	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
Hyperspectral	CM234970	Geospatial	T=1	P=1	Elective Course	-

AUTHORIZATION	SLP Developer	Course Group Coordinator	Head of Study Program
	Prof. Lalu Muhamad Jaelani, S.T., M.Sc., Ph.D.	Prof. Lalu Muhamad Jaelani, S.T., M.Sc., Ph.D.	Putra Maulida, S.T., M.T., Ph.D

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 and Surveying, Hydrography, Photogrammetry and Remote Sensing, as well as Geospatial and Land Information.
ELO-7	Able to perform spatial data acquisition using modern measurement methods, geospatial data processing, using industry standard software, and making standard designs and analyses in the fields of Geodesy and Surveying, Hydrography, Photogrammetry and Remote Sensing, as well as Geospatial and Land Information.
ELO-12	Able to apply the concepts of management, entrepreneurship, the latest technology-based innovation, sustainable, and environmentally wise.

Course Learning Outcomes (CLO)

CLO-1	Students are able to understand the concept of remote sensing using hyperspectral sensors
CLO-2	Students are able to extract parameter information in waters, land and the atmosphere from hyperspectral data
CLO-3	Students are able to carry out hyperspectral data calibration processing and create spectral libraries

Matrix ELO – CLO

CPMK	ELO-6	ELO-7	ELO-12
CLO-1	V	V	
CLO-2	V	V	

		CLO-3		V	V

Course Description	In this course, students will study one of the fundamental objectives in geodesy, which is the determination of the Earth's shape and size through gravity measurements. Theoretical foundations of gravity, as well as measurement and reduction methods, will be provided so that students gain knowledge of the characteristics and data acquisition processes related to determining the Earth's shape and size. To enhance understanding and gain practical experience, students will be assigned tasks involving basic calculations to model the Earth's shape and size. This course will also cover dynamic Earth phenomena that influence variations in the Earth's shape and size. Students will be encouraged to think critically about the application of Earth shape and size models in practical surveying and mapping activities.
Course Materials	1. Hyperspectral Concepts and Instruments 2. Hyperspectral Electromagnetic Waves 3. Digital Airborne Imaging Spectrometer 4. Hyperspectral Data Calibration 5. Spectral Library
References	**Main:** 1. Rechards, John.R, dan Jia, X., 1999: Remote Sensing Digital Image Analysis, Springer 2. Schowengerdt, Robert.A, 1997: Remote Sensing kata modal dan Metode Image Processing, Academic Press. 3. Dyer, Johen.R, 1994:. Penerapan penyerapan Spektroskopi Senyawa Organik, Prentice Hall of India **Additional :** 1. Tong, T., Tian, Q., Pu, O., dan Zhao, C. 2001, penentuan Spectrscopic status Air gandum menggunakan 1650-1850 nm fitur penyerapan spektral, Int.J.Rs, Vol 2. Curran, Paul.J. 2001, Imaging spektrometri untuk aplikasi ekologi, JAG, Vol.3-Issue 4,305-312 3. http://speclab.cr.usgs.gov/spectral-lib.html untuk perpustakaan spektral
Lecturer	Prof. Lalu Muhamad Jaelani, S.T., M.Sc., Ph.D.
Prerequisite	-

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)
1-3	Students are able to understand the concept of spectrum and perform filtering on spectral data	Accuracy in understanding the concept of spectrum and	1. Completeness of the material 2. Depth of explanation and	1. Lecture [3 x 45'] 2. Discussion [3 x 45'] 3. Task and Quiz [3 x 45']		1. Concept of Atmospheric Correction	20

		performing spectral filtering	effectiveness of communication			2. Correction Method using FLAASH	
4-7	Students are able to understand and carry out processing to obtain parameters using sensors such as AVIRIS, TRWIS, HYDICE, CASI, OKSI AVS, MERIS, or Hyperion	Accuracy in understanding and conducting processing to obtain parameters using sensors such as AVIRIS, TRWIS, HYDICE, CASI, OKSI AVS, MERIS, or Hyperion	1. Completeness of the material 2. Depth of explanation and effectiveness of communication	1. Lecture [4 x 45'] 2. Practice [4 x 45'] 3. Task [4 x 45']		1. Concept of Remote Sensing for Water Bodies 2. Extraction of Key Water Quality Parameters (Chlorophyll-a, Total Suspended Solids, Sea Surface Temperature)	30
8	**Midterm Evaluation / Midterm Exam**						**50**
9-12	Able to extract information from imagery by correcting data for the accuracy of currently available instruments, such as NASA/JPL Airborne Visible and Infrared Imaging Spectrometer	Accuracy in extracting information from imagery by correcting data for the accuracy of currently available instruments, such as the NASA/JPL Airborne Visible and Infrared	1. Completeness of the material 2. Depth of explanation and effectiveness of communication	1. Lecture [4 x 45'] 2. Discussion [4 x 45'] 3. Practice[4 x 45'] 4. Response [4 x 45'] 5. Presentation [4 x 45']		1. Concept of Remote Sensing for Land Areas 2. Information Extraction from Imagery: Spectral Indices (Vegetation, Fire, Drought), Land Surface Temperature, and Impervious Objects	40

		Imaging Spectrometer					
13-15	Able to understand the concept of interpreting hyperspectral resolution, where high spectral resolution image data can be simplified by using a spectral library	Accuracy in understanding the concept of hyperspectral resolution interpretation, where high spectral resolution image data can be simplified by using a spectral library	1. Completeness of the material 2. Depth of explanation and effectiveness of communication	1. Presentation [3 x 45'] 2. Quiz [3 x 45'] 3. Task [3 x 45'] 4. Practice [3 x 45'] 5. Case study exercise [3 x 45'] 6. Discussion and presentation [3 x 45']		Concept of spectral analysis and information extraction from imagery using hyperspectral data through Linear Spectral Unmixing Algorithm and Spectral Angle Mapper Classification	10
16	**Final Semester Evaluation / Final Semester Examination**						**100**