	Universitas Negeri Surabaya Faculty of Mathematics and Natural Sciences Undergraduate Mathematics Study Program	Document Code

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date
General Physics	4420102162	General Physics	T=2	P=0	ECTS=3.18	1	July 17, 2024

AUTHORIZATION	SP Developer	Course Cluster Coordinator	Study Program Coordinator
	Nugrahani Primary Putri, M.Si.	Nugrahani Primary Putri, M.Si.	Prof. Dr. Raden Sulaiman, M.Si.

Learning model	**Project Based Learning**

Program Learning Outcomes (PLO)

PLO study program that is charged to the course

Program Objectives (PO)

PO - 1	Have the ability to think critically and use appropriate concepts to qualitatively analyze problems or situations involving physics
PO - 2	Have the ability to use physics concepts and appropriate mathematical methods to obtain solutions to quantitative problems in physics

PLO-PO Matrix

P.O
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	This course discusses Vectors, Particle Kinematics, Particle Dynamics, Fluids, Thermophysics, Static and Dynamic Electricity, and Magnetism, through active learning with a combination of discussion and question and answer methods.

References

Main :

1. Bueche, F.J., 2000, Schaum 19s Outline of College Physics, McGraw-Hill.
2. Sarojo, A.G., 2014, Seri Fisika Dasar Mekanika, edisi 5, Salemba Teknika.
3. Serway, R.A., and Jewett, J.W., 2010, Physics for Scientists and Engineers withModern Physics, Salemba Teknika.

Supporters:

Supporting lecturer	Drs. Imam Sucahyo, M.Si. ASNAWI Dzulkiflih, S.Si., M.T. Nugrahani Primary Putri, S.Si., M.Si. Abd. Kholiq, S.Pd., M.T. Abu Zainuddin, S.Pd., M.Pd. Meta Yantidewi, S.Si., M.Si. Nurita Apridiana Lestari, S.Pd., M.Pd. Dr. Fitriana, S.Si.

Week-	Final abilities of each learning	Evaluation	Help Learning, Learning methods, Student Assignments, [Estimated time]	Learning materials	Assessment Weight (%)

	stage (Sub-PO)	Indicator	Criteria & Form	Offline (*offline*)	Online (*online*)	[References]	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	Students are able to understand and apply vector concepts	1. Students are able to classify basic quantities, derived quantities and their units 2. Students are able to apply vector operations in solving physics problems	**Criteria:** Students will get full marks if they meet the assessment indicators **Form of Assessment** : Participatory Activities	Discussion and assignment 100 minutes	Discussion and assignment 100 minutes	**Material:** Ch 1 and Ch 3 **References:** *Serway, RA, and Jewett, JW, 2010, Physics for Scientists and Engineers with Modern Physics, Salemba Teknika.*	5%
2	Students are able to understand the concept of particle kinematics	Students can identify quantities in various types of motion	**Criteria:** Students will get full marks if they meet the assessment indicators **Form of Assessment** : Participatory Activities	Discussion and assignment 100 minutes	Discussion and assignment 100 minutes	**Material:** Ch 2 **References:** *Serway, RA, and Jewett, JW, 2010, Physics for Scientists and Engineers with Modern Physics, Salemba Teknika.* **Material:** Ch 2 **Reference:** *Sarojo, AG, 2014, Basic Physics of Mechanics Series, 5th edition, Salemba Teknika.*	5%
3	• Students can solve particle kinematics problems	Students can solve particle kinematics problems	**Criteria:** Students will get full marks if they meet the assessment indicators **Form of Assessment** : Test	Discussion and assignment 100 minutes	Discussion and assignment 100 minutes	**Material:** Ch 2 **References:** *Serway, RA, and Jewett, JW, 2010, Physics for Scientists and Engineers with Modern Physics, Salemba Teknika.* **Material:** Ch 2 **Reference:** *Sarojo, AG, 2014, Basic Physics of Mechanics Series, 5th edition, Salemba Teknika.*	5%
4	Students are able to understand and apply the concept of particle dynamics	1. Explain the concept of particle dynamics 2. Solving particle dynamics problems	**Criteria:** Students will get full marks if they meet the assessment indicators **Form of Assessment** : Participatory Activities	Discussion and assignment 100 minutes	Discussion and assignment 100 minutes	**Material:** Ch 5, 6 and 7 **References:** *Serway, RA, and Jewett, JW, 2010, Physics for Scientists and Engineers with Modern Physics, Salemba Teknika.* **Material:** Ch 1 **References:** *Bueche, FJ, 2000, Schaum 19s Outline of College Physics, McGraw-Hill.*	5%

5	Students are able to understand and apply the concept of particle dynamics	1. Explain the concepts of work and energy 2. Apply the concepts of work and energy	**Criteria:** Students will get full marks if they meet the assessment indicators **Form of Assessment** : Portfolio Assessment	Discussion and assignment 100 minutes	Discussion and assignment 100 minutes	**Material:** Ch 2 **Reference:** *Sarojo, AG, 2014, Basic Physics of Mechanics Series, 5th edition, Salemba Teknika.* **Material:** Ch 5, 6 and 7 **References:** *Serway, RA, and Jewett, JW, 2010, Physics for Scientists and Engineers with Modern Physics, Salemba Teknika.*	5%
6	Students are able to understand the concepts of static and dynamic fluids	1. Analyze variables that influence fluid conditions 2. Solving problems related to static and dynamic fluid concepts	**Criteria:** Students will get full marks if they meet the assessment indicators **Form of Assessment** : Participatory Activities	Discussion and assignment 100 minutes	Discussion and assignment 100 minutes	**Material:** Ch 2 **Bibliography:** *Bueche, FJ, 2000, Schaum 19s Outline of College Physics, McGraw-Hill.* **Material:** Ch 14 **References:** *Serway, RA, and Jewett, JW, 2010, Physics for Scientists and Engineers with Modern Physics, Salemba Teknika.*	5%
7	Students are able to understand the concepts of static and dynamic fluids	1. Analyze variables that influence fluid conditions 2. Solving problems related to static and dynamic fluid concepts	**Form of Assessment** : Test	Discussion and assignment 100 minutes	Discussion and assignment 100 minutes	**Material:** Ch 2 **Bibliography:** *Bueche, FJ, 2000, Schaum 19s Outline of College Physics, McGraw-Hill.* **Material:** Ch 14 **References:** *Serway, RA, and Jewett, JW, 2010, Physics for Scientists and Engineers with Modern Physics, Salemba Teknika.*	5%

8	Students are able to solve physics problems related to vectors, kinematics, dynamics and fluids	Students can solve kinematics, dynamics and fluid problems	**Criteria:** Students will get full marks if they meet the assessment indicators **Form of Assessment** : Test	Midterm 100 minutes	Midterm 100 minutes	**Material:** ch 1 & 2 **References:** *Bueche, FJ, 2000, Schaum 19s Outline of College Physics, McGraw-Hill.* **Material:** ch 1 & 2 **Reference:** *Sarojo, AG, 2014, Basic Physics of Mechanics Series, 5th edition, Salemba Teknika.* **Material:** Ch: 1, 2, 3, 5, 6, 7, 14 **References:** *Serway, RA, and Jewett, JW, 2010, Physics for Scientists and Engineers with Modern Physics, Salemba Teknika.*	10%
9	Students are able to understand the concept of thermophysics	1.• Explain the heat transfer process 2.• Apply the laws of thermodynamics to physics problems	**Criteria:** Students will get full marks if they meet the assessment indicators **Form of Assessment** : Participatory Activities	Discussion and assignment 100 minutes	Discussion and assignment 100 minutes	**Material:** Ch 3 **Bibliography:** *Bueche, FJ, 2000, Schaum 19s Outline of College Physics, McGraw-Hill.* **Material:** Ch.19 **References:** *Serway, RA, and Jewett, JW, 2010, Physics for Scientists and Engineers with Modern Physics, Salemba Teknika.*	5%
10	Students are able to understand the concept of thermophysics	1.• Explain the heat transfer process 2.• Apply the laws of thermodynamics to physics problems	**Criteria:** Students will get full marks if they meet the assessment indicators **Form of Assessment** : Participatory Activities	Discussion and assignment 100 minutes	Discussion and assignment 100 minutes	**Material:** Ch 3 **Bibliography:** *Bueche, FJ, 2000, Schaum 19s Outline of College Physics, McGraw-Hill.* **Material:** Ch.19 **References:** *Serway, RA, and Jewett, JW, 2010, Physics for Scientists and Engineers with Modern Physics, Salemba Teknika.*	5%

11	Students are able to understand the concept of Coulomb's Law and electric fields	• Students are able to carry out calculations using the concepts of Coulomb's Law and electric fields	**Criteria:** Students will get full marks if they meet the assessment indicators **Form of Assessment** : Participatory Activities	Discussion and assignment 100 minutes	Discussion and assignment 100 minutes	**Material:** Ch 5 **Bibliography:** *Bueche, FJ, 2000, Schaum 19s Outline of College Physics, McGraw-Hill.* **Material:** Ch 23 **References:** *Serway, RA, and Jewett, JW, 2010, Physics for Scientists and Engineers with Modern Physics, Salemba Teknika.*	5%
12	Students are able to understand the concept of Coulomb's Law and electric fields	• Students are able to carry out calculations using the concepts of Coulomb's Law and electric fields	**Criteria:** Students will get full marks if they meet the assessment indicators **Form of Assessment** : Participatory Activities	Discussion and assignment 100 minutes	Discussion and assignment 100 minutes	**Material:** Ch 5 **Bibliography:** *Bueche, FJ, 2000, Schaum 19s Outline of College Physics, McGraw-Hill.* **Material:** Ch 23 **References:** *Serway, RA, and Jewett, JW, 2010, Physics for Scientists and Engineers with Modern Physics, Salemba Teknika.*	5%
13	Students are able to understand the concept of dynamic electricity	1. • Students can explain the differences between various types of electrical circuits 2. • Students can solve questions related to dynamic electrical concepts	**Criteria:** Students will get full marks if they meet the assessment indicators **Form of Assessment** : Participatory Activities	100 minute discussion and assignment	100 minute discussion and assignment	**Material:** Ch 5 **Bibliography:** *Bueche, FJ, 2000, Schaum 19s Outline of College Physics, McGraw-Hill.* **Material:** Ch 27, 28 **References:** *Serway, RA, and Jewett, JW, 2010, Physics for Scientists and Engineers with Modern Physics, Salemba Teknika.*	5%
14	Students are able to understand the concept of dynamic electricity	1. • Students can explain the differences between various types of electrical circuits 2. • Students can solve questions related to dynamic electrical concepts	**Criteria:** Students will get full marks if they meet the assessment indicators **Form of Assessment** : Participatory Activities	100 minute discussion and assignment	100 minute discussion and assignment	**Material:** Ch 5 **Bibliography:** *Bueche, FJ, 2000, Schaum 19s Outline of College Physics, McGraw-Hill.* **Material:** Ch 27, 28 **References:** *Serway, RA, and Jewett, JW, 2010, Physics for Scientists and Engineers with Modern Physics, Salemba Teknika.*	5%

15	Students are able to understand the concept of magnetic fields	1.• Students can explain the concepts of magnetic fields, magnetic forces, Lorentz forces, and electromagnetic induction 2.• Students can solve questions related to the concept of magnetic fields	**Criteria:** Students will get full marks if they meet the assessment indicators **Form of Assessment** : Participatory Activities	100 minute discussion and assignment	100 minute discussion and assignment	**Material:** Ch 29, 30 **References:** *Serway, RA, and Jewett, JW, 2010, Physics for Scientists and Engineers with Modern Physics, Salemba Teknika.*	5%
16		Students can solve thermophysics, electricity and magnetism problems	**Criteria:** Students will get full marks if they meet the assessment indicators **Form of Assessment** : Test	UAS 100 minutes	UAS 100 minutes	**Material:** Ch 19, 23, 27, 28, 29, 30 **References:** *Serway, RA, and Jewett, JW, 2010, Physics for Scientists and Engineers with Modern Physics, Salemba Teknika.*	20%

Evaluation Percentage Recap: Project Based Learning

No	Evaluation	Percentage
1.	Participatory Activities	55%
2.	Portfolio Assessment	5%
3.	Test	40%
		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.