Science 5 (Physics)

Basic Course Information

Course Number	02005023	**Subject Category**	Compulsory(G)
Class Format	Lecture	**Credit Type and Number of Credits**	1.5
Department	Computer	**Student Category**	Year 3
Period of Study	Semester 1	**Classes per Week**	3
Required Materials	KOSEN Textbook Series Physics volume 1, Mechanics and Waves, H. Uehio et al., Morikita Publishing Co., Ltd. ISBN978-4-627-15511-4 KOSEN Textbook Series Physics volume 2, Heat, Electricity and Magnetism, and Atoms, H. Uehio et al., Morikita Publishing Co., Ltd. ISBN978-4-627-15521-4		
Instructor	Suwun Suwunnarat	Natsuda Klongvessa	

Course Objective

There are various types of engineering problems that require a good knowledge and application of physics, especially in mechatronics. Physics 5 is continued from Physics 4 and a major subject of science 5. Physics 5 is originally designed to be on a focus of optics and electromagnetism. The subject is aimed to deepen students' understanding of light, optics and electromagnetism including electromagnetic wave. The assignment is designed to help the students to develope knowledge, problem solving skill and understanding.

Evaluation(Rubric)	Ideal Level of Achievement (Very Good)	Standard Level of Achievement (Good)	Unacceptable Level of Achievement (Fail)
Understanding concepts of physics and their relations	Ability to correctly understand and explain concepts in Physics and connect with real life experiences.	Ability to fairly understand and explain concepts in Physics and connect with real life experiences.	Lacks of the appropriate knowledge and understanding in Physics. Unclear linkages of physics concepts from different contents.
Mastering mathematical and graphical expressions skills.	Ability to describe equations and show good understanding by using graphs with necessary details and vice versa	Ability to fairly describe equations and show understanding by using graphs and vice versa.	Equations are limited or inaccurate. Graphs are incomplete or absent.
Problem Solving	Ability to provide a clear and logical expression from general concepts/equations to solve specific problems with different conditions. All final numerical answers are correct with appropriate units and calculations	Ability to fairly provide some logical expression from general concepts/equations to solve specific problems with different conditions in calculations, algebraic, or units.	Provide an unclear logical progression or solution which is very difficult to follow. Major algebraic and/or other mathematical mistakes in solutions.

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 optics and electromagnetism. Students are expected to develop an appreciation of the fundamental laws and principles and their applications to solve typical problems.
Class Format:	Lecture/exercise, and mini-Lab/demonstration
Please Note :	The students are requested to keep hard copies or electronic 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 1	Contents and Method of Course	Goals	Related MCC
1st week	Reviews of light waves	Check what students' recognition of light waves from physics 4 and what will be applied in this course. To explain concept of optical path length.	
2nd week	Interference of light due to thin film and Newton's ring	To explain the concepts of light waves and its properties: interference due to thin film and Newton's ring, and its calculation.	
3rd week	Anti-Reflection coating	To explain the concepts of a single-layer anti-reflection coating, and its calculation and application.	
4th week	Polarization and polarizer, and Lab: Malus' law	To explain the concepts of the polarization of light waves and the classification of three types of polarizations and how polarizer works, and its calculation.	工-A 1 65 工-B 1 1 工-B 1 2 工-B 1 3 工-B 1 4 工-B 1 7
5th week	Images formed by mirrors	To explain the concepts of images formed by flat and spherical mirrors and to apply the mirror's equation.	
6th week	Images formed by lenses	To explain the concepts of images formed by thin lenses and to apply the lens' equation.	
7th week	Optical instruments, and Lab: focal length of a converging lens	To explain the concepts of optical instruments.	工-B 1 1 工-B 1 2 工-B 1 3 工-B 1 4 工-B 1 8
8th week	Wrap-up of first half of semester	Review of content week 1 - 7	
9th week	Midterm Examination	Midterm examination of week 1-7	
10th week	Return Midterm Examination and Feedback	Review learning	
11th week	Electrostatic force and electric field	Understanding the fundamental principles of electrostatics, i.e., charge, Coulomb's law, electric field, electric field lines and Gauss' law	工-A 1 68 工-A 1 69 工-A 1 70 工-A 1 71
12th week	Electric potential and its applications	Appreciation of the concept of electric potential and its application, e.g., capacitors	工-A 1 71
13th week	Current and voltage	Learning the basic concepts related to electrodynamics, i.e., current, Ohm's law, electric power and Joule heat	工-A 1 72 工-A 1 73 工-A 1 74
14th week	Direct current circuit	Investigating the special case of electrodynamics, i.e., steady current, and relevant topics, e.g., resistors, battery, ammeter, voltmeter and Kirchhoff's laws	工-B 1 9
15th week	Magnetic field	Being able to calculate magnetic fields due to a magnet and an electric current, and force that current receives from the magnetic fields	
16th week	Electromagnetic induction and alternating current	Understanding the basic mechanism of electromagnetic induction and the alternating sinusoidal currents	
17th week	Electromagnetic waves	Knowing electromagnetic waves	
18th week	Review	Review of content week 11 - 17	
19th week	Final Examination	Final examination of week 11-17	

Do not

	Examination	Assignment	Mutual Evaluations between students	Group work	Portfolio	Other
Basic Ability	60	30		10		
Technical Ability						
Interdisciplinary Ability						