	Universitas Negeri Surabaya Faculty of Social Sciences and Law Geography Education Undergraduate Study Program	Document Code

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date
Applied Remote Sensing	8720202128		T=2	P=1	ECTS=4.77	0	July 18, 2024

AUTHORIZATION	SP Developer	Course Cluster Coordinator	Study Program Coordinator
	.....	.....	Dr. Nugroho Hari Purnomo, S.P., M.Si.

Learning model	**Case Studies**
Program Learning Outcomes (PLO)	**PLO study program which is charged to the course**
	Program Objectives (PO)
	PLO-PO Matrix

	P.O

PO Matrix at the end of each learning stage (Sub-PO)

P.O	Week															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

Short Course Description	The Applied Remote Sensing course discusses digital image processing methods and analysis techniques from low spatial resolution (MODIS), medium resolution (Landsat 7 ETM+/Landsat 8 OLI) to high resolution (QuickBird/Ikonos), methods of analyzing interferrometric radar image data (SRTM and GDEM ASTER) through digital image processing tools, as well as their application in land resource studies. Learning is carried out for one semester using demonstration methods, discussions, practicums and individual and group assignments. Assessment is carried out through written, performance and portfolio tests.
References	**Main :**

1. Adams J,B, Gillespie A,R,. 2006. Remote Sensing of Landscape with Spectral Images 13 A Physical Modeling Approach. New York: Cambridge University Press.
2. Alexakis D,D, Hadjimitsis D,G, Agapiou A,. 2013. Integrated use of remote sensing, GIS, and precipitation data for the assessment of soil erosion rate in the catchment area of Yalias in Cyprus. Atmospheric Research.
3. Borengasserm M, Hungate W, Watkins, R,. 2008. Hyperspectral Remote Sensing 13 Principles and Applications. New York: CRC Press.
4. Chang H, Li X, Ge, L,. 2010. Assessment of SRTM ACE2 and ASTER GDEM using RTK-GPS.
5. Danoedoro P,. 2012. Pengantar Penginderaan Jauh Digital. Yogyakarta: Penerbit Andi.
6. Elachi C, Zyl J,V,. 2006. Introduction to the Phisics and Techniques of Remote Sensing, Second Edition. New Jersey: John Wiley & Sons.
7. Horning N, Robinson J,A, Sterling E,J, Turner W, Spector S,. 2010. Remote Sensing for Ecology and Conservation. New York: Oxford University Press.
8. Kalacska M, Sanchez-Azofeifa G, A,. 2008. Hyperspectral Remote Sensing Of Tropical And Subtropical Forests. New York: Taylor & Francis Group.
9. Newman M,E, McLaren K,P, Wilson B,S,. 2011. Use of Object-oriented classification and fragmentation analysis (1985-2008) to identify important areas for conservation in Cockpit County Jamaica. Environ Monit Assess 172 391-406.
10. Papandaki E,S, Mertikas S,P, Sarris A,. 2011. Identification of lineaments with possible structural origin using aster images and DEM derided products in western Crete. Greece: EARSel eProceedings 10

	Supporters:
Supporting lecturer	Dr. Muzayanah, S.T., M.T. Dr. Aida Kurniawati, S.Pd., 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	Students understand the characteristics of electromagnetic waves on objects as a basis for visual and digital interpretation of remote sensing data. Students understand the characteristics of Landsat 8 OLI images. Students can acquire Landsat 8 OLI image data.	1. Can explain the nature of the wavelengths used in passive remote sensing 2. Can explain the concept of radiation interaction (Radiance, Irradiance, Energy, and Photon) 3. Can explain the characteristics of each Landsat 8 OLI image band 4. Can acquire Landsat 8 OLI imagery	**Criteria:** 20% Assignments, 80% UTS	Lectures, discussions, independent practice, 2 X 50 assignments			0%
2	Able to perform geometric corrections on digital images. Able to perform initial radiometric corrections	1. Able to install GCP on images using Image to Image and Data to Image techniques 2. Able to carry out histogram and Top of Atmospheric Correction adjustment processes for Landsat 8 OLI images	**Criteria:** 20% assignments, 80% midterm	Lectures, discussions, independent practice, 2 X 50 assignments			0%
3	Students are able to improve the quality of image data through correcting image spectral information as a result of interference from atmospheric influences, sensor differences, and topographic variations	1. Explain the concept of radiometric and geometric correction 2. Explain the components of atmospheric image correction carrying out TOA correction and image to image correction procedures on Landsat 7 ETM / Landsat 8 OLI images	**Criteria:** 20% assignments, 80% midterm	Demonstrations, guided practice, 2 X 50 assignments			0%
4	Students are able to carry out the digital image mosaic process	1. Can explain the image balancing process 2. Can perform histogram matching process 3. Can show image mosaic results	**Criteria:** 20% assignments, 80% midterms	Demonstrations, guided practice, 2 X 50 assignments			0%
5	Students are able to improve image quality through the image fusion process	1. Can explain the concept of image fusion 2. Can carry out the Pansharpening process	**Criteria:** 20% assignments, 80% midterm	DemonstrationGuided PracticeGroup and field assignments 2 X 50			0%
6	Students are able to improve images through spectral transformation	Able to carry out image rationing processes, spectral index, tasseled-cap transformation and PCA	**Criteria:** 20% assignments, 80% midterm	DemonstrationGuided PracticeGroup and field assignments 2 X 50			0%

7	Students are able to perform visual interpretations of land cover/use on digital images	1. Can explain the concept of spectral pattern recognition 2. Can perform monoscopic / stereoscopic interpretation 3. Can carry out re-interpretation sampling and test samples	**Criteria:** 20% assignments, 80% midterm	Demonstration, guided practice, 2 X 50 assignments			0%
8	UTS	UTS		2 X 50			0%
9	Students master the technique of interpreting monoscopic physiographic objects to produce information on field units or other phenomena related to field characteristics	1. Can explain the physiographic concept of landforms 2. Can carry out the physiographic interpretation process monoscopically	**Criteria:** 20% assignments, 80% final exams	Demonstration, guided practice and 2 X 50 assignments			0%
10	Students master initial and advanced classification techniques for remote sensing images for land mapping	1. Able to carry out non-referenced and referenced classification techniques 2. Able to carry out classification accuracy testing 3. able to derive thematic maps resulting from the classification process	**Criteria:** 20% Assignments, 80% UAS	Demonstration, guided practice and 2 X 50 assignments			0%
11	Students are able to carry out vegetation density analysis based on remote sensing image data	1. Able to explain the concept of vegetation density 2. Able to extract vegetation density information through vegetation index images 3. Able to carry out correlation and regression processes of image data with field data 4. Able to produce thematic maps of vegetation density / biomass	**Criteria:** 20% assignments 80% final exam	Demonstrations, guided practice, and 2 X 50 assignments			0%
12	Students are able to carry out vegetation density analysis based on remote sensing image data	1. Able to explain the concept of vegetation density 2. Able to extract vegetation density information through vegetation index images 3. Able to carry out correlation and regression processes of image data with field data 4. Able to produce thematic maps of vegetation density / biomass	**Criteria:** 20% assignments 80% final exam	Demonstrations, guided practice, and 2 X 50 assignments			0%

13	Students are able to analyze remote sensing data to extract land and sea surface temperature information	1. Can explain the concept of recording Earth's surface temperature 2. Can extract land and sea surface temperature information 3. Can create thematic maps of land and sea surface temperatures		Lecture, guided practice, independent assignment 2 X 50			0%
14	Students are able to analyze remote sensing data to digitally extract information on built-up land and impervious surfaces	1. Can explain the concept of reflection of electromagnetic waves on hardened objects 2. Able to extract information on built-up land and impervious areas		Lecture, guided practice, independent assignment 2 X 50			0%
15	Students are able to analyze remote sensing data to digitally extract information on built-up land and impervious surfaces	1. Can explain the concept of reflection of electromagnetic waves on hardened objects 2. Able to extract information on built-up land and impervious areas		Lecture, guided practice, independent assignment 2 X 50			0%
16	UAS	UAS		2 X 50			0%

Evaluation Percentage Recap: Case Study

No	Evaluation	Percentage
		0%

Notes

1. **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.
2. **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.
3. **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.
4. **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.
5. **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.
6. **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.
7. **Forms of assessment:** test and non-test.
8. **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.
9. **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.
10. **Learning materials** are details or descriptions of study materials which can be presented in the form of several main points and sub-topics.
11. **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%.
12. TM=Face to face, PT=Structured assignments, BM=Independent study.