



Universitas Negeri Surabaya
Faculty of Mathematics and Natural Sciences
Physics Education Undergraduate Study Program

Document Code

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight	SEMESTER	Compilation Date																																																																																																															
Ipba	8420302099	Compulsory Study Program Subjects	T=2 P=0 ECTS=3.18	6	February 5, 2024																																																																																																															
AUTHORIZATION	SP Developer		Course Cluster Coordinator		Study Program Coordinator																																																																																																															
	Mita Anggaryani, M.Pd., Ph.D.		Prof. Tjipto Prastowo, Ph.D		Mita Anggaryani, M.Pd., Ph.D.																																																																																																															
Learning model	Project Based Learning																																																																																																																			
Program Learning Outcomes (PLO)	PLO study program that is charged to the course																																																																																																																			
	Program Objectives (PO)																																																																																																																			
	PO - 1	Able to think at a high level (complex) effectively in solving problems related to Universal Gravity																																																																																																																		
	PO - 2	Able to collaborate effectively in creating good written work related to Earth Structure																																																																																																																		
	PO - 3	Able to process information effectively to solve problems related to the Solar System																																																																																																																		
	PO - 4	Able to communicate effectively in presenting IPBA Thematic Posters																																																																																																																		
	PLO-PO Matrix																																																																																																																			
		<table border="1" style="margin: auto;"> <tr><td>P.O</td></tr> <tr><td>PO-1</td></tr> <tr><td>PO-2</td></tr> <tr><td>PO-3</td></tr> <tr><td>PO-4</td></tr> </table>				P.O	PO-1	PO-2	PO-3	PO-4																																																																																																										
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PO Matrix at the end of each learning stage (Sub-PO)																																																																																																																				
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Short Course Description	This lecture discusses: History of planet Earth, Earth systems and structure, interactions of large-scale systems and plate tectonics, natural disasters, disaster mitigation, volcanoes, origins of the universe, the Sun system, Earth in the Sun system, Earth's atmosphere, Solar radiation, Threats to planet Earth and efforts to protect it. This lecture can be attended by students who have taken the Basic Physics I course. The lectures are implemented using a project based learning model with an exploratory case study approach in activities inside the classroom and outside the classroom through field work. The learning process is supported by the VLP volcano simulation software that has been developed and other software that is considered relevant in supporting the IPBA learning process. This learning aims to develop the predicting and decision-making skills of prospective physics teacher students as well as the ability to solve authentic problems that develop in society.																																																																																																																			
References	Main :																																																																																																																			
	<ol style="list-style-type: none"> McConnell David and Steer David (2013), 1CThe Good Earth 1D, Introductory to Earth Science, Third Edition, Pergamon Press. Madlazim, Supriyono dan MNR Jauharyyah (2014). 1C Ilmu Pengetahuan Bumi dan Antariksa 1D. Diklat Kuliah IPBA. Fardon, J. et al. 2003. Planet Earth. London, UK: Lorenz Books. http://www.fisikaunesa.net/vi-learninghttp://ocw.mit.edu/courses/#earth-atmospheric-and-planetary-sciences Tjasyono, B. 2017. Sains Kebumihan dan Antariksa Pendekatan Multidisipliner. Surabaya: Unesa Press. 																																																																																																																			
	Supporters:																																																																																																																			
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Supporting lecturer		Dr. Eko Hariyono, S.Pd., M.Pd. Setyo Admoko, S.Pd., M.Pd. Mita Anggaryani, M.Pd., Ph.D. Nurita Apridiana Lestari, S.Pd., M.Pd. Muhammad Habibulloh, M.Pd.					
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	Analyzing the concept of Universal Gravity including Kepler's Law and Newton's Gravity, Newton's interpretation of Kepler's Law.	Students analyze the concept of Universal Gravity including Kepler's Law and Newton's Gravity, Newton's interpretation of Kepler's Law. Students are able to	Criteria: Individual Form of Assessment : Participatory Activities	Contextual Learning Discussion Questions and answers 100	Contextual Learning Discussion Questions and answers Synchronous 100	Material: Universal Gravitation Bibliography: <i>McConnell David and Steer David (2013), 1CThe Good Earth 1D, Introductory to Earth Science, Third Edition, Pergamon Press.</i>	0%
2	Explains the concept of a system of two celestial bodies, the influence of gravity on the shape of the earth, tides and planetary orbits.	Students are able to explain the concept of the system of two celestial bodies, the influence of gravity on the shape of the earth, tides and planetary orbits properly and correctly.	Criteria: Individual Form of Assessment : Participatory Activities	Contextual Learning Discussion Questions and answers 100	Contextual Learning Discussion Questions and answers Synchronous 100	Material: Universal Gravitation Bibliography: <i>McConnell David and Steer David (2013), 1CThe Good Earth 1D, Introductory to Earth Science, Third Edition, Pergamon Press.</i>	1%
3	Explaining the motion and position of celestial bodies including the daily and annual apparent motion of the sun, the position and appearance of the moon, lunar and solar eclipses and their impact on human life	Students are able to explain the motion and position of celestial bodies including the daily and annual apparent motion of the sun, the position and appearance of the moon, lunar and solar eclipses and their impact on human life properly and correctly.	Criteria: Individual Form of Assessment : Participatory Activities	Contextual Learning Discussion Questions and Answers 100	Contextual Learning Discussion Questions and answers Synchronous 100	Material: Motion of Celestial Objects Reference: <i>McConnell David and Steer David (2013), 1CThe Good Earth 1D, Introductory to Earth Science, Third Edition, Pergamon Press.</i>	1%
4	Analyze the concept of the Ecosphere: Atmosphere, Lithosphere, Hydrosphere and Biosphere	Students are able to analyze the concept of the Ecosphere: Atmosphere, Lithosphere, Hydrosphere and Biosphere properly and correctly	Criteria: 1.Work in group 2.Paper/Scientific Work Form of Assessment : Participatory Activities, Project Results Assessment / Product Assessment	Project-Based Team Learning 100	Project-Based Team Learning Synchronous 100	Material: Ecosphere Bibliography: <i>McConnell David and Steer David (2013), 1CThe Good Earth 1D, Introductory to Earth Science, Third Edition, Pergamon Press.</i>	5%

5	<p>1. Analyze the concept of the Ecosphere: Atmosphere, Lithosphere, Hydrosphere and Biosphere</p> <p>2. Analyze physical phenomena that occur due to the movement of the Earth's layers</p> <p>3. Presenting the physical concepts of the Universe and the relationship between the Atmosphere, Lithosphere, Hydrosphere and Biosphere in the Ecosphere</p>	<p>1. Students are able to analyze the concept of the Ecosphere: Atmosphere, Lithosphere, Hydrosphere and Biosphere properly and correctly</p> <p>2. Students are able to analyze physical phenomena that occur due to the movement of the Earth's layers properly and correctly</p> <p>3. Students are able to present the physical concepts of the Universe and the relationship between the Atmosphere, Lithosphere, Hydrosphere and Biosphere in the Ecosphere properly and correctly</p>	<p>Criteria:</p> <p>1. Work in group 2. Paper/Scientific Work</p> <p>Form of Assessment : Project Results Assessment / Product Assessment</p>	Project-based Team Learning 100	Project-based Team Learning Synchronous 100	<p>Material: Earth Structure Bibliography: <i>McConnell David and Steer David (2013), 1C The Good Earth 1D, Introductory to Earth Science, Third Edition, Pergamon Press.</i></p>	5%
6	<p>1. Analyze the concept of Earth Structure: Core, Mantle, Earth's Crust</p> <p>2. Analyze physical phenomena that occur due to the movement of the Earth's layers</p> <p>3. Presenting the physical concepts of the Universe and the relationship between the Atmosphere, Lithosphere, Hydrosphere and Biosphere in the Ecosphere</p>	<p>1. Students are able to analyze the concept of Earth Structure: Core, Mantle, Earth's Crust properly and correctly</p> <p>2. Students are able to analyze physical phenomena that occur due to the movement of the Earth's layers properly and correctly</p> <p>3. Students are able to present the physical concepts of the Universe and the relationship between the Atmosphere, Lithosphere, Hydrosphere and Biosphere in the Ecosphere</p>	<p>Criteria:</p> <p>1. Work in group 2. Paper/Scientific Work</p> <p>Form of Assessment : Project Results Assessment / Product Assessment</p>	Project-based Team Learning 100	Project-based Team Learning Synchronous 100	<p>Material: Planet Earth Reference: <i>Farndon, J. et al. 2003. Planet Earth. London, UK: Lorenz Books.</i> http://www....physicsunesa.net/vi-learning http://ocw.mit.edu/courses/#earth-atmospheric-and-planetary-sciences</p>	5%

7	<p>1. Analyze physical phenomena caused by the interaction of components in the Ecosphere</p> <p>2. Analyze physical phenomena that occur due to the movement of the Earth's layers</p> <p>3. Create an IPBA Thematic paper: Physical Phenomena caused by the interaction of components in the Ecosphere and the movement of the Earth's plates</p>	<p>1. Students are able to analyze physical phenomena caused by the interaction of components in the Ecosphere well</p> <p>2. Students are able to analyze physical phenomena that occur due to the movement of the Earth's layers well</p> <p>3. Students are able to write an IPBA Thematic paper: Physical Phenomena caused by the interaction of components in the Ecosphere and the movement of the Earth's plates</p>	<p>Criteria:</p> <p>1. Work in group</p> <p>2. Paper/Scientific Work</p> <p>Form of Assessment :</p> <p>Project Results Assessment / Product Assessment</p>	<p>Project-based Team Learning 100</p>	<p>Project-based Team Learning Synchronous 100</p>	<p>Material: Volcanology</p> <p>Literature: <i>Hariyono, E. 2016. Introduction to Geoscience Focusing on Volcano Studies. Surabaya: Unesa Press.</i></p>	5%
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8	UTS	<p>1. Students are able to analyze the concept of Universal Gravity including Kepler's Law and Newton's Gravity, Newton's interpretation of Kepler's Law properly and correctly.</p> <p>2. Students are able to explain the concept of the system of two celestial bodies, the influence of gravity on the shape of the earth, tides and planetary orbits properly and correctly</p> <p>3. Students are able to explain the motion and position of celestial bodies including the apparent daily and annual motion of the sun, the position and appearance of the moon, lunar and solar eclipses and their impact on human life properly and correctly.</p> <p>4. Students are able to analyze the concept of the Ecosphere: Atmosphere, Lithosphere, Hydrosphere and Biosphere properly and correctly</p> <p>5. Students are able to analyze the concept of Earth Structure: Core, Mantle, Earth's Crust properly and correctly</p> <p>6. Analyze the concept of the Ecosphere: Atmosphere, Lithosphere, Hydrosphere and Biosphere</p> <p>7. Analyze the concept of Earth Structure: Core, Mantle, Earth's Crust</p>	<p>Criteria: 1. Test 2. Individual</p> <p>Form of Assessment : Test</p>	Test 100	Test 100	<p>Material: Earth and Space References : <i>Madlazim, Supriyono and MNRjauhariyah (2014). 1C Earth and Space Sciences 1D. IPBA Lecture Diktat.</i></p>	20%
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9	<p>1.Explains the concept of the Solar System which includes the origin of the solar system, members of the solar system, scale models of the solar system, small astronomical objects, planets, satellites, and the interplanetary medium</p> <p>2.Explaining the Solar System: planets, satellites, and the interplanetary medium</p>	<p>1.Students are able to explain the concept of the Solar System which includes the origin of the solar system, members of the solar system, scale models of the solar system, small astronomical objects, planets, satellites, and the interplanetary medium</p> <p>2.Students are able to explain the Solar System: planets, satellites and the interplanetary medium well</p>	<p>Criteria: Individual</p> <p>Form of Assessment : Participatory Activities</p>	Contextual Learning Discussion Questions and answers 100	Contextual Learning Discussion Questions and answers Synchronous 100	<p>Material: Solar System</p> <p>Reference: <i>Tjasyono, B. 2017. Earth and Space Science Multidisciplinary Approach. Surabaya: Unesa Press.</i></p>	1%
10	<p>1.Explaining Asteroids: orbits and physical conditions of asteroids, asteroids and space mechanics</p> <p>2.Explaining Comets: discovery of comets, orbits and physical properties of comets</p>	<p>1.Students are able to explain Asteroids: orbits and physical conditions of asteroids, asteroids and space mechanics well</p> <p>2.Students are able to explain comets: discovery of comets, orbits and physical properties of comets well</p>	<p>Criteria: Individual</p> <p>Form of Assessment : Participatory Activities</p>	Contextual Learning Discussion Questions and Answers 100	Contextual Learning Discussion Questions and answers Synchronous 100	<p>Material: Solar System</p> <p>Reference: <i>Tjasyono, B. 2017. Earth and Space Science Multidisciplinary Approach. Surabaya: Unesa Press.</i></p>	1%
11	<p>1.Explaining Stars and Their Dynamics: the sun as a star, distance and motion of stars, magnitude</p> <p>2.Explaining Stars and Their Dynamics: classification of stars, the Hertzsprung Russel diagram and the life history of stars</p>	<p>1.Students are able to explain stars and their dynamics: the sun as a star, distance and motion of stars, magnitude well</p> <p>2.Students are able to explain stars and their dynamics: classification of stars, the Hertzsprung Russel diagram and the life history of stars well</p>	<p>Criteria: Individual</p> <p>Form of Assessment : Participatory Activities</p>	Problem Solving Discussion 100	Contextual Learning Discussion Questions and answers Synchronous 100	<p>Material: Bintang</p> <p>Pustaka: <i>Tjasyono, B. 2017. Earth and Space Science Multidisciplinary Approach. Surabaya: Unesa Press.</i></p>	1%
12	<p>1.Explaining Galaxies and the Universe: galaxy classification catalog, Milky Way Galaxy</p> <p>2.Explaining Cosmology and interstellar matter</p>	<p>1.Students are able to explain Galaxies and the Universe: catalog of galaxy classifications, the Milky Way Galaxy well</p> <p>2.Students are able to explain Cosmology and interstellar matter well</p>	<p>Criteria: 1.Work in group 2.Poster</p> <p>Form of Assessment : Participatory Activities, Project Results Assessment / Product Assessment</p>	Project-based Team Learning 100	Project-based Team Learning Asynchronous 100	<p>Material: Earth and Space Reference</p> <p>Reference : <i>Tjasyono, B. 2017. Earth and Space Science Multidisciplinary Approach. Surabaya: Unesa Press.</i></p>	5%

13	Create IPBA Thematic posters	Students are able to make IPBA Thematic posters	Criteria: 1. Work in group 2. Poster Form of Assessment : Participatory Activities, Project Results Assessment / Product Assessment	Project-based Team Learning 100	Project-based Team Learning Asynchronous 100	Material: Earth and Space Reference : Tjasyono, B. 2017. <i>Earth and Space Science Multidisciplinary Approach.</i> Surabaya: Unesa Press.	5%
14	Create IPBA thematic posters	Students are able to make IPBA Thematic posters	Criteria: 1. Work in group 2. Poster Form of Assessment : Project Results Assessment / Product Assessment	Project-based Team Learning 100	Project-based Team Learning Asynchronous 100	Material: Earth and Space Reference : Tjasyono, B. 2017. <i>Earth and Space Science Multidisciplinary Approach.</i> Surabaya: Unesa Press.	5%
15	Presenting IPBA Thematic posters	Students individually and in groups were able to present IPBA Thematic posters	Criteria: 1. Individual 2. Group 3. Poster Form of Assessment : Project Results Assessment / Product Assessment	Question and Answer Presentation 100	Synchronous 100 Question and Answer Presentation	Material: Earth and Space Reference : Tjasyono, B. 2017. <i>Earth and Space Science Multidisciplinary Approach.</i> Surabaya: Unesa Press.	20%
16	Presenting IPBA Thematic posters	Students individually and in groups were able to present IPBA Thematic posters	Criteria: 1. Individual 2. Group 3. Poster Form of Assessment : Project Results Assessment / Product Assessment	Question and Answer Presentation 100	Synchronous 100 Question and Answer Presentation	Material: Earth and Space Reference : Tjasyono, B. 2017. <i>Earth and Space Science Multidisciplinary Approach.</i> Surabaya: Unesa Press.	20%

Evaluation Percentage Recap: Project Based Learning

No	Evaluation	Percentage
1.	Participatory Activities	12.5%
2.	Project Results Assessment / Product Assessment	67.5%
3.	Test	20%
		100%

Notes

- 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.
- 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.
- 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.
- 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.
- Indicators for assessing** ability in the process and student learning outcomes are specific and measurable statements that identify the ability or performance of student learning outcomes accompanied by evidence.
- 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.
- Forms of assessment:** test and non-test.
- 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.
- 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.
- Learning materials** are details or descriptions of study materials which can be presented in the form of several main points and sub-topics.
- 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%.
- TM=Face to face, PT=Structured assignments, BM=Independent study.