

TKU211122

Fluid, Heat & Waves

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BASIC INFORMATION

Course Credit	2 / 100 minutes per Week
Course Type	Required
Course Classification	Basic Science
Prerequisites	Classical Mechanics

STUDENT AND LEARNING OUTCOMES

Covered Student Outcomes

Fundamental and Engineering Knowledge (KP.1)

Learning Outcomes

- LO1** Students are able to understand the concepts related to gravity, periodic motion, waves and fluid mechanics.
- LO2** Students are able to understand the concepts related to heat, temperature, thermal properties of matter and the laws of thermodynamics.

COURSE DESCRIPTION

Fluid, Heat & Waves course is the continuation of Classical Mechanics course. It discusses the concepts and theories related to Gravity, Periodic Motion, Waves, Fluid Mechanics and Thermodynamics. Students is required to take the Classical Mechanics course before taking this course.

TOPICS

1. Gravity

- 1.1 Newton's Law of Gravity
- 1.2 Weight and Gravitational Potential energy
- 1.3 Satellite Motion
- 1.4 Kepler's Laws and the Motion of Planets

2. Periodic Motion

- 2.1 Simple Harmonic Motion
- 2.2 Pendulum and Spring-Mass System
- 2.3 Forced Oscillation and Resonance

3. Fluid Mechanics

- 3.1 Hydrostatic and Pascal's Principle
- 3.2 Buoyancy and Archimedes' Principle
- 3.3 Bernoulli's Equation

3.4 Viscosity, Turbulence, and Magnus Effect

4. Waves and Sound

4.1 Wave and its Properties

4.2 Mathematical Description of Wave

4.3 Sound Wave

4.4 Superposition and Interference

4.5 Standing Wave

4.6 Doppler Effect

5. Heat and Temperature

5.1 Temperature and Thermometer

5.2 Thermal Equilibrium

5.3 Thermal Expansion

5.4 Quantity of Heat and Calorimetry

6. Thermal Properties of Matter

6.1 Molecular Properties of Matter

6.2 Kinetic-Molecular Model of an Ideal Gas

6.3 Heat Capacity

6.4 Molecular Speeds

7. The Law of Thermodynamics

7.1 The First Law of Thermodynamics

7.2 The Second Law of Thermodynamics

REFERENCES

- [1] Young & Freedman, 2008, University Physics with Modern Physics, Addison-Wesley Publishing Co., Boston
- [2] Halliday-Resnick-Walker, 2004, Fundamentals of Physics, John Wiley & Sons, Inc., New York
- [3] Randall D. Knight, 2008, Physics for Scientists and Engineers, Addison-Wesley Publishing Co., Boston