TEACHING PLAN
BACHELOR OF EDUCATION IN BUILDING ENGINEERING (BE-BE) STUDY PROGRAM
DEPARTMENT OF CIVIL ENGINEERING, FACULTY OF ENGINEERING, UNIVERSITAS NEGERI PADANG

COURSE	CODE	COURSE CLUSTER	CREDITS Theory	CREDITS Practice	SEM.	VERSION
Calculus	SIP1.61.2102	Compulsory Course of Study Program	2		2	1

Lecturer in Charge			Lecturer in Charge
			Rizky Indra Utama, M. Pd.T. NIDN. 0006048805

Remarks	Dean of Faculty of Engineering	Head of Civil Engineering Department	Coordinator of BEVE
	Dr. Fahmi Rizal, M.Pd., M.T NIP. 195912041985031004	Faisal Ashar, Ph.D. NIP. 19750103 200312 1001	Drs. Revian Body, MSA. NIP. 19600103 198503 1003

Program Learning Outcomes	Program Learning Outcomes (PLO)
	1. Master *basic knowledge of science* (mathematics, natural sciences) and other scientific disciplines that form the basis of building engineering vocational education field for carrying out professional work *(Knowledge and Understanding).*
	1.1. Able to implement basic concepts of mathematics and physics to master subjects matter in the field of building engineering vocational education.
	1.2. Mastering Statics, Mechanics, Statistics, Technology Materials, and Engineering Drawings as the basic knowledge in the field of building engineering vocational education.
	2. Able to identify, formulate, solve, and evaluate various technical problems of buildings as the basic ability for teaching in the field of building engineering vocational education *(Engineering analysis, investigation and assessment) .*

2.1. Able to identify, formulate, solve, and evaluate technical problems in the field of geotechnical and transportation as the basic ability for teaching in the field of building engineering vocational education.

2.2. Able to identify, formulate, solve, and evaluate technical problems in the field of structure and construction management as the basic ability for teaching in the field of building engineering vocational education.

2.3. Able to identify, formulate, solve, and evaluate technical problems in the field of hydrology as the basic ability for teaching in the field of building engineering vocational education.

3. Possess the ability to design building by taking into account environmental, social, health and work safety issues as the basis for teaching in the field of building engineering vocational education *(Engineering design)*.

   3.1. Able to make design programming by taking into account environmental, social, health and work safety issues, in cooperation with various party related.

   3.2. Able to analyze the design by taking into account environmental, social, health and work safety aspects.

   3.3. Able to produce design by taking into account environmental, social, health and work safety aspects.

4. Possess social, managerial, team work, and effective communication competencies, entrepreneurial character, environmental insight and life-long learning habits. *(Transferable and soft skills)*.

   4.1. Possess religious character implemented in personal and professional activities.

   4.2. Possess the spirit of nationalism, social sensitivity and environmental insight

   4.3. Able to communicate effectively and work in a team.

   4.4. Able to transfer science and technology to the community to improve the quality of life

   4.5. Possess entrepreneurial character

5. Possess the ability to innovate and adapt to the development of science and technology, and implement it into the learning process of building engineering vocational education field by taking into account non-technical risks that may occur (ethical, ecological, commercial, and industrial impact) *(Engineering practice)*.

   5.1. Able to innovate and use information technology (software) in the field of building engineering vocational education by taking into account the ethical, ecological, commercial and industrial impact.

   5.2. Able to use information technology-based equipment (hardware) in field of building engineering vocational

	education.
	6. Possess a good ability to design, implement and evaluate the learning process in the field of building engineering vocational education *(Educational design).*
	6.1. Able to design curriculum and learning process of building engineering vocational education.
	6.2. Able to implement, control, evaluate and improve the quality of learning process through research in the field of building engineering vocational education.
	6.3. Able to develop an effective, efficient, and attractive learning media in the field of building engineering vocational education.
Course Learning Outcomes	**Course Learning Outcomes (CLO): CALCULUS**

Course LO	PLO
1. Shows honesty, discipline, and responsible attitude in completing integral tasks	1.1, 4.1, 4.2, 4.3
2. Able to calculate indefinite integrals	1.1, 4.1, 4.2, 4.3
3. Able to apply sigma and quantity properties	1.1, 4.1, 4.2, 4.3
4. Able to calculate the surface area of a flat plane with curved boundaries in everyday life by using various methods.	1.1, 4.1, 4.2, 4.3
5. Able to understand basic definite integral concepts and apply them in solving curved boundary area problem.	1.1, 4.1, 4.2, 4.3
6. Prove the basic theorem of calculus and other integral theorems.	1.1, 4.1, 4.2, 4.3
7. Apply logical and critical thinking in the implementation of the theorem of definite integral properties.	1.1, 4.1, 4.2, 4.3
8. Apply basic theorems related to definite integrals and use them in problem solving	1.1, 4.1, 4.2, 4.3
9. Apply the concept of integral in determining the flat surface area, volume of rotating objects and the length of the curve.	1.1, 4.1, 4.2, 4.3
10. Use the correct theorem in calculating the surface volume of a rotating object.	1.1, 4.1, 4.2, 4.3

Course Description	This course contains the subject of Basic Calculus, which includes Integral and Its Use. Integral material consists of: Anti derivative (indefinite integral), differential equations, writing of numbers and sigma, area introduction, definite integrals, fundamental theorems of calculus, definite integral properties, and assistance in definite integral calculations. Integral Use material includes: calculation of the area of a flat plane, calculation of the volume of objects in space and the volume of rotating objects, calculation of the length of the curve, and calculation of the area of the rotating surface.
Literature	**Main (ML):**
	1. E.J Purcell (1984) *Kalkulus dan Geometri Analisis*. Jilid 1. Penerbit Erlangga. Jakarta.
	Supporting:
	1. G.E. Dyball (1980). *Mathematics for Technician Engineers*. McGraw-Hill. London.

	2. Kreyszig. (1993). *Matematika Teknik Lanjutan.* Edisi VI. Penerbit PT. Gramedia Pustaka Utama. Jakarta.	
	3. Wirodikromo, Sartono, Drs. (2005). *Matematika Berdasar Kurikulum Berbasis Kompetensi.* Penerbit Erlangga. Jakarta.	
Teaching Media	**Software (SL):**	**Hardware:**
	Microsoft Word and Excel	Computer, LCD Projector and white board.
Team Teaching	Dr. Rijal Abdullah, M.T., Rizky Indra Utama, S.T., M.T., M.Pd.T, Windry Novalia Jufri, S.Pd., M.Pd.	
Assessment	Mid-Semester Exam, Final Exam, Individual Assignment	
Prerequisite	Mathematics Analysis	

TEACHING MATERIAL

Week	Expected Competency	Study Material	Teaching Method and Strategy	Assignment	Assessment Criteria/ Indicator	Reference
(1)	Students are able to understand lecture material and lecture contracts	**Introduction to Calculus, lecture contract, silabus**	Lecture	-	1. Attitude 2. Knowledge	ML 1 SL 1,2,3
(2)	CLO-1 Knowledge and understanding of: 1. Anti differentiation 2. Anti-derivative writing 3. Rules of rank 4. Indefinite integral	**Anti-derivative (Indefinite Integral)**	Lecture and work in group	Individual Assignment	1. Attitude 2. Knowledge	ML 1
(3)	CLO-2 Knowledge and understanding of: 1. Differential Equations 2. Separation of variables 3. Motion Problem	**Differential Equations**	Lecture and work in group	Individual Assignment	1. Attitude 2. Knowledge	ML 1
(4)	CLO-3 Knowledge and understanding of: 1. Writing sigma 2. Properties of Sigma 3. Special Additions 4. Mathematical	**Writing Amount and Sigma**	Lecture and work in group	Individual Assignment	1. Attitude 2. Knowledge	ML 1

Week	Expected Competency	Study Material	Teaching Method and Strategy	Assignment	Assessment Criteria/ Indicator	Reference
	Induction					
(5)	CLO-4 Knowledge and understanding of: 1. Area according to the inner polygon 2. Area according to the outer polygon	**Introduction to Area**	Lecture and work in group	Individual Assignment	1. Attitude 2. Knowledge	ML 1
(6)	CLO-5 Knowledge and understanding of: 1. Riemann Sum 2. Integral Theorem 3. Calculation of Definite Integral	**Definite Integral**	Lecture and work in group	Individual Assignment	1. Attitude 2. Knowledge	ML 1
(7)	CLO-6 Knowledge and understanding of: 1. Basic Theorem 2. Iintegral linearity	**Basic Theorem of Calculus**	Lecture and discussion	Individual Assignment	1. Attitude 2. Knowledge	ML 1
(8)	**Mid-Semester Exam**					
(9)	CLO-7 Knowledge and understanding of: 1. The Nature of Compariso 2. Differentiation of Definite Integral against its limit 3. Mean Value Theorem for Integral	**Properties of Definitie Integral Tentu**	Lecture and work in group	Individual Assignment	1. Attitude 2. Knowledge	ML 1
(10)	CLO-8 Knowledge and	**Assistance in Integral Calculations**	Lecture and work in group	Individual Assignment	1. Attitude 2. Knowledge	ML 1

Week	Expected Competency	Study Material	Teaching Method and Strategy	Assignment	Assessment Criteria/ Indicator	Reference
	understanding of: 1. Replacement Method 2. Use of Symmetry 3. Use of Periodic					
(11)	CLO-9 Knowledge and understanding of: 1. The area above the x-axis 2. The area between 2 curves	**Calculation of Flat Area**	Lecture and work in group	Individual Assignment	1. Attitude 2. Knowledge	ML 1
(12)	CLO-9 Knowledge and understanding of: 1. Rotary object: Disc Method 2. Ring Method 3. Other Spatial Objects With Known Sections	**Calculating the Volume of Objects in Slabs, Discs and Rings**	Lecture and work in group	Individual Assignment	1. Attitude 2. Knowledge	ML 1
(13)	CLO-9 Knowledge and understanding of: Tube Shell Method	**Calculating the Volume of the Rotary Object: Tube Shell**	Lecture and work in group	Individual Assignment	1. Attitude 2. Knowledge	ML 1
(14)	CLO-9 Knowledge and understanding of: 1. Length 2. Arc Length Differential	**Calculating the Length of Curve on a Plane (Flat Curve)**	Lecture and work in group	Individual Assignment	1. Attitude 2. Knowledge	ML 1
(15)	CLO-10 Knowledge and understanding of: 1. Rotation around the	**Calculating the Rotary Surface Area**	Lecture and work in group	Individual Assignment	1. Attitude 2. Knowledge	ML 1

Week	Expected Competency	Study Material	Teaching Method and Strategy	Assignment	Assessment Criteria/ Indicator	Reference
	x-axis 2. Rotation around the y-axis					
(16)	**Final Exam (Evaluation to reveal the learning outcomes of students)**					

Correlation between CLO, PLO and Assessment Methods

	Assesment	Weight (%)	PLO-1			PLO-2				PLO-3				PLO-4					PLO-5			PLO-6		
			1	2	3	1	2	3	4	1	2	3	4	1	2	3	4	5	1	2	3	1	2	3
CLO 1	Mid-Semester Exam (Question 1)	7	X																					
CLO 2	Mid-Semester Exam (Question 2)	8	X																					
CLO 3	Group Assignment	5	X											X	X	X								
CLO 4	Individual Assignment	5	X											X	X	X								
CLO 5	Mid-Semester -Exam (Question 3)	7	X																					
CLO 6	Mid-Semester -Exam (Question 4)	8	X																					
CLO 7	Individual Assignment	5	X											X	X	X								
CLO 8	Group Assignment	5	X											X	X	X								
CLO 1	Final Exam (Question 1)	7	X																					
CLO 5	Final Exam (Question 2)	7	X																					
CLO 9	Final Exam (Question 3)	7	X																					
CLO 9	Final Exam (Question 4)	7	X																					
CLO 9	Final Exam (Soal 5)	7	X																					
CLO 10	Individual Assignment	5	X											X	X	X								
Presence		10																						
TOTAL		100																						

Assessment Component

Mid-Semester Exam   : 30%

Final Exam   : 35%

Individual & Group Assignment   : 25%

Presence   : 10%

Total   **: 100%**

Description of Assessment Level

	Excellent	**Good**	**Satisfy**	**Fail**
Description	80-100	70-79	51-69	>50
Formulation	-	-	-	-
Count	-	-	-	-
Analysis	90-100	70-89	51-69	>50

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				