	SEMESTER LEARNING PLAN **DEPARTMENT OF GEOMATICS ENGINEERING** **FACULTY OF CIVIL, PLANNING, and GEO ENGINEERING**		
PROGRAM	**UNDERGRADUATE**		
COURSE NAME	**Digital Photogrammetry**	**CODE**	**RM184520**
SEMESTER	**V (five)**	**CREDITS**	**3 (three)**
LECTURERS	**Teguh Hariyanto (coord.)**		
	Agung Budi Cahyono, Husnul Hidayat		

COURSE MATERIALS	1	Definition and use of the photogrammetry technique, the basic concept of electro-optics (CCD and CMOS image sensors) for digital cameras
	2	Digital camera calibration metric and non-metric with inertial measurement units (IMU)
	3	The interior and exterior orientation theory for digital using mathematics 3D models, The theory and application of digital aerial triangulation
	4	The theory and application of linear features (e.g straight-lines and conic sections) in digital images
	5	The theory and application of LIDAR data to generate DSM, DTM, and DEM, The basic concept of digital photogrammetric workstation (DPW)
EXPECTED LEARNING OUTCOMES THAT IMPOSED IN THE COURSE	C	Able to identify, formulate, analyze and solve problems in the fields of geodesy, surveying, hydrographic, remote sensing, photogrammetry, and cadastral.
	D	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.
	E	Able to apply information & communication technology and the latest technological developments in the fields of geodesy, surveying, hydrographic, remote sensing, photogrammetry, geographic information systems, and cadastral.
	G	Able to plan, perform and evaluate the process of surveying and mapping activities using the latest technology in the fields of geodesy, surveying, hydrographic, remote sensing, photogrammetry, and cadastral.
COURSE LEARNING OUTCOMES	1	Able to explain the concept of physics and digital electro-optics (CCD/CMOS), metric and non-metric digital camera and other tools which support the stereoscopic concept
	2	Able to explain theoretically and empirically in the computational photogrammetry with mono and stero digital photos
	3	Able to apply the concept of digital photogrammetry in the solutions of digital orientation process by means of mathematics 3D models between image coordinates and object (ground) coordinates to obtain the detail planimetric and height
	4	Able to know and apply the concept of the LIDAR technology to generate DEM, DSM, and contour.

ABILITY CATEGORIES	*Cognitive Prosecess*	*Analyse*
	Knowledge Domain	*Procedural*
	Psychomotor	*Conscious control*
	Affective	*Change of attitude*

Class	Lesson learning outcome	Criteria dan Assessment Indicator	Weight	Learning Materials	Learning Experience	Learning Methods	Estimated Time
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	Able to explain the concept of digital photogrammetry as a mapping technique generating lange scale maps with digital data images	1. The truth procedures	10,00%	The definition, components, and use of digital aerial imagery	Lecture	Lecture and Questions & Answers (A&Q)	1 x 50'
					Discussion and Presentation		1 x 50'
					Exercise/Practice		1 x 50'
2-3	Able to explain the concept of basic metric and non-metric digital camera	1. The accuracy to use camera components 2. The truth procedures	20,00%	The basic of electro-optics and wave propagation, components of digital camera (i.e. CCD and CMOS systems)	Lecture	Lecture, A&Q, and Task	1 x 50'
					Discussion and Presentation		1 x 50'
					Exercise/Practice		1 x 50'
4-5	Able to explain sensor platform system	1. The accuracy to use digital photogrammetry tools 2. The truth procedures	10,00%	The basic application of sensor platform system (UAV, airborne, satellite) and IMU tools	Lecture	Lecture, A&Q, and Task	1 x 50'
					Discussion and Presentation		1 x 50'
					Exercise/Practice		1 x 50'
6-7	Able explain the concept of mathematics models for a process of digital image orientation and its correction to support the stereoscopic concept	1. The accuracy to use formulas or equations 2. The truth procedures	10,00%	The basic computation of digital aerial imagery using the principle of collinear and coplanar to create a relationship between model photos	Lecture	Lecture, A&Q, and Task	1 x 50'
					Discussion and Presentation		1 x 50'
					Exercise/Practice		1 x 50'

8	Mid-Semester Evaluation						
9-10	Able to explain the concept of triangulation (e.g. minor control points)	1. The accuracy to use formulas or equations 2. The truth procedures	20,00%	The basic concept of differential/linearization and computation which requires the strip and block triangulation as a mathematics model	Lecture	Lecture, A&Q, and Task	1 x 50'
					Discussion and Presentation		1 x 50'
					Exercise/Practice		1 x 50'
11-12	Able to explain a process of coordinate computation using the principle of digital aerial imagery and 3D transformation	1. The accuracy to use formulas or equations 2. The truth procedures	10,00%	The basic concept of differential/linearization 3D transformation from image coordinates to object (ground) coordinates on a map coordinate system	Lecture	Lecture, A&Q, and Task	1 x 50'
					Discussion and Presentation		1 x 50'
					Exercise/Practice		1 x 50'
13-14	Able to explain a process to obtain the Z (vertical) coordinate using the LIDAR system	1. The accuracy to use formulas or equations 2. The truth procedures	10,00%	The data acquisition model, LIDAR data pre-processing and processing to generate STM, DTM, DEM, height of point, and contour	Lecture	Lecture, A&Q, and Task	1 x 50'
					Discussion and Presentation		1 x 50'
					Exercise/Practice		1 x 50'
15	Able to explain a process of mapping using DPW	1. The accuracy to use formulas or equations 2. The truth procedures	10,00%	The basic concept of tools, hardware, software, operating system, and results of DPW	Lecture	Lecture, A&Q, and Task	1 x 50'
					Discussion and Presentation		1 x 50'
					Exercise/Practice		1 x 50'
16	Final Semester Evaluation						
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