



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		
CAD and CAM	MES1.61. 4108	Study Program Compulsory Courses / MEVE core courses	2	1	4	1
Responsible	Dr. Refdinal, M.Pd .; Delima Yanti Sari, ST, MT; Rifelino, S.Pd., MT; Budi Syahri S.Pd., M.Pd.T .; Febri Prasetya S.Pd., M.Pd.T .; Rahmat Aziz Nabawi S.Pd., M.Pd.T			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	Study Program 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 thinking 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): <ol style="list-style-type: none"> 2.1. problem identification skills 					

	<ul style="list-style-type: none"> 2.2. problem analysis skills 2.3. problem evaluation skills 3. Possess a good ability in designing, manufacturing and operating machines (Engineering design) <ul style="list-style-type: none"> 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 <i>mechanical engineering vocational education</i>. (Education design) <ul style="list-style-type: none"> 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) <ul style="list-style-type: none"> 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 (Transferable skill / softskill) <ul style="list-style-type: none"> 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	Course Learning Outcomes (CLO)

Outcomes	CLO		PLO
	1. Students are able to communicate and are skilled at making pictures in detail (2 dimensions) using autocad and are able to communicate through norms and standardization of technical drawings		3.1, 3.2, 3.3, 3.4, 5.1, 5.2, 5.3
	2. Students are able to communicate and are skilled at making drawings in Part / Assembly (3 Dimensions) using autocad and are able to communicate through norms and standardization of technical drawings able to communicate through norms and standardization of technical drawings		3.1, 3.2, 3.3, 3.4, 5.1, 5.2, 5.3
	3. Students are able to communicate and are skilled at making work processes (manufacturing) turning machines using Master Cam able to communicate through norms and standardization of the machining process		3.1, 3.2, 3.3, 3.4, 5.1, 5.2, 5.3
	4. Students are able to communicate and are skilled at making the work process (manufacturing) of a milling machine using a Master Cam capable of communicating through the norms and standardization of the machining process		3.1, 3.2, 3.3, 3.4, 5.1, 5.2, 5.3
Course descriptions	This course provides 2D and 3D drawing knowledge and skills using computer aided design (CAD) and drawing the turning (2A) and milling (3A) manufacturing processes using Master Cam software. CAD software varies widely, this course uses Autocad and Master Cam X-5 software		
References	Main references (RU):		
	1. Dr. KL Narayana, Dr. P. Kannaiah, K.Venom Reddy, Machine drawing, 3rd printing, New Age International (P) Limited, Publishers, New Delhi		
	Additional references (RP)		
	1. Takashi, GS, Sugiarto. NH, Describing Machines according to ISO Standards, Sixth Printing, PT.Pradnya Paramita, Jakarta 1994.		
Learning Media	Software:	Hardware:	
		Computer, LCD Projector and Whiteboard and peripherals	
Team Teaching			
Assessment	Mid-Term Exam, Final Exam, Independent & group assignments, Group presentations		
Requirements Subject	Engineering Drawing, Machine Drawing		

COURSE SUBJECTS

Week	Expected competencies	Topics	Method and strategy for learning	Assignment	Criterion / Assessment indicator	References
(1)	CLO-1: (PLO-1.2, 1.3) Students are able to communicate and are skilled in making geometric construction drawings with CAD software	Introduction Introduction to courses and the lecture system, Geometric Construction <ul style="list-style-type: none"> • Straight Line Construction using the Triangle ruler • Multi-faceted Construction • Radius • Spiral Construction • Elliptical Construction • Parabol Construction 	Self-study, group discussions, and simulations	Make a summary and description of the material presented in the resume book	<i>Question & Answer</i>	RU-1 and RP-1
(2)	CLO-2: [PLO-1.2, 1.3, 2.1, 2.2] Students are able to communicate and are skilled in making projection images with CAD software	<ul style="list-style-type: none"> • Types of Projection • View • Pictorial Image Classification • Perspective Projection 	Self-study and simulation	<ul style="list-style-type: none"> • Make a summary and description of the material presented in the resume book • Task work on questions 	<i>Question & Answer</i>	RU-1 and RP-1
(3)	CLO-3: [PLO-1.2, 1.3, 2.1, 2.2] Students are able to communicate and are skilled in making cutout drawings with CAD software	<ul style="list-style-type: none"> • Shade Line • Types of Shading Lines According to Material • Types of Cutting • Cutting Rotates • Objects or parts of objects that cannot be cut • Special Cutting 	Self-study and simulation	<ul style="list-style-type: none"> • Make a summary and description of the material presented in the resume book • Task work on questions 	<i>Question & Answer</i>	RU-1 and RP-1
(4)	CLO-4.1: [CP-2.1, 2.2,	<ul style="list-style-type: none"> • Dimension Tool 	Self-study and simulation	<ul style="list-style-type: none"> • Make a summary and 	<i>Question &</i>	RU-1 and

Week	Expected competencies	Topics	Method and strategy for learning	Assignment	Criterion / Assessment indicator	References
	2.3, 3.3] Students are able to communicate and are skilled in providing sizes and symbols of work on work drawings with CAD software	<ul style="list-style-type: none"> Text 		description of the material presented in the resume book <ul style="list-style-type: none"> Task work on questions 	<i>Answer</i>	RP-1
(5)	CLO-4,2: [CP-2.1, 2.2, 2.3, 3.3] Students are able to communicate and are skilled in making stretch drawings with CAD software	<ul style="list-style-type: none"> Draw the pipe stretch, and the joints on the pipe Draw a stretch of the cone and the truncated cone Image of a stretch of the pyramid 	Self-study and simulation	<ul style="list-style-type: none"> Make a summary and description of the material presented in the resume book Task work on questions 	<i>Question & Answer</i>	RU-1 and RP-1
(6)	CLO-4,3: [CP-2.1, 2.2, 2.3, 3.3] Students are able to communicate and are skilled in making 3D solid drawings with CAD software	<ul style="list-style-type: none"> Solid modeling image Define the work plane Extrude 	Self-study and simulation	<ul style="list-style-type: none"> Make a summary and description of the material presented in the resume book Diesel engine / gasoline engine demonstration 	<i>Question & Answer</i>	RU-1 and RP-1
(7)	CLO-4.4: [CP-2.1, 2.2, 2.3, 3.3] Students are able to communicate and are skilled in editing 3D solid images with CAD software	Solid Editing	Self-study and simulation	<ul style="list-style-type: none"> Make a summary and description of the material presented in the resume book The task of making a summary of scientific articles 	<i>Question & Answer</i>	RU-1 and RP-1
(8)	CLO-4.4: [CP-2.1, 2.2, 2.3, 3.3]	Assembly image	Self-study and simulation	<ul style="list-style-type: none"> 	<i>Question & Answer</i>	RU-1 and RP-1

Week	Expected competencies	Topics	Method and strategy for learning	Assignment	Criterion / Assessment indicator	References
	Students are able to communicate and are skilled in assembling 3D solid images with CAD software					
(9)	Mid-Test					
(10)	CLO-4.5: [CP-2.1, 2.2, 2.3, 3.3] Students are able to analyze the basic concepts of Computer aided manufacturing (CAM)	basic concepts of computer aided manufacturing (CAM)	Self-study and simulation	<ul style="list-style-type: none"> • Make a summary and description of the material presented in the resume book • Task work on questions 	<i>Question & Answer</i>	RU-1 and RP-1
(11)	CLO-4.6: [CP-2.1, 2.2, 2.3, 3.3] Students are able to understand cutting tools and CNC Milling infeed parameters Identify cutting tools and parameters for CNC milling	cutting tools and CNC Milling infeed parameters Identify cutting tools and parameters for CNC milling	Self-study and simulation	<ul style="list-style-type: none"> • Make a summary and description of the material presented in the resume book • The task of summarizing scientific articles related to water turbines 	<i>Question & Answer</i>	RU-1 and RP-1
(12)	CLO-4.7: [CP-2.1, 2.2, 2.3, 3.3] Students Understand the Command Functions to Create a Toolpath Drill Program. Using Command	Command Functions To Create a Toolpath drill program.	Self-study and simulation	<ul style="list-style-type: none"> • Make a summary and description of the material presented in the resume book • Task: identify pump utilization in the surrounding 	<i>Question & Answer</i>	RU-1 and RP-1

Week	Expected competencies	Topics	Method and strategy for learning	Assignment	Criterion / Assessment indicator	References
	Functions to Create Drill Toolpath Program			environment		
(13)	CLO-4.8: [CP-2.1, 2.2, 2.3, 3.3] Understanding command function to create face & roughing program	Create a face & roughing program	Self-study and simulation	<ul style="list-style-type: none"> • Make a summary and description of the material presented in the resume book 	<i>Question & Answer</i>	RU-1 and RP-1
(14)	CLO-5.1: [PLO-2.1, 2.2, 2.3, 3.2, 3.4, 5.1] Students are able to understand cutting tools and CNC Turning infeed parameters Identify cutting tools and parameters for CNC Turning	Understand CNC Turning cutting tools and infeed parameters Identify cutting tools and parameters for CNC Turning	Self-study and simulation	<ul style="list-style-type: none"> • Make a summary and description of the material presented in the resume book 	<i>Question & Answer</i>	RU-1 and RP-1
(15)	CLO-5.2: [PLO-2.1, 2.2, 2.3, 3.2, 3.4, 5.1] Students Understand Command Functions to Make Toolpath turning Program. Using Command Functions to Create Toolpath Program	Create Toolpath turning program.	Self-study and simulation	<ul style="list-style-type: none"> • Making group presentations on non-conventional energy (4 groups) • Group discussion on renewable energy technology 	<i>Question & Answer</i>	RU-1 and RP-1
(16)	CLO-6: [PLO-6.2,6.4] Understanding command functions make lathe flat, cascaded and radius	flat, multilevel and radius lathe program	Self-study and simulation	Create presentations and group discussions on the environmental impact of conventional energy convention machines	<i>Question & Answer</i>	RU-1, RU-4

Task	: 45%
Midterm exam (UTS)	: 20 %
Final exams (UAS)	: 25%
<u>Presence</u>	: 10%
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
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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				

