	Universitas Negeri Surabaya Faculty of Engineering Civil Engineering Undergraduate Study Program	Document Code

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date
MEASUREMENT AND MAPPING	2220102179	Compulsory Study Program Subjects	T=2	P=0	ECTS=3.18	1	July 17, 2024

AUTHORIZATION	SP Developer	Course Cluster Coordinator	Study Program Coordinator
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Learning model: Case Studies

Program Learning Outcomes (PLO)

PLO study program that is charged to the course

Program Objectives (PO)

PO - 1	Able to make contour / elevation drawings and calculate the volume of excavation or fill
PO - 2	Able to map area areas using open and closed polygon calculations.

PLO-PO Matrix

P.O
PO-1
PO-2

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
PO-1																
PO-2																

Short Course Description: This course discusses various map knowledge, cartesian coordinate systems, as well as knowledge of tools used for measurement and mapping. This lecture also discusses how to measure longitudinal planes and profiles, as well as calculating height differences trigonometrically and crosshair height. The height difference calculation will produce a contour image so that the volume of both the fill and excavation in an earthwork can be determined. Apart from that, there is also material regarding mapping to measure the area of an area, including understanding azimuth and coordinates, open and closed polygons, and the position of points by tying them to the face. Lectures are held face-to-face, either directly or online. Assessments are carried out to determine the achievement of course learning outcomes through assignments, quizzes, mid-semester exams and final semester exams.

References

Main :

1. Wongsotjitro, S. 1985. Ilmu Ukur Tanah. Penerbit Kanisius.
2. Brinker, Russel C, dan Wolf, Paul R. 1986. Dasar - dasar Pengukuran Tanah (Surveying). Penerbit Erlangga
3. Amir, Z. 1988. Dasar-dasar Pengukuran Terestris Dan Pemetaan Situasi. Jurusan Teknik Sipil FakultasTeknik, Universitas Andalas.
4. Muhamadi, M. 1986. Ilmu Ukur Tanah I. Fak.Tek.Sipil & Perencanaan Jurusan Teknik Sipil Institut Teknologi 10 Nopember Surabaya

Supporters:

1. Pelatihan Pengoperasian Alat Ilmu Ukur Tanah Theodolit dan Total Station di SMKN 1 Sidoarjo

Supporting lecturer: Drs. Andang Widjaja, S.T., M.T.
Abdiyah Amudi, S.T., M.T.
Heri Suryaman, S.Pd., M.Pd.
Danayanti Azmi Dewi Nusantara, S.T., M.T.

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	1. Able to explain IUT and create maps according to correct standards. 2. Able to create a straight line blocked by buildings. 3. Able to know the function of theodolite and total station measurement tools	1. Explain the meaning of IUT and map requirements. 2. Explain the various types of maps. 3. Explain the branches of geodesy and land measurement. 4. Determine perpendicular lines, measure obstructed distances, and determine measurement error calculations.	**Form of Assessment** : Participatory Activities	Lectures, discussions, questions and answers, and practical demonstrations in the field 2 x 50		**Material:** Theodolite and total station **Reference:** *Training on the Operation of Land Measuring Equipment Theodolite and Total Station at SMKN 1 Sidoarjo* **Material:** understanding of IUT and map requirements, various types of maps, branches of geodesy and land measuring, perpendicular lines, measuring obstructed distances, and determining the calculation of measurement errors. **Reference:** *Wongsotjitro, S. 1985. Land Surveying. Kanisius Publishers.*	0%
2	1. Able to carry out situation mapping measurements 2. Able to determine and calculate height differences	1. Measure the basic framework and map with simple tools 2. Determine the height difference and take level measurements	**Form of Assessment** : Participatory Activities	Lectures, discussions, questions and answers, and practical demonstrations in the field 2 x 50		**Material:** basic framework and mapping with simple tools, height differences and measuring flat terrain. **Reference:** *Wongsotjitro, S. 1985. Land Surveying. Kanisius Publishers.*	0%
3	1. Able to calculate height differences 2. Able to calculate the height difference in one go	1. Calculate distance and calculate height difference 2. Determine the height difference and take level measurements 3. Describes the flat, elongated shape 4. Calculate the height difference in one go	**Form of Assessment** : Participatory Activities	Lectures, discussions, questions and answers, and practical demonstrations in the field 2 x 50		**Material:** distance and calculating height differences, height differences and taking measurements of flat sipats, elongated flat sipats, height differences in one go. **Reference:** *Wongsotjitro, S. 1985. Science of Land Surveying. Kanisius Publishers.*	0%

4	1. Able to determine angles, distances and height differences in longitudinal & transverse profiles 2. Able to determine the accuracy of measurements using a spirit level	1. Calculate angles, distances, and height differences 2. Draw longitudinal and transverse profiles 3. Calculate and explain measurement accuracy and water level height difference	**Form of Assessment** : Participatory Activities	Lectures, discussions, questions and answers, and practical demonstrations in the field 2 x 50		**Material:** angles, distances and height differences, longitudinal and transverse profiles, measurement accuracy and water level height differences. **Reference:** *Wongsotjitro, S. 1985. Land Surveying. Kanisius Publishers.*	20%
5	1. Able to determine the accuracy of measurements using a spirit level 2. Able to determine measurements of flat, longitudinal edges	1. Calculate and explain measurement accuracy and water level height difference 2. Calculate and explain measurements of longitudinal flat surfaces	**Form of Assessment** : Participatory Activities	Lectures, discussions, questions and answers, and practical demonstrations in the field 2 x 50		**Material:** measuring long flat slopes, measuring and different water level heights. **Reference:** *Wongsotjitro, S. 1985. Science of Land Surveying. Kanisius Publishers.*	0%
6	1. Able to determine measurements of flat, longitudinal edges 2. Able to determine the flatness of the profile	1. Calculate and explain measurements of longitudinal flat surfaces 2. Calculate and explain profile flatness measurements	**Form of Assessment** : Participatory Activities	Lectures, discussions, questions and answers, and practical demonstrations in the field 2 x 50		**Material:** measurement of longitudinal flat sipat, measurement of flat profile sipat. **Reference:** *Wongsotjitro, S. 1985. Science of Land Surveying. Kanisius Publishers.*	0%
7	1. Able to determine the flatness of the profile 2. Able to create maps correctly according to standards	1. Calculate and explain profile flatness measurements 2. Draw maps according to the results of distance measurements, height differences and angles.	**Form of Assessment** : Participatory Activities	Lectures, discussions, questions and answers, and practical demonstrations in the field 2 x 50		**Material:** measurement of profile flatness, maps correctly according to standards. **Reference:** *Amir, Z. 1988. Basics of Terrestrial Measurements and Situation Mapping. Department of Civil Engineering, Faculty of Engineering, Andalas University.*	0%
8	Midterm Exam (UTS)		**Form of Assessment** : Participatory Activities	2 X 50			30%

9	Able to determine azimuth and point coordinates	1. Determines the azimuth of two fixed points 2. Determines the azimuth from the initial azimuth 3. Determine the coordinates of the point	**Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment, Portfolio Assessment, Practice / Performance	Lectures, discussions, questions and answers, and practical demonstrations in the field 2 x 50		**Material:** azimuth from two fixed points, azimuth from initial azimuth, point coordinates **References:** *Brinker, Russel C, and Wolf, Paul R. 1986. Basics of Land Measurement (Surveying). Erlangga Publishers*	0%
10	Able to determine azimuth and point coordinates	1. Determines the azimuth of two fixed points 2. Determines the azimuth from the initial azimuth 3. Determine the coordinates of the point	**Form of Assessment** : Participatory Activities	Lectures, discussions, questions and answers, and practical demonstrations in the field 2 x 50		**Material:** azimuth from two fixed points, azimuth from initial azimuth, point coordinates **Reference:** *Muhamadi, M. 1986. Land Surveying I. Fak.Tek.Civil & Planning Department of Civil Engineering, Institute of Technology 10 November Surabaya*	0%
11	Able to determine the coordinates of closed polygon points	1. Determining the azimuth 2. Determining the difference in abscissas (DX) 3. Determining the difference in ordinates (DY) 4. Determine the coordinates of the point	**Form of Assessment** : Participatory Activities	Lectures, discussions, questions and answers, and practical demonstrations in the field 2 x 50		**Material:** azimuth, abscissa difference (DX), ordinate difference (DY), point coordinates **Reference:** *Wongsotjitro, S. 1985. Land Surveying. Kanisius Publishers.*	0%
12	Able to determine the coordinates of open polygon points	1. Determining the azimuth 2. Determining the difference in abscissas (DX) 3. Determining the difference in ordinates (DY) 4. Determine the coordinates of the point	**Form of Assessment** : Participatory Activities	Lectures, discussions, questions and answers, and practical demonstrations in the field 2 x 50		**Material:** azimuth, abscissa difference (DX), ordinate difference (DY), point coordinates **Reference:** *Wongsotjitro, S. 1985. Land Surveying. Kanisius Publishers.*	0%
13	Able to determine point coordinates using the Front Binding method	1. Determining the azimuth 2. Determining the difference in abscissas (DX) 3. Determining the difference in ordinates (DY) 4. Determine the coordinates of the point	**Form of Assessment** : Participatory Activities	Lectures, discussions, questions and answers, and practical demonstrations in the field 2 x 50		**Material:** azimuth, abscissa difference (DX), ordinate difference (DY), point coordinates **Reference:** *Wongsotjitro, S. 1985. Land Surveying. Kanisius Publishers.*	10%

14	1. Able to determine point coordinates using the Backward Binding method: Collins 2. Able to determine point coordinates using the Backward Binding method: Cassini	1. Determining the azimuth 2. Determine the coordinates of the aid point 3. Determine the coordinates of the point being searched	**Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment, Portfolio Assessment, Practice / Performance	Lectures, discussions, questions and answers, and practical demonstrations in the field 2 x 50		**Material:** azimuth, help point coordinates, coordinates of the point being searched. **Reference:** *Wongsotjitro, S. 1985. Land Surveying. Kanisius Publishers.*	0%
15	Able to determine basic framework points, detail points and situation mapping contours	1. Determine the basic framework points by: closed polygon, open polygon, forward binding, and backward binding 2. Determine detailed points using: perpendicular coordinates, polar coordinates, and trilateration 3. Determine contour lines by means of radial, profile, path, and raster (box)	**Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment, Portfolio Assessment, Practice / Performance	Lectures, discussions, questions and answers, and practical demonstrations in the field 2 x 50		**Material:** basic framework points using: closed polygons, open polygons, forward binding, and backward binding; detailed points using: perpendicular coordinates, polar coordinates, and trilateration; contour lines using radial, profile, strip, and raster (box) **References:** *Wongsotjitro, S. 1985. Land Surveying. Kanisius Publishers.*	0%
16	Final Semester Examination (UAS)		**Form of Assessment** : Participatory Activities, Portfolio Assessment	2 x 50			40%

Evaluation Percentage Recap: Case Study

No	Evaluation	Percentage
1.	Participatory Activities	80%
2.	Portfolio Assessment	20%
		100%

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** abilities in the process and student learning outcomes are specific and measurable statements that identify the abilities 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.