Science 4 (Physics)

Basic Course Information

Course Number	82005922	**Subject Category**	Compulsory-GI
Class Format	Lecture	**Credit Type and Number of Credits**	1
Department	Computer	**Student Category**	Year 2
Period of Study	Semester 2	**Classes per Week**	2
Required Materials	KOSEN Textbook Series Physics volume 1, Mechanics and Waves, H. Ushio et al, Morikita Publishing Co., Ltd. ISBN978-4-627-15511-4		
Instructor	Natsuda Kongwassa	Suwun Suwunnarat	

Course Objective

There are various types of engineering problems that require a good knowledge and application of physics.
This course introduces concepts of waves:
1) Fundamental knowledge of wave (Waveform, Standing wave, Huygens' principle and wave properties)
2) Concept of sound waves including resonance, beats and Doppler effect,
3) Concept of ligh waves including Young's experiment, dispersion and scattering of light.

Evaluation (Rubric)	Ideal Level of Achievement (Very Good)	Standard Level of Achievement (Good)	Unacceptable Level of Achievement (Fail)
Understanding concepts of Physics and their relation	Demonstrates very good knowledge and understanding of concepts in Physics. Good connections among these concepts and mathematical procedures to correctly solve problems or answer questions.	Demonstrates good knowledge and understanding of typical Physics concepts. Good connections among these concepts and mathematical procedures to solve problems, but occasionally may make minor errors.	Lacks the appropriate knowledge and understanding of concepts in Physics. Weak connections among these concepts.
Mathematical and graphical representation	Describe equations related to waves. Show good understanding and graphs are logical with sufficient details to describe the waves.	Describe equation related to waves. Understanding and graphs are reasonable with information to describe the waves, but not in details.	Describe equations related to waves insufficiently. Equations are limited or in accurate. Graphs are incomplete or absent of information.
Problem Solving	Provide a clear and logical progression from general concepts/equations to solve specific problems with different conditions. All final numerical answers are correct with appropriate units and calculations.	Provide a logical progression from general concepts/equations to solve specific problems with minor mistakes in calculation, algebraic, or units.	Provide an unclear logical progression or solution which is very difficult to follow. Major algebraic and/or other mathematical mistakes in solution.
Understanding of fundamental knowledge of waves (Waveform, Standing wave, Huygens' principle and wave properties)	Ability to solve not only basic problems but also applied problems on midterm and/or final exams about this category.	Can explain fundamental knowledge of waves (Waveform, Standing wave, Huygens' principle and wave properties)	Unable to explain fundamental knowledge of waves (Waveform, Standing wave, Huygens' principle and wave properties)
Understanding of sound waves (including resonance, beats and Doppler effect)	Ability to solve not only basic problems but also applied problems on midterm and/or final exams about this category.	Can explain sound waves (including resonance, beats and Doppler effect)	Unable to explain sound waves (including resonance, beats and Doppler effect)
Understanding of light waves (including Young's experiment, dispersion and scattering of light).	Ability to solve not only basic problems but also applied problems on midterm and/or final exams about this category.	Can explain light waves (including Young's experiment, dispersion and scattering of light)	Unable to explain light waves (including Young's experiment, dispersion and scattering of light)

Relationship with Learning Outcomes

G(1) Wide knowledge on Science and Engineering and practical ability to apply them to solve problems in the society.
Please change
Please change

Teaching Method

Outline:	Students will study basic concepts and principles of waves in physics.
Class Format:	Lecture, Practice and experiment.
Please Note :	Students are required to ask any questions after sufficient self-learning. All materials will be posted on the Google classroom. The student is requested to keep photo copies or files of all submitted material to ensure further study by oneself. Assignment is requested to submit in Google classroom within a week after it is assigned. If not, there will be score deduction for late submission (full score = 100 points: submission within a week), 80 points: submission after one week and 65 points: submission after Physics' final exam date) and 0 points (2 weeks after the final exam date).

Course Plan

Semester 2	Contents and Method of Course	Goals	Related MCC
1st week	Class orientation Fundamental Formula of Wave and waveform	Explain fundamental Formula of Wave and Reading Waveform	II-A 1 53
2nd week	Types of waves and priciple of superposition of waves	Explain the difference between transverse waves and longitudinal waves. Explain the priciple of superposition of waves.	II-A 1 54 II-A 1 55
3rd week	Standing waves	Explain standing waves. Able to perform basic calculation and draw basic graphical interpretation related to standing waves.	II-A 1 56 II-A 1 57 II-A 1 58
4th week	Standing waves (Labi and Huygens' principle	Perform the experiment related to standing waves. Explain Huygens' principle. Able to draw graphical interpretation of travelling wave using Huygens' principle.	II-B 1 1 II-B 1 2 II-B 1 5 II-B 1 6 II-B 1 7 II-A 1 59
5th week	Diffraction and reflection of waves.	Explain diffraction and reflection of waves. Draw graphical interpretation related to diffraction and reflection of waves. Perform calculation related to reflection of waves.	II-A 1 60
6th week	Refraction and total internal reflection of waves	Explain refraction and total internal reflection of waves. Draw graphical interpretation related to refraction and total internal reflection of waves. Perform calculation related to refraction and total internal reflection of waves.	II-A 1 60
7th week	Interference of waves	Calculate the conditions for constructive and destructive interference of waves.	II-A 1 61
8th week	Midterm examination	Contents from week 1-7	
9th week	Return Midterm exam and Feedback Introduction to sound waves	Review learning content of week 1-7.	
10th week	Reflection, refraction, diffraction and interference of sound waves	Explain reflection, refraction, diffraction and interference of sound waves.	II-A 1 61
11th week	Resonance	Explain resonance. Calculate the eigenfrequencies of open-tube and closed-tube based on tube length and sound speed in air column of the tube (not considering open-end correction).	II-A 1 62 II-A 1 63
12th week	Beat and doppler effect	Explain beat and doppler effect. Perform calculation related to beat and doppler effect.	II-A 1 64
13th week	Introduction of light waves. Nature of light waves. Reflection, refraction and diffraction of light waves.	Explain nature of light. Perform calculation related to reflection, refraction of light.	II-A 1 65 II-A 1 66
14th week	Young's experiment. Interference of light waves.	Explain Young's experiment Perform calculation related to interference of light waves.	
15th week	Dispersion and scattering of light	Explain that spectrums are generated by the dispersion phenomena caused by the difference in wavelength.	II-A 1 67
16th week	Summary of week 9-15, preparation for final examination	Review learning content of week 9-15.	
17th week	Final examination	Contents from week 9-15	
18th week	Return Final exam and Feedback	Review learning content of week 9-15.	

Do not

	Examination	Quiz	Mutual Evaluation between students	Report	Portfolio	Other
Basic Ability	60	0	0	0	40	0
Technical Ability	0	0	0	0	0	0
Interdisciplinary Ability	0	0	0	0	0	0