



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

Document Code

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight	SEMESTER	Compilation Date
Physics of Oceanography	4520102075	Study Program Elective Courses	T=2 P=0 ECTS=3.18	5	July 17, 2024
AUTHORIZATION	SP Developer		Course Cluster Coordinator	Study Program Coordinator	
	Prof. Tjipto Prastowo, Ph.D.		Prof. Tjipto Prastowo, Ph.D.	Prof. Dr. Munasir, S.Si., M.Si.	

Learning model	Project Based Learning																																																																																																				
Program Learning Outcomes (PLO)	PLO study program that is charged to the course																																																																																																				
	PLO-7 Communicate their ideas and/or research results in academic writing and speaking effectively.																																																																																																				
	PLO-12 Have the ability to improve their knowledge and be able to continue their studies to a higher level.																																																																																																				
	PLO-14 Formulate physical systems as physical models using mathematics																																																																																																				
	Program Objectives (PO)																																																																																																				
	PO - 1 Mastering a structured study of the dynamics and role of oceans as a physical system in human life and living creatures.																																																																																																				
	PO - 2 Understand aspects of interdependence between oceans and humans.																																																																																																				
	PO - 3 Understand the physical structure and characteristics of oceans in the context of marine resource utilization.																																																																																																				
	PO - 4 Understand the potential threat of hydro-meteorological disasters related to the hydrological cycle of sea water which is triggered by local, regional and global climate conditions.																																																																																																				
	PLO-PO Matrix																																																																																																				
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PO Matrix at the end of each learning stage (Sub-PO)																																																																																																					
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Short Course Description	Indonesia, as a maritime country with an ocean area that is much larger than its land area, requires special courses that discuss issues related to the knowledge and utilization of Indonesia's marine resources. The approach taken in this lecture is phenomenology with the focus of discussion emphasizing aspects of marine physics. Discussion topics in lectures include: physical properties of sea water; waves and ocean energy; tides and ocean currents; regional and global ocean circulation; Indonesia's geographical position and The Indonesian Through-Flow (ITF), a hydro-meteorological disaster related to the hydrological cycle of sea water and the characteristics of tsunami waves.
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References	Main :
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1. Prastowo, T. 2012. Sains Kebumihan. Unpublished work, pp.1-31.
2. Burhanudin, S. dkk. 2003. Sejarah Maritim Indonesia. Jakarta: BRKP Kementerian Perikanan dan Kelautan, pp.1-185.
3. Supangat dan Susanna. 2005. Pengantar Oseanografi. Jakarta: BRKP Kementerian Perikanan dan Kelautan, pp.2-286.
4. Pinet, P. R. 1998. Invitation to Oceanography. London, UK: Jones and Bartlett Publishers, pp.1-620.
5. Stewart, R. H. 2004. Introduction to Physical Oceanography. Texas, US: Texas A & M Uni Press, pp.1-352.

Supporters:

Supporting lecturer
 Prof. Tjipto Prastowo, Ph.D.
 Arie Realita, M.Si.
 Muhammad Nurul Fahmi, S.Si., M.Si.

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	Able to understand that Indonesia is a maritime country in terms of geographical, historical, socio-economic and socio-cultural aspects	Students are able to explain that Indonesia is a maritime country in terms of geographical, historical, socio-economic and socio-cultural aspects	Criteria: quantitative Form of Assessment : Participatory Activities	• Lecture• Discussion• Question and answer 2 X 50		Material: Indonesia as a maritime country: Geographical overview, Historical overview, Socio-economic overview, Socio-cultural overview Bibliography: Burhanudin, S. et al. 2003. Indonesian Maritime History. Jakarta: BRKP Ministry of Fisheries and Maritime Affairs, pp.1-185.	2%
2	Able to understand the important role of the sea as a physical system for humans in the context of marine resource potential, able to understand ocean circulation and the hydrological cycle	Students are able to explain the important role of the sea as a physical system for human life in the context of marine resource potential, are able to explain ocean circulation and the hydrological cycle	Criteria: quantitative Form of Assessment : Participatory Activities	• Lecture• Discussion• Question and answer 2 X 50		Material: Sea as a physical system, Physical structure of the sea, Characteristics of the sea, Hydrological cycle References: Supangat and Susanna. 2005. Introduction to Oceanography. Jakarta: BRKP Ministry of Fisheries and Maritime Affairs, pp.2-286.	3%

3	Able to understand the effect of exposure to solar radiation on temperature at the sea surface and at depth through the mechanism of sea-air interaction	Students are able to explain the effect of exposure to solar radiation on temperature at the sea surface and at depth through the mechanism of sea-air interaction	Criteria: quantitative Form of Assessment : Participatory Activities	• Lecture• Discussion• Question and answer 2 X 50		Material: Ocean temperature, solar radiation, sea-air interaction, sea surface temperature, temperature as a function of sea depth. References: <i>Supangat and Susanna. 2005. Introduction to Oceanography. Jakarta: BRKP Ministry of Fisheries and Maritime Affairs, pp.2-286.</i>	3%
4	Able to understand the constant composition of ocean salinity, able to understand vertical and horizontal variations in ocean salinity which is the internal driving force of the Indonesian Cross Current (Arlindo)	Students are able to explain the constant composition of ocean salinity throughout the earth's surface, able to explain vertical (locally applicable) and horizontal (regionally applicable) variations in ocean salinity which are the internal driving force of the Indonesian Cross Flow (Arlindo)	Criteria: quantitative Form of Assessment : Participatory Activities	• Lecture• Discussion• Question and answer 2 X 50		Material: Ocean salinity, Salt composition, Salinity as a function of sea depth, Horizontal variations in salinity on several surfaces of the earth References: <i>Pinet, PR 1998. Invitation to Oceanography. London, UK: Jones and Bartlett Publishers, pp.1-620.</i>	3%
5	Able to understand density distribution as a function of temperature and salinity, discuss vertical and horizontal variations in ocean density which are the internal driving force of the Indonesian Cross Current (Arlindo), able to understand physical processes: mixing and diffusion which cause sea water stratification	Students are able to explain density distribution as a function of temperature and salinity, discuss vertical (locally applicable) and horizontal (regionally applicable) variations in ocean density which are the internal driving force of the Indonesian Throughflow (Arlindo), able to explain physical processes: mixing and diffusion which causes seawater stratification	Criteria: quantitative Form of Assessment : Participatory Activities	• Lecture• Discussion• Question and answer 2 X 50		Material: Distribution of ocean density and pressure, Density as a function of temperature and salinity, Density as a variation in ocean depth, Horizontal variations in density on several surfaces of the earth, Physical processes that influence density References: <i>Pinet, PR 1998. Invitation to Oceanography. London, UK: Jones and Bartlett Publishers, pp.1-620.</i>	3%

6	Able to understand issues related to the characteristics of the propagation of light and sound waves under the sea surface, discuss how light and sound-based sensors work in the sea, understand underwater acoustic technology for mapping bathymetry and seabed topography	Students are able to explain issues related to the characteristics of the propagation of light and sound waves under the sea surface, discuss how light and sound-based sensors work in the sea, and are able to understand underwater acoustic technology for mapping bathymetry and seabed topography	Criteria: quantitative Form of Assessment : Participatory Activities	• Lecture• Discussion• Question and answer 2 X 50		Material: Propagation of light and sound in the sea, underwater visibility, underwater light sensor technology, characteristics of sound in the sea, underwater acoustic sensor technology. Reference: <i>Pinet, PR 1998. Invitation to Oceanography. London, UK: Jones and Bartlett Publishers, pp.1-620.</i>	3%
7	Able to understand the influence of sea-air interactions on sea breeze distribution patterns that cause sea waves, able to understand the speed characteristics of wave groups in shallow seas and deep seas	Students are able to explain the influence of sea-air interactions on sea breeze distribution patterns that cause sea waves, and are able to understand the speed characteristics of wave groups in shallow seas and deep seas.	Criteria: quantitative Form of Assessment : Participatory Activities	• Lecture• Discussion• Question and answer 2 X 50		Material: Sea-air interaction, Wind distribution patterns, Ocean waves, Shallow ocean waves, Deep ocean waves, Ocean wave energy References: <i>Stewart, RH 2004. Introduction to Physical Oceanography. Texas, US: Texas A&M Union Press, pp.1-352.</i>	4%
8	Able to understand USS questions well	Students are able to solve USS questions well	Criteria: 100 marks if the USS questions are answered well and correctly Form of Assessment : Project Results Assessment / Product Assessment	• Written test • Discussion of USS 2 X 50 questions		Material: Midterm Exam Literature:	20%
9	Able to understand the phenomena and dynamics of sea water tides as a power generation system, able to understand the effectiveness of tidal power in shallow waters and deep waters	Students are able to explain the phenomena and dynamics of sea water tides as a power generation system, able to understand the effectiveness of tidal power in shallow and deep waters	Criteria: quantitative Form of Assessment : Participatory Activities	• Lecture• Discussion• Question and answer 2 X 50		Material: Sea water tides, Tidal dynamics, Tidal variations in shallow and deep waters, Tidal power generation systems References: <i>Prastowo, T. 2012. Earth Science. Unpublished work, pp.1-31.</i>	4%

10	Able to understand the phenomenon of sea water movement due to the influence of wind, understand the types of ocean currents, understand the consequences of divergent currents and convergent currents	Students are able to explain the phenomenon of sea water movement due to the influence of wind (ocean currents), understand the types of ocean currents (surface currents and underwater currents), understand the consequences of divergent currents and convergent currents	<p>Criteria: Full marks if articles are collected</p> <p>Form of Assessment : Participatory Activities</p>	<p>• Lecture• Discussion• Question and answer 2 X 50</p>		<p>Material: Ocean currents, Sea-air interactions, Ocean surface currents, Undersea currents, Ocean divergence and convergence</p> <p>References: <i>Prastowo, T. 2012. Earth Science. Unpublished work, pp.1-31.</i></p>	4%
11	Able to understand the potential threat of hydro-meteorological disasters related to the hydrological cycle of sea water which is triggered by local, regional and global climate conditions, understand disaster mitigation efforts (prevention and management)	Students are able to explain the potential threat of hydro-meteorological disasters related to the hydrological cycle of sea water which is triggered by local, regional and global climate conditions, explain disaster mitigation efforts (prevention and management)	<p>Criteria: quantitative</p> <p>Form of Assessment : Participatory Activities</p>	<p>• Lecture• Discussion• Question and answer 2 X 50</p>		<p>Material: Disasters triggered by hydro-meteorological factors, floods, drought, forest fires, disaster mitigation, efforts to reduce disaster risks.</p> <p>Reference: <i>Prastowo, T. 2012. Earth Science. Unpublished work, pp.1-31.</i></p>	4%
12	Able to understand the potential threat of hydro-meteorological disasters related to the hydrological cycle of sea water which is triggered by local, regional and global climate conditions, understand disaster mitigation efforts (prevention and management)	Students are able to explain the potential threat of hydro-meteorological disasters related to the hydrological cycle of sea water which is triggered by local, regional and global climate conditions, explain disaster mitigation efforts (prevention and management)	<p>Criteria: quantitative</p> <p>Form of Assessment : Participatory Activities</p>	<p>• Lecture• Discussion• Question and answer 2 X 50</p>		<p>Material: Disasters triggered by hydro-meteorological factors, floods, drought, forest fires, disaster mitigation, efforts to reduce disaster risks.</p> <p>Reference: <i>Pinet, PR 1998. Invitation to Oceanography. London, UK: Jones and Bartlett Publishers, pp.1-620.</i></p>	4%
13	Able to understand the contents of posters related to marine physics with a discussion focus on the use of marine resources	Students are able to explain the contents of the poster related to marine physics with a discussion focus on the use of marine resources	<p>Criteria: Full marks if the poster is presented at the end of the semester</p> <p>Form of Assessment : Participatory Activities</p>	<p>• Poster Presentation • Discussion • Questions and Answers 2 X 50</p>		<p>Material: Marine Poster Demo</p> <p>Reference: <i>Prastowo, T. 2012. Earth Science. Unpublished work, pp.1-31.</i></p>	4%

14	Able to understand the contents of posters related to marine physics with a discussion focus on the use of marine resources	Students are able to explain the contents of the poster related to marine physics with a discussion focus on the use of marine resources	Criteria: Full marks if the poster is presented at the end of the semester Forms of Assessment : Participatory Activities, Project Results Assessment / Product Assessment	• Poster Presentation • Discussion • Questions and Answers 2 X 50		Material: Poster presentation Reference: Prastowo, T. 2012. <i>Earth Science. Unpublished work, pp.1-31.</i>	4%
15	Able to understand the contents of posters related to marine physics with a discussion focus on the use of marine resources	Students are able to explain the contents of the poster related to marine physics with a discussion focus on the use of marine resources	Criteria: Full marks if the poster is presented at the end of the semester Form of Assessment : Participatory Activities	• Poster Presentation • Discussion • Questions and Answers 2 X 50		Material: Poster presentation Reference: Prastowo, T. 2012. <i>Earth Science. Unpublished work, pp.1-31.</i>	4%
16	Able to understand UAS projects well		Criteria: Full marks if the project meets the assessment rubric Form of Assessment : Participatory Activities	Final Assignment Presentation 2 x 50		Material: Final Semester Exam Literature:	30%

Evaluation Percentage Recap: Project Based Learning

No	Evaluation	Percentage
1.	Participatory Activities	77%
2.	Project Results Assessment / Product Assessment	22%
		99%

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.

