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

SEMESTER LEARNING PLAN (SLP)

COURSE NAME	CODE	COURSE GROUP	CREDITS (SKS)		SEMESTER	Date of Preparation
Satellite Altimetry	CM234961	Geodesy and Geodinamics	T=2	P=0	Elective Course	-

AUTHORIZATION	SLP Developer	Course Group Coordinator	Head of Study Program
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Learning Outcomes (LO)

Expected Learning Outcomes (ELO) that Imposed in the Course	
ELO-6	Able to identify, formulate, analyze and solve problems in the fields of geodesy, surveying, hydrographic, remote sensing, photogrammetry, and cadastral.
ELO-7	Able to perform spatial data acquisition using modern measurement methods, geospatial data processing, using industry standard software, and making standard designs and analyzes in the fields of geodesy, surveying, hydrography, remote sensing, photogrammetry, and cadastral.
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	Able to explain the basic concepts of satellite altimetry.
CLO-2	Able to explain the basic theories and measurement methods to determine sea level using altimetry satellites.
CLO-3	Able to do simple data processing to determine sea level using altimetry satellites.
CLO-4	Able to explain sea level and its variations and their influence in global and regional sea phenomena.

Matrix ELO – CLO

CPMK	ELO-6	ELO-7	ELO-8
CLO-1		v	
CLO-2	v		v
CLO-3	v	v	v
CLO-4		v	

Course Description	In this course, students will study one study of satellite geodesy, satellite altimetry. Satellite altimetry is a method of measuring sea level height and its variations use radar altimeters. The basic concept of satellite geodesy in general and satellite altimetry in particular will be provided so that students will have knowledge of the principles of sea level measurement using satellite altimetry. In addition, some corrections and biases related to data processing in the calculation of sea level anomaly (SLA) were also conveyed. To better understand the knowledge of altimetry satellites, students will be given the task of doing calculations and data processing and analysis in determining sea level and its variations. Satellite altimetry applications that are related to the oceanic phenomena will also be given in this lecture. Students will be invited critically about the use of satellite altimetry technology for survey and mapping purposes.
Course Materials	1. Introduction of altimetry satellites. 2. The basic principle of an altimeter 3. Corrections and biases in the altimetry data due to the atmosphere: troposphere (dry and wet components) and ionosphere, sea state bias and geophysical effects: Tides and dynamic atmospheric. 4. Mean sea surface model 5. Sea level anomaly (SLA) analysis: along-tracks and crossovers 6. Satellite altimetry applications in the fields of: geodesy & geophysics, oceanography, etc
References	**Main:**
	1. Cipollini, P., J. Benveniste, F. Birol, M. J. Fernandes, E. Obligis, M. Passaro, P. T. Strub, G. Valladeau, S. Vignudelli and J. Wilkin (2017). Satellite altimetry in coastal regions. Satellite Altimetry Over Oceans and Land Surfaces. D. 2. Church, J. A., P. U. Clark, A. Cazenave, J. M. Gregory, S. Jevrejeva, A. Levermann, M. A. Merrifield, G. A. Milne, R. S. Nerem, P. D. Nunn, A. J. Payne, W. T. Pfeffer, D. Stammer and A. S. Unnikrishnan. 2013. Sea Level Change. 3. Fu, L.L. and Cazenave, A. 2001. Satellite Altimetry and Earth Sciences: A Handbook of Techniques and Applications, 4. Vignudelli, S., et al. 2011. "Satellite Altimetry: Sailing Closer to the Coast." 217-238. 5. Vignudelli, S., Kostianoy, A. G., Cipollini, P. and Benveniste, J. , 2011. Coastal Altimetry, Berlin Heidelberg,
	Additional :
	1. Related journals.

Lecturer	1. Dr. Eko Yuli Handoko, S.T., M.T.
Prerequisite	Satellite Geodesy, Hydrography

Class/ Week	Lesson Learning Outcome (Sub-CLO)	Evaluation		Forms of Learning, Learning methods,Student Assignments/Task, [Estimated Time]		Learning Materials [References]	Weight (%)
		Indicators	Criteria and Form	Offline	Online		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1-2	- Able to explain the basic principles of satellite geodesy		1. Completeness of the material 2. Depth of explanation and effectiveness of communication	1. Lecture [1 x 50'] 2. Discussion [1 x 50']		•	10
3-5	- Able to explain the basic principles of satellite altimetry	1.	1. Completeness of the material 2. Depth of explanation and effectiveness of communication	1. Lecture [2 x 50'] 2. Discussion [1 x 50'] 3. Task [1 x 50']			30
6-7	- Able to explain the concept of mean sea surface (MSS)	1.	1. Completeness of the material 2. Depth of explanation and effectiveness of communication	1. Lecture [2 x 50'] 2. Discussion [2 x 50']			10
8	**Midterm Evaluation / Midterm Exam**						**50**
9-12	Able to explain bias and errors in altimetry measurements and can provide measurement corrections to altimetry satellite observation data	1.	1. Completeness of the material 2. Depth of explanation and effectiveness of communication	1. Lecture [2 x 50'] 2. Discussion, Task [1 x 50'] 3. Response [1 x 50']			20

13-15	*Able to explain and apply satellite altimetry applications in the field of geodesy and related fields*	1.	1. Completeness of the material 2. Depth of explanation and effectiveness of communication	1. Lecture [2 x 50'] 2. Discussion, Task [1 x 50'] 3. Response/exercise [1 x 50']			30
16	**Final Semester Evaluation / Final Semester Examination**						**100**