TEACHING PLAN

BACHELOR OF EDUCATION IN BUILDING ENGINEERING (BE-BE) STUDY PROGRAM

DEPARTMENT OF CIVIL ENGINEERING, FACULTY OF ENGINEERING, UNIVERSITAS NEGERI PADANG

COURSES	CODE	GROUP OF COURSES	SCU		SEM	VERSION
			Theory	Pract		
Mathematical Analysis	**SIP1.61.1103**	**Scientific and Expertise Courses**	2		3	1
Responsible Lecturer	**Windry Novalia Jufri, M.Pd**		**the signature of the responsible lecturer**			

Information	**Dean of the Faculty of Engineering**	**Head of the Civil Engineering Department**	**Study Program Coordinator Building Engineering Education**
	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

Graduate Learning Outcomes	**Learning Achievement of Graduate Study Programs**
	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	**Learning Achievment of Course (CPMK)**

CPMK	CPL
1. Able to complete real number arithmetic operations	1.1, 4.1, 4.2, 4.3
2. Able to solve ordinary inequality and inequality of absolute values.	1.1, 4.1, 4.2, 4.3
3. Able to analyze and complete series calculations.	1.1, 4.1, 4.2, 4.3
4. Able to understand the properties of matrix, determinant and inverse.	1.1, 4.1, 4.2, 4.3
5. Able to apply matrices in simultaneous equation solving	1.1, 4.1, 4.2, 4.3
6. Able to calculate tangent gradient on various graphs of functions as well as the speed and acceleration of moving objects (derivatives)	1.1, 4.1, 4.2, 4.3
7. Able to analyze problems related to derived applications (monotony, concavity, local extremes)	1.1, 4.1, 4.2, 4.3
8. Able to identify the elbow and polar coordinate system and describe point position in the graph system	1.1, 4.1, 4.2, 4.3
9. Able to describe the position of points in the coordinate system and find the characteristics of the line connecting the coordinate points.	1.1, 4.1, 4.2, 4.3
10. Able to analyze the triangular system and properties of trigonometric comparisons.	1.1, 4.1, 4.2, 4.3
11. Able to calculate the area and volume of objects in building engineering work	1.1, 4.1, 4.2, 4.3
12. Able to analyze functions/equations based on function graphs using the least square method	1.1, 4.1, 4.2, 4.3

Short descriptions of course	Mathematical analysis is included in the Scientific and Expertise Subject (MKK) group in Semester 1. This course serves as a support for mastery of structure and other subjects that require calculation. The subject matter is focused on the analysis and application of mathematical concepts in the field of Civil Engineering. The primary material includes arithmetic operations, systems of equations (algebra), geometry, trigonometry, series, functions and limit functions, derivatives (differentials) and their applications.

References	**Main Reference (RU) :**	
	1. Kalkulus dan Geometri Analisis. Edwin J. Purcell. Dale Varberg Edisi 5 2. Aljabar linier Elementer	
	Suporting Reference (RP)	
	1. *Calculus edisi 9* . Rigdon, Purcell dan Varberg 2. Internet/googling	
Learning Media	**Software:**	**Hardware:**
	Office Word dan Powerpoint	Komputer, LCD Projector dan Papan tulis dan perangkatnya
Team Teaching	Dr. Rijal Abdullah, M.T., Windry Novalia Jufri, M.Pd.	
Assessment	UTS, UAS, Tugas dan quiz	
Requirements Subject		

LEARNING MATERIALS

Weeks	Competence to be achieved	Study Materials	Learning Methods and Strategies	Assignments / task	Assessment Criteria / Indicators	Rreference
(1)	CPMK-1 Knowledge and Understanding of: 1. Real numbers 2. Operational count real numbers 3. Decimal, density and calculator	**Real Number System**	Expository and discussion	quiz	1. Attitude 2. Knowledge	RU 1,2
(2)	CPMK-2 Knowledge and Understanding of: 1. Usual inequalities 2. Absolute inequalities	**The Inequality System**				RU 1,2 RP 1,2
(3)	CPMK-3 Knowledge and Understanding of: 1. Artimatika series 2. Geometry series	**Row**	Expository and discussion	quiz	1. Attitude 2. Knowledge	

Weeks	Competence to be achieved	Study Materials	Learning Methods and Strategies	Assignments / task	Assessment Criteria / Indicators	Rreference
	3. Binomial series					
(4)	CPMK-4 dan CPMK-5 Knowledge and Understanding of: 1. Inverse 2. Adjoint	**Matrix**				
(5)	CPMK-4 dan CPMK-5 Knowledge and Understanding of: 1. Inverse 2. Adjoint	**Matrix**		quiz	1. Attitude 2. Knowledge	RU 1,2
(6)	CPMK-4 dan CPMK-5 Knowledge and understanding of: Simultaneous equations	**Matrix**		quiz	1. Attitude 2. Knowledge	RU 1,2
(7)	CPMK-6 Knowledge and Understanding of: 1. Derivative properties 2. Derivative rules	**Dervative**	Expository and discussion	quiz	1. Attitude 2. Knowledge	RU 1,2
(8)	CPMK-6dan CPMK-7 Knowledge and understanding of: Maximum and minimum values	**Derivative**				
(8)	**Mid-Semester Evaluation through Mid-Semester Examination**					
(9)	CPMK-6 dan CPMK-7	**Derivative**	Expository and discussion	Quis	1. Attitude	RU 1,2

Weeks	Competence to be achieved	Study Materials	Learning Methods and Strategies	Assignments / task	Assessment Criteria / Indicators	Rreference
	Knowledge and understanding of: 1. Monotonous 2. Application of concavity derivatives				2. Knowledge 3. Skill	RP 1,2
(10)	CPMK-6 dan CPMK-7 Knowledge and Understanding of: Local extreme derivative application, the turning point	**Derivative**		Quis	1. Attitude 2. Knowledge	RU 1,2 RP 1,2
(11)	CPMK-8 dan CPMK-9 Knowledge and Understanding of: 1. Determining the point and calculating the distance of the coordinate points **1.** 2. Identity of the liner function graph and function graph	**Coordinate**		Latihan	1. Attitude 2. Knowledge	RU 1,2 RP 1,2
(12)	CPMK-10 Knowledge and Understanding of: 1. Triangles and trigonometry	**Trignometry**	Expository and discussion	Quiz	1. Attitude 2. Knowledge 3. Skill	RU 1,2 RP 1,2
(13)	CPMK-11 Knowledge and Understanding of: sharp Volume	**Geometry**	Expository and discussion	exercise	1. Attitude 2. Knowledge	
(14)	CPMK-12 Knowledge and understanding of:	**Function graph**	Expository and discussion	exercise	1. Attitude 2. Knowledge	RP 1,2

Weeks	Competence to be achieved	Study Materials	Learning Methods and Strategies	Assignments / task	Assessment Criteria / Indicators	Rreference
	function graph					
(15)	CPMK-12 Knowledge and understanding of: graph of the function with the least square method	**Function graph**	Expository and discussion	exercise	1. Attitude 2. Knowledge	RP 1,2
(16)	**Final Semester Evaluation (Evaluation which evaluates to see the final achievement of student learning outcomes)**					

Keterkaitan CPMK dengan CPL dan Metode Assesment

	Assesment	Bobot (%)	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	4	5	1	2	3	1	2	3
CPMK 1	Quis +UTS 1	**55**																						
CPMK 2	Quis +UTS 2																							
CPMK 3	Quis +UTS 3																							
CPMK 4,5	Quis +UTS 4																							
CPMK 5,6	Quis +UTS 5																							
CPMK 7	UAS 1	**35**																						
CPMK 8,9	UAS 2																							
CPMK 10	UAS 3																							
CPMK 11	UAS 4																							
CPMK 12	UAS 5																							
Kehadiran		**10**																						
TOTAL		**100**																						

Komponen Penilaian

Ujian Tengah Semester	:	35%
Ujian Akhir Semester	:	35%
Kuis	:	20%
Kehadiran	:	10%
Total	**:**	**100%**

Deskripsi Tingkat Penilaian

	Excellent	**Good**	**Satisfy**	**Fail**
Deskripsi	Mampu mendeskripsikan dengan benar dan lengkap	Mampu mendeskripsikan dengan benar tapi kurang lengkap	Mampu mendeskripsikan tapi kurang jelas dan kurang lengkap	Tidak mampu mendeskripsikan
Formulasi	Mampu memformulasikan dengan benar dan lengkap	Mampu memformulasikan dengan benar tapi kurang lengkap	Mampu memformulasikan tapi kurang jelas dan kurang lengkap	Tidak mampu memformulasikan
Menghitung	Mampu menghitung dengan benar dan lengkap	Mampu menghitung dengan benar tapi kurang lengkap	Mampu menghitung tapi kurang jelas dan kurang lengkap	Tidak mampu menghitung
Analisis	Mampu menganalisis dengan benar dan lengkap	Mampu menganalisis dengan benar tapi kurang lengkap	Mampu menganalisis tapi kurang jelas dan kurang lengkap	Tidak mampu menganalisis

Sistem Penilaian

Nilai Angka	**Nilai Mutu**	**Angka Mutu**	**Sebutan Mutu**	**Nilai Angka**	**Nilai Mutu**	**Angka Mutu**	**Sebutan Mutu**
85 – 100	A	4.0	Dengan pujian	55 – 59	C	2.0	Cukup
80 – 84	A-	3.6	Sangat baik sekali	50 – 54	C-	1.6	Kurang cukup
75 – 79	B+	3.3	Baik sekali	40 – 49	D	1.0	Kurang
70 – 74	B	3.0	Baik	≤ 39	E	0.0	Gagal
65 – 69	B-	2.6	Cukup Baik	-	T	-	Tertunda
60 – 64	C+	2.3	Lebih dari cukup				

KEMENTERIAN PENDIDIKAN DAN KEBUDAYAAN
UNIVERSITAS NEGERI PADANG
JURUSAN TEKNIK SIPIL
Alamat: Jl. Prof. Dr. Hamka, Kampus UNP Air Tawar, Padang 25131
Telp. (0751) 7055644, Fax (0751) 7055628, website: www.ft.unp.ac.id, e-mail: info@ft.unp.ac.id

SOAL UJIAN TENGAH SEMESTER (MID TERM)

Matakuliah	:	Analisis Matematika
Kode/SKS	:	
Sifat Ujian	:	*Close Book*
Dosen	:	Dr. Rijal Abdullah, M.T.
		Windry Novalia Jufri, M.Pd
Waktu	:	100 Menit
Bobot nilai maksimal	:	35%

No	Soal	Bobot
1	Selesaikan operasional hitung berikut tanpa menggunakan kalkulator: a. $\frac{1+\sqrt{25}+3\times 2-8\div 2}{3\times 4-\sqrt{32^2+4^2+1}} - \frac{(4\times 2+7\times 2)\div 11}{\sqrt{9}+12\div 2-2^3}$ b. $\frac{x^2+x-6}{x^2-1}\cdot\frac{x^2+x-2}{x^2+5x+6}$	2
2	Nyatakanlah himpunan penyelesaian dari ketaksamaan yang diberikan dalam cara penulisan selang dan sketsakan grafiknya dalam garis bilangan**!** a. $\frac{2x-1}{x-3}\geq 7$ b. $(2x+1)^2(x^2-5x+6)<0$ c. $\lvert 4x+2\rvert>10$ d. $2x^2+7x-15\geq 0$ e. $\lvert\frac{x}{2}+7\rvert\geq 2$	10
3	Tiga buah bilangan membentuk Deret Aritmatika. Jumlah ketiga bilangan itu 36, sedangkan hasil kali ketiga bilangan adalah 1536. Tentukan bilangan yang terbesar!	2
4	Pecahkanlah system berikut menggunakan eliminasi Gauss-Jordan dan Keterbalikan Matriks $X=A^{-1}.B$ (membandingkan metode dan hasil). **Aturan: Invers dicari dengan Adjoint!** $x_1+4x_2+3x_3=12$ $-x_1-2x_2=-12$ $2x_1+2x_2+3x_3=8$	7
5	Gunakan aturan rantai untuk mencari $D_x y$	9

	a. $y = \left(\frac{3x+1}{x^2+2}\right)^3$ b. $y = (3x^2+5)^{32}(x^3-11)^{40}$ c. $y = \frac{(x^2-1)^4}{(4x^3-5)^2}$	

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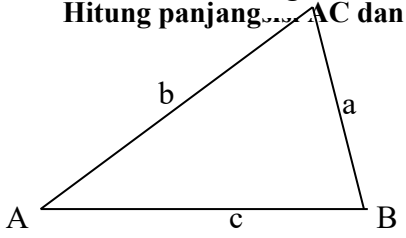
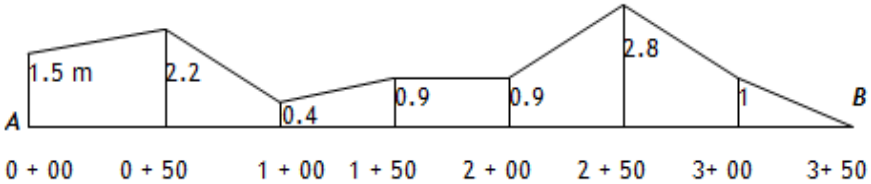
SOAL UJIAN AKHIR SEMESTER

Matakuliah	:	Analisis Matematika
Kode/SKS	:	
Sifat Ujian	:	*Close Book*
Dosen	:	Dr. Rijal Abdullah, M.T.
		Windry Novalia Jufri, M.Pd
Waktu	:	100 Menit
Bobot nilai maksimal	:	35%

No	Soal	Bobot
1	Temukan titik-titik kritis dari fungsi berikut dan jika disimpulkan bahwa pada f''(x) < 0 grafik cekung ke bawah dan pada f''(x) > 0 gafik cekung ke atas, temukan pada titik kritis mana grafik cekung ke atas atau cekung ke bawah: $f(x) = x^3 - 2x^2 + x + 1$ $f(x) = 3x^4 - 4x^3 + 2$ $f(x) = x^2/(x^2+1)$	15
2	Temukan koordinat titik pusat lingkaran dengan persamaan $4x^2 + 4y^2 + 4x - 12y + 1 = 0$	2
3	Sudut A = $32^0 8'$ sudut B = $76^0 31'$ Panjang sisi AB C ,8 m **Hitung panjang.... AC dan sisi BC!** 	3
4	 Hitung luas tanah pada gambar di atas!	5
5	Data di dalam table berikut diasumsikan berasal dari persamaan non-liner $T = at^b$ (a dan b adalah bilangan konstan) T 1 2 3 4 5 6 T 3 12 27 48 75 108 Temukan bentuk hubungan antara y dan x (hitung m dan b dengan metode *least square)* Hitungharga T pada t = 4,5	10

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SOAL TUGAS MATA KULIAH
(QUIZ)

Matakuliah	:	Analisis Matematika
Kode / SKS	:	
Sifat Tugas	:	Close Book
Dosen	:	Dr. Rijal Abdullah, M.T.
		Windry Novalia Jufri, M.Pd
Waktu	:	30 Menit
Bobot Nilai	:	25%

CPMK	Soal	Bobot
CPMK-3	1. Dari sebuah Deret Aritmatika, jumlah 4 suku pertama $S_4 = 17$ dan jumlah 8 suku pertama $S_8 = 58$, Tentukanlah suku pertama deret tersebut? 2. Tiga buah bilangan membentuk Deret Aritmatika. Jumlah ketiga bilangan itu 36, sedangkan hasil kali ketiga bilangan adalah 1536. Tentukan bilangan yang terbesar 3. Jumlah n suku pertama Deret Aritmatika adalah $S_n = n^2 + 3n$, Tentukan suku ke- 20 .	15
CPMK-4 dan CPMK-5	1. Selesaikan SPL berikut dengan menggunakan aturan Cramer: $2x_1 + x_2 - 3x_3 = 0$ $4x_1 + 5x_2 + x_3 = 8$ $-2x_1 - x_2 + 4x_3 = 2$Type equation here.	10