RENCANA PEMBELAJARAN SEMESTER (RPS)
PROGRAM STUDI S1 PENDIDIKAN TEKNIK BANGUNAN
JURUSAN TEKNIK SIPIL, FAKULTAS TEKNIK, 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. Able to apply basic science knowledge (mathematics, natural sciences) and other multidisciplinary disciplines which become the foundation for the field of Building Engineering Vocational Education in carrying out professional work in their respective fields (Knowledge and Understanding). 1.1. Able to show good understanding and implement basic mathematical concepts to solve various problems in the field of building engineering. 1.2. Have a high understanding and can implement basic concepts of physics and chemistry (natural sciences) in the field of building engineering. 1.3. Have a high understanding and can implement the basic principles of basic engineering (mechanics, engineering drawings) in the field of building engineering. 2. Able to think critically and creatively in identifying, formulating, problem-solving, evaluating various problems in the

	field of Building Engineering Vocational Education with the most appropriate and effective scientific method (Engineering analysis, investigations and assessment). 2.1. Able to identify various technical problems in the field of building engineering 2.2. Able to analyze various technical problems in the field of building engineering 2.3. Able to evaluate various technical problems in the building sector 2.4. Able to communicate Engineering Analysis, Investigation and Assessment materials to students/training. 3. Have a reliable ability in designing, implementing and supervising engineering design works. 3.1. Able to realize work drawings in collaboration with various related parties. 3.2. Able to manage building engineering work by paying attention to environmental, social, health and safety aspects. 3.3. Able to supervise the implementation of building engineering work 3.4. Able to communicate Engineering Design material to students. 4. Have reliable abilities in designing, implementing and evaluating the learning process in Building Engineering Vocational Education (Education design). 4.1. Able to design curriculum and learning process in building engineering. 4.2. Able to implement, control, evaluate and improve the quality of the learning process 4.3. Able to develop effective, efficient, and attractive learning media. 5. Having the ability to adapt and innovate to the development of science and technology and implement it into educational goals and professional work by considering possible non-technical risks (Engineering practice). 5.1. Able to innovate and develop 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. Have social and managerial competence, work together, communicate effectively, have entrepreneurial character, are environmentally friendly and aware of the importance of lifelong learning (transferable and soft skills). 6.1. Able to work creatively, innovatively, collaboratively, be careful, responsible, responsive to environmental changes. 6.2. Have curiosity, think critically, are open-minded, and objective.

	7. 6.3. Able to communicate effectively and work together in teamwork.
Course Learning Outcomes	**Learning Achievment of Course (CPMK)**

CPMK	CPL
1. Able to complete real number arithmetic operations	1.1, 6.1, 6.2, 6.3
2. Able to solve ordinary inequality and inequality of absolute values.	1.1, 6.1, 6.2, 6.3
3. Able to analyze and complete series calculations.	1.1, 6.1, 6.2, 6.3
4. Able to understand the properties of matrix, determinant and inverse.	1.1, 6.1, 6.2, 6.3
5. Able to apply matrices in simultaneous equation solving	1.1, 6.1, 6.2, 6.3
6. Able to calculate tangent gradient on various graphs of functions as well as the speed and acceleration of moving objects (derivatives)	1.1, 6.1, 6.2, 6.3
7. Able to analyze problems related to derived applications (monotony, concavity, local extremes)	1.1, 6.1, 6.2, 6.3
8. Able to identify the elbow and polar coordinate system and describe point position in the graph system	1.1, 6.1, 6.2, 6.3
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, 6.1, 6.2, 6.3
10. Able to analyze the triangular system and properties of trigonometric comparisons.	1.1, 6.1, 6.2, 6.3
11. Able to calculate the area and volume of objects in building engineering work	1.1, 6.1, 6.2, 6.3
12. Able to analyze functions/equations based on function graphs using the least square method	1.1, 6.1, 6.2, 6.3

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 3. Binomial series	**Row**	Expository and discussion	quiz	1. Attitude 2. Knowledge	
(4)	CPMK-4 dan CPMK-5 Knowledge and Understanding of: 1. Inverse 2. Adjoint	**Matrix**				
(5)	CPMK-4 dan CPMK-5 Knowledge and	**Matrix**		quiz	1. Attitude 2. Knowledge	RU 1,2

Weeks	Competence to be achieved	Study Materials	Learning Methods and Strategies	Assignments / task	Assessment Criteria / Indicators	Rreference
	Understanding of: 1. Inverse 2. Adjoint					
(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 Knowledge and understanding of: 1. Monotonous 2. Application of concavity derivatives	**Derivative**	Expository and discussion	Quis	1. Attitude 2. Knowledge 3. Skill	RU 1,2 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	**Coordinate**		Latihan	1. Attitude 2. Knowledge	RU 1,2 RP 1,2

Weeks	Competence to be achieved	Study Materials	Learning Methods and Strategies	Assignments / task	Assessment Criteria / Indicators	Rreference
	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					
(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	**Function graph**	Expository and discussion	exercise	1. Attitude 2. Knowledge	RP 1,2
(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	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
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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. $\frac{1+\sqrt{25}+3\times 2-8+2}{3\times 4-\sqrt{32^2+4^2+1}}-\frac{(4\times 2+7\times 2)\div 11}{\sqrt{9}+12\div 2-2^3}$ 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. $(3x+1)^3(x^2-5x+6)<0$ c. $\lvert 4x+2\rvert \geq 10$ d. $2x^2+7x-15\geq 0$ e. $\frac{x}{-2}+7\geq 2$	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!** $x_1+4x_2+3x_3=12$ $-x_1-3x_2=-12$ $2x_1+2x_2+3x_3=8$	7
5	Gunakan aturan rantai untuk mencari $\frac{dz}{dx}$	9

	a. $y = \left(\frac{3x+1}{x^2+2}\right)^3$ b. $y = (3x^2+5)^{12}(x^3-11)^{10}$ c. $y = \frac{(x^2-1)^4}{(4x^3-5)^2}$	

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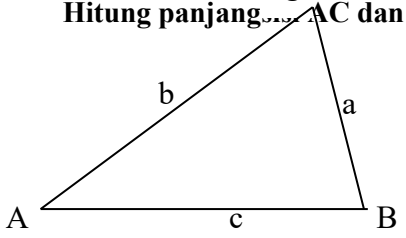
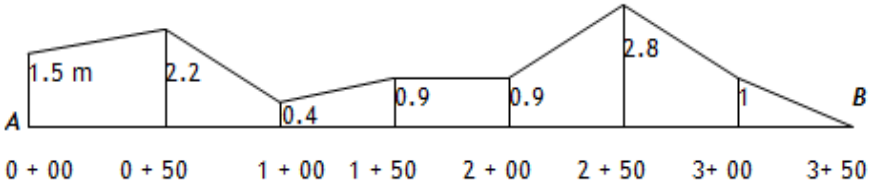
SOAL UJIAN AKHIR SEMESTER

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: $2x_1 + x_3 - 3x_2 = 0$ $3x_1 + 2x_2 + x_3 = 5$ $-2x_1 - x_3 + 4x_2 = 2$ Type equation here.	10