	Universitas Negeri Surabaya Faculty of Mathematics and Natural Sciences Master of Science Education Study Program	Document Code

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date
Physical Science Study IV	8410103082		T=3	P=0	ECTS=6.72	3	July 17, 2024

AUTHORIZATION	SP Developer	Course Cluster Coordinator	Study Program Coordinator
	.....	.....	Dr. Eko Hariyono, S.Pd., M.Pd.

Learning model	**Case Studies**
Program Learning Outcomes (PLO)	**PLO study program that is charged to the course**
	Program Objectives (PO)
	PLO-PO Matrix

	P.O

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

Short Course Description	Examining the philosophical basis of nuclear physics as it relates to human life, the field of low energy nuclear physics, elementary particles including high energy collisions which covers various issues regarding future life and nuclear reactors.
References	**Main :**

1. Ghoshal, S. N. 2002. Nuclear Physics (for undergraduate and postgraduate Student of Indian Universities). Ram Nagar, New Delhi: S. Chand & Company LTD .
2. Halliday, David. 1963. Introductary Nuclear Physics . Tokyo: Modern Asia Edition.
3. Klimov, A. 1975. Nuclear Physics and Nuclear Reactors . Moscow: Mir Publishers.
4. Subrahmanyam, N. Lal, Brij. Seshan. J. 2005. Atomic and Nuclear Physics . Ram Nagar, New Delhi: S. Chand & Co. Ltd

	Supporters:
Supporting lecturer	Prof. Dr. Prabowo, M.Pd. Dr. Titin Sunarti, M.Si. Prof. Tjipto Prastowo, Ph.D.

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	Examining the philosophical basis of nuclear physics as it relates to human life.	Able to explain the background and philosophical basis of nuclear physics.		Lectures and questions and answers 3 X 50			0%
2	Explain various findings about the atomic model	Able to explain the weaknesses & advantages of various models of the atom/atomic nucleus.		Lectures and questions and answers. 3 X 50			0%
3	Examines nuclear structure and radioactivity.	Able to explain nuclear structure and radioactivity.		Presentation and discussion. 3 X 50			0%
4	Examining the radio theory of alpha and beta particle activity.	Able to explain the theory of radioactivity which is related to alpha and beta particles		Presentation and discussion 3 X 50			0%
5	Study and explain gamma rays	Able to understand and explain gamma rays.		Presentation and discussion 3 X 50			0%
6	Examining the detection and measurement of nuclear radiation	Able to explain nuclear radiation detection and measurement instruments.		Presentation and discussion 3 X 50			0%
7	Examining nuclear properties and nuclear models.	Able to explain nuclear properties and models.		Presentation and discussion 3 X 50			0%
8	Mastering the concepts that have been presented at meeting 7 (UTS)	Able to answer questions according to the concepts discussed at meetings 1 – 7.		Written exam 3 X 50			0%
9	Examining various things about nuclear reactions.	Able to explain various things about nuclear reactions.		Presentation and discussion 3 X 50			0%
10	Examining charged particle accelerators.	Able to explain charged particle accelerators		Presentation and discussion 3 X 50			0%
11	Examines neutron physics and nuclear fission & fusion	Able to study neutron physics as well as nuclear fission and fusion.		. Presentation and discussion. 3 X 50			0%
12	Examining nuclear energy for peace as well as transuramic and artificial elements.	Able to study the concept of nuclear energy as well as transuramic and artificial elements.		Presentation and discussion 3 X 50			0%
13	Examining the theory of nuclear forces.	Able to study nuclear forces.		Presentation and discussion 3 X 50			0%

14	Examining elementary particles	Able to study elementary particles.		Presentation and discussion 3 X 50			0%
15	Examining the theory of cosmic rays.	Able to study cosmic rays.		Presentation and discussion 3 X 50			0%
16	Master all UAS lecture material.	Able to answer questions related to all lecture material.		Written exam 3 X 50			0%

Evaluation Percentage Recap: Case Study

No	Evaluation	Percentage
		0%

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.