	Universitas Negeri Surabaya **Faculty of Engineering** **, Electrical Engineering Education Undergraduate Study Program**	**Document Code**

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date
Engineering Physics Practicum	8320101221	Compulsory Study Program Subjects	**T=1**	**P=0**	**ECTS=1.59**	1	July 17, 2024

AUTHORIZATION	SP Developer	Course Cluster Coordinator	Study Program Coordinator
	Roswina Dianawati, S.Pd., M.Ed.	.....	Dr. Nur Kholis, S.T., M.T.

Learning model	**Project Based Learning**	
Program Learning Outcomes (PLO)	**PLO study program that is charged to the course**	
	PLO-5	Able to align the electrical and electronics engineering training curriculum in vocational education that is relevant to the demands of global industrial development (Education).
	PLO-9	Able to communicate in Indonesian and English well orally and in writing (General).
	PLO-12	Able to carry out analysis on research and development of electrical engineering and electronics engineering expertise programs by following scientific writing rules (SSC2.2).
	Program Objectives (PO)	
	PO - 1	Have the ability to communicate effectively, think critically, and make appropriate decisions
	PO - 2	Master basic physics concepts and apply them to the field of electrical engineering
	PLO-PO Matrix	

P.O	PLO-5	PLO-9	PLO-12
PO-1			
PO-2			

PO Matrix at the end of each learning stage (Sub-PO)

P.O	Week															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
PO-1																
PO-2																

Short Course Description	Engineering Physics Practicum is a course designed to provide students with direct experience in applying physics principles in an engineering context. Through the project-based learning method, students will carry out a series of experiments which include charging and discharging capacitors, Lorentz force, Faraday's law, Kirchoff's laws 1 and 2, as well as carrying out a final project as a group.	
References	**Main :**	

1. Diah Wulandari. 2014. Fisika Teknik I. Swadana.
2. Frederick j. Buece. 2006. Schaums Outline of theory and problems of College Physics, edisi kesepuluh. Erlangga.
3. Halliday, Resnic, Jearl Walker. 2011. Principles of Physics, Ninth Edition. John Wiley & Son.
4. Sears Zemansky. 1986. Fisika Untuk Universitas I. Binacipta.

	Supporters:	
Supporting lecturer	Dr. Hj. Euis Ismayati, M.Pd. Roswina Dianawati, S.Pd., M.Ed.	

Week-	Final abilities of each learning stage (Sub-PO)	Evaluation		Help Learning, Learning methods, Student Assignments, [Estimated time]		Learning materials [References]	Assessment Weight (%)
		Indicator	Criteria & Form	Offline (*offline*)	Online (*online*)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	Students are able to understand the concept of charging and discharging capacitors.	1. Explain the theory of charging and discharging capacitors. 2. Calculates the charging and discharging times of capacitors.	**Criteria:** Accuracy of explanations and calculations. **Form of Assessment** : Practical Assessment, Test	Practice in the Laboratory 1 X 50		**Material:** Charging and discharging capacitors **Reader:** *Diah Wulandari. 2014. Engineering Physics I. Self-funding.*	5%
2	Students are able to apply the theory of charging and discharging capacitors in experiments.	1. Carrying out experiments on charging and discharging capacitors. 2. Analyze experimental data.	**Criteria:** Accuracy of analysis and application of theory. **Form of Assessment** : Practical Assessment, Practice/Performance	Practice in the Laboratory 1 X 50		**Material:** Charging and discharging capacitors **Reader:** *Diah Wulandari. 2014. Engineering Physics I. Self-funding.*	5%
3	Students are able to apply the theory of charging and discharging capacitors in experiments.	1. Carrying out experiments on charging and discharging capacitors. 2. Analyze experimental data.	**Criteria:** Accuracy of analysis and application of theory. **Form of Assessment** : Practical Assessment, Practice/Performance	Practice in the Laboratory 1 X 50		**Material:** Charging and discharging capacitors **Reader:** *Diah Wulandari. 2014. Engineering Physics I. Self-funding.*	5%
4	Students are able to understand and apply the concept of Lorentz force.	1. Explain the principle of Lorentz force. 2. Applying the concept of Lorentz force in calculations.	**Criteria:** Ability to explain and apply concepts. **Form of Assessment** : Practical Assessment, Test	- 1 X 50		**Material:** Lorentz Style **Reference:** *Frederick j. Buece. 2006. Schaums Outline of theory and problems of College Physics, tenth edition. Erlangga.*	5%
5	Students are able to understand and apply the concept of Lorentz force.	1. Explain the principle of Lorentz force. 2. Applying the concept of Lorentz force in calculations.	**Criteria:** Ability to explain and apply concepts. **Form of Assessment** : Practical Assessment, Test	Practice in the Laboratory 1 X 50		**Material:** Lorentz Style **Reference:** *Frederick j. Buece. 2006. Schaums Outline of theory and problems of College Physics, tenth edition. Erlangga.*	5%
6	Students are able to carry out experiments related to the Lorentz force.	1. Carrying out Lorentz force experiments. 2. Analyze experimental results.	**Criteria:** Accuracy of conducting experiments and analyzing results. **Form of Assessment** : Practical Assessment, Practice/Performance	Practice in the Laboratory 1 X 50		**Material:** Lorentz Style **Reference:** *Frederick j. Buece. 2006. Schaums Outline of theory and problems of College Physics, tenth edition. Erlangga.*	5%

7	Students are able to carry out experiments related to the Lorentz force.	1. Carrying out Lorentz force experiments. 2. Analyze experimental results.	**Criteria:** Accuracy of conducting experiments and analyzing results. **Form of Assessment** : Practical Assessment, Practice/Performance	Practice in the Laboratory 1 X 50		**Material:** Lorentz Style **Reference:** *Frederick j. Buece. 2006. Schaums Outline of theory and problems of College Physics, tenth edition. Erlangga.*	5%
8	Midterm exam		**Criteria:** Compliance with the answer key.	Doing UTS 1 X 50 questions		**Material:** Theory of charging and discharging capacitors, Lorentz force principle. **Bibliography:** *Frederick j. Buece. 2006. Schaums Outline of theory and problems of College Physics, tenth edition. Erlangga.*	20%
9	Students are able to understand and apply Faraday's law.	1. Explain Faraday's law. 2. Apply Faraday's law in the given context.	**Criteria:** Ability to explain and apply the law. **Form of Assessment** : Practical Assessment, Test	Practice in the Laboratory 1 X 50		**Material:** Faraday **Bibliography:** *Halliday, Resnic, Jearl Walker. 2011. Principles of Physics, Ninth Edition. John Wiley & Son.*	5%
10	Students are able to understand and apply Faraday's law.	1. Explain Faraday's law. 2. Apply Faraday's law in the given context.	**Criteria:** Ability to explain and apply the law. **Form of Assessment** : Practical Assessment, Test	Practice in the Laboratory 1 X 50		**Material:** Faraday **Bibliography:** *Halliday, Resnic, Jearl Walker. 2011. Principles of Physics, Ninth Edition. John Wiley & Son.*	5%
11	Students are able to carry out experiments related to Faraday's law.	1. Carrying out experiments related to Faraday's law. 2. Analyze experimental results.	**Criteria:** Accuracy of conducting experiments and analyzing results. **Form of Assessment** : Practical Assessment, Practice/Performance	Practice in the Laboratory 1 X 50		**Material:** Faraday **Bibliography:** *Halliday, Resnic, Jearl Walker. 2011. Principles of Physics, Ninth Edition. John Wiley & Son.*	5%
12	Students are able to carry out experiments related to Faraday's law.	1. Carrying out experiments related to Faraday's law. 2. Analyze experimental results.	**Criteria:** Accuracy of conducting experiments and analyzing results. **Form of Assessment** : Practical Assessment, Practice/Performance	Practice in the Laboratory 1 X 50		**Material:** Faraday **Bibliography:** *Halliday, Resnic, Jearl Walker. 2011. Principles of Physics, Ninth Edition. John Wiley & Son.*	5%
13	Students are able to understand and apply Kirchoff's laws 1 and 2 in electrical circuits.	1. Explain Kirchoff's laws 1 and 2. 2. Apply Kirchoff's laws in electrical circuit analysis.	**Criteria:** Ability to explain and apply laws in analysis. **Form of Assessment** : Practical Assessment	Practice in the Laboratory 1 X 50		**Material:** Kirchoff 1 and 2 **Bibliography:** *Sears Zemansky. 1986. Physics for I. Binabuat University.*	5%

14	Students are able to understand and apply Kirchoff's laws 1 and 2 in electrical circuits.	1. Explain Kirchoff's laws 1 and 2. 2. Apply Kirchoff's laws in electrical circuit analysis.	**Criteria:** Ability to explain and apply laws in analysis. **Form of Assessment** : Practical Assessment	Practice in the Laboratory 1 X 50		**Material:** Kirchoff 1 and 2 **Bibliography:** *Sears Zemansky. 1986. Physics for I. Binabuat University.*	5%
15	Students are able to design and implement a final group project related to the material they have studied.	1. Designing the final project. 2. Implement the project according to design.	**Criteria:** Creativity, teamwork, and conformity to design. **Form of Assessment** : Project Results Assessment / Product Assessment	Practice in the Laboratory 1 X 50		**Material:** Final group project **Reader:** *Sears Zemansky. 1986. Physics for I. Binabuat University.*	15%
16	Final Semester Examination (UAS)	-	**Criteria:** Compliance with the answer key. **Form of Assessment** : Test	Final Semester Examination (UAS) 1 X 50		**Material:** Faraday's laws, Kirchoff's laws 1 and 2. **Bibliography:** *Sears Zemansky. 1986. Physics for I. Binabuat University.*	20%

Evaluation Percentage Recap: Project Based Learning

No	Evaluation	Percentage
1.	Project Results Assessment / Product Assessment	15%
2.	Practical Assessment	37.5%
3.	Practice / Performance	15%
4.	Test	32.5%
		100%

Notes

1. **Learning Outcomes of Study Program Graduates (PLO - Study Program)** are the abilities possessed by each Study Program graduate which are the internalization of attitudes, mastery of knowledge and skills according to the level of their study program obtained through the learning process.
2. **The PLO imposed on courses** are several learning outcomes of study program graduates (CPL-Study Program) which are used for the formation/development of a course consisting of aspects of attitude, general skills, special skills and knowledge.
3. **Program Objectives (PO)** are abilities that are specifically described from the PLO assigned to a course, and are specific to the study material or learning materials for that course.
4. **Subject Sub-PO (Sub-PO)** is a capability that is specifically described from the PO that can be measured or observed and is the final ability that is planned at each learning stage, and is specific to the learning material of the course.
5. **Indicators for assessing** abilities in the process and student learning outcomes are specific and measurable statements that identify the abilities or performance of student learning outcomes accompanied by evidence.
6. **Assessment Criteria** are benchmarks used as a measure or measure of learning achievement in assessments based on predetermined indicators. Assessment criteria are guidelines for assessors so that assessments are consistent and unbiased. Criteria can be quantitative or qualitative.
7. **Forms of assessment:** test and non-test.
8. **Forms of learning:** Lecture, Response, Tutorial, Seminar or equivalent, Practicum, Studio Practice, Workshop Practice, Field Practice, Research, Community Service and/or other equivalent forms of learning.
9. **Learning Methods:** Small Group Discussion, Role-Play & Simulation, Discovery Learning, Self-Directed Learning, Cooperative Learning, Collaborative Learning, Contextual Learning, Project Based Learning, and other equivalent methods.
10. **Learning materials** are details or descriptions of study materials which can be presented in the form of several main points and sub-topics.
11. **The assessment weight** is the percentage of assessment of each sub-PO achievement whose size is proportional to the level of difficulty of achieving that sub-PO, and the total is 100%.
12. TM=Face to face, PT=Structured assignments, BM=Independent study.