TEACHING INSTRUCTIONAL DESIGN (BRP)

COURSE

ADVANCED PHYSICS LABORATORY WORK 1

by

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

TEACHING INSTRUCTIONAL DESIGN

Course Name	Advanced Physics Laboratory Work 1	**Credit(s)**	**Prerequisite course(s)**	**Requisite for course(s)**	**Integration Between Other Courses**
Course Code	SCPH602144	1	Modern Physics	-	-
Relation to Curriculum	Compulsory Course				
Semester	4				
Lecturer(s)	Dr. Arief Sudarmaji, M.T.				
Course Description	After finishing this course, 4th term physics students are expected to be able to analyze (C4) concepts in advanced physics and operate (P3) measuring instruments in daily life correctly to solve (A5) extant problems according to the applicable laws of Physics. The language of teaching in this course is Bahasa Indonesia.				

Program Learning Outcome (PLO)	
PLO-1.1	Formulating the problems in and solutions to mechanics physics, optics, electricity and magnetism, nuclear and particle physics, and solid-state physics.
PLO-5.2	Measuring physical quantities.
PLO-5.3	Processing data.
PLO-5.4	Interpreting data.

PLO-7	Applying the knowledge of Physics in community and practical life, as well as identifying and adapting to new things.
PLO-7.1	Applying the basic concepts of physics to solve problems in advanced physics.
PLO-7.5	Learning the latest instruments that support their work.
PLO-9	Practicing attitudes and skills that support success at work and in participating in community activities.
PLO-9.4	Being able to work in a team.
Course Learning Outcome (CLO)	
CLO-1	Students are able to analyze (C4) concepts in advanced physics and operate (P3) measuring instruments in daily life correctly to solve (A5) extant problems according to the applicable laws of Physics
Sub-CLO(s)	
Sub-CLO 1	Analyze (C4) and demonstrate (P2) concepts in mechanics to solve (A5) problems in daily life,
Sub-CLO 2	Analyze (C4) and demonstrate (P2) concepts in electricity and magnetism to solve (A5) problems in daily life,
Sub-CLO 3	Analyze (C4) and demonstrate (P2) concepts in optics to solve (A5) problems in daily life.
Sub-CLO 4	Analyze (C4) and demonstrate (P2) concepts in nuclear and particle physics to solve (A5) problems in daily life.
Sub-CLO 5	Analyze (C4) dan demonstrate (P2) concepts in solid-state physics to solve (A5) problems in daily life.
Sub-CLO 6	Use (C3) and operate (P3) measuring instruments in physics to solve (A5) problems in daily life.
Sub-CLO 7	Investigate (C3) and report (P2) advanced physics phenomenon and make (A2) laboratory work reports according to existing guidelines.
Study Materials	• Torsional Oscillator • Magnetic Torque

	• Microwaves • Thomson Tube • Thermal Radiation • Zeeman Effect • Radioactive Decay and Half-life • Franck-Hertz Effect • Nuclear Magnetic Resonance • Rutherford Scattering • Electron Spin Resonance • Hall Effect (Metal) • Hall Effect (Semiconductor) • Hysteresis
Reading List	1. J.P Holman, Experimental Method for Engineers, 7th ed., McGraw-Hill Book, Inc, 2001. 2. Ogawa Seiki, Instruction Manual: Franck-Hertz demonstration, OGAWA SEIKI, Tokyo Central PO Box No.1618 Tokyo, Japan, 1987. 3. Ogawa Seiki, Instruction Manual: e/m Demonstration Apparatus, OGAWA SEIKI, Tokyo Central PO Box No.1618 Tokyo Japan, 1987 4. Leybold-Heraeus, Physics Experiment, vol. 1,2 & 3, Leybold GmBH, 1986. 5. Krane, Kenneth, Modern Physics, 2nd ed., Mc Graw Hill, 1996. 6. H.D. Resnick dan J. Walker, Fundamental of Physics, 6th ed., John Wiley & Son, Inc, 2001. 7. Pasco Heat conduction Apparatus, Instruction Manual 012-09189A, www.pasco.com, 2012. 8. Teach Spin, Faraday Rotation, Guide to the experiment, Teach Spin.Inc., Tri-Main Centre-Suite 409, 2495 Main Street.Buffalo, NY 14214-2153, 2012

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	**Introduction on course contract**						
2	Sub CLO 1-7	One of the modules from the course material, according to group allocation **[Reference]** Leybold-Heraeus, Physics Experiment, vol. 1,2 & 3, Leybold GmBH, 1986.	Laboratory work and report writing. **[Time estimation]** 200 minutes	**Orientation:** Pre-test prior to laboratory work (20%) **Exercise:** 1. Doing laboratory work, 2. Writing laboratory work report. (60%) **Feedback:** Comments from the laboratory assistant (20%)	Students can report laboratory work results in a report according to existing guidelines.	Students can operate laboratory instruments and achieve good results.	10%
3	Sub CLO 1-7	One of the modules from the course material, according to group allocation **[Reference]** Leybold-Heraeus, Physics Experiment, vol. 1,2 & 3, Leybold GmBH, 1986.	Laboratory work and report writing. **[Time estimation]** 200 minutes	**Orientation:** Pre-test prior to laboratory work (20%) **Exercise:** 1. Doing laboratory work, 2. Writing laboratory work report. (60%)	Students can report laboratory work results in a report according to existing guidelines.	Students can operate laboratory instruments and achieve good results.	10%

				Feedback: Comments from the laboratory assistant (20%)			
4	Sub CLO 1-7	One of the modules from the course material, according to group allocation **[Reference]** Leybold-Heraeus, Physics Experiment, vol. 1,2 & 3, Leybold GmBH, 1986.	Laboratory work and report writing. **[Time estimation]** 200 minutes	**Orientation:** Pre-test prior to laboratory work (20%) **Exercise:** 1. Doing laboratory work, 2. Writing laboratory work report. (60%) **Feedback:** Comments from the laboratory assistant (20%)	Students can report laboratory work results in a report according to existing guidelines.	Students can operate laboratory instruments and achieve good results.	10%
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				Feedback: Comments from the laboratory assistant (20%)			
6	Sub CLO 1-7	One of the modules from the course material, according to group allocation **[Reference]** Leybold-Heraeus, Physics Experiment, vol. 1,2 & 3, Leybold GmBH, 1986.	Laboratory work and report writing. **[Time estimation]** 200 minutes	**Orientation:** Pre-test prior to laboratory work (20%) **Exercise:** 1. Doing laboratory work, 2. Writing laboratory work report. (60%) **Feedback:** Comments from the laboratory assistant (20%)	Students can report laboratory work results in a report according to existing guidelines.	Students can operate laboratory instruments and achieve good results.	10%
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				Feedback: Comments from the laboratory assistant (20%)			
8	Sub CLO 1-7	One of the modules from the course material, according to group allocation **[Reference]** Leybold-Heraeus, Physics Experiment, vol. 1,2 & 3, Leybold GmBH, 1986.	Laboratory work and report writing. **[Time estimation]** 200 minutes	**Orientation:** Pre-test prior to laboratory work (20%) **Exercise:** 1. Doing laboratory work, 2. Writing laboratory work report. (60%) **Feedback:** Comments from the laboratory assistant (20%)	Students can report laboratory work results in a report according to existing guidelines.	Students can operate laboratory instruments and achieve good results.	10%
9	Sub CLO 1-7	One of the modules from the course material, according to group allocation **[Reference]** Leybold-Heraeus, Physics Experiment, vol. 1,2 & 3, Leybold GmBH, 1986.	Laboratory work and report writing. **[Time estimation]** 200 minutes	**Orientation:** Pre-test prior to laboratory work (20%) **Exercise:** 1. Doing laboratory work, 2. Writing laboratory work report. (60%)	Students can report laboratory work results in a report according to existing guidelines.	Students can operate laboratory instruments and achieve good results.	10%

				Feedback: Comments from the laboratory assistant (20%)			
10	Sub CLO 1-7	One of the modules from the course material, according to group allocation **[Reference]** Leybold-Heraeus, Physics Experiment, vol. 1,2 & 3, Leybold GmBH, 1986.	Laboratory work and report writing. **[Time estimation]** 200 minutes	**Orientation:** Pre-test prior to laboratory work (20%) **Exercise:** 1. Doing laboratory work, 2. Writing laboratory work report. (60%) **Feedback:** Comments from the laboratory assistant (20%)	Students can report laboratory work results in a report according to existing guidelines.	Students can operate laboratory instruments and achieve good results.	10%
11	**REMEDIAL**						
12	**REMEDIAL**						
13	Sub CLO 1-5	Laboratory modules that have been done. **[Reference]** Leybold-Heraeus, Physics Experiment, vol. 1,2 & 3, Leybold GmBH, 1986.	Presentation of laboratory work results. **[Time estimation]** 200 minutes	**Orientation:** Material review and presentation exercise (20%) **Exercise:** 1. Making a presentation on laboratory work results,	Students can explain laboratory work results in presentation form according to existing guidelines.	Students can answer questions from the assessor during their presentation.	5%

				2. Presenting laboratory work results. (60%) **Feedback:** Question and answer session; and final comment from the assessor. (20%)			
14	Sub CLO 1-5	Laboratory modules that have been done. **[Reference]** Leybold-Heraeus, Physics Experiment, vol. 1,2 & 3, Leybold GmBH, 1986.	Presentation of laboratory work results. **[Time estimation]** 200 minutes	**Orientation:** Material review and presentation exercise (20%) **Exercise:** 1. Making a presentation on laboratory work results, 2. Presenting laboratory work results. (60%) **Feedback:** Question and answer session; and final comment from the assessor. (20%)	Students can explain laboratory work results in presentation form according to existing guidelines.	Students can answer questions from the assessor during their presentation.	5%
15	**Final Exam**						

II. Assignment Design

Week	Assignment Name	Sub-CLOs	Assignment	Scope	Working Procedure	Deadline	Outcome
2-10	Laboratory report	SUB-CLO 1-7	Making laboratory reports	• Torsional Oscillator • Magnetic Torque • Microwaves • Thomson Tube • Thermal Radiation • Zeeman Effect • Radioactive Decay and Half-life • Franck-Hertz Effect • Nuclear Magnetic Resonance • Rutherford Scattering • Electron Spin Resonance • Hall Effect (Metal) • Hall Effect (Semiconductor) • Hysteresis	Individual Homework	1 week	Submitted laboratory reports
2-10	Pre-test	SUB-CLO 1-7	Solving problem sets	• Torsional Oscillator • Magnetic Torque • Microwaves • Thomson Tube • Thermal Radiation • Zeeman Effect • Radioactive Decay and Half-life • Franck-Hertz Effect • Nuclear Magnetic Resonance • Rutherford Scattering • Electron Spin Resonance • Hall Effect (Metal) • Hall Effect (Semiconductor) Hysteresis	Answering the problem set	30 minutes	Submitted problem set answers
13-14	Presentation	SUB-CLO 1-5	Presentation of laboratory reports	• Torsional Oscillator • Magnetic Torque	1. Making a presentation	1week	Submitted presentation

			for modules that have been done	• Microwaves • Thomson Tube • Thermal Radiation • Zeeman Effect • Radioactive Decay and Half-life • Franck-Hertz Effect • Nuclear Magnetic Resonance • Rutherford Scattering • Electron Spin Resonance • Hall Effect (Metal) • Hall Effect (Semiconductor) • Hysteresis	of laboratory work results 2. Presenting laboratory work results		
15	Final Exam	SUB-CLO 1-5	Solving exam questions	• All laboratory Work of Advanced Physics course materials	Answering final exam questions	100 minutes	Submitted final exam answers

III. Assessment Criteria (Learning Outcome Evaluation)

Evaluation Type	Sub-CLO	Assessment Type	Frequency	Evaluation Weight (%)
Laboratory work	1-7	1. Laboratory report 2. Pre-test 3. Laboratory work	1 each week	70
Presentation	1-5	Presentation	1	20
Final exam	1-5	Exam questions	1	10
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	Score	Indicator
Introduction	4	Contains: (1) background for the preparation of the report, (2) problem identification / gap analysis, (3) questions (4) objectives, and (5) citing relevant and current references
	3	Loads the goal and 3 of the other 4 items
	2	Loading objective and 2 of the other 4 items
	1	Does not contain the purpose of preparing the report, there are one or more than 4 other items
	0	Does not contain objectives and 4 other items
Content	4	Structured & cohesive, conducts a comprehensive literature review and performs a complete critical analysis

	3	Structured, conduct a comprehensive literature review and complete critical analysis
	2	Less structured, conducting literature reviews but less comprehensive and carrying out simple critical analysis
	1	Unstructured & cohesive, review of literature is not comprehensive and does not contain critical analysis
Conclusion	4	Related to the implementation of tasks and there are suggestions for feasible improvements to the next assignment
	3	It is related to the implementation of tasks and there are suggestions for improvement of the next assignment but it is not feasible
	2	Regarding the implementation of the task but no suggestions
	1	Not related to the execution of duties and no suggestions
	4	The report is neat and attractive, complete with cover and photo / picture
	3	The report is neat and attractive, with a cover or photo / image
	2	The report includes a cover or photo / image but is not neat or attractive
	1	The report is not neat and unattractive, does not have a cover and photo / image
	4	Easy to understand, correct word choice, and spelling all right
	3	Easy to understand, correct word choice, some misspellings
	2	Less understandable, inaccurate word choice, and some misspellings
	1	It is not easy to understand, the choice of words is not quite right, and there are lots of misspellings