Bangladesh University of Engineering and Technology
Department of Physics

Course Teacher: Dr. Mehnaz Sharmin

Course Outline

Program:	**Architecture (ARCH)**
Course Title:	Physics (Light, Heat and Sound)
Course Code:	PHY-115
Semester:	July 2021
Level:	1st year 1st semester
Credit Hour:	3.0
Name & Designation of the Teacher:	Dr. Mehnaz Sharmin Associate Professor Department of Physics
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Rationale: This course in Physics is developed on elementary level which will help the students to build up their skill in analyzing various problems related to waves, especially sound wave. Sound is a form of energy which an essential part of our everyday life. It is produced when something vibrates and in turn causes the medium (water, air, etc.) around it to vibrate. Human emotion, biological movement, social interactions, comfort of living, etc. are strongly dependent on the sound around us. Sometimes sound gives us happiness (Example: bird's chirping, flow of fountains, melodious music, etc.), sometimes it is a noise or pollution (Example: loudspeakers, heavy machine sounds, vehicle horns, etc.). Sometimes sound can irritate people even inside an apartment or auditorium or classrooms or any other buildings if proper acoustics are not obeyed while designing the structure. So, the knowledge of sound is very important in architecture. The objective of this course is to clarify the basic knowledge of generation of sound by oscillations and various characteristics of sound waves and to present some real- life examples of the applications of this subject.

Pre-requisite (if any)**:** None

Course Synopsis: Simple harmonic motion: Differential equation of simple harmonic oscillation, Energy of simple harmonic oscillator, Damped oscillation. Forced oscillation. Characteristics of mechanical waves, Equations of a travelling wave, Energy; Stationary waves: Beats, Physical qualities of sound, Reflection, Transmission and intensity of sound waves. Variation of sound intensity with distance, Units of sound intensity: Decibel and other units, Doppler's principle.

Course Objectives:

The learning objectives of this course are to-

1. Learn about different types of oscillation.
2. Develop the skill to establish and solve the equations of motion of various oscillatory systems.
3. Acquire knowledge about the characteristics of various mechanical waves.
4. Comprehend the physical quantities of sound
5. Enrich the acquaintance of architectural acoustics.
6. Clarify the concept of Doppler's principle of sound.

Tentative Lecture Plan

Lectures	Topics
1-5	Simple harmonic motion: Differential equation of simple harmonic oscillation, Energy of simple harmonic oscillator, Damped oscillation. Forced oscillation.
6-9	Characteristics of mechanical waves, Equations of a travelling wave, Energy; Stationary waves: Beats, Physical qualities of sound, Reflection, Transmission and intensity of sound waves.
10-12	Variation of sound intensity with distance, Units of sound intensity: Decibel and other units, Doppler's principle.

Learning Resources

1. Physics – David Halliday, Robert Resnick, and Jearls Walker
2. Vibrations and Waves- A. P. French
3. Physics for Engineers (Part-1) - Dr. Gias Uddin Ahmad
4. Waves and Oscillation – Brij Lal and N. Subramanium
5. Lecture notes: available in the “class materials” of the respective MS Teams classroom.

Program Outcomes (POs)

After finishing this course, a student will be capable to -

- Solve the equation of motion for different types of oscillatory systems.
- Distinguish different types of waves and the phenomena related to them.
- Evaluate physical quantities related to wave motion.
- Analyse problems related to sound wave.
- Explain Reverberation in terms of Sabine's formula and solve the problem related to reverberation.

Teaching Methods:

1. Lecture
2. Discussion
3. Question & Answer
4. Demonstration
5. Problem Solving

Assessment Policies:

Attendance: Class attendance is very important since by missing a class you may miss a class test that may be equivalent to a failed class test and it carries 10% weight of your grade, cannot be recovered unless the absence is appropriately justified and excused.

Class Test/Quizzes: There will be a total of four class tests in this course. Three teachers will be teaching this course and each teacher will be taking at least one class tests. Lowest score of the (four) CT will be dropped. If you miss any class test, it will count at the lowest score, and will be dropped. **So, no make-up for any class test.** You can expect one/two class test from Modern Physics.

Conduct: Please turn off your cell phones before entering class, and please don't have any sidebar conversations during class. There will be ample opportunity for you to talk during class at certain times. However, it is imperative that the class is quiet at all other times so that your fellow students are not distracted. I encourage you to raise your hand and ask relevant questions in class.

Collaboration Policy: Collaboration during exams is strictly prohibited. Exams will be of the usual closed-book, closed-notes type. On the other hand, in order to learn the materials, collaboration and group discussions outside of classroom are highly encouraged.

Calculators and Laptops: A non-graphic, non-programmable calculator Calculators may be used for exams. While in the class any calculators can be used. You may take notes on a laptop. However, you may not use your laptop for Facebook, web surfing, or other activities not directly related to class.

You will not be allowed to use your cellphone as a calculator in the test.

Grading System:

The total performance of a student in a given course is based on a scheme of continuous assessment. For theory courses this continuous assessment is made through a set of quizzes/in class evaluation, class participation, homework assignments, and a term final examination. Thirty per cent of marks of a theoretical course shall be allotted for continuous assessment i.e., quizzes and homework assignments, in class evaluation and class participation. The remainder of marks will be allotted to Term Final examination of 3-hour duration, which will be conducted centrally by the university. There will be internal and external examiners for each course in the term final examination. The distribution of marks for a given theoretical course will be as follows:

Items	Marks (%)
Class Attendance	10 %
Quizzes	20 %
Term final examination: Internal (Section A) External (Section B)	 35 % 35 %
Total	100 %

All students are expected to attend classes regularly. The university believes that attendance is necessary for effective learning. The first responsibility of a student is to attend classes regularly, and one is required to attend at least 60% of all classes held in every course. Basis for awarding marks for class participation and attendance will be as follows:

Attendance	Marks
90% and above	10
85% to less than 90%	9
80% to less than 85%	8
75% to less than 80%	7
70% to less than 75%	6
65% to less than 70%	5
60% to less than 65%	4
Less than 60%	0

Letter grades and corresponding grade points will be awarded in accordance with the provisions shown below:

Numerical Grade	Letter Grade	Grade Point
80% or above	A+ (A plus)	4.00
75% to less than 80%	A (A regular)	3.75
70% to less than 75%	A- (A minus)	3.50
65% to less than 70%	B+ (B plus)	3.25
60% to less than 65%	B (B regular)	3.00
55% or less than 60%	B- (B minus)	2.75
50% to less than 55%	C+ (C plus)	2.50
45% to less than 50%	C (C regular)	2.25
40% to less than 45%	D (D regular)	2.00
Less than 40%	F	0.00