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
Remote Sensing	CM234418	Geospatial	T=2	P=1	5	-

AUTHORIZATION	SLP DEVELOPER	COURSE GROUP COORDINATOR	HEAD OF UNDERGRADUATE PROGRAM
	Prof. Dr. Ir. Bangun Muljo Sukojo, DEA.DESS	Prof. Lalu Muhamad Jaelani, ST, M.Sc, Ph.D	Putra Maulida, ST, MT, Ph.D

Learning Outcome (LO)		
	Expected Learning Outcomes (ELO) that Imposed in the Course	
	ELO-5	Able to design survey and mapping activities using the latest technology in the fields of geodesy, surveying, hydrographic, remote sensing, photogrammetry, and cadastral.
	ELO-6	Able to identify, formulate, analyze and solve problems in the fields of geodesy, surveying, hydrographic, 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 understand the history and basic concepts of remote sensing and the development of cutting-edge/up-to-date geospatial information science and technology in the fields of geodesy and surveying, geodynamics and environment, geospatial, geomarin, and land

<table>
<tr><td></td><td>CLO-2</td><td>Have skills in processing remote sensing image data and the development of state-of-the-art geospatial information science and technology in the fields of geodesy and surveying, geodynamics and environment, geospatial, geomarin, and land</td></tr>
<tr><td></td><td>CLO-3</td><td>Have skills in processing radiometric calibration, geometric correction and the development of cutting-edge/up-to-date geospatial information science and technology in the fields of geodesy and surveying, geodynamics and environment, geospatial, geomarin, and land</td></tr>
<tr><td></td><td>CLO-4</td><td>Students conduct interpretation and classification of satellite imagery and the development of the latest geospatial information science and technology in the field of geodesy and surveying, geodynamics and environment, geospatial, geomarin, and land</td></tr>
<tr><td></td><td></td><td>Matrix ELO – CLO
<table>
<tr><td>CLO</td><td>ELO-2</td><td>ELO-6</td><td>ELO-7</td></tr>
<tr><td>CLO-1</td><td>V</td><td>V</td><td>V</td></tr>
<tr><td>CLO-2</td><td>V</td><td>V</td><td>V</td></tr>
<tr><td>CLO-3</td><td>V</td><td>V</td><td>V</td></tr>
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<tr><td>Course Description</td><td colspan="2">This course contains the processing and utilization of extra-terrestrial spatial data.</td></tr>
<tr><td>Course Materials</td><td colspan="2">1. Remote Sensing Concepts, Historical Platform, Basic Principles, Electromagnetic Wave Physics, Transport Vehicle, Satellite Geometry
2. Image Types and Specifications, Definition, Active Remote Sensing Satellites, Passive Remote Sensing Satellites, Reflectant Characters on Earth's Surface Objects
3. Interpretation, Basic Understanding, Basis of Interpretation, Key Interpretations, Types, Methods, Processes, Tools, Data/Documents for Interpretation
4. Geometric Correction, Radiometric Correction, Algorithm Usage, Radiometric Calibration, Software Usage and Image Classification</td></tr>
<tr><td>References</td><td colspan="2">Main References :</td></tr>
<tr><td></td><td colspan="2">1. Penginderaan Jauh (Dasar Teori dan Terapan), ITS Press, 2012, Sukojo, B.M
2. Remote Sensing and Image Interpretation (Book by Ralph W. Kiefer and Thomas Lillesand) Originally published: 1979 Authors: Ralph W. Kiefer, Thomas Lillesand
3. Introduction to Remote Sensing (Book by James B Campbell) Originally published: 1987 Author: James B Campbell</td></tr>
<tr><td></td><td colspan="2">Additional References :</td></tr>
<tr><td></td><td colspan="2">1. Image Analysis, Classification and Change Detection in Remote Sensing: With Originally published: 2014 By Morton J. Canty
2. Physical Principles of Remote Sensing Originally published: 2013 By W. G. Rees</td></tr>
</table>

	3. Classification Methods for Remotely Sensed Data, Second Edition Originally published: 2009 By Paul Mather, Brandt Tso.. 4. Remote sensing, models, and methods for image processing (Book by Robert A. Schowengerdt) Originally published: January 1997 Author: Robert A. Schowengerdt						
Lecturer	Prof. Lalu Muhamad Jaelani, ST, M.Sc, Ph.D Prof. Dr. Ir. Bangun Muljo Sukojo, DEA, DESS Dr-Ing. Noorlaila Hayati, ST, MT Dr. Filsa Bioresita, ST, MT						
Prerequisite	Photogrammetry						
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	Able to explain the concept, history, and basic principle of remote sensing		Completeness of material, depth of explanation, effectiveness of communication, accuracy of attitude	Lecture, Teacher-centered learning [1 x 45’]		1. Explain the concept of remote sensing	5.00%
				Lecture, Teacher-centered learning [1 x 45’]		2. Explain the history of remote sensing	
				Lecture, Teacher-centered learning [1 x 45’]		3. Explain the basic principle of remote sensing	
2	Able to explain the fundamental physics of electromagnetic waves,		Completeness of material, depth of explanation, effectiveness of	Lecture, Teacher-centered learning [1 x 45’]		1. Explain the fundamental physics of electromagnetic waves	5.00%

	platforms, and satellite geometry		communication, accuracy of attitude	Lecture, Teacher-centered learning [1 x 45’]		2. Explain the platforms used in remote sensing	
				Lecture, Teacher-centered learning [1 x 45’]		3. Explain satellite geometry	
				Discussion, Student-centered learning [1 x 45’]		4. Real case studies	
3	Able to explain the types and specification of remote sensing images, and the principle of active and pasive remote sensing		Completeness of material, depth of explanation, effectiveness of communication, accuracy of attitude	Lecture, Teacher-centered learning [1 x 45’]		1. Explain the types and specification of remote sensing images	10.00%
				Lecture, Teacher-centered learning [1 x 45’]		2. Explain the official names of topographic which have a characteristic of natural object	
				Lecture, Teacher-centered learning [1 x 45’]		3. Explain active sensors in remote sensing	
				Lecture, Teacher-centered learning [1 x 45’]		4. Explain pasive sensors in remote sensing	
				Exercise and Task , Student-centered learning [1 x 45’]			

4-5	Able to explain the reflectance characteristics of surface objects		Completeness of material, depth of explanation, effectiveness of communication, accuracy of attitude	Lecture, Teacher-centered learning [2 x 45’]		1. Explain the reflectance characteristics of surface objects	10.00%
				Lecture, Teacher-centered learning [2 x 45’]		2. Explain the reflectance characteristics of vegetation	
				Lecture, Problem-based learning [2 x 45’]		3. Explain the reflectance characteristics of soil and water	
				Exercise and Task , Student-centered learning [1 x 45’]			
6	Able to explain image interpretation, its concept in remote sensing, and principals of image interpretation		Completeness of material, depth of explanation, effectiveness of communication, accuracy of attitude	Lecture, Teacher-centered learning [1 x 45’]		1. Explain image interpretation	10.00%
				Lecture, Teacher-centered learning [1 x 45’]		2. Explain the concept in remote sensing	
				Lecture, Teacher-centered learning [1 x 45’]		3. Explain principals of image interpretation	
				Task Response, Student-centered learning [1 x 45’]			

7	Able to explain the meaning of interpretation keys, types, methods, process, tools, and data interpretation		Completeness of material, depth of explanation, effectiveness of communication, accuracy of attitude	Lecture, Teacher-centered learning [1 x 45’]		1. Explain the interpretation keys	10.00%
				Lecture, Teacher-centered learning [1 x 45’]		2. Explain the types and methods of interpretation	
				Lecture, Teacher-centered learning [1 x 45’]		3. Explain the process, tools, and data interpretation	
				Big Task, Student-centered learning []			
8	Mid-Semester Evaluation						**50%**
9-10	Able to explain corrections in remote sensing, and to perform geometric and radiometric corrections		Completeness of material, depth of explanation, effectiveness of communication, accuracy of attitude	Lecture, Teacher-centered learning [2 x 45’]		1. Explain and do geometric correction	15.00%
				Lecture, Teacher-centered learning [2 x 45’]		2. Explain and do radiometric correction	
				Dicsussion, Problem-based learning [2 x 45’]			
				Response and Task, Student-centered learning [2 x 45’]			
11	Able to explain the meaning and use of		Completeness of material, depth of explanation,	Lecture, Teacher-centered learning [1 x 45’]		1. Explain and use formulas or equations	10.00%

	formulas in radiometric calibration		effectiveness of communication, accuracy of attitude	Lecture, Teacher-centered learning [1 x 45’]		2. Explain and do radiometric calibration	
				Dicsussion, Problem-based learning [1 x 60']			
				Response and Task, Student-centered learning []			
12-13	Able to explain and use software for image processing		Completeness of material, depth of explanation, effectiveness of communication, accuracy of attitude	Lecture, Teacher-centered learning [2 x 45’]		1. Explain the use of software for image processing	15.00%
				Discussion, Student-centered learning [2 x 45’]		2. Explain and do image processing	
				Task, Problem-based learning [2 x 60']			
14	Able to explain the meaning of image classification		Completeness of material, depth of explanation, effectiveness of communication, accuracy of attitude	Lecture, Teacher-centered learning [1 x 45’]		1. Explain and do image classification	5.00%
				Lecture, Teacher-centered learning [1 x 45’]		2. Explain the process of image classification	
				Discussion, Student-centered learning [1 x 45’]		3. Explain and do image processing	

				Task, Student-centered learning [1 x 45’]			
15	Able to analyze the result of image processing		Completeness of material, depth of explanation, effectiveness of communication, accuracy of attitude	Lecture, Teacher-centered learning [1 x 45’]		1. Explain the result of image classification	5.00%
				Lecture, Teacher-centered learning [1 x 45’]		2. Analyze the procedures of image classification	
				Exercise, Student-centered learning [1 x 45’]			
				Task, Student-centered learning [1 x 45’]			
16	**Final Semester Evaluation / Final Semester Examination**						**100%**