



TEACHING INSTRUCTIONAL DESIGN (BRP)
COURSE
BASIC PHYSICS 2

by

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August 2020



UNIVERSITAS INDONESIA
FACULTY OF MATHEMATICS AND NATURAL SCIENCES
PHYSICS UNDERGRADUATE STUDY PROGRAM

TEACHING INSTRUCTIONAL DESIGN

Course Name	Basic Physics 2	Credit(s)	Prerequisite course(s)	Requisite for course(s)	Integration Between Other Courses
Course Code	SCPH601201	4	Basic Physics 1	Thermodynamics, Vibrations and Waves, Modern Physics, Laboratory Works of Advanced Physics 1	Laboratory Works of Basic Physics 2
Relation to Curriculum	Compulsory Course				
Semester	2				
Lecturer(s)	Dr. Dwi Seno K. Sihono				
Course Description	After completing this course, when faced with basic physics problems in the fields of electricity & magnetism, waves, and optics, 1st year physics students are able to apply the principles and concepts of electricity & magnetism, waves, and optics to formulate a solution. This course is taught in Indonesian.				
Program Learning Outcome (PLO)					
PLO 1	Able to apply classical and modern physics concepts in solving general physics problems.				

PLO 2	Able to apply mathematical methods in solving physics problem analytically or numerically.
PLO 3	Able to apply physics knowledge to communities as well as identify and adapt to new things.
Course Learning Outcome (CLO)	
CLO 1	Students are able to apply basic physics principles and concepts to formulate a solution and their applications in physical phenomena in everyday life.
Sub-CLO(s)	
Sub-CLO 1	Able to apply electricity concepts in physical phenomena in everyday life.
Sub-CLO 2	Able to apply magnetism concepts in physical phenomena in everyday life.
Sub-CLO 3	Able to apply vibrations and waves concepts in physical phenomena in everyday life.
Sub-CLO 4	Able to apply optics concepts in physical phenomena in everyday life.
Study Materials	
	<ul style="list-style-type: none"> - Electric Charge and Electric Field - Gauss's law - Electric potential - Capacitor and Dielectric - Electric current - Resistance and Direct Current - Magnetic Field and Magnetic Force - Magnetic Field Source - Electromagnetic Induction - Inductance - Electromagnetic Oscillation - Alternating Current - Maxwell's equation - Mechanical Wave - Sound Waves - Standing waves

	<ul style="list-style-type: none">- The Nature and Propagation of Light- Light polarization- Light Wave Superposition & Interference- Light Wave Diffraction- Geometry optics- Optical tools and device
Reading List	<ol style="list-style-type: none">1. Halliday, Resnick, dan Walker, Principles of Physics 10th Edition, Wiley, 2014.2. Serway Jewett, Physics for Scientists and Engineers 9th Edition, Thomson Brooks/Cole, 2014.3. Giancoli, Physics for Scientists and Engineers 7th Edition, Pearson, 2014

I. Teaching Plan

Week	Sub-CLO	Study Materials [with reference]	Teaching Method [with est. time]	Learning Experiences (*O-E-F)	Sub-CLO Achievement Indicator		Sub-CLO Weight on Course (%)
					General	Specific	
1	1	Electric charge and electric field, Gauss's law [1]	Interactive learning, question-based learning self-study 200 minutes	<p>Orientation Watch video and assignment through EMAS (30%)</p> <p>Exercise Discussion, question and answer (60%)</p> <p>Feedback Lecturer feedback on discussion (10%)</p>	Know about the concepts of electric charge, field, and Gauss's law	Able to apply the concepts of electric charge, field, and Gauss's law	25
2	1	Electric potential, capacitor, and dielectrics [1]	Interactive learning, question-based learning self-study 200 minutes	<p>Orientation Watch video and assignment through EMAS (30%)</p> <p>Exercise Discussion, question and answer (60%)</p> <p>Feedback Lecturer feedback on discussion (10%)</p>	Know about the concepts of electric potential, capacitor, and dielectric	Able to apply the concepts of electric potential, capacitor, and dielectric	25
3	1	Electric current, resistance, and DC [1]	Interactive learning, question-based learning self-study	<p>Orientation Watch video and assignment through EMAS</p>	Know about the concepts of electric	Able to apply the concepts of electric current,	25

			200 minutes	(30%) Exercise Discussion, question and answer (60%) Feedback Lecturer feedback on discussion (10%)	current, resistance, and DC	resistance, and DC	
4	2	Magnetic field, magnetic force, magnetic field source [1]	Interactive learning, question-based learning self-study 200 minutes	Orientation Watch video and assignment through EMAS (30%) Exercise Discussion, question and answer (60%) Feedback Lecturer feedback on discussion (10%)	Know about the concepts of magnetic field and force	Able to apply the concepts of magnetic field and force	8
5	2	EM Induction and Inductance [1]	Interactive learning, question-based learning self-study 200 minutes	Orientation Watch video and assignment through EMAS (30%) Exercise Discussion, question and answer (60%)	Know about the concepts of EM induction and inductance	Able to apply the concepts of EM induction and inductance	8

				Feedback Lecturer feedback on discussion (10%)			
6	2	EM Oscillation [1]	Interactive learning, question-based learning self-study 200 minutes	Orientation Watch video and assignment through EMAS (30%) Exercise Discussion, question and answer (60%) Feedback Lecturer feedback on discussion (10%)	Know about the concepts of EM oscillation	Able to apply the concepts of EM oscillation	8
7	2	AC and Maxwell's equation [1]	Interactive learning, question-based learning self-study 200 minutes	Orientation Watch video and assignment through EMAS (30%) Exercise Discussion, question and answer (60%) Feedback Lecturer feedback on discussion (10%)	Know about the concepts of AC and Maxwell's equation	Able to apply the concepts of AC and Maxwell's equation	8
8	Mid-Term Exam						

9	3	Mechanical waves and sound waves [1]	Interactive learning, question-based learning self-study 200 minutes	<p>Orientation Watch video and assignment through EMAS (30%)</p> <p>Exercise Discussion, question and answer (60%)</p> <p>Feedback Lecturer feedback on discussion (10%)</p>	Know about the concepts of mechanical waves and sound waves	Able to apply the concepts of mechanical waves and sound waves	8
10	3	Standing waves [1]	Interactive learning, question-based learning self-study 200 minutes	<p>Orientation Watch video and assignment through EMAS (30%)</p> <p>Exercise Discussion, question and answer (60%)</p> <p>Feedback Lecturer feedback on discussion (10%)</p>	Know about the concepts of standing waves	Able to apply the concepts of standing waves	8
11	4	Nature and principle of light [1]	Interactive learning, question-based learning self-study 200 minutes	<p>Orientation Watch video and assignment through EMAS (30%)</p> <p>Exercise</p>	Know about the concepts of light	Able to apply the concepts of light	8

				<p>Discussion, question and answer (60%)</p> <p>Feedback Lecturer feedback on discussion (10%)</p>			
12	4	Light polarization [1]	Interactive learning, question-based learning self-study 200 minutes	<p>Orientation Watch video and assignment through EMAS (30%)</p> <p>Exercise Discussion, question and answer (60%)</p> <p>Feedback Lecturer feedback on discussion (10%)</p>	Know about the concepts of light polarization	Able to apply the concepts of light polarization	8
13	4	Superposition and interference light waves [1]	Interactive learning, question-based learning self-study 200 minutes	<p>Orientation Watch video and assignment through EMAS (30%)</p> <p>Exercise Discussion, question and answer (60%)</p> <p>Feedback Lecturer feedback on discussion</p>	Know about the concepts of superposition and interference	Able to apply the concepts of superposition and interference	8

				(10%)			
14	4	Light diffraction [1]	Interactive learning, question-based learning self-study 200 minutes	Orientation Watch video and assignment through EMAS (30%) Exercise Discussion, question and answer (60%) Feedback Lecturer feedback on discussion (10%)	Know about the concepts of diffraction	Able to apply the concepts of diffraction	8
15	4	Geometrical optics and devices [1]	Interactive learning, question-based learning self-study 200 minutes	Orientation Watch video and assignment through EMAS (30%) Exercise Discussion, question and answer (60%) Feedback Lecturer feedback on discussion (10%)	Know about the concepts of geometrical optics	Able to apply the concepts of geometrical optics	8
16	Final Exam						

II. Assignment Design

Week	Assignment Name	Sub-CLOs	Assignment	Scope	Working Procedure	Deadline	Outcome
3	Individual assignment 1	SUB-CLO 1	Problem sets	<ul style="list-style-type: none"> • Electric charge and electric field • Gauss Law • Electric potential • Capacitor and dielectric 	Homework	1 week	Answer sheet
5	Individual assignment 2	SUB-CLO 1	Problem sets	<ul style="list-style-type: none"> • Electric current • Resistance and DC 	Homework	1 week	Answer sheet
7	Individual assignment 3	SUB-CLO 2	Problem sets	<ul style="list-style-type: none"> • Magnetic field and force • Magnetic field source • EM Induction • EM Oscillation 	Homework	1 week	Answer sheet
7	Quiz 1	SUB-CLO 1 dan 2	Problem sets	<ul style="list-style-type: none"> • Electric charge and electric field • Gauss Law • Electric potential • Capacitor and dielectric • Electric current • Resistance and DC • Magnetic field and force • Magnetic field source • EM Induction • EM Oscillation 	EMAS	100 minutes	Answer sheet
7	Mid-Term Exam	SUB-CLO 1 dan 2	Problem sets	<ul style="list-style-type: none"> • Electric charge and electric field • Gauss Law • Electric potential • Capacitor and dielectric • Electric current • Resistance and DC • Magnetic field and force • Magnetic field source • EM Induction • EM Oscillation • AC • Maxwell equation 	EMAS	100 minutes	Answer sheet

10	Individual assignment 4	SUB- CLO 3	Problem sets	<ul style="list-style-type: none"> • Mechanical waves • Sound Waves • Standing waves 	Homework	1 week	Answer sheet
12	Individual assignment 5	SUB- CLO 4	Problem sets	<ul style="list-style-type: none"> • Principle of light • Light polarization 	Homework	1 week	Answer sheet
14	Individual assignment 6	SUB- CLO 4	Problem sets	<ul style="list-style-type: none"> • Superposition and interference • Light waves • Diffraction 	Homework	1 week	Answer sheet
14	Quiz 2	SUB- CLO 3-4	Problem sets	<ul style="list-style-type: none"> • Mechanical waves • Sound Waves • Standing waves • Principle of light • Light polarization • Superposition and interference • Light waves • Diffraction 	EMAS	100 minutes	Answer sheet
14	Scientific Papers	SUB- LO 1- 4	Writing papers	All study materials	Group assignment	1 semester	Papers
14	Final Exam	SUB- CLO 1-4	Problem sets	<ul style="list-style-type: none"> • Mechanical waves • Sound Waves • Standing waves • Principle of light • Light polarization • Superposition and interference • Light waves • Diffraction • Geometrical Optics • Optics device 	EMAS	100 minutes	Answer sheet

III. Assessment Criteria (Learning Outcome Evaluation)

Evaluation Type	Sub-CLO	Assessment Type	Frequency	Evaluation Weight (%)
Individual Assignment	1 - 4	Answer sheet or files	6	30
Group Assignment	1 - 4	Scientific writings	1	10
Quiz 1	1 & 2	Answer sheet or files	1	10
Quiz 2	3 & 4	Answer sheet or files	1	10
Mid-Term Exam	1 & 2	Answer sheet or files	1	20
Final Exam	3 & 4	Answer sheet or files	1	20
Total				100

IV. Rubric(s)

This rubric is used as a guideline for assessing or giving levels of student performance results. a rubric usually consists of assessment criteria that include the dimensions / aspects that are assessed based on indicators of learning achievement. This assessment rubric is useful for clarifying the basics and aspects of the assessment so that students and lecturers can be guided by the same thing regarding the expected performance demands. Lecturers can choose the type of rubric according to the assessment given.

A. Conversion of the student's final score

Score	Grade	Equivalent
85 - 100	A	4.00
80 - < 85	A-	3.70
75 - < 80	B+	3.30
70 - < 75	B	3.00
65 - < 70	B-	2.70
60 - < 65	C+	2.30
55 - < 60	C	2.00
40 - < 50	D	1.00
< 40	E	0.00

B. Assessment rubric: project report and papers

Criteria	A (90)	B (75)	C (60)	D (50)
Organization (Order, flow, and transition)	Information is presented in an effective order. The excellent structure of paragraphs and transitions improves readability and comprehension. The executive summary or abstract is presented first, allowing the reader to easily follow the rest of the report.	Information is logically ordered by paragraphs and transitions. Within sections, the order in which ideas are presented may be confusing at times.	Information is scattered and needs further development.	There is no clear sequence of paragraphs, so there is no progressive flow of ideas. The details and examples are disorganized, difficult to follow or understand.
Information Quality	Supporting details are specific to the topic and provide the necessary information.	Some details do not support the topic of the report.	Details are a bit vague.	No details on the information given.
Introduction	Paragraph is clearly stated, has a sharp	Paragraph is clearly	Paragraph is not	Paragraph is unclear

	focus, and increases the impact of the report.	stated.	structured correctly.	and vague.
Conclusion	Paragraphs summarize concisely and draw a clear and effective conclusion that increase the impact of the report.	Paragraphs summarize the entire topic concisely.	Paragraphs does not draw the correct conclusion.	Paragraph is unclear and vague
Use of language: words choice, grammar, and sentence structure	Sentences are complete, grammatical, and flow together easily. The word is chosen for its proper meaning.	Most sentences are complete, grammatical, and flow together. Mistakes are minor and does not distract reader.	Minor mistakes in sentence structure and grammar are frequent. Unnecessary repetition of words and phrases.	Major mistakes in sentence structure and grammar. Frequent repetition of words and phrases.
Use of pictures: numbers, graphs & images	All numbers, graphics and images used are accurate, consistent with text, and of good quality. Appropriate and consistent labeling.	Most numbers, graphics, and images used are accurate. A few inconsistencies in labeling.	Some inaccurate graphics and images are used. Labeling is not consistent.	Numbers, graphs, and images used are not accurate, bad quality, and not properly labeled.