



MODULE HAND BOOK

MECHANICAL ENGINEERING VOCATIONAL EDUCATION STUDY PROGRAM

FACULTY OF ENGINEERING – UNIVERSITAS NEGERI PADANG

COURSE NAME	CODE	Course classification	CU		Sem	Version
			Theory	Pract		
Mathematics	MES1.61.1102	Study Program Compulsory Courses	2	0	1	1
Responsible	Primawati, S.Si., M.Si., Dr. Ir. Mulianti, MT,			Signature _____		
INFORMATION	Dean		Head of Department		Coordinator of study program	
	<u>Dr. Fahmi Rizal, M.Pd., MT</u> NIP. 195912041985031004		<u>Drs. Purwantono, M.Pd</u> NIP. 196308041986031002		<u>Drs. Purwantono, M.Pd</u> NIP. 196308041986031002	
Program Learning Outcomes	Program Learning Outcomes (PLO): <ol style="list-style-type: none"> 1. Possess a good ability to apply the basic science (mathematics and natural sciences) and other disciplines in profesional jobs / projects (Knowledge-understanding) <ol style="list-style-type: none"> 1.1. possess a good understanding and can apply the basic concept of mathematics to solve various technical problems 1.2. possess a good understanding and can apply basic the concept of physic to solve various technical problems 1.3. possess a good understanding and can apply basic the concept of chemistry to solve various technical problems 2. Possess a critical and creative thingking in identifying, formulating, problem solving and evaluating various problems 					

in mechanical engineering using the most appropriate and effective scientific method (**Engineering analysis, investigations and assessment**):

- 2.1. problem identification skills
- 2.2. problem analysis skills
- 2.3. problem evaluation skills
3. Possess a good ability in designing, manufacturing and operating machines (**Engineering design**)
 - 3.1. able to formulate ideas/concepts into a technical drawing, design and budget plans
 - 3.2. able to operate various machines and other engineering equipment with the correct standard operating procedure
 - 3.3. able to design a machine or machinery system based on a valid scientific theory
 - 3.4. able to realize a concept/design into a prototype, manufacturing process and engineering system
4. Possess a good ability to design, organize and evaluate the education and learning process in *mechanical engineering vocational education*. (**Education design**)
 - 4.1. able to design curriculum and learning process by considering various aspects
 - 4.2. able to organize, control, evaluate and improve the quality of the learning process
 - 4.3. able to develop an interesting, effective and efficient learning medias
5. Possess a good ability to adapt to development in science and technology and apply it into professional jobs by considering any non-technical aspects. (**Engineering practice**)
 - 5.1. able to innovate and develop technology in the field of mechanical engineering by considering social, economic and environmental aspects
 - 5.2. able to carry out the optimization process and increase the efficiency of machines or machining system.
 - 5.3. able to improve the performance of machine/ machinery system by applying the information technology

	6. Possess a good softskil and spirit of lifelong learning (<i>Transferable skill / softskill</i>) 6.1. possess a religious character 6.2. possess a spirit of nasionalisme, social sensitivity and environmental consevation orientation 6.3. possess the ability to communicate effectively and work together in teamwork 6.4. possess the ability to transfer science and technology to society to improve the quality of life 6.5. possess a good characters of entrepreneur	
Course Learning Outcomes	Course Learning Outcomes (SLO)	
	CLO	PLO
	1. Able to complete multiplication and division	1.1, 2.1, 2.2
	2. Able to complete ranks.	1.1, 2.1, 2.2
	3. Able to complete factoring	1.1, 2.1, 2.2
	4. Able to complete function operations	1.1, 2.1, 2.2
	5. Able to complete series operations.	1.1, 2.1, 2.2
	6. Be able to complete logarithmic operations	1.1, 2.1, 2.2
	7. Able to complete the coordinate system	1.1, 2.1, 2.2
	8. Able to solve mathematical logic	1.1, 2.1,
9. Able to solve set problems	1.1, 2.1,	
Course descriptions	This course is intended to complement students' abilities so that they can understand basic Mathematical concepts such as numbers, factoring, functions, series, logarithms, coordinate systems, logic and set theory properly.	
References	Main references (RU):	
	1. Kastroud. Edition 5. 2003, "Mathematics for Engineering", Jakarta: Publisher Erlangga. 2. Bill Cox (2001), "Understanding Engineering Mathematics", Great Britain, MPG Books Ltd. Bodmin, Cornwall	

	Additional references (RP)	
	1. Sutarman. E. 2013. Engineering Mathematics. Yogyakarta: Andi	
Learning Media	Software:	Hardware:
		Computer, LCD Projector and Whiteboard and peripherals
Team Teaching	Primawati, S.Si., M.Si., Dr. Ir. Mulianti, MT	
Assessment	Mid-Term Exam, Final Exam, Group Assignment, Group Presentation	
Requirements Subject		

COURSE SUBJECTS

Week	Expected competencies	Topics	Method and strategy for learning	Assignment	Criterion / Assessment indicator	References
(1)	CLO-1,(PLO. 1.1, 2.1, 2.2) Students are able to complete multiplication and division	Definition of the concept of numbers, properties of numbers, multiplication and division	Material explanation [60 '] Question and answer [1x10 '] Group discussion through practice questions [1x30 ']	<ul style="list-style-type: none"> • Make a summary and description of the material presented in the resume book • Group discussion on multiplication and division exercises 	Able to complete multiplication and division operations	RU-1, RU-2, RP-1
(2)	CLO-2: (PLO. 1.1, 2.1, 2.2) Students are able to complete ranks.	Powerful roots, scientific notation, absolute value	Material review by students [1x10 '] Material explanation [60 '] Question and answer [1x10 '] Group discussion through practice questions [1x20 ']	<ul style="list-style-type: none"> • Make a summary and description of the material presented in the resume book • Group discussion about practice questions for exponential roots, scientific notation, absolute value 	Able to complete operations involving square roots, scientific notation, absolute values	RU-1, RU-2, RP-1
(3)	CLO-3, (PLO. 1.1, 2.1, 2.2)	Basic factoring, quadratic equation factoring and	Material explanation [60 ']	<ul style="list-style-type: none"> • Make a summary 	Able to solve quadratic equation	RU-1, RU-2,

Week	Expected competencies	Topics	Method and strategy for learning	Assignment	Criterion / Assessment indicator	References
	Students are able to complete factoring operations	polynomial equations	Question and answer [1x10'] Group discussion through practice questions [1x30']	and description of the material presented in the resume book • Group discussion on exercises about factoring quadratic equations and polynomial equations	factoring and polynomial equations.	RP-1
(4)	CLO-4, (PLO. 1.1, 2.1, 2.2) Students are able to complete functional operations	Function definition, plot of a function, formula as function	Material explanation [60'] Question and answer [1x10'] Group discussion through practice questions [1x30 ']	• Make a summary and description of the material presented in the resume book • Group discussion about practice questions using function, plot a function, formula as function	Be able to complete function operations, plots and formulas as functions	RU-1, RU-2, RP-1

Week	Expected competencies	Topics	Method and strategy for learning	Assignment	Criterion / Assessment indicator	References
(5)	CLO-4, (PLO. 1.1, 2.1, 2.2) Students are able to complete functional operations.	Even functions and odd functions, composition of functions and inverse functions	Material review by students [1x10 '] Material explanation [60 '] Question and answer [1x10 '] Group discussion through practice questions [1x20 ']	<ul style="list-style-type: none"> • Make a summary and description of the material presented in the resume book • Group discussion about practice questions using function even and odd functions, composition of functions and inverse functions 	Able to complete even function and odd function operations, composition of functions and inverse functions	RU-1, RU-2, RP-1
(6)	CLO-5, (PLO. 1.1, 2.1, 2.2) Students are able to complete series operations.	Definition of series, series and sigma notation, finite series and infinite series	Material explanation [60 '] Question and answer [1x10 '] Group discussion through practice questions [1x30 ']	<ul style="list-style-type: none"> • Make a summary and description of the material presented in the resume book • Group discussion on question exercises using sigma series and 	Able to complete sigma series and notation operations, finite series and infinite series	RU-1, RU-2, RP-1

Week	Expected competencies	Topics	Method and strategy for learning	Assignment	Criterion / Assessment indicator	References
				notation, finite series and infinite series		
7	CLO-4, (PLO. 1.1, 2.1, 2.2) Students are able to complete functional operations.	Exponential function, $y = a^n$, general exponential function ax , natural exponential function ax , manipulation of exponential functions.	Material explanation [60'] Question and answer [1x10'] Group discussion through practice questions [1x30']	<ul style="list-style-type: none"> • Make a summary and description of the material presented in the resume book • Group discussion on problem exercises using the exponential function, $y = a^n$, the general function of the exponent ax, the natural exponential function ax, the manipulation of the exponential function. 	Able to solve exponential function operations, $y = a^n$, general function exponential ax , natural exponential function ax , manipulation of exponential functions.	RU-1, RU-2, RP-1

Week	Expected competencies	Topics	Method and strategy for learning	Assignment	Criterion / Assessment indicator	References
(8)	MIDTERM EXAM					
(9)	CLO-6, (PLO. 1.1, 2.1, 2.2) Students are able to complete logarithmic operations	Definition of logarithms, logarithms with a general basis a , logarithmic manipulation and examples of logarithms	Material explanation [60 '] Question and answer [1x10 '] Group discussion through practice questions [1x30 ']	<ul style="list-style-type: none"> • Make a summary and description of the material presented in the resume book • Group discussion on problem exercises using a general basis a, logarithmic manipulation and logarithmic examples 	Able to complete operations logarithms with a general basis a , logarithmic manipulation and examples of logarithms	RU-1, RU-2, RP-1
(10)	CLO-7, , (PLO. 1.1, 2.1, 2.2) Students are able to complete the coordinate system	A Cartesian coordinate system, geometric lines, dividing lines by their ratios	Material explanation [60 '] Question and answer [1x10 '] Group discussion through practice questions [1x30 ']	<ul style="list-style-type: none"> • Make a summary and description of the material presented in the resume book • Group discussion on Cartesian 	Able to solve problems related to Cartesian coordinates, geometric lines, dividing lines based on ratios	RU-1, RU-2, RP-1

Week	Expected competencies	Topics	Method and strategy for learning	Assignment	Criterion / Assessment indicator	References
				coordinate exercises, geometric lines, dividing lines by ratios		
(11)	CLO-7, , (PLO. 1.1, 2.1, 2.2) Students are able to complete the coordinate system	Polar coordinate systems, congruence triangles, examples relating to polar coordinates	Material explanation [60 ' Question and answer [1x10 ' Group discussion through practice questions [1x30 '	<ul style="list-style-type: none"> • Make a summary and description of the material presented in the resume book • Group discussion on exercises Polar coordinate system, congruence of triangles, examples relating to polar coordinates 	Able to complete exercises related to polar coordinate systems, congruence triangles, examples related to polar coordinates	RU-1, RU-2, RP-1
(12)	CLO-8, (PLO. 1.1, 2.1) Students are able to solve mathematical logic	Logic, proposition definitions, compound propositions and truth tables	Material explanation [1x30 ' Group discussion through practice questions [1x60 '	<ul style="list-style-type: none"> • Make a summary and description of the material presented in the resume book 	Able to solve questions compound propositions and truth tables	RU-1, RU-2, RP-1

Week	Expected competencies	Topics	Method and strategy for learning	Assignment	Criterion / Assessment indicator	References
			Question and answer [1x10 ']	<ul style="list-style-type: none"> Group discussion on logic, multiple propositions and truth tables 		
(13)	CLO-8, (PLO. 1.1, 2.1,) Students are able to solve mathematical logic	The properties of compound propositions, the laws of logic and inference	Material explanation [1x30 ' Group discussion through practice questions [1x60 ' Question and answer [1x10 '	<ul style="list-style-type: none"> Make a summary and description of the material presented in the resume book Group discussion on the properties of compound propositions, the laws of logic and inference 	Able to solve problems related to the properties of multiple propositions, the laws of logic and conclusion	RU-1, RU-2, RP-1
(14)	CMPK-9, (PLO. 1.1, 2.1,) Mastering set theory	Set definition, set writing and important terms	Material explanation [60 ' Question and answer [1x10 ' Group discussion through practice questions [1x30 '	<ul style="list-style-type: none"> Make a summary and description of the material presented in the resume book Group discussion 	Be able to explain important sets and terms	RU-1, RU-2, RP-1

Week	Expected competencies	Topics	Method and strategy for learning	Assignment	Criterion / Assessment indicator	References
				on set and important terms		
(15)	CMPK-9, (PLO. 1.1, 2.1,) Mastering set theory	The properties of the set, the laws of the set, the principle of duality	Material explanation [1x30 ' Group discussion through practice questions [1x60 ' Question and answer [1x10 '	<ul style="list-style-type: none"> • Make a summary and description of the material presented in the resume book • Group discussion on the properties of sets, the laws of sets, the principle of duality 	Be able to identify traits set, law on set, principle of duality	RU-1, RU-2, RP-1
(16)	Final Semester Evaluation (Evaluation which is intended to determine the final achievement of student learning outcomes)					

Note : 1 credit = (50 'TM + 60' BT + 60 'BM) / Week BM = Independent Study T = Theory (aspects of science)
 TM = Face to Face (Lecture) PS = Simulation Practicum (160 minutes / week) P = Practice (aspects of work skills)
 BT = Structured Learning. PL = Laboratory Practicum (160 minutes / week)

Assessment Components

Midterm exam (UTS)	: 35%
Final exams (UAS)	: 35%
Assignment	: 20%
<u>Presence</u>	<u>: 10%</u>
Total	: 100%

Scoring/Grading level description

	Excellent	Good	Satisfy	Fail
ability to describe	Able to describe correctly and completely	Able to describe correctly but not complete	Able to describe but less clear and incomplete	Unable to describe
ability to formulate	Able to formulate correctly and completely	Able to formulate correctly but not complete	Able to formulate but less clear and incomplete	Unable to formulate
ability to calculate	Able to calculate correctly and completely	Able to calculate correctly but not complete	Able to calculate but less clear and incomplete	Unable to calculate
ability to analyze	Able to analyze correctly and completely	Able to analyze correctly but not complete	Able to analyze but less clear and incomplete	Unable to analyze

Scoring and grading system

Score	Quality	Quality score	Designation	Score	Quality	Quality score	Designation
85 – 100	A	4.0	Outstanding	55 – 59	C	2.0	Acceptable
80 – 84	A-	3.6	Excellent	50 – 54	C-	1.6	Poor
75 – 79	B+	3.3	Very good	40 – 49	D	1.0	Poor
70 – 74	B	3.0	Good	≤ 39	E	0.0	Fail
65 – 69	B-	2.6	Good	-	T	-	Tertunda
60 – 64	C+	2.3	Acceptable				