Department of Architecture
Bangladesh University of Engineering and Technology

COURSE OUTLINE
Course No: PHY 115
Level 1/ Term 1
Credit (Contact) Hours: 3.0

PART A: General Information

Description of Course PHY 115

1	**Course Title**	: Physics (Light, Heat and Sound)
2	**Type of Course**	: Non-departmental course
3	**Offered to**	: Department of Architecture
4	**Pre-requisite Course(s)**	: N/A

PART B: Course Details

1. Course Content (As approved by the Academic Council)

Sound: 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.

Light: Illumination and photometry, Luminous intensity; Their measurements and units, Phosphorescence, Fluorescence, Discharge lamps. Theories of light: Interference: Young's double slit experiment, Determination of thickness of a film, Diffraction: Diffraction due to a single slit, Polarization: Different methods of polarization, Intensity of polarized light.

Heat: Humidity; Vapour pressure, Temperature related humidity; Transmission of heat: Conduction: Conductivity, Rectilinear flow of heat, Determination of thermo-conductivity of good and bad conductors, Heat flow through compound walls; Convection: Free and forced convection, Domestic and industrial applications, Ventilation; Radiation: Different Laws of radiation, Black body radiation, Radiation from surfaces, Solar radiation.

2. Course Objectives

Objective 1: To develop logical and critical thinking with scientific knowledge of light, heat and sound required for the students of architecture.

Objective 2: To understand the different laws of physics associated with light, heat and sound, and apply them to solve the real life problems.

3. Knowledge required

Insert previous knowledge requirements: N/A

4. Course Outcomes

CO No.	CO Statement At the end of the course, a student should be able to	Corresponding PO(s)*	Domains and Taxonomy level(s)**	Delivery Method(s) and Activity(-ies)	Assessment Tool(s)
CO1	Describe the basic laws of physics related to light, heat and sound to express different phenomena in the physical world.	PO(a)	C1	e.g., Lectures, Homework	e.g., Written exams; viva voce; presentation; assignment
CO2	Explain the fundamental concepts and theories of light, heat and sound applicable for different physical conditions.	PO(a)	C2	e.g., Lectures, Homework	e.g., Written exams; viva voce; presentation; assignment

CO3	Apply the relevant laws of physics to solve various mathematical problems and interpret the result and its consequences.	PO(a)	C3, C4	e.g., Lectures, Homework	e.g., Written exams; viva voce; presentation; assignment

***POs**
PO (a): Architectural knowledge; PO(b): Problem analysis; PO (c): Design/development of solutions; PO(d): Investigation; PO(e) Modern tool use; PO(f): Architect and society; PO(g): Environment and sustainability; PO(h): Ethics; PO(i): Individual work and teamwork; PO(j): Communication; PO(k): Project management and finance; PO(l): life-long learning
****Domains**
C-Cognitive : C1: Knowledge; C2: Comprehension; C3: Application; C4: Analysis; C5: Synthesis; C6: Evaluation
A-Affective : A1: Receiving; A2: Responding; A3: Valuing; A4: Organizing; A5: Characterizing
P-Psychomotor: P1: Perception; P2: Set; P3: Guided Response; P4: Mechanism; P5: Complex Overt Response; P6: Adaptation; P7: Organization

5. Lecture Plan

wk	Lecture Topics	Corresponding CO(s)
1	• Illumination and photometry • Conduction of Heat • Simple harmonic motion: Differential equation of simple harmonic oscillation	CO1, CO2
2	• Luminous intensity, their measurements and units • Temperature Gradient, Coefficient of thermal Conductivity, Thermal Diffusivity • Energy of simple harmonic oscillator	CO1, CO2
3	• Phosphorescence, Fluorescence, Discharge lamps • Rectilinear flow of heat along a bar • Application of simple harmonic oscillation	CO1, CO2, CO3
4	• Theories of light , Interference of light • Determination of Thermal conductivity: Searle's Method, Lee's and Charlton's Method • Solving mathematical problems related to simple harmonic oscillation	CO1, CO2, CO3
5	• Young's double slit experiment, solving mathematical problems • Heat flow through a compound wall, Solving mathematical problems • Damped oscillation, Forced oscillation and resonance	CO1, CO2, CO3
6	• Class Test (Light) • Class Test (Heat) • Class Test (Sound)	
7	• Determination of thickness of a film • Convection of Heat • Solving mathematical problems related to damped and forced oscillations.	CO1, CO2, CO3
8	• Solving numerical problems related to the thickness of a film • Thermal Radiation, Black Body, Kirchoff's Law • Introduction to wave motion, Characteristics of various waves	CO1, CO2, CO3
9	• Diffraction of light • Distribution of energy in the spectrum in the Black Body, Wien's Law, Rayleigh- Jeans Law, solving mathematical problems • Travelling waves: Equations of a travelling wave, Energy calculation for a wave motion	CO1, CO2, CO3

10	• Diffraction due to single slit • Plank's Radiation Law • Stationary waves: Interference of sound waves, Beats, Interference of sound waves by reflection at free and rigid boundaries	CO1, CO2, CO3
11	• Mathematical problems related to diffraction of light • Solar radiation, application of Thermal Radiations • Solving mathematical problems related to wave motion	CO2+CO3
12	• Polarization of light • Problem Solving Class related to Thermal Radiation • 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	CO1, CO2, CO3
13	• Different methods of polarization , Intensity of polarized light • Gas and Vapour, Vapour Pressure • Growth and decay of sound intensity	CO1, CO2
14	• Mathematical problems related to Polarization of light • Hygrometry, Relative Humidity, Temperature dependent Humidity • Doppler's principle, solving mathematical problems	CO1, CO2, CO3

6. Assessment Strategy

- Class Participation: Class participation and attendance will be recorded in every class.
- Continuous Assessment: Continuous assessment any of the activities such as quizzes, assignment, presentation, etc. The scheme of the continuous assessment for the course will be declared on the first day of classes.
- Final Examination: A comprehensive term final examination will be held at the end of the Term following the guideline of academic Council.

7. Distribution of Marks

Class Participation	10%
Continuous Assessment	20%
Final Examination	70%
Total	100%

8. Textbook/ Reference

1. Fundamentals of Physics (10^{th} Edition); D. Halliday, R. Resnick, and J. Walker.
2. Physics for Engineers - Part-I; Dr. Gias Uddin Ahmad.
3. A Textbook of Optics; N. Subrahmanyam and Brij Lal.
4. Heat and Thermodynamics; N. Subrahmanyam and Brij Lal.

Department of Architecture
Bangladesh University of Engineering and Technology

COURSE OUTLINE
Course No: PHY 115
Level 1/ Term 1
Credit (Contact) Hours: 3.0

Prepared by:		
Name: Dr. Muhammad Samir Ullah Signature:	Name: Dr. Mehnaz Sharmin Signature:	Name: Mr. Probal Roy Signature:
Date of Preparation: 11 May, 2022		
Date of Approval by BUGS: 16 May, 2022		