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
Photogrammetry	CM234314	Geoinformatics	T=2	P=1	4	-

AUTHORIZATION	SLP DEVELOPER	COURSE GROUP COORDINATOR	HEAD OF UNDERGRADUATE PROGRAM
	D Agung Budi Cahyono, ST, M.Sc, DEA	Agung Budi Cahyono, ST, M.Sc, DEA	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-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.
	Course Learning Outcomes (CLO)	
	CLO-1	Students are able to design photogrammetric method mapping activities according to job requirements (TOR) such as making flight paths and calculating the number of photos.

<table>
<tr><td></td><td>CLO-2</td><td>Students are able to explain and apply the concepts of light, optical physics, cameras and other equipment to support the concept of photogrammetry</td></tr>
<tr><td></td><td>CLO-3</td><td>Students are able to apply and solve problems based on theoretical and empirical concepts in photogrammetric calculations</td></tr>
<tr><td></td><td>CLO-4</td><td>Students are able to apply and solve problems of analytical photogrammetry concepts in solving the orientation process</td></tr>
<tr><td></td><td>CLO-5</td><td>Students are able to apply and perform processing based on photogrammetric interpretation techniques</td></tr>
<tr><td></td><td></td><td>Matrix ELO – CLO
<table>
<tr><td>CLO</td><td>ELO-5</td><td>ELO-6</td><td>ELO-7</td></tr>
<tr><td>CLO-1</td><td>V</td><td></td><td></td></tr>
<tr><td>CLO-2</td><td>V</td><td>V</td><td></td></tr>
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<tr><td>CLO-4</td><td></td><td></td><td>V</td></tr>
<tr><td>CLO-5</td><td></td><td>V</td><td>V</td></tr>
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<tr><td>Course Description</td><td colspan="2">In this course students will study and apply the concepts and procedures of photogrammetry science and techniques. As a method for large-scale mapping, photogrammetry will be used to produce basic and thematic maps. In the learning process, this course will study optical, mechanical and analytical concepts in the data acquisition process. Meanwhile, quantitative analysis will carry out a manual interpretation method using the 7 key interpretation method. It is hoped that students will have learning experience and be able to think critically about photogrammetry for mapping, especially large-scale mapping.</td></tr>
<tr><td>Course Materials</td><td colspan="2">1. Definision and concept of photogrammetry
2. Basic concept of optics for photogrammetry
3. Metric and non-metric aerial cameras
4. Interpretation of photogrammetry
5. Determination of difference in height with parallax bar
6. Theory of exterior and interior orientation
7. Theory of aerial triangulation and bundle adjustment
8. Basic theory of parallel/cross-eyed viewing in single and stereo images
9. Mosaic images and plotting
10. Design of the flight line and number of images</td></tr>
<tr><td>References</td><td colspan="2">Main References :</td></tr>
<tr><td></td><td colspan="2">1. Wolf, P.R. & Dewitt, B.A. 2004. Elements of Photogrammetry with Appl. in GIS, McGraw-Hill.</td></tr>
</table>

	2. Kraus K., 1993. Photogrammetry, Vol 1 and 2. 4th rev. ed, Ferd. Dümmlers Verlag 3. Hariyanto, T. 2004. Pengantar Fotogrametri, Buku Ajar,Teknik Geomatika ITS 4. Cahyono, A.B. dan Hapsari, H.H. 2006. Petunjuk Praktikum Fotogrametri Dasar, Teknik Geodesi – FTSP, ITS
	Additional References : 1. E-learning - Dep. Teknik Geomatika, 2020. MK. Fotogrametri. Http://share.its.ac.id 2. G.Konecny, 2005. Photogrammetri, 2nd edition, Sprin Verlag
Lecturer	Dr-Ing. Ir. Teguh Hariyanto, M.Sc Agung Budi Cahyono, ST, M.Sc, DEA Hepi Hapsari Handayani, ST, M.Sc, PhD Husnul Hidayat, ST, MT
Prerequisite	No Prerequisite

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 of photogrammetry as a well known technique of mapping for both interpretation (quantitative) and measurement		Completeness of material, depth of explanation, effectiveness of communication, accuracy of attitude	Lecture ,Teacher-centered learning [1 x 45’]		1. Basic principle of photogrammetry 2. Concept of optical physics 3. Concept of light	5.00%
				Discussion ,Student-centered learning [1 x 45’]			
				Practice ,Problem-based learning [1 x 45’]			

2-3	Able to explain the concept of basic physics in medias of photography, such as camera tools and film media		Completeness of material, depth of explanation, effectiveness of communication, accuracy of attitude	Lecture ,Teacher-centered learning [1 x 45’]		1. Basic optics and wave propagation 2. Components of aerial camera, pinhole, and lens	10.00%
				Discussion ,Student-centered learning [1 x 45’]			
				Practice ,Problem-based learning [1 x 45’]			
4-5	Able to apply the method of interpreting aerial photos using image interpretation keys		Completeness of material, depth of explanation, effectiveness of communication, accuracy of attitude	Lecture ,Teacher-centered learning [1 x 45’]		1. Interpretation 2. Stereoscope"	10.00%
				Discussion ,Student-centered learning [1 x 45’]			
6	Able to explain the concept of optical physics, for example camera tools and plotter in order to support the concept of stereoscopic image		Completeness of material, depth of explanation, effectiveness of communication, accuracy of attitude	Lecture ,Teacher-centered learning [1 x 45’]		1. Basic computation of vertical aerial photography, image coordinate system, and ground coordinate system	20.00%
				Discussion ,Student-centered learning [1 x 45’]			
				Practice ,Problem-based learning [1 x 45’]			
7	Able to explain the concept of camera calibration		Completeness of material, depth of explanation,	Lecture ,Teacher-centered learning [1 x 45’]		1. Parameter calibration, non-metric camera,	10.00%

			effectiveness of communication, accuracy of attitude	Discussion ,Student-centered learning [1 x 45’]		relative orientation, space intersection, self calibration, and budle adjustment	
				Practice ,Problem-based learning [1 x 45’]			
8	Mid-Semester Evaluation						
9-10	Able to explain the concept of relief displacement and parallax for interior orientation		Completeness of material, depth of explanation, effectiveness of communication, accuracy of attitude	Lecture ,Teacher-centered learning [1 x 45’]		1. Concept of relief displacement, basic concept of relief displacement to calculate height and interior orientation data	15.00%
				Discussion ,Student-centered learning [1 x 45’]			
				Practice ,Problem-based learning [1 x 45’]			
11-12	Able to find examples and solutions from photogrammetry applications in the field of mapping		Completeness of material, depth of explanation, effectiveness of communication, accuracy of attitude	Lecture ,Teacher-centered learning [1 x 45’]		1. Journal of ISPRS, Photogrametria, Elsevier	10.00%
				Discussion ,Student-centered learning [1 x 45’]			
				Practice ,Problem-based learning [1 x 45’]			

13-14	Able to do coordinate computation using the principles of vertical aerial photography		Completeness of material, depth of explanation, effectiveness of communication, accuracy of attitude	Lecture ,Teacher-centered learning [1 x 45’]		1. Conditions of collinearity, mathematical relationships between the image and ground coordinates 2. Coordinate transformation with the central projection systems	10.00%
				Discussion ,Student-centered learning [1 x 45’]			
				Practice ,Problem-based learning [1 x 45’]			
15	Able to design a work of aerial photography		Completeness of material, depth of explanation, effectiveness of communication, accuracy of attitude	Lecture ,Teacher-centered learning [1 x 45’]		1. The flow chart of a photogrammetry work, the plan to use types of aerial camera, number of ground control point (GCP) and independent control point (ICP) for the process of aerial triangulation, number of images, strips, and models in photogrammetry	10.00%
				Discussion ,Student-centered learning [1 x 45’]			
				Practice ,Problem-based learning [1 x 45’]			
16	**Final Semester Evaluation / Final Semester Examination**						