هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

T-104
2022

Course Specification

Course Title:	**WAVES AND VIBRATIONS**
Course Code:	**212PHYS**
Program:	**PHYSICS**
Department:	**PHYSICS**
College:	**SCIENCE**
Institution:	**Jazan College**
Version:	**2022**
Last Revision Date:	**24 December 2022**

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A. General information about the course:

Course Identification		
1. Credit hours:	2	
2. Course type		
a.	University ☐ College ☐ Department ☒ Track☐ Others☐	
b.	Required ☒ Elective☐	
3. Level/year at which this course is offered:		$6^{th}/2^{nd}$
4. Course General Description The course provides fundamental concepts of vibrations and waves including oscillatory motion, wave motion, sound waves, and superposition of standing waves.		
5. Pre-requirements for this course (if any): 251 Phys		
6. Co- requirements for this course (if any): NIL		
7. Course Main Objective(s) This course is designed to provide students with the following: • The physics of simple harmonic motion (SHM) • Basic analysis of damped oscillations • Basics and adequate analysis of wave motion and sound waves • Physics of waves interference • Representation of superposition of standing waves		

1. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1.	Traditional classroom	18	82%
2.	E-learning		
3.	Hybrid • Traditional classroom • E-learning	4	18%
4.	Distance learning		

2. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	22
2.	Laboratory/Studio	
3.	Field	
4.	Tutorial	
5.	Others (specify)	
	Total	22

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	**Define** the simple harmonic motion, Uniform Circular Motion, underdamped, critically damped, overdamped, and forced oscillations, transverse wave, longitudinal wave, reflection, and transmission coefficients of travelling waves, Traveling Wave, superposition of sinusoidal waves, Sound Levels, Doppler effect, interference, Standing Waves, harmonics, Resonance, Beats	PLO1.1	Lectures, blackboard and visualization, brainstorming, group and interactive discussion, Interactive illustration – Problem based learning	**Direct** (formative and summative): In-class interactive questioning, quizzes, and written exams. **Indirect**: student survey
1.2	**Discuss** the interference of sinusoidal waves, the origin of standing Waves, Energy of the Simple Harmonic Oscillator, Damped Oscillations, Forced Oscillations, reflection, and transmission coefficients of traveling waves, differences between, transverse and longitudinal waves, principle of superposition to two sinusoidal waves, concepts of nodes and antinodes and how boundary conditions lead to normal modes, harmonics beating phenomenon,	PLO1.2	Lectures, blackboard and visualization, group and interactive guided discussion, Interactive discussion	**Direct** (formative and summative): In-class interactive questioning, quizzes, written exams. **Indirect**: student survey
…				
2.0	Skills			
2.1	**Solve** various problems related to Oscillatory Motion, Wave Motion, Sound Waves, Superposition and Standing Waves.	PLO2.1	Lectures, blackboard and visualization, brainstorming, group and interactive discussion, Interactive illustration –	**Direct** (formative and summative): In-class interactive questioning,

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
			Problem based learning	quizzes, written exams **Indirect**: student survey
2.2	**Derive** the equation of motion of a block-spring system, simple pendulum, physical pendulum, torsional pendulum, and the linear wave equation, derive the velocity and acceleration of SHM and the kinetic, potential and total energy of a mechanical system undergoing SHM, Rate of Energy Transfer by Sinusoidal Waves on Strings, expression for the speed of sound, Intensity of Periodic Sound Waves, expression of Standing Waves	PLO2.2	Lectures, blackboard and visualization, brainstorming, group and interactive discussion, Interactive illustration – Problem based learning	**Direct** (formative and summative): In class interactive questioning, quizzes, written exams **Indirect**: student survey
…	**Develop** communication competencies during interactive discussion, group assignments, essays or web-based activities.	PLO2.4	Interactive and Group discussion, expository and discovery teaching	**Direct** (formative and summative): **Indirect**: student survey
3.0	Values, autonomy, and responsibility			
3.1	**Show** the ability to handle activities among a group and bear individual responsibility.	PLO3.1	Interactive and Group discussion, expository and discovery teaching	**Direct** (formative and summative): **Indirect**: student survey
3.2				
…				

C. Course Content

No	List of Topics	Contact Hours
1.	**Oscillatory Motion:** Motion of an Object Attached to a Spring, Analysis Model: Particle in Simple Harmonic Motion, Energy of the Simple Harmonic Oscillator, Comparing Simple Harmonic Motion with Uniform Circular Motion, The Pendulum, Damped Oscillations, Forced Oscillations	7
2.	**Wave Motion:** Propagation of a Disturbance, Analysis Model: Traveling Wave, The Speed of Waves on Strings, Reflection and Transmission, Rate of Energy Transfer by Sinusoidal Waves on Strings, The Linear Wave Equation.	5
3	**Sound Waves**: Pressure Variations in Sound Waves, Speed of Sound Waves, Intensity of Periodic Sound Waves, The Doppler Effect.	3
4	**Superposition and Standing Waves:** Analysis Model: Waves in Interference, Standing Waves, Analysis Model: Waves Under Boundary Conditions, Resonance, Standing Waves in Air Columns, Standing Waves in Rods and Membranes, Beats: Interference in Time.	7
Total		22

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	**Mid-term exam**	**7**	**20 (20%)**
2.	**Student activities (Assignments, Quizzes, group work etc.…)**	**Distributed over the semester**	**30 (30%)**
3.	**Final Exam**	**12**	**50 (50%)**

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.)

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	• Fundamentals of Physics; Halliday, Resnik and Walker, John Wiley, and Sons Inc., • Vibrations and Waves (The M.I.T. Introductory Physics Series), A.P. French, W.W. Norton & Company; 1st Edition (January 17, 1971)
Supportive References	Physics for Scientists and Engineers, Raymond A. Serway, John W. Jewett, 9th Edition, 2014.
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	1 Lecture room(s) for groups of 25 students.
Technology equipment (projector, smart board, software)	Data show- smart board
Other equipment (depending on the nature of the specialty)	None

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students, Peer and program leader	Indirect (CES)- Indirect peer evaluation
Effectiveness of students assessment	Students, Program assessment committee	Direct/ Indirect
Quality of learning resources	Students, Faculty members	Indirect
The extent to which CLOs have been achieved	Instructor	Direct/Indirect
Other	None	

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval Data

COUNCIL /COMMITTEE	DEPARTMENT BOARD
REFERENCE NO.	PHYS2304
DATE	28/2/2023