INSTITUT TEKNOLOGI SEPULUH NOPEMBER
FACULTY OF CIVIL, PLANNING AND GEO ENGINEERING
DEPARTMENT OF GEOMATICS ENGINEERING
UNDERGRADUATE PROGRAM

SEMESTER LEARNING PLAN (SLP)

COURSE NAME	CODE	COURSE GROUP	CREDITS		SEMESTER	COMPILATION DATE
Physical Oceanograhy	CM234310	Geomarine	T=2	P=1	4	-

AUTHORIZATION	SLP DEVELOPER	COURSE GROUP COORDINATOR	HEAD OF UNDERGRADUATE PROGRAM
	Danar Guruh Pratomo, S.T., M.T., Ph.D.	Putra Maulida, ST, MT, Ph.D	Putra Maulida, ST, MT, Ph.D

Learning Outcome (LO)		
	Expected Learning Outcomes (ELO) that Imposed in the Course	
	ELO-4	Able to apply mathematics, science, and engineering in the fields of geodesy, surveying, hydrography, remote sensing, photogrammetry, geographic information systems, and cadastral to gain a thorough. understanding of the principles of engineering.
	ELO-8	Able to compile scientific reports and provide solutions based on leadership, creativity and communication skills as well as being responsible for the work done.
	Course Learning Outcomes (CLO)	
	CLO-1	Students are able to understand the definition, concept, theory, history, and application of oceanography, especially physical oceanography.
	CLO-2	Students are able to understand the relationships and influences of the atmosphere on oceans.
	CLO-3	Students are able to understand the ocean heat budget.

<table>
<tr><td></td><td>CLO-4</td><td>Students are able to understand the relationship among temperature, salinity, conductivity, density, pressure, and depths of the ocean.</td></tr>
<tr><td></td><td>CLO-5</td><td>Students are able to understand the concept and the relationship of wind, ocean currents, waves, and deep water circulation.</td></tr>
<tr><td></td><td>CLO-6</td><td>Students are able to understand the concept of ocean tides.</td></tr>
<tr><td></td><td>CLO-7</td><td>Students are able to understand the coastal processes.</td></tr>
<tr><td></td><td></td><td>Matrix ELO – CLO
<table>
<tr><td>CLO</td><td>ELO-4</td><td>ELO-8</td></tr>
<tr><td>CLO-1</td><td>V</td><td></td></tr>
<tr><td>CLO-2</td><td>V</td><td></td></tr>
<tr><td>CLO-3</td><td>V</td><td></td></tr>
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<tr><td>CLO-7</td><td></td><td>V</td></tr>
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<tr><td>Course Description</td><td colspan="2">This lecture is designed to introduce students to the important physical processes that occur in the oceans in such a way that they will understand conceptual physical principles and on a larger scale how this system includes into part of the earth as a unitary system. The initial focus was to develop the basic equations that illustrate the principles underlying physical oceanography. These principles are then used to help understand density, salinity, temperature, ocean depth, waves, tides, currents, and deep ocean circulation. Throughout the lecture, case examples will be given to show how physical oceanography affects and is influenced by the ocean.</td></tr>
<tr><td>Course Materials</td><td colspan="2">1. Definitions, concepts, theories, history and application of oceanography especially physical osmography
2. Temperature, salinity, density, conductivity, pressure and depth of the sea
3. Atmospheric effects on the ocean
4. Winds, waves, currents, circulation in the deep sea
5. Tides and seawater processes
6. Ocean heat balance and impact</td></tr>
<tr><td>References</td><td colspan="2">Main References :
1. Stewart, R.H., 2000. Introduction to Physical Oceanography. Department of Oceanography
2. Thurman, Harold V. 1994. Introductory Oceanography. Columbus: Charles</td></tr>
</table>

	Additional References :
	1. Open University. 1989. Waves, Tides and Shallow-Water Processes. Oxford:Pergamon Press.Pergamon Press. 2. Open University. 1989. Ocean Circulation. Oxford: Pergamon Press 3. Open University. 1989. Seawater: Its Composition, Properties and Behaviour.Oxford: Pergamon Press.
Lecturer	Danar Guruh Pratono S.T, M.T, Ph.D Dr. Muhammad Aldila Syariz, S.T., M.S., Ph.D. Irena Hana Hariyanto, S.T., M.T. Khomsin, ST, MT
Prerequisite	Physics 1 and Physics 2

Class/ Week	**Lesson Learning Outcome (Sub-CLO)**	**Evaluation**		**Forms of Learning, Learning methods, Student Assignments/Task, [Estimated time]**		**Learning Materials [References]**	**Weight (%)**
		Indicator	**Criteria**	**Offline**	**Online**		
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
1	Students are able to explain theories, definitions, concepts, history and applications of oceanography and physical oceanography		Material completeness, depth of explanation, effectiveness of communication, accuracy of attitude	Lecture, Teacher-centered learning [2x45’] Presentation, Student-centered learning [1x45’] Discussion, Problem-based learning [3x45’]		Introduction to physical oceanography and oceanography; Historical oceanography and physical oceanography; Applications of physical oceanography in the field of geomatics	5

2 - 3	Students are able to explain the effect of the atmosphere on the ocean		Material completeness, depth of explanation, effectiveness of communication, accuracy of attitude	Lecture, Teacher-centered learning [4x45’] Presentation, Student-centered learning [4x45’] Discussion, Problem-based learning [6x45’]		Earth in planet system; Coriolis force; Wind system; Wind measurement and scale; Wind tension	15
4 - 5	Students are able to understand the hot balance in the ocean		Material completeness, depth of explanation, effectiveness of communication, accuracy of attitude	Lecture, Teacher-centered learning [4x45’] Presentation, Student-centered learning [2x45’] Discussion, Problem-based learning [6x45’]		Definition of heat balance in the ocean; Calculation of hot flux; Geographical distribution of fluxes	15
6 -7	Students are able to explain the relationship between temperature, density, salinity, conductivity and pressure with the depth of the sea		Material completeness, depth of explanation, effectiveness of communication, accuracy of attitude	Lecture, Teacher-centered learning [4x45’] Presentation, Student-centered learning [2x45’] Discussion, Problem-based learning [6x45’]		Salinity;Density; Temperature; Conductivity; Pressure; Ocean Depth	15
8	**Mid Term Evaluation**						**50**
9	Students are able to understand the ocean's response to the wind		Material completeness, depth of explanation,	Lecture, Teacher-centered learning [2x45’]		Ekman Layer; Inertia force at sea level; Ekman mass transport; Ekman	10

			effectiveness of communication, accuracy of attitude	Presentation, Student-centered learning [1x45'] Discussion, Problem-based learning [3x45']		Theory and its applications	
10 - 12	Students are able to understand circulation in the ocean		Material completeness, depth of explanation, effectiveness of communication, accuracy of attitude	Lecture, Teacher-centered learning [4x45'] Presentation, Student-centered learning [2x45'] Discussion, Problem-based learning [6x45']		Hydrostatic balance; Geostropic equation; Geostropic currents; Flow measurement; Lagrange and Euler svedrup theory; The Munk solution; Surface circulation and deep sea	15
13 - 14	Students are able to understand the theories, concepts and types of waves		Material completeness, depth of explanation, effectiveness of communication, accuracy of attitude	Lecture, Teacher-centered learning [4x45'] Presentation, Student-centered learning [2x45'] Discussion, Problem-based learning [6x45']		Linear Wave Theory; Non Linear Wave Theory; Wave Spectrum; Forecasting of waves; Wave observation	15
15	Students are able to understand the tides and the formation of the beach		Material completeness, depth of explanation, effectiveness of communication, accuracy of attitude	Lecture, Teacher-centered learning [2x45'] Presentation, Student-centered learning [1x45']		Theory of Tides; Tide Applications; Tides Prediction; Coastal Processes	10

				Discussion, Problem-based learning [3x45’]			
16	**Final Semester Evaluation / Final Semester Examination**						**100**