and Work: - Kinetic Energy, - Work and Kinetic Energy, - Work done by the gravitational Force, - Work done by a spring Force, - Work done by a general variable Force - Power - Exercises	Ch7 Sec. 7.1 Sec. 7.2 Sec. 7.3 Sec. 7.4 Sec. 7.5 Sec. 7.6	Quiz
8	MIDTERM SEMESTER BREAK		
9	Potential Energy and Conservation of Energy: - Potential Energy; - Conservation of Mechanical Energy; - Reading a Potential Energy Curve; - Work done on a system by an external Force; - Conservation of Energy; - Exercises.	Ch8 Sec. 8.1 Sec. 8.2 Sec. 8.3 Sec. 8.4 Sec. 8.5	Quiz
10	System of Particles / Center of Mass and Linear Momentum: - Center of Mass; - Newton's Second Law for a System of Particles; - Linear Momentum; - Exercises.	Ch9 Sec. 9.1 Sec. 9.2 Sec. 9.3	Quiz
11	Collision: - Collision and Impulse; - Conservation of Linear Momentum; - Momentum and Kinetic Energy in Collision; - Inelastic collision - Elastic Collision in one Dimension; - Collision in two Dimensions; - System with varying Mass: a Rocket. - Exercises.	Ch9 Sec. 9.4 Sec. 9.5 Sec. 9.6 Sec. 9.6 Sec. 9.8 Sec. 9.9	Quiz
12	Rotation: - Rotation variables; - Rotation with constant angular acceleration; - Relating the Linear and Angular variables; - Kinetic Energy of Rotation; - Calculating the Rotational Inertia; - Torque; - Newton's Second Law for Rotation;	Ch10 Sec. 10.1 Sec. 10.2 Sec. 10.3 Sec. 10.4 Sec. 10.5 Sec. 10.6 Sec. 10.7	Quiz

	• Work and Rotational Kinetic Energy; • Exercises.	Sec. 10.8	
13	Rolling, Torque, and Angular Momentum: • Rolling as Translation and Rotation Combined; • Forces and Kinetic Energy of Rolling; • The Yo-Yo • Torque Revisited / Torque as a Vector; • Angular Momentum; • Newton's Second Law in Angular Form; • Work and Rotational Kinetic Energy; • Conservation of Angular Momentum; • Precession of a Gyroscope; • Exercises.	Ch11 Sec. 11.1 Sec. 11.2 Sec. 11.3 Sec. 11.4 Sec. 11.5 Sec. 11.6 Sec. 11.7 Sec. 11.8 Sec. 11.9	Quiz
14	Equilibrium and Elasticity: • Static Equilibrium; • Center of Gravity; • Tension and Compression • Exercises.	Ch12 Sec. 12.1 Sec. 12.2 Sec. 12.3	Quiz
15	Gravitation: • Newton's Law of Gravitation; • Gravitation and the Principle of Superposition; • Gravitation near Earth's Surface; • Gravitation inside Earth; • Gravitational Potential Energy; • Planets and Satellites: Kepler's Law; • Satellites: Orbits and Energy; • Einstein and Gravitation; • Exercises.	Ch13 Sec. 13.1 Sec. 13.2 Sec. 13.3 Sec. 13.4 Sec. 13.5 Sec. 13.6 Sec. 13.7 Sec. 13.8	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