

Syllabus

Physics, 2nd Stage – Sound, and Wave Motion

2nd Semester, 2023-2024

Course Description: Two semester hours (15 lectures). An introduction to vibrational and wave motion with applications to acoustics. This course is designed to be an introduction to University Level Physics, specifically for students interested in Physics. It is assumed that these students have mastered or at least been exposed to certain basics in physics (Classical Physics - forces, Newton's Laws, momentum, waves, etc.). The course covers periodic motion, oscillations, mechanical, and sound waves.

Textbook:

Fundamentals of Physics by Halliday, Resnick, and Walker, 10th Edition

ISBN: 978-1-118-23071-8, Publisher: Wiley

الصوت والحركة الموجية, الدكتور أمجد عبد الرزاق كرجية, جامعة الموصل, 1987

Lecture Time and Place: AM – AM, Room:

Instructor:

Student Learning Outcomes:

- 1- Have the understanding of the concepts of oscillatory motion, superposition of waves, sound, and electromagnetic waves.
- 2- Have experience with common mathematical and experimental tools including solving problems for this course.
- 3- Have skills in collecting and analyzing experimental data.

Goals of the Course:

Students will gain knowledge of wave motion and acoustics. The properties of waves will be discussed. The effect of medium on the properties of waves will be covered.

Grading Procedure and Scale:

Lecture Grade: The lecture portion of the grade is determined by homework, tests, and the final exam as outlined below:

- Homework and attendance 20% (Late Homework penalty 10% each day)
- Two Tests 20% each for a total of 40%
- Final exam (comprehensive) 40%

Scale:

90 and above Excellent (A)

80 and above but less than 90: Very Good (B)

70 and above but less than 80: Good (C)

60 and above but less than 70: Satisfactory (D)

Less than 60: Sufficient (E)

Less Than 50: Fail (F)

Any decision to curve the grade will be taken at the end of the semester. Missing an exam without first making arrangements for a make-up with the instructor (excused absence must be cleared before the exam) will automatically result in the failing grade. Missing other class periods will result in penalties.

1. Wave Motion.

Waves and Wave Motion.

Kinds/Types of Waves.

Characteristics of Waves.

Properties of Waves

2. Sound.

Nature and Sources of Sounds.

Characteristics of Sound.

Properties of Sound.

Transmission of Sound

1: Introduction

A brief introduction to problem-solving in physics, Physical quantities (Standards and Units), errors, uncertainty, and some math.

2: Oscillations and Waves

Oscillations

Simple harmonic motion

Harmonic motion and circular motion

The force law

Energy in simple harmonic oscillators

Damping and forced oscillations

3: Mechanical Waves

Characteristics of waves

Wavelength and frequency

Speed and energy in a traveling wave

Standing waves

4: Sound Waves

The characteristics of sound waves

The speed of sound

Intensity of sound waves

Superposition of sound waves (interference and beats)

The Doppler effect