



UNIVERSITAS PENDIDIKAN INDONESIA

SEMESTER LEARNING PLAN (RPS)

COURSE IDENTITY

Course Name	Course Code	Credits	Workload	Course Group	Semester	Prerequisite Course	Date of Issue
ILMU UKUR TANAH	SA222	3	135	Study Program Skill Development (PKPS)	2		2025-02-05 07:59:28

Prepared by Course Lecturer	Reviewed by Study Program Quality Assurance Team	Approved by Head of Study Program
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COURSE DESCRIPTION AND PROGRAM LEARNING OUTCOMES

Course Description	Surveying is a course included in the study program skill development category.		
Program Learning Outcomes assigned to the Course	1	Able to master the basic concepts of regional surveying and mapping, as well as the foundations and applications of mathematics and statistics in the field of regional surveying and mapping.	
	2	Able to design, develop, produce, utilize, control, and evaluate spatial information analysis models and theories based on science and technology.	
	3	Able to plan regional surveying and mapping activities; acquire, validate, process, and analyze survey and mapping data; and visualize geosphere information based on science and technology.	
Course Learning Outcome	1	Understanding horizontal control network measurements.	
	2	Able to conduct data acquisition and measurement planning.	
	3	Able to perform data processing and presentation of Horizontal Control Networks.	
	4	Able to carry out horizontal control network measurement projects.	
	5	Understanding vertical control network measurements.	
	6	Able to conduct data acquisition and measurement planning.	
	7	Able to perform data processing and presentation of Vertical Control Networks.	
	8	Able to carry out vertical control network measurement projects.	
Sub-Course Learning Outcomes	1	CPMK - 1	Students are able to explain the concepts, methods, and instruments used in horizontal control network measurements and apply measurement principles to accurately determine the positions of control points.
	2	CPMK - 2	Students are able to conduct data acquisition using appropriate horizontal control network methods and design effective measurement planning to obtain accurate and reliable results.
	3	CPMK - 3	Students are able to perform data processing from horizontal control network measurements and present it in appropriate forms such as maps, tables, or technical reports, while considering applicable standards and accuracy.
	4	CPMK - 4	Students are able to plan, conduct, and complete horizontal control network measurement projects independently or in teams, and produce outputs in accordance with applicable technical standards.
	5	CPMK - 5	Students are able to explain the concepts, methods, and instruments used in vertical control network measurements and apply measurement principles to accurately determine the elevations of control points.
	6	CPMK - 6	Students are able to conduct data acquisition using appropriate vertical control network methods and design effective measurement planning to obtain accurate and reliable results.

	7	CPMK – 7	Students are able to process data from vertical control network measurements and present it in appropriate forms such as maps, tables, or technical reports while considering applicable standards and accuracy.
	8	CPMK – 8	Students are able to plan, conduct, and complete vertical control network measurement projects independently or in teams and produce outputs in accordance with applicable technical standards.
	9	CPMK - 9	Students are able to present vertical control network measurement projects independently or in teams and produce outputs in accordance with applicable technical standards.
Lecture Topics	1	Introduction to Vertical Control Networks	
	2	Reference Systems for Vertical Control Networks	
	3	Methodology for Determining Vertical Position	
	4	Height Difference Measurement, Data Processing, Errors, and Height Difference Corrections	
	5	Longitudinal and Cross Section Profile Measurement	
	6	Vertical Control Network Measurement Using the Leveling Method	
	7	Introduction to Horizontal Control Networks	
	8	Reference Systems for Horizontal Control Networks	
	9	Methodology for Determining Horizontal Position	
	10	Angle Measurement Methods	
	11	Distance Measurement Methods	
	12	Direction/Azimuth Measurement	
	13	Closed Horizontal Control Network Measurement	
	14	Open Horizontal Control Network Measurement	
Learning Outcomes Demonstrated at the End of the Course *)	Participation in classroom activities, attendance in class, laboratory activities, completion of assignments and quizzes, midterm and final examinations, as well as the final project at the end of the course.		
Learning Strategy		Case Method	
	✓	Team based Project	
		Other	
Learning Activities	Learning activities are conducted synchronously and asynchronously, including face-to-face meetings, lectures, tutorials, case methods, and team-based projects. During this course, students are required to participate in the following activities: a. Lectures b. Practicum c. Assignments d. Presentation		

References	1	Basuki, S. 2014. Ilmu Ukur Tanah. Gadjah Mada University Press. Yogyakarta
	2	Frick, H. 1985. Ilmu dan Alat Ukur Tanah. Kanisius. Jakarta
	3	Hendriatiningsih, S. 1990. Engineering Survey. Teknik geodesi FPTS ITB. Bandung.
	4	Purworaharjo,U. 1986. Ilmu Ukur Tanah Seri C Pemetaan Topografi. Teknik Geodesi Fakultas Teknik Sipil dan Perencanaan Institut Teknologi Bandung.
	5	Nathanson J.A.2011, Surveying Fundamental and Practices (6th edition). Pearson/Prentice Hall
	6	Hofmann-Wellenhof, B., & Moritz, H. (2006). Physical geodesy (2nd ed.). Springer.
	7	Torge, W., & Müller, J. (2012). Geodesy (4th ed.). De Gruyter.
	8	Vaniček, P., & Krakiwsky, E. J. (2015). Geodesy: The concepts (2nd ed.). Elsevier.
	9	Ghilani, C. D. (2018). Adjustment computations: Spatial data analysis (6th ed.). Wiley.
	10	Iliffe, J., & Lott, R. (2008). Datums and map projections for remote sensing, GIS, and surveying (2nd ed.). Whittles Publishing.
	11	Schwarz, C. R. (Ed.). (2005). Geodesy beyond 2000: The challenges of the first decade. International Association of Geodesy Symposia, Vol. 121. Springer.
	12	Sansò, F., & Sideris, M. G. (Eds.). (2013). Geoid determination: Theory and methods. Springer.

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Week	Sub-CPMK	Indicators of Sub-Course Learning Outcomes that can be demonstrated by students	Course Materials	Assessment		Forms and Methods of Learning		Duration (hours)	Reference Number	Access Time
				Form of Assessment (test/non-test)	Assessment Weight (%)	Synchronous (face-to-face and virtual meetings)	Asynchronous (independent assignments and group assignments)			
1	Students are able to explain the concepts, methods, and instruments used in horizontal control network surveying and to apply measurement principles to accurately determine the positions of control points.	Students are able to explain the concepts, methods, and instruments used in vertical control network surveying and apply measurement principles to accurately determine the elevations of control points.	Introduction to the Horizontal Control Network	Participatory	5	Face to face	Independent assignment	3,5	1,3,9,10,11,12	03-02-2025 07:00
2	Students are able to explain the concepts, methods, and instruments used in horizontal control network surveying and to apply measurement principles to accurately determine the positions of control points.	Students are able to understand and re-explain the concepts, methods, and instruments used in vertical control network surveying and apply measurement principles to accurately determine the elevations of control points.	Vertical Control Network Reference System	Participatory	5	Face to face	Independent assignment	3,5	1,2,3,4,8,12	10-02-2025 07:00
3	Students are able to explain the concepts, methods, and instruments used in horizontal control network surveying and to apply measurement principles to accurately determine the positions of control points.	Students are able to explain the concepts, methods, and instruments used in horizontal control network surveying and apply measurement principles to accurately determine the positions of control points.	Horizontal Control Network Reference System	Participatory	5	Face to face - Practicum	Independent assignment	3,5	1,7,8	17-02-2025 10:20

Week	Sub-CPMK	Indicators of Sub-Course Learning Outcomes that can be demonstrated by students	Course Materials	Assessment		Forms and Methods of Learning		Duration (hours)	Reference Number	Access Time
				Form of Assessment (test/non-test)	Assessment Weight (%)	Synchronous (face-to-face and virtual meetings)	Asynchronous (independent assignments and group assignments)			
4	Students are able to explain the concepts, methods, and instruments used in horizontal control network surveying and to apply measurement principles to accurately determine the positions of control points.	Students are able to carry out data acquisition using appropriate Horizontal Control Network methods and design an effective measurement plan to obtain accurate and reliable results.	Methodology for Determining Horizontal Position	Participatory	5	Face to face	Independent assignment	3,5	1,3,6,8	24-02-2025 10:20
5	Students are able to carry out data acquisition using appropriate Horizontal Control Network methods and design an effective measurement plan to obtain accurate and reliable results.	Students are able to carry out the processing of horizontal control network measurement data and present it in appropriate forms, such as maps, tables, or technical reports, while considering the applicable standards and accuracy.	Angle Measurement Methods	Participatory	5	Face to face	Independent assignment	3,5	1,2,3,4,5,8,9	03-03-2025 10:20
6	Students are able to carry out data acquisition using appropriate Horizontal Control Network methods and design an effective measurement plan to obtain accurate and reliable results.	Students are able to carry out data acquisition using appropriate Horizontal Control Network methods and design an effective measurement plan to obtain accurate and reliable results.	Distance Measurement Methods	Participatory	5	Face to face - Practicum	Independent assignment	3,5	6,7,8,9,10	10-03-2025 10:20

Week	Sub-CPMK	Indicators of Sub-Course Learning Outcomes that can be demonstrated by students	Course Materials	Assessment		Forms and Methods of Learning		Duration (hours)	Reference Number	Access Time
				Form of Assessment (test/non-test)	Assessment Weight (%)	Synchronous (face-to-face and virtual meetings)	Asynchronous (independent assignments and group assignments)			
7	Students are able to explain the concepts, methods, and instruments used in horizontal control network surveying and to apply measurement principles to accurately determine the positions of control points.	Students understand the concept of the vertical reference system and map projection system in the context of planning a vertical control network using a level instrument.	Introduction to Horizontal Control Networks	Participatory	5	Face to face	Reading assignment	3,5	11,12	20-03-2025 10:20
8	Midterm Examination				15					27-03-2025 10:40
9	Students are able to carry out data acquisition using appropriate Vertical Control Network methods and design an effective measurement plan to obtain accurate and reliable results.	Students are able to carry out leveling measurements.	Vertical Control Network Measurement Using the Leveling Method	Multiple Choice	5	Face to face	Practicum assignment	150	1	17-04-2025 14:30
10	Students are able to explain the concepts, methods, and instruments used in vertical control network surveying and to apply measurement principles to accurately determine the elevations of control points.	Students are able to explain the concepts, methods, and instruments used in vertical control network surveying and apply measurement principles to accurately determine the elevations of control points.	Vertical Control Network Reference System	Performance	5	Face to face	Practicum assignment	3,5	4,7,9,10	21-04-2025 08:40

Week	Sub-CPMK	Indicators of Sub-Course Learning Outcomes that can be demonstrated by students	Course Materials	Assessment		Forms and Methods of Learning		Duration (hours)	Reference Number	Access Time
				Form of Assessment (test/non-test)	Assessment Weight (%)	Synchronous (face-to-face and virtual meetings)	Asynchronous (independent assignments and group assignments)			
11	Students are able to carry out data acquisition using appropriate Vertical Control Network methods and design an effective measurement plan to obtain accurate and reliable results.	Students are able to carry out data acquisition using appropriate Vertical Control Network methods and design an effective measurement plan to obtain accurate and reliable results.	Methodology for Determining Vertical Position	Performance	5	Face to face	Practicum assignment	3,5	2,4,5,7,8,9,11,12	24-04-2025 15:30
12	Students are able to carry out data acquisition using appropriate Vertical Control Network methods and design an effective measurement plan to obtain accurate and reliable results.	Students are able to process vertical control network measurement data and present it in appropriate forms, such as maps, tables, or technical reports, while considering the applicable standards and accuracy.	Height Difference Measurement, Data Processing, Errors, and Height Difference Correction	Performance	5	Face to face – Practicum	Practicum assignment	3,5	1,3,5,7,8,9,11	28-04-2025 14:40
13	Students are able to plan, implement, and complete a vertical control network surveying project independently or in a team, and produce outputs that comply with the applicable technical standards.	Students are able to plan, implement, and complete a vertical control network surveying project independently or in a team, and produce outputs that comply with the applicable technical standards.	Longitudinal and Cross-Sectional Profile Measurement	Participatory	5	Face to face	Practicum assignment	3,5	1,2,3,4,5,7,9,11	05-05-2025 07:40

Week	Sub-CPMK	Indicators of Sub-Course Learning Outcomes that can be demonstrated by students	Course Materials	Assessment		Forms and Methods of Learning		Duration (hours)	Reference Number	Access Time
				Form of Assessment (test/non-test)	Assessment Weight (%)	Synchronous (face-to-face and virtual meetings)	Asynchronous (independent assignments and group assignments)			
14	Students are able to plan, implement, and complete a vertical control network surveying project independently or in a team, and produce outputs that comply with the applicable technical standards.	Students are able to plan, implement, and complete a vertical control network surveying project independently or in a team, and produce outputs that comply with the applicable technical standards.	Vertical Control Network Measurement Using the Leveling Method	Performance	5	Face to face	Practicum assignment	3,5	1,3,9	14-05-2025 13:00
15	Students are able to present a vertical control network surveying project independently or in a team, and produce outputs that comply with the applicable technical standards.	Students are able to present a vertical control network surveying project independently or in a team, and produce outputs that comply with the applicable technical standards.	Vertical Control Network Measurement Using the Leveling Method	Participatory	5	Face to face	Practicum assignment	3,5	6,7,9,12	20-05-2025 13:00
16	Final Examination				15					27-05-2025 13:00

STUDENT LEARNING TIME (WORKLOAD)

LEARNING ACTIVITIES	ACTIVITY		SYNCHRONOUS (Face- to-face / Virtual meeting)	ASYNCHRONOUS (Structured / Independent)	STUDENT LEARNING PREPARATION	TOTAL STUDENT LEARNING TIME
	Lectures/Responses/Tutorials		14 × 180 minutes = 2520 minutes	-x-	-x-	2520 minutes (42.0 hours)
	Project-based learning		-x-	8 × 180 minutes = 1440 minutes	8 × 60 minutes = 480 minutes	1920 minutes (32.0 hours)
	Diskusi (pembelajaran berbasis kasus)		8 × 120 minutes = 960 minutes	-x-	3 × 60 minutes = 180 minutes	1140 minutes (19.0 hours)
	TOTAL					5580 minutes (93.0 hours)
ASSESSMENT		Continuous Assessment				
		Participation during learning activities	16 × 120 minutes = 1920 minutes	-x-	-x-	1920 minutes (32.0 hours)
		Project work	-x-	-x-	-x-	0 minutes (0.0 hours)
		Assignments	4 × 60 minutes = 240 minutes	-x-	-x-	240 minutes (4.0 hours)
		Quizzes	-x-	-x-	-x-	0 minutes (0.0 hours)
		Formative				180 minutes (3.0 hours)
		Summative				180 minutes (3.0 hours)
	TOTAL					2520 minutes (42.0 hours)
TOTAL WORKLOAD						8100 minutes (135 hours)
TOTAL IDEAL HOURS						135 hours
CREDITS (SKS)						3
COMPLIANCE WITH CREDIT REQUIREMENTS						Appropriate

ASSESSMENT CRITERIA FOR COURSE LEARNING OUTCOMES (CPMK)

No	CPMK (Course Learning Outcome)	CPL			TAXONOMY	Weight	CPMK Achievement Criteria
		CPL-1	CPL-2	CPL-3			
1	Understanding horizontal control network measurements.				2	25	75% of the total students obtain a minimum score of 60 (scale of 100).
2	Able to conduct data acquisition and measurement planning.				3	10	75% of the total students obtain a minimum score of 60 (scale of 100).
3	Able to perform data processing and presentation of the Horizontal Control Network.				4	0	75% of the total students obtain a minimum score of 60 (scale of 100).
4	Able to complete a horizontal control network measurement project.				6	0	75% of the total students obtain a minimum score of 60 (scale of 100).
5	Understanding vertical control network measurements.				2	20	75% of the total students obtain a minimum score of 60 (scale of 100).
6	Able to conduct data acquisition and measurement planning.				3	0	75% of the total students obtain a minimum score of 60 (scale of 100).
7	Able to perform data processing and presentation of the Vertical Control Network.				4	10	75% of the total students obtain a minimum score of 60 (scale of 100).
8	Able to complete a vertical control network measurement project.				6	5	75% of the total students obtain a minimum score of 60 (scale of 100).

COLLABORATIVE ASSIGNMENT DESIGN

ASSIGNMENT TITLE	Preparation of Horizontal and Vertical Control Networks
LEARNING METHOD	Team-based Project
TIME	
ASSESSMENT WEIGHT	50
SUB-CPMK	Students are able to explain the concepts, methods, and instruments used in horizontal control network measurements and apply measurement principles to accurately determine the positions of control points.

TASK DESCRIPTION	
Horizontal and vertical control networks are the main foundation of spatial reference systems. This assignment aims to develop understanding and skills in defining and establishing these control networks. With a well-defined control network, the accuracy and consistency of spatial data can be improved, which is essential in applications such as mapping, navigation, and geographic analysis.	
TASK COMPLETION STEPS	
1. Literature review, 2. Planning, 3. Preliminary survey, 4. Determination of control points, 5. Horizontal and Vertical Control Network measurements, 6. Data analysis and processing, 7. Reporting	
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1. Horizontal and Vertical Control Networks, 2. Final Report, 3. Presentation	
ASSESSMENT INDICATORS, CRITERIA, AND WEIGHT	
The assessment consists of several components. In the planning component (10%), students are expected to be able to plan the establishment of the control network. In the measurement component (30%), students are expected to conduct measurements accurately and correctly. In the data analysis component (30%), students are required to perform comprehensive data analysis using appropriate methodologies. In the control network results component (20%), the resulting control network is expected to be accurate and reliable. In the documentation component (10%), students are expected to produce a report that is clear, detailed, and well structured.	
IMPLEMENTATION SCHEDULE	
Note: The total number of days in one semester is $16 \times 7 = 112$ days. The schedule can be determined based on the number of days.	
Activity	Implementation Time
Planning (Week 1–4 and 9–12)	340
Data Acquisition Implementation (Week 5–8 and 13–15)	
Presentation of Results (Week 8 and 16)	340

OTHER INFORMATION
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REFERENCES
1. Hendriatiningsih, S. 1990. Engineering Survey. Teknik geodesi FPTS ITB. Bandung. 2. Purworaharjo,U. 1986. Ilmu Ukur Tanah Seri C Pemetaan Topografi. Teknik Geodesi Fakultas Teknik Sipil dan Perencanaan Institut Teknologi Bandung. 3. Nathanson J.A.2011, Surveying Fundamental and Practices (6th edition). Pearson/Prentice Hall 4. Hofmann-Wellenhof, B., & Moritz, H. (2006). Physical geodesy (2nd ed.). Springer. 5. Torge, W., & Müller, J. (2012). Geodesy (4th ed.). De Gruyter. 6. Vanířek, P., & Krakiwsky, E. J. (2015). Geodesy: The concepts (2nd ed.). Elsevier.