



**YOGYAKARTA STATE UNIVERSITY
FACULTY OF MATHEMATICS AND NATURAL SCIENCES**

SYLLABI

FRM/FMIPA/063-00
1 April 2010

Faculty : Mathematics and Natural Sciences
Study Program : Physics Education
Course / Code : Introduction of Mechanics Heat and Sound
Credit : Theory: 3 Practice: 0 sks
Semester : 1st
Prerequisite/Code : -
Professor : -

I. Course Description

This course includes some subjects matters in mechanics, heat, and sound. By studying this subjects, the students could understand the phenomena that occurred in mechanics, heat, and sound. The details subjects consist of: measurements, translation equilibrium, friction, torque and rotational equilibrium, motion, Newton's laws, work, energy, power, impulse and momentum, uniform circular motion, elasticity, fluid, temperature and expansion, heat, transfer of heat, production of sound wave, speed of sound, vibrating air column, resonance, interference, Doppler's effect.

II. Standard of Competence

After conducting this course, the students have the understanding of several concepts in mechanics, heats and its application in daily life.

III. Activity

Mee-ting#	Basic Competence	Essentials Concept	Learning Strategy	Learning Materials/ References	Character
1st	Introduction: Technical measurement and vectors	International system; significan figure; measuring instrument, units conversion; scalar and vector	Discussion and information	Tippens. 2010. Physics (seventh edition). McGraw-Hill	Confident, complying, appreciating

		quantities; forces and vectors, vector resultante, vector operations			
2 nd	Translation equilibrium and friction	Newton's first law; Newton's second law, Newton's third law; equilibrium; free body diagram; friction	Discussion and information	Tippens. 2010. Physics (seventh edition). McGraw	Confident complying, appreciating
3 th	Torque and rotational equilibrium	Conditions for equilibrium; the moment arm; torque; resultant torque; equilibrium; center of gravity	Discussion and information	Tippens. 2010. Physics (seventh edition). McGraw	Confident complying, appreciating
4 th	Uniform Acceleration	Speed, velocity; acceleration; sign convention in acceleration; free falling bodies, projectile motion; trajectory	Discussion and information	Tippens. 2010. Physics (seventh edition). McGraw	Confident complying, appreciating
5 th	Newton's Second Law	Newton's second law of motion; relation between mass and weight; application of Newton's second law to single body problem	Discussion and information	Tippens. 2010. Physics (seventh edition). McGraw	Confident complying, appreciating
6 th	Work, Energy and Power.	Work; resultant of work; energy; kinetic energy; potential energy; conservation of energy; energy and friction force; power	Discussion and information	Tippens. 2010. Physics (seventh edition). McGraw	Confident complying, appreciating
7 th	Impulse and Momentum	Impulse; momentum; the law of conservation of momentum, elastic impact, inelastic impact	Discussion and information	Tippens. 2010. Physics (seventh edition). McGraw	Responsible, thinking logically, creatively, inovatively, dicipline, curious,
8 th	Uniform Circular Motion	Motion in circular path; centripetal acceleration; centripetal force;	Discussion and information	Tippens. 2010. Physics (seventh	

		conical pendulum; motion in vertical circle; satellites in circular orbits; Kepler's law		edition). McGraw	
9 th	Rotation of Rigid Bodies	Angular displacement; angular velocity; angular acceleration; relationship between rotational and linear motion; rotational kinetic energy; moment of inertia; the second law of motion and rotation; rotational work and power; angular momentum; conservation of angular momentum	Discussion and information	Tippens. 2010. Physics (seventh edition). McGraw	
10 th	Elasticity	Elastic properties of matter; Young modulus; shear modulus; volume elasticity; Bulk modulus; other physical properties of metals	Discussion and information	Tippens. 2010. Physics (seventh edition). McGraw	
11 th	Fluids	Density; pressure; fluid pressure; measuring pressure; the hydraulic pressure; Archimedes's Principle; fluid flow; pressure and velocity; Bernoulli's equation; application of Bernoulli's equation	Discussion and information	Tippens. 2010. Physics (seventh edition). McGraw	Responsible, thinking logically, creatively, inovatively, dicipline, curious
12 th	Temperature and Expansion	Temperature and thermal energy; the measurement of temperature; the gas thermometer; the absolute temperature scale; linear expansion; area expansion; volume	Discussion and information	Tippens. 2010. Physics (seventh edition). McGraw	

		expansion; the unusual expansion of water			
13 th	Transfer of Heat	Method of heat transfer; conduction; convection; radiation	Discussion and information	Tippens. 2010. <i>Physics</i> (seventh edition). McGraw	
14 th	Thermal Properties of Matter	Ideal gasses; Boyle's law; Charles's law; Gay-Lussac's law; General Gas Law; molecular mass and the mole; the ideal gas law; liquifaction of gas; vaporization; vapor pressure; triple point; humidity	Discussion and information	Tippens. 2010. <i>Physics</i> (seventh edition). McGraw	
15 th	Thermodynamics	Heat and work; the internal energy function; the first law of thermodynamics; isobaric processes and the P-V diagram; adiabatic processes; isochoric processes; isothermal processes; the second law of thermodynamics	Discussion and information	Tippens. 2010. <i>Physics</i> (seventh edition). McGraw	
16 th	Sound	Production of a sound wave; the speed of sound; vibrating air columns; forced vibration and resonance, audible sound wave; pitch and quality; interference and beats; the Doppler effect	Discussion and information	Tippens. 2010. <i>Physics</i> (seventh edition). McGraw	Responsible, thinking logically, creatively, inovatively, dicipline, curious

IV. Reference

Compulsory:

Tippens, PE. 2010. *Physics* (seventh edition). Boston: McGraw-Hill Higher Education

Additional:

Giancoli, Douglas C. 1998. *PHYSICS: Principles with application*. Fifth edition. Prentice Hall Inc.

V. Evaluation

No	Componen	Worth
1	Participation	10 %
2	Assignment	40 %
3	Mid Semester	25%
4	Examination	25%
		100%

Yogyakarta, August 20th 2010

Yusman Wiyatmo, M.Si.