



**TEACHING PLAN**  
**BUILDING ENGINEERING VOCATIONAL EDUCATION (BEVE) STUDY PROGRAM**  
**CIVIL ENGINEERING DEPARTMENT, FACULTY OF ENGINEERING, UNIVERSITAS NEGERI PADANG**

COURSE	CODE	COURSE CLUSTER	CREDITS		SEM	VERSION
			Theory	Practice		
Topographic Surveying	SIP1.61.3303		2	1	3	1
Lecturer in Charge				Lecturer in Charge  <u>Dr. Eng. Nevy Sandra</u> NIP.19791005 200501 2 001		
Remarks	<b>Dean of Faculty of Engineering</b>	<b>Head of Civil Engineering Department</b>	<b>Coordinator of BEVE</b>			
	<u>Dr. Fahmi Rizal, M.Pd., M.T</u> NIP. 195912041985031004	<u>Faisal Ashar, Ph.D.</u> NIP. 19750103 200312 1001	<u>Drs. Revian Body, MSA.</u> NIP. 19600103 198503 1003			
<b>Program Learning Outcomes</b>	<b>Program Learning Outcomes (PLO)</b>					
	<p>At the time of graduation, students from Building Engineering Vocational Education study program are expected to have:</p> <ol style="list-style-type: none"> <li>1. The ability to apply basic knowledge of science (mathematics, natural sciences ) and other multidisciplinary knowledges which are the basis of Building Engineering Vocational Education field in carrying out its professional work (Knowledge and Understanding).               <ol style="list-style-type: none"> <li>1.1. Able to show good understanding and to implement the basic concept of mathematics to solve various problems in building engineering field.</li> <li>1.2. Have a high understanding and able to implement the basic concept of Physics and Chemistry (natural sciences) in building engineering field.</li> <li>1.3. Have a high understanding and able to implement the basic concept of basic engineering (Mechanics, Engineering Drawings) in building engineering field.</li> </ol> </li> </ol>					

2. The ability to think critically and creatively in identifying, formulating, problem solving, and evaluating various problems in building engineering vocational education field by using the most appropriate and effective scientific method (Engineering analysis, investigations and assessment).
  - 2.1. Able to identify various technical problems in building engineering field.
  - 2.2. Able to analyze various technical problems in building engineering field.
  - 2.3. Able to evaluate various technical problems in building engineering field.
3. The reliable ability to plan, implement, and supervise the works in building engineering field. (Engineering design).
  - 3.1. Able to implement shop drawings in collaboration with various related parties.
  - 3.2. Able to manage building engineering works by paying attention to environmental, social, health and safety aspects.
  - 3.3. Able to supervise the implementation of building engineering works.
4. The reliable ability to plan, implement, and evaluate the learning process in Building Engineering Vocational Education study program (Education design).
  - 4.1. Able to plan the curriculum and learning process in building engineering field.
  - 4.2. Able to carry out, control, evaluate and improve the quality of the learning process.
  - 4.3. Able to develop an effective, efficient and interesting teaching media.
5. The ability to adapt to and innovate towards the development of science and technology and implement it into educational and professional work goals by considering non-technical risks that may occur (Engineering practice).
  - 5.1. Able to innovate and develop the technology in the field of building engineering by considering social, economic and environmental aspects.
  - 5.2. Able to analyze environmental conditions in the planning, implementation and supervision of buildings.
  - 5.3. Implement information technology and computers into the planning, implementation, and supervision processes of buildings.
6. Social and managerial competencies, collaboration and effective communication skills, entrepreneurial character, environmental insight, and awareness of the importance of lifelong learning (Transferable and softskill).

	<p>6.1. Able to work creatively, innovatively, collaboratively, carefully, responsibly, and responsive to environmental change.</p> <p>6.2. Have curiosity and critical thinking, open-minded, and objective.</p> <p>6.3. Able to communicate effectively and to collaborate in teamwork.</p>	
<b>Course Learning Outcomes</b>	<b>Course Learning Outcomes (CLO): Concrete Technology</b>	
	<b>Course LO</b>	<b>PLO</b>
	1. Have the knowledge and ability to operate the theodolite for measuring angles, distances, elevations and determining coordinates.	
	2. Able to measure the coordinates of polygon for the map traverse	
	3. Able to measure the horizontal angles and determine the coordinates of one point.	
	4. Able to measure and plot contour.	
	5. Able to measure and plot the map layout	
	6. Able to measure in making curves for road/river bends.	
	7. Able to measure in order to check the straightness of the column and determine the coordinate point of building and elevation	
8. Able to measure the distance, different height, elevation, and coordinate by using an Electro Distance Meter EDM/Total Station and Global Position System GPS devices.		
<b>Course Description</b>	This course provides knowledge and skills about Topography Surveying, how to use theodolite measuring tool, Total Station, GPS and also the planning and aerial measuring of surveying and mapping	
<b>Literature</b>	<b>Main:</b>	
	<p>1. Frick, Heinz. Ilmu dan Alat Ukur Tanah. Yayasan Konisius Yogyakarta. 1991.</p> <p>2. Gayo, Yusuf. Pengukuran Topografi dan Teknik Pemetaan. PT. Pradnya Paramitha. Jakarta. 1992.</p> <p>3. Irvine, William. Penyigian untuk Konstruksi. ITB. 1995.</p> <p>4. Kavanagh, Barry F. Surveying with Construction Application. 3rd Edition. Prentice Hall. 1995.</p> <p>5. Soemarlan, DS. Latihan Praktek Ukur Tanah dan Pemetaan. Departemen Pendidikan dan Kebudayaan Direktorat Pendidikan Menengah Kejuruan. 1979.</p> <p>6. Wongsotjitra, Soetomo. Ilmu Ukur tanah. Yayasan Konisius Yogyakarta. 1997.</p>	
	<b>Supporting:</b>	
	1. Ghilani, Charles D. and Wolf, Paul R., Elementary Surveying, An Introduction to Geomatics	
<b>Teaching Media</b>	<b>Software:</b>	<b>Hardware:</b>
		Computer, LCD Projector and White Board

<b>Team Teaching</b>	
<b>Assessment</b>	Mid-Semester Exam, Final Exam, Individual and Group Assignment, Group Presentation
<b>Prerequisite</b>	Survey and mapping basics

### TEACHING MATERIAL

Week	Expected Competency	Study Material	Teaching Method and Strategy	Assignment	Assessment Criteria/ Indicator	Reference
(1)	<ol style="list-style-type: none"> <li>1. Understanding the learning activity for one semester,</li> <li>2. Apply the code of conduct in laboratory and field</li> <li>3. Understanding rights and responsibility</li> <li>4. Have the knowledge and ability to operate a theodolite for measuring angles, distances, elevation difference and determining coordinates</li> </ol>	Providing the information - Lecture curriculum - Learning materials for one semester theories and field practices - Assessment of theory and field practice - Book references  II. Providing all the information below  A. Theodolite - Definition of theodolite - Variations of theodolite - Classifications of theodolite - Installation and instructions on how to use a theodolite	Lectures and discussion.	Observe carefully, Summarize	N/A	RU 1,2,3,4,5,6
(2)	CPMK 1 Have the knowledge and ability to operate a theodolite for measuring angles, distances,	Operating theodolite - Determine the vertical and horizontal angles - Determine the rod reading	Lectures and discussion, and demonstration.	Make report	Studiosness Information completeness	RU 1,2,3,4,5,6

Week	Expected Competency	Study Material	Teaching Method and Strategy	Assignment	Assessment Criteria/ Indicator	Reference
	elevation difference, and determining coordinates	- Determine the inclined and the horizontal distances - Determine the elevation difference				
(3)	CPMK 1 Able to operate a theodolite for measuring angles, distances, elevation difference, and determining coordinates	Measuring the horizontal angle - How to reiterate - How to repeat	Lectures and discussion, and practice	Make report	Studiosness Cooperation Accuracy Completeness	RU 1,2,3,4,5,6
(4)	CPMK 2 Able to measure the coordinates in Traverse	Definitions of polygons and their functions  Variations of polygons - Traverse Polygon - Traverse Link  How to measure a coordinate point with Traverse Link	Lectures and discussion, and practice	Make report	Studiosness Cooperation Accuracy Completeness	RU 1,2,3,4,5,6
(5)	CPMK 2 Able to measure the coordinates in Traverse	How to measure a coordinate point with Traverse Polygon	Lectures and discussion, and practice	Make report	Studiosness Cooperation Accuracy Completeness	RU 1,2,3,4,5,6
(6)	CPMK 2 Able to measure the coordinates in Traverse	How to measure a coordinate point with Traverse Polygon	Practice	Make report	Studiosness Cooperation Accuracy Completeness	RU 1,2,3,4,5,6
(7)	CPMK 2 Able to measure the coordinates in Traverse	Data assessment with Traverse Polygon	Lectures and discussion.	Make report	Studiosness Cooperation Accuracy Completeness	RU 1,2,3,4,5,6

Week	Expected Competency	Study Material	Teaching Method and Strategy	Assignment	Assessment Criteria/ Indicator	Reference
(8)	<b>Mid-Semester Exam</b>					
(9)	CPMK 3 Able to measure horizontal angles and determine the coordinates of one point	Intersection and Resection	Lectures and discussion. Practice	Make report	Studiosness Activeness in lectures Tidiness Completeness	RU 1,2,3,4,5,6
(10)	Able to measure and create contour maps	<p>A. Goals and definitions</p> <p>B. Measurement variations and forms - Traverse - Details</p> <p>C. Contour map - Definition - Understanding of contour line - How to use contour map</p> <p>D. How to read a contour map - Polar system - Grid/raimetry system</p> <p>E. Measurement for drawing contour map - polar system - grid system</p> <p>F. Calculating and drawing contour map Polar system</p>	Lectures and discussion, and practice	Make report	Studiosness Cooperation Accuracy Completeness	RU 1,2,3,4,5,6

Week	Expected Competency	Study Material	Teaching Method and Strategy	Assignment	Assessment Criteria/ Indicator	Reference
(11)	CPMK 5 Able to measure for making map situation	A. Definition of map situation B. Measurement techniques C. Drawing and analyzing D. How to measure for making the map situation - Measure the point - Traverse - Detail measurements - Calculating and drawing	Lectures and discussion, and practice	Make report	Studiosness Cooperation Accuracy Completeness	RU 1,2,3,4,5,6
(12)	CPMK 6 Able to measure the horizontal curve	A. Goals of making the horizontal curve B. Horizontal curve forms - Main curve arrow - Detail point C. How to measure for making the horizontal curve	Lectures and discussion, and practice	Make report	Studiosness Cooperation Accuracy Completeness	RU 1,2,3,4,5,6
(13)	CPMK 7 Able to measure the central point of a building and the straightness of the column	A. Measure the central point of a building B. Measure the straightness and the height of the column C. Percentage of the column slope	Lectures and discussion, and practice	Make report	Studiosness Cooperation Accuracy Completeness	RU 1,2,3,4,5,6
(14)	CPMK 8 Able to operate an electronic distance meter (EDM)/Total	A. Variations of electro-optical devices B. Requirements of electro-optical devices	Lectures and discussion, and practice	Make report	Studiosness Cooperation Accuracy Completeness	RU 1,2,3,4,5,6

Week	Expected Competency	Study Material	Teaching Method and Strategy	Assignment	Assessment Criteria/ Indicator	Reference
	Station dan Global Position System (GPS) for measuring angles, distances, elevation difference, and determining coordinates	C. How to use a digital electro-optical device - Components and their functions - How to read horizontal and vertical angles - How to measure flat and curve distances - How to measure different heights and elevations - How to measure a coordinate point D. Requirements for GPS E. Components tutorials and the guide on how to use the GPS				
(15)	Able to evaluate and present the results of field practical.	Group presentation	Discussion.	Make report	Studiosness Cooperation	RU 1,2,3,4,5,6
<b>(16)</b>	<b>Final exam</b>					



**Notes:**

**Correlation between CLO, PLO and Assessment Methods**

	Assesment	Weight (%)	CPL-1			CPL-2				CPL-3				CPL-4			CPL-5			CPL-6			
			1	2	3	1	2	3	4	1	2	3	4	1	2	3	1	2	3	1	2	3	
CPMK 1		20																					
CPMK 2		25																					
CPMK 3		7.5																					
CPMK 4		7.5																					
CPMK 5		7.5																					
CPMK 6		7.5																					
CPMK 7		7.5																					
CPMK 8		7.5																					
<b>Kehadiran</b>		<b>10</b>																					
<b>TOTAL</b>		<b>100</b>																					

**Assessment Components**

Mid-Semester Exam	: 20%
Final Exam	: 30%
Field Reports and Presentations	: 40%
<u>Attendance</u>	<u>: 10%</u>
Total	: 100 %

### Description of Assessment Level

	Excellent	Good	Satisfy	Fail
Description				
Formulation				
Calculation				
Analysis				

### Assessment System

Score Range	Grade Letter	Grade Point	Notes	Score Range	Grade Letter	Grade Point	Notes
85 – 100	A	4.0	Exceptional	55 – 59	C	2.0	Quite Satisfactory
80 – 84	A-	3.6	Excellent	50 – 54	C-	1.6	Poor
75 – 79	B+	3.3	Very Good	40 – 49	D	1.0	Very Poor
70 – 74	B	3.0	Good	≤ 39	E	0.0	Fail
65 – 69	B-	2.6	Fairly Good	-	T	-	Delayed
60 – 64	C+	2.3	Satisfactory				



KEMENTERIAN PENDIDIKAN DAN KEBUDAYAAN  
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**MID-SEMESTER EXAM (FIELD TEST)**

Course : **Topographic Surveying**  
Code / Credits : SIP.... /4  
Type of Exam : Open Book  
Lecturer : Team  
Time Allocation : 10 minutes  
Maximum Grade : 100 (20%)

**Tasks:**

1. Make sure the theodolite in the level as instructed
2. Draw the sketch of the location
3. Point to the north or the other assigned point
4. The angle should be 90 degrees vertically
5. Point to the target
6. Leave a note on the horizontal angle
7. Make sure to write the data you picked from the optical rod
8. The total duration is 10 minutes

Name:

Student number:

Signature:

**Drawing sketch:**

**Evaluation:**

Tests	Percentage (%)	Scale 1-10	Points
Leveling equipment	2		
Vertical angle	3		
Horizontal angle	5		
Data from the optical rod	4		
Sketch	4		
Time	2		
<i>Fast (1-5 minutes)</i>			
<i>Moderate (5-10 minutes)</i>			
<i>Expected (10 minutes)</i>			
<b>Total</b>	<b>20%</b>		



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## FINAL EXAM

Course : **Topographic Surveying**  
Code / Credits : SIP.... /4  
Type of Exam : Open Book  
Lecturer : Team  
Time Allocation : 120 minutes  
Maximum Grade : 100 (30%)

Based on the information and the measurement result in the area, we have collected all the data of Traverse Polygon below:

1. Point A is located on the following coordinates (+250.00, -250.00)
2. Azimuth,  $\alpha_{ab} = 270^{\circ}0'00''$
3. The measurement goes clockwise
4. The collected data are below:

Points	Angles			Distances (d)
	°	'	''	m
A	224	59	57	A – B = 200.000
B	44	59	57	B – C = 282.843
C	134	59	57	C – D = 200.000
D	89	59	57	D – E = 400.000
E	44	59	57	E – A = 282.843

### TASKS:

1. Write the code on your sheet.
2. Calculate the coordinates of B, C, D, E on the table
3. Calculate the area on the table,
4. Draw the area on the drawing paper with the right scale and complete it with all the symbols and other information.

### Bobot

1. Row 1 until 15, Weighted 27.5%
2. Scale drawing, Weighted 2.5%