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		
Metal Welding Technology	MES1.52.3008	Compulsory Courses/ profiency	0	3	3	
Responsible	Drs. Purwantono, M.Pd, Drs. Nelvi Erizon, M.Pd, Drs. Jasman., M.Kes, Drs. Irzal, M. Kes ,, Bulkia Rahim, M.Pd, Junil Adri, M.Pd.T		Signature _____			

INFORMATION	Dean	Head of Department	Coordinator of study program
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Program Learning Outcome	Program learning outcome of Mechanical engineering vocational education:
	1. Possess a good ability to apply the basic science (mathematics and natural sciences) and other disciplines in profesional jobs / projects (Knowledge-understanding) 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 ***(Transferable skill / softskill)***
   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

CLO	PLO
1. Students understand welding techniques	2.2, 2.3, 3.1, 3.3, 3.4, 5.1, 5.2, 5.3
2. Students Understand main components and tools for SMAW welding	3.1, 3.3, 3.4, 5.2,
3. Skilled Student weld fillets	3.1, 3.3, 3.4, 5.2,

	4. College student Skilled in welding grooves	3.1, 3.3, 3.4, 5.2,
Course descriptions	Skilled in performing electric flame arc welding processes in positions under the hand, vertical Up and Down, Horizontal vertical and overhead positions 1G, 2G, 3G, 4G, 6G and 1F, 2F, 3F, 4F in accordance with the welding techniques and procedures right.	
References	Main Reference (RU):	
	1. Fabrication Team (2010) Electric Flame Arc Welding Module 2. The Fabrication Team (2012) Job Practices for Metal Welding Technology	
	Additional Reference (RP)	
	1. Sonawan, H., Suratman, R., 2004, Introduction to Understanding Metal Welding, Alfa Beta, Bandung. 2. Smith, D., 1984, Welding Skills and Technology, McGraw-Hill, New York.	
Learning Media	Software:	Hardware:
		Computer, LCD Projector and Whiteboard and peripherals
Team Teaching		
Assessment	Mid-Test Exam, Final Exam, Independent & group assignments, Group presentations	
Requirements Subject	No	

Course Objects

Week	Expected competencies	Topics	Method and strategy for leraning	Assignment	Criterion / Assessment indicattor	References
(1)	CLO-1: [PLO-2.1, 2.2, 2.3) Students are capable : Understand the importance	Electric Flame Arc Welding Work Safety Tool's name	Lecture [1x200 '] Discussion [1x20 '] Demonstration [1x70 ']	Make a summary and description of the material presented in the	Oral and written	RU-1, and RU 2 RP-1, RP 2

Week	Expected competencies	Topics	Method and strategy for leraning	Assignment	Criterion / Assessment indicattor	References
	of work safety, Understand the function of safety tools in the welding process. Skilled in using welding work safety equipment	Function How To Use It	Conclusion [1x10 ']	resume book		
(2)	CLO-2: [PLO-2.1, 2.2, 2.3. Students are capable Understand and know the function of the main components and tools of electric arc welding equipment. Skilled in using welding tools Skilled in using the main components of welding equipment	2. Main components and tools for welding process 2.1 Main components 2.2 Assistive tools 2.3 How to operate a welding machine 2.4 Turning on the electric arc	Lecture [1x50 '] Discussion [1x20 '] Practicum [1x220 '] Conclusion [1x10 ']	Make a summary and description of the material presented in the resume book Practicum Turn on the electric arc	Oral and written and practicum and practicum reports	RU-1, and RU 2 RP-1, RP 2
(3)	CLO-3: [PLO-.5.1, 5.2, 5.3.] Students are capable Skilled in welding lines in the electric arc welding process	Welding Line welding	Lecture [1x50 '] Discussion [1x20 '] Practicum [1x220 '] Conclusion [1x10 ']	Make a summary and description of the material presented in the resume book Practicum Welding Line welding	Oral and written and practicum and practicum reports	RU-1, and RU 2 RP-1, RP 2
(4)	CLO-3: [PLO-.5.1, 5.2, 5.3.] Students are capable Skilled in welding the connection I	Welding Connection I	Lecture [1x50 '] Discussion [1x20 '] Practicum [1x220 '] Conclusion [1x10 ']	Make a summary and description of the material presented in the resume book Practicum Welding Connection I	Oral and written and practicum and practicum reports	RU-1, and RU 2 RP-1, RP 2
(5)	CLO-3: [CP-5.1, 5.2, 5.3.] College student Understand Skilled in welding pinch joints	Welding of coincided joints	Lecture [1x50 '] Discussion [1x20 '] Practicum [1x220 '] Conclusion [1x10 ']	Make a summary and description of the material presented in the resume book Practicum Welding of coincided joints	Oral and written and practicum and practicum reports	RU-1, and RU 2 RP-1, RP 2

Week	Expected competencies	Topics	Method and strategy for leraning	Assignment	Criterion / Assessment indicattor	References
(6)	CLO-3: [CP-5.1, 5.2, 5.3.] College student Understand Skilled in welding the T connection with the 1F / PA position	Welding the T position 1f / PA connection	Lecture [1x50 '] Discussion [1x20 '] Practicum [1x220 '] Conclusion [1x10 ']	Make a summary and description of the material presented in the resume book Practicum Welding the T position 1f / PA connection	Oral and written and practicum and practicum reports	RU-1, and RU 2 RP-1, RP 2
(7)	CLO-3: [CP 5.1, 5.2, 5.3.] College student Skilled in welding T Position 2F / PB connection	Weld the T-Position 2F / PB Connection	Lecture [1x50 '] Discussion [1x20 '] Practicum [1x220 '] Conclusion [1x10 ']	Make a summary and description of the material presented in the resume book Practicum Weld the T-Position 2F / PB Connection	Oral and written and practicum and practicum reports	RU-1, and RU 2 RP-1, RP 2
(8)	CLO-3: [CP 5.1, 5.2, 5.3.] College student Skilled in welding the T Position 3 F / PF connection	Weld the 3F / PF Position T Connection	Lecture [1x50 '] Discussion [1x20 '] Practicum [1x220 '] Conclusion [1x10 ']	Make a summary and description of the material presented in the resume book Practicum Weld the 3F / PF Position T Connection	Oral and written and practicum and practicum reports	RU-1, and RU 2 RP-1, RP 2
(9)	CLO-3: [CP 5.1, 5.2, 5.3.] College student Skilled in welding the T Position 4F / PE joint	Weld the 4F / PE Position T Connection	Lecture [1x50 '] Discussion [1x20 '] Practicum [1x220 '] Conclusion [1x10 ']	Make a summary and description of the material presented in the resume book Practicum Weld the 4F / PE Position T Connection	Oral and written and practicum and practicum reports	RU-1, and RU 2 RP-1, RP 2
(10)	CLO-4: [CP 5.1, 5.2, 5.3.] College student Skilled in welding 1G / PA V Position Connection	Weld the 1G / PA V Position Connection	Lecture [1x50 '] Discussion [1x20 '] Practicum [1x220 '] Conclusion [1x10 ']	Make a summary and description of the material presented in the resume book Practicum Weld the 1G / PA V Position Connection	Oral and written and practicum and practicum reports	RU-1, and RU 2 RP-1, RP 2

Week	Expected competencies	Topics	Method and strategy for leraning	Assignment	Criterion / Assessment indicattor	References
(11)	**CLO-4: [CP** 5.1, 5.2, 5.3.] College student Skilled in welding V Position 2G / PC connection	Weld the 2G / PC V position connection	Lecture [1x50 '] Discussion [1x20 '] Practicum [1x220 '] Conclusion [1x10 ']	Make a summary and description of the material presented in the resume book Practicum Weld the 2G / PC V position connection	Oral and written and practicum and practicum reports	RU-1, and RU 2 RP-1, RP 2
(12)	**CLO-4: [CP** 5.1, 5.2, 5.3.] College student Skilled in welding V Position 3G / PF Connection	Weld the V Position 3G / P Connection	Lecture [1x50 '] Discussion [1x20 '] Practicum [1x220 '] Conclusion [1x10 ']	Make a summary and description of the material presented in the resume book Practicum Weld the V Position 3G / P Connection	Oral and written and practicum and practicum reports	RU-1, and RU 2 RP-1, RP 2
(13)	**CLO-4: [CP** 5.1, 5.2, 5.3.] College student Skilled in welding V Position 4G / PE connection	Weld the V Position 4G / PE Connection	Lecture [1x50 '] Discussion [1x20 '] Practicum [1x220 '] Conclusion [1x10 ']	Make a summary and description of the material presented in the resume book Practicum Weld the V Position 4G / PE Connection	Oral and written and practicum and practicum reports	RU-1, and RU 2 RP-1, RP 2
(14)	**CLO-4: [CP** 5.1, 5.2, 5.3.] College student Skilled in welding V Position 2G / PB Pipe Connections	Weld Pipe Connection V Position 2G / PB	Lecture [1x50 '] Discussion [1x20 '] Practicum [1x220 '] Conclusion [1x10 ']	Make a summary and description of the material presented in the resume book Practicum Weld Pipe Connection V Position 2G / PB	Oral and written and practicum and practicum reports	RU-1, and RU 2 RP-1, RP 2
(15)	**CLO-4: [CP** 5.1, 5.2, 5.3.] College student Skilled in welding V Position 1G / PA Pipe Connections	Weld Pipe Connection V Position 1 G / PA	Lecture [1x50 '] Discussion [1x20 '] Practicum [1x220 '] Conclusion [1x10 ']	Make a summary and description of the material presented in the resume book Practicum Weld Pipe Connection V Position 1 G / PA	Oral and written and practicum and practicum reports	RU-1, and RU 2 RP-1, RP 2
(16)	**CLO-4: [CP** 5.1, 5.2, 5.3.]	Weld the 6G HL45 V Position	Lecture [1x50 ']	Make a summary and	Oral and written and	RU-1, and RU 2

Week	Expected competencies	Topics	Method and strategy for leraning	Assignment	Criterion / Assessment indicattor	References
	College student Skilled in welding V Position 6 G HL 45 Pipe Joints	Pipe Connection	Discussion [1x20 '] Practicum [1x220 '] Conclusion [1x10 ']	description of the material presented in the resume book Practicum Weld the 6G HL45 V Position Pipe Connection	practicum and practicum reports	RP-1, RP 2
	Final Exam					

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

The linkage between CLO and PLO and assessment methods

MSN1.62.4007	Assessment	Point (%)	PLO-1			PLO-2			PLO-3				PLO-4			PLO-5			PLO-6				
			1	2	3	1	2	3	1	2	3	4	1	2	3	1	2	3	1	2	3	4	5
CLO-1.2	UTS. 2.2, 2.3	2		V	V																		
CLO-1.3	UTS. 2.2, 2.3	2		V	V																		
CLO-2.3	UTS. 2.2, 2.3	2					V	V															
CLO-3.2	UTS. 2..2, 2.3	2					V	V															
CLO-3.3	UTS. 2.2, 2.3	2					V	V															
CLO-4.2	UAS. 2.2, 2.3	2															V	V					
CLO-4.3	UAS. 2.2, 2.3	2															V	V					
CLO-4.4	UAS. 2.2, 2.3	2															V	V					
CLO-4.5	UAS. 2.2, 2.3	2															V	V					
CLO-4.6	UAS. 2.2, 2.3	2															V	V					
CLO-3	Practicum	60									V												

CLO-4	Practicum										V												
CLO-3,4	Practical report	10																					
Presence		10																					
TOTAL		100																					

Assessment Component

Midterm exam : 10%

Final exams : 10%

Duty : 70%

Presence : 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 analysize 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	-	Postpone
60 – 64	C+	2.3	Acceptable				