科目ナンバリング	U-LAS12 10032 LE57						
授業科目名 <英訳>	Physics of Wave and Oscillation-E2 Physics of Wave and Oscillation-E2			担当者所属 職名・氏名	工学研究科　講師　AMAR, Julien Samuel		
群	自然科学科目群			分野(分類)	物理学(基礎)	使用言語	英語
旧群	B群	単位数	2単位	週コマ数	1コマ	授業形態	講義（対面授業科目）
開講年度・開講期	2026・前期	曜時限	火4	配当学年	主として2回生	対象学生	理系向

[授業の概要・目的]

Through theoretical explanations and (some) experimental demonstrations, this course will enable students to grasp, explain, and apply the fundamental concepts of oscillation and wave related phenomena in physical systems.

[到達目標]

Physics of oscillation and wave related phenomenon is a fundamental tool for understanding nature and many brunches of modern technology. In my opinion, it is also one of the most 'fun' topics in physics to study!

In this course, we will begin our study with the simplest situation involving oscillation of one particle and slowly build up a comprehensive theoretical understanding of complex vibrations and wave. Also, whenever possible, we will test these theories through experimental demonstrations.

My primary objectives in this course are:

(1) to clearly explain the fundamental theoretical concepts of oscillation and wave related phenomena in physical systems, (2) to show experimental verification of these concepts wherever possible, (3) to elaborate the technological significance of these concepts, (4) to motivate practical problem solving.

[授業計画と内容]

1. Oscillation of a single particle: simple harmonic motion, equation of motion and its solution, potential and kinetic energies; damped harmonic oscillator and Quality factor; damped-forced vibration and the phenomenon of resonance; superposition principle. (5 weeks)

2. Coupled oscillators: coupled oscillation of two particles; normal modes; 3 coupled oscillators; N-coupled oscillators. (5 weeks)

3. Waves: wave equation and its solutions; longitudinal and transverse waves; normal modes of a string under tension; standing and travelling waves; Fourier decomposition of plucked strings' vibration; dispersion, group and phase velocities. (4 weeks)

4. Feedback.（1 week）

[履修要件]

Basic knowledge of trigonometry and Newton's laws are required. Some understanding of complex numbers will be helpful.

Physics of Wave and Oscillation-E2(2)へ続く↓↓↓

Physics of Wave and Oscillation-E2(2)

[成績評価の方法・観点]

Evaluation procedure: active participation (10%), one assignment (40%), and final Exam (50%)

[教科書]

A. P. French 『Vibrations and Waves』（CBS Publishers & Distributors）ISBN:8123909144, 9788123909141（The M.I.T. Introductory Physics Series, 2003）

[参考書等]

（参考書）
授業中に紹介する

[授業外学修（予習・復習）等]

Following study materials and working on assignment / homework

[その他（オフィスアワー等）]

Will be discussed in class

[主要授業科目（学部・学科名）]