



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		
ITG-MIG and Las Oxy Acetylene Welding	MES2.61.5108	Elective Courses	1	2	5	1
Responsible	Drs. Purwantono, M.Pd, Drs. Jasman, M. Kes., Drs. Nelvi Erizon, M. Pd., Drs. Jamsan, M. Kes., Drs. Irzal, M. Kes.			Signature		
INFORMATION	Dean	Head of Department	Coordinator of study program			
	Dr. Fahmi Rizal, M.Pd., MT NIP. 195912041985031004	Drs. Purwantono, M.Pd NIP. 196308041986031002	Drs. Purwantono, M.Pd NIP. 196308041986031002			
Program Learning Outcome	Program learning outcome of Mechanical engineering vocational education:					
	<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 (<i>Engineering analysis, investigations and assesment</i>): <ol style="list-style-type: none"> 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

Program Learning Outcome	Program learning outcome of Mechanical engineering vocational education:	
	CLO	PLO
	1. Students can understand work safety, Main Tools, tools for welding Oxy Asitelin, TIG and MIG	2.1, 2.2, 2.3, 3.1, 3.2, 3.3, 3.4, 5.1, 5.2
	2. Skilled Student using Oxy Asitelin TIG and MIG welding work safety equipment	2.1, 2.2, 2.3, 3.1, 3.2, 3.3, 3.4, 5.1, 5.2
	3. Skilled Student welding Oxy Asitelin TIG and MIG	2.1, 2.2, 2.3, 3.1, 3.2, 3.3, 3.4, 5.1, 5.2
	4. Skilled Student create a lesson plan and demonstrate the welding process of Oxy Asitelin TIG and MIG	2.1, 2.2, 2.3, 3.1, 3.2, 3.3, 3.4, 5.1, 5.2
Course descriptions	Skilled in performing and analyzing welding processes such as Welding Oxy Asitelin, TIG and MIG for various types of welding positions and can apply for the making of learning designs about Welding of Asitelin Oxy, TIG and MIG Welding positions Oxy Asitelin, TIG and MIG under hand, vertical Up and Down, Horizontal vertical and position above the head according to the correct welding technique and procedure.	
References	Main Reference (RU):	
	<ol style="list-style-type: none"> 1. Fabrication Team (2012) Welding Module Oxy Asitelin, TIG and MIG 2. Fabrication Team (2012) Job Practice Welding Oxy Asitelin, TIG and MIG 3. American Welding Society, 2001, Structural Welding Code-Steel, International Standard Book, Althouse, Turnquist, 4. Bowditch, (1984), Modern Welding, Sout Holland: Goodheart Wilcox. 	
	Additional Reference (RP)	
	<ol style="list-style-type: none"> 1. Anonymous, (1992), Welding Design & Fabrication Data Sheets, Ohio: Penton Publishing, Inc. 2. Cary, (1993), Modern Welding Technology, New Jersey: Prentice Hall 	
Learning Media	Software:	Hardware:
		Main Equipment, Assistive Equipment, Work safety equipment, Welding Oxy Asitelin, TIG and MIG, LCD Projector and Whiteboard and its devices
Team Teaching		
Assessment	Mid-Test Exam, Final Exam, Practicum Results and attendance	
Requirements Subject	Fabrication, Plate Building Techniques, Occupational Health and Safety, Metal Welding Technology	

COURSE OBJECTS

Week	Expected competencies	Topics	Method and strategy for learning	Assignment	Criterion / Assessment indicator	References
(1)	<p>CLO-1 and 2: [PLO-2.1, 2.2, 2.3, 6.3,) Students are capable :</p> <ol style="list-style-type: none"> Understand the importance of work safety, Understand the function of work safety tools in the Oxy Asitelin, TIG and MIG welding process Skilled in using Oxy Asitelin TIG and MIG welding safety equipment 	<p>Safety Welding Oxy Asitelin TIG and MIG</p> <ol style="list-style-type: none"> Tool's name Function How To Use It 	<p>Lecture [1x120 '] Discussion [1x50 '] Demonstration [1x50 '] Conclusion [1x30 ']</p>	<ol style="list-style-type: none"> Make a summary and description of the material presented in the resume book Practicing using the Oxy Asitelin TIG and MIG welding safety equipment 	Oral, written and practicum	RU-1,3,4 RP-1 and 2
(2)	<p>CLO-1: [PLO-2.1, 2.2, 2.3, 6.3,) Students are capable understand and apply welding symbols to machine construction</p>	<p>Welding symbols</p> <ol style="list-style-type: none"> Image of the welding symbol Method of applying symbols How to describe the welding symbol in a welded joint construction drawing 	<p>Lecture [1x120 '] Discussion [1x50 '] Demonstration [1x50 '] Conclusion [1x30 ']</p>	Make a summary and description of the material presented in the resume book	Oral and written	RU-1,3,4 RP-1 and 2
(3)	<p>CLO-1 and 3: [PLO-2.1, 2.2, 2.3, 6.3, 3.1, 3.2, 3.3, 3.4, 6.3) Students are capable Understand and know the function of the main components and supporting tools and operate the Oxy</p>	<p>Main components and tools for welding processes</p> <ol style="list-style-type: none"> Main component Assistive tools How to operate Oxy Asitelin TIG and MIG welding machines Turning on the Oxy 	<p>Lecture [1x50 '] Discussion [1x30 '] Practicum [1x150 '] Conclusion [1x20 ']</p>	Make a summary and description of the material presented in the resume book Practicum Turning on the Oxy Asitelin TIG and MIG arc arc	Oral and written and practicum	RU-1 and 2

Week	Expected competencies	Topics	Method and strategy for learning	Assignment	Criterion / Assessment indicator	References
	Asitelin TIG and MIG welding.	Asitelin TIG and MIG arc arc				
(4)	CLO-3: [CP-3.1, 3.2, 3.3, 3.4, 6.3.] College student Skilled in welding the T connection with the 1F / PA position in the Oxy Asitelin TIG and MIG processes	Weld the connection T Position 1f / PA in the TIG and MIG Oxy Asitelin welding process 1. Preparation of welded materials 2. Welding pressure, current and speed settings 3. Welding techniques and procedures	Lecture [1x50 '] Discussion [1x30 '] Practicum [1x150 '] Conclusion [1x20 ']	Make a summary and description of the material presented in the resume book Practicum connection T with position 1F / PA in the Oxy Asitelin TIG and MIG processes	Oral and written and practicum	RU-1 and 2
(5)	CLO-3: [CP-3.1, 3.2, 3.3, 3.4, 6.3.] Skilled students weld the T position 2F / PB connection in the TIG and MIG Oxy Asitelin process	Weld the T-Connection 2F / PB Position in the TIG and MIG Oxy Asitelin welding process 1. Preparation of welded materials 2. Welding pressure, current and speed settings 3. Welding techniques and procedures	Lecture [1x50 '] Discussion [1x30 '] Practicum [1x150 '] Conclusion [1x20 ']	Make a summary and description of the material presented in the resume book Practicum welding of T-position 2F / PB joints in the Oxy Asitelin TIG and MIG processes	Oral and written and practicum	RU-1 and 2
(6)	CLO-3: [CP-3.1, 3.2, 3.3, 3.4, 6.3.] Skilled students weld the T position 3 F / PF connection in the TIG and MIG Oxy Asitelin welding process	Welding of the 3F / PF position in the TIG Oxy Asitelin process and MIG welding 1. Preparation of welded materials 2. Welding pressure, current and speed settings 3. Welding techniques and procedures	Lecture [1x50 '] Discussion [1x30 '] Practicum [1x150 '] Conclusion [1x20 ']	Make a summary and description of the material presented in the resume book Practicum welds T Position 3 F / PF joints in the TIG and MIG Oxy Asitelin welding process	Oral and written and practicum	RU-1 and 2
(7)	CLO-3: [CP-3.1, 3.2, 3.3, 3.4, 6.3.]	Weld the T Connection 4F / PE Position in the TIG Oxy	Lecture [1x50 '] Discussion [1x30 ']	Make a summary and description of the	Oral and written and practicum	RU-1 and 2

Week	Expected competencies	Topics	Method and strategy for learning	Assignment	Criterion / Assessment indicator	References
	Skilled students weld the 4F / PE position T connection in the TIG and MIG Oxy Asitelin Welding process	Asitelin and MIG welding processes 1. Preparation of welded materials 2. Welding pressure, current and speed settings 3. Welding techniques and procedures	Practicum [1x150 ' Conclusion [1x20 '	material presented in the resume book Practicum Weld the 4F / PE Position T Connection in the TIG and MIG Oxy Asitelin Welding process		
(8)	Mid-Semester Evaluation through Mid-Semester Examination					
(9)	CLO-3: [CP-3.1, 3.2, 3.3, 3.4, 6.3.] Skilled students weld the 1G / PA position V connection in the TIG and MIG and Oxy Asitelin welding process	Weld the Connection V Position 1G / PA In the TIG and MIG Oxy Asitelin welding process 1. Preparation of welded materials 2. Welding pressure, current and speed settings 3. Welding techniques and procedures	Lecture [1x50 ' Discussion [1x30 ' Practicum [1x150 ' Conclusion [1x20 '	Make a summary and description of the material presented in the resume book Practicum welding of 1G / PA position V connection on TIG and MIG and Oxy Asitelin welding process	Oral and written and practicum	RU-1 and 2
(10)	CLO-3: [CP-3.1, 3.2, 3.3, 3.4, 6.3.] Skilled Students Weld the V Position 2G / PC Connection in the Welding Process of Oxy Asitelin TIG and MIG and Oxy Asitelin	Weld the V position 2G / PC connection in the Oxy Asitelin TIG and MIG welding process 1. Preparation of welded materials 2. Welding pressure, current and speed settings 3. Welding techniques and procedures	Lecture [1x50 ' Discussion [1x30 ' Practicum [1x150 ' Conclusion [1x20 '	Make a summary and description of the material presented in the resume book Practical welding of V position 2G / PC connection in TIG and MIG and Oxy Asitelin welding process	Oral and written and practicum	RU-1 and 2
(11)	CLO-3: [CP-3.1, 3.2, 3.3, 3.4, 6.3.] Skilled Students Weld the V	Weld the V Position 3G / PF Connection in the TIG and MIG Oxy Asitelin welding	Lecture [1x50 ' Discussion [1x30 ' Practicum [1x150 '	Make a summary and description of the material presented in	Oral and written and practicum	RU-1 and 2

Week	Expected competencies	Topics	Method and strategy for learning	Assignment	Criterion / Assessment indicator	References
	Position 3G / PF Connection in the Welding Process of Oxy Asitelin TIG and MIG and Oxy Asitelin	process 1. Preparation of welded materials 2. Welding pressure, current and speed settings 3. Welding techniques and procedures	Conclusion [1x20 ']	the resume book Practicum Weld the V Position 3G / PF Connection in the Welding Process of Oxy Asitelin TIG and MIG and Oxy Asitelin		
(12)	CLO-3: [CP-3.1, 3.2, 3.3, 3.4, 6.3.] Skilled Students Weld the V Position 4G / PE Connection in the TIG and MIG Oxy Asitelin Welding process	Weld the V Position 4G / PE Connection in the TIG and MIG Oxy Asitelin welding process 1. Preparation of welded materials 2. Welding pressure, current and speed settings 3. Welding techniques and procedures	Lecture [1x50 '] Discussion [1x30 '] Practicum [1x150 '] Conclusion [1x20 ']	Make a summary and description of the material presented in the resume book Practicum Weld the V Position 4G / PE Connection in the TIG and MIG Oxy Asitelin Welding process	Oral and written and practicum	RU-1 and 2
(13)	CLO-3: [CP-3.1, 3.2, 3.3, 3.4, 6.3.] Skilled students weld 5G / PB V position pipe connections in the TIG and MIG Oxy Asitelin Welding process	Weld Pipe Connection V Position 5G / PB In the Oxy Asitelin TIG and MIG welding process 1. Preparation of welded materials 2. Welding pressure, current and speed settings 3. Welding techniques and procedures	Lecture [1x50 '] Discussion [1x30 '] Practicum [1x150 '] Conclusion [1x20 ']	Make a summary and description of the material presented in the resume book Practicum Weld Pipe Connection V Position 5G / PB in the TIG and MIG Oxy Asitelin Welding process	Oral and written and practicum	RU-1 and 2
(14)	CLO-3: [CP-3.1, 3.2, 3.3, 3.4, 6.3.] Skilled students weld pipe joints V position 6 G HL 45 in the TIG and MIG Oxy Asitelin welding process	Weld Pipe Joints V Position 6G HL-45 In the Oxy Asitelin TIG and MIG welding process 1. Preparation of welded materials 2. Welding pressure, current and speed settings	Lecture [1x50 '] Discussion [1x30 '] Practicum [1x150 '] Conclusion [1x20 ']	Make a summary and description of the material presented in the resume book Practicum Weld Pipe Connection V Position 6 G HL 45 in TIG and MIG	Oral and written and practicum	RU-1 and 2

Week	Expected competencies	Topics	Method and strategy for learning	Assignment	Criterion / Assessment indicator	References
		3. Welding techniques and procedures		Oxy Asitelin Welding process		
(15)	CLO-4: [CP-2.1, 2.2, 2.3, 3.1, 3.2, 3.3, 3.4, 6.3] Skilled students make learning plans for the welding process of TIG and MIG Oxy Asitelin welding	Creating a learning design for the TIG and MIG Welding Oxy Asitelin process 1. Material preparation 2. Setting the stages of learning 3. Techniques and procedures for making learning designs	Lecture [1x50 ' Discussion [1x30 ' Practicum [1x150 ' Conclusion [1x20 '	Make a summary and description of the material presented in the resume book Practicum create a lesson plan for the welding process of the TIG and MIG Oxy Asitelin Welding	Oral and written and practicum	RU-1 and 2
(16)	CLO-4: [CP-2.1, 2.2, 2.3, 3.1, 3.2, 3.3, 3.4, 6.3] Skilled students demonstrate the welding process of Oxy Asitelin TIG and MIG	Demonstration method for TIG and MIG Welding Oxy Asitelin processes 1. Preparation of demonstrated materials 2. Setting of learning stages 15.3 Demonstration techniques and procedures	Lecture [1x50 ' Discussion [1x30 ' Practicum [1x150 ' Conclusion [1x20 '	Make a summary and description of the material presented in the resume book Practicum demonstrated the Oxy Asitelin TIG and MIG welding process	Oral and written and practicum	RU-1 and 2
(17)	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

MSN1.6 2.4007	Assessment	Ponit (%)	PLO-1			PLO-2			PLO-3				PLO-4			PLO-5			PLO-6			PLO-7			
			1	2	3	1	2	3	1	2	3	4	1	2	3	1	2	3	1	2	3	1	2	3	
CLO-1	UTS. 2.1, 2.2, 2.3	4				V	V	V																	
CLO-2	UTS. 2.1, 2.2, 2.3	4				V	V	V																	
CLO-3	UTS. 2.1, 2.2, 2.3	4				V	V	V																	
CLO-3	UTS. 2.1, 2.2, 2.3	3				V	V	V																	
CLO-3	UTS. 2.1, 2.2, 2.3	3				V	V	V																	
CLO-3	UTS. 2.1, 2.2, 2.3	3				V	V	V																	
CLO-3	UTS.2.1, 2.2, 2.3	3				V	V	V																	
CLO-3	UAS. 2.1, 2.2, 2.3	4				V	V	V																	
CLO-3	UAS. 2.1, 2.2, 2.3	4				V	V	V																	
CLO-3	UAS. 2.1, 2.2, 2.3	4				V	V	V																	
CLO-3	UAS. 2.1, 2.2, 2.3	3				V	V	V																	
CLO-3	UAS. 2.1, 2.2, 2.3	3				V	V	V																	
CLO-3	UAS. 2.1, 2.2, 2.3	3				V	V	V																	
CLO-3	UAS. 2.1, 2.2, 2.3	3				V	V	V																	
CLO-4	UAS. 2.1, 2.2, 2.3	3				V	V	V																	
CLO-3	Job Practicum	40				V	V	V	V	V	V	V												V	
Presence		10																							
TOTAL		100																							

Assessment Component

- Midterm exam (UTS) : 25%
- Final exams (UAS) : 25%
- Assignment : 40%
- 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 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	-	Postpone
60 – 64	C+	2.3	Acceptable				

