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		
Research methodology	MES1.61.6105	Compulsory Courses Supporting tools	2	0	6	1
Responsible	Prof. Suparno, M.Pd; Dr. Mulianti, M.Pd; Sri Rizki Putri Primandari, MT, Ph.D.		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. Be able to describe the scientific approach in a study	2.1; 2.2; 2.3; 6.3
2. Mastering research problems	2.1; 2.2; 2.3; 6.3
3. Be able to identify research variables	2.1; 6.3
4. Be able to identify literature reviews that are relevant to research	2.1; 6.3
5. Mastering a frame of mind in a study	2.1; 2.2; 2.3; 6.3
6. Be able to describe the hypothesis	2.1; 6.3
7. Be able to describe the methodology	2.1; 6.3
8. Able to identify population, research sample and sampling technique	2.1; 6.3

	9. Mastering research instruments	2.1; 2.2; 2.3; 6.3
	10. Mastering data and appropriate data analysis techniques	1.1; 6.3
	11. Able to implement statistics in data analysis techniques using SPSS	1.1; 5.3

Course descriptions	This course is a field of study that applies research theories in writing a Jigsaw-based cooperative research proposal which includes a scientific approach, basic research concepts, general problems and research problems, variables, literature review, frame of mind, hypotheses, population and samples. research, instrumentation, data and analysis.
References	**Main Reference (RU):**
	1. Creswell, John W. (2019). Research Design. Approaches to Qualitative, Quantitative and Mixed Methods. Translated: Achmad Fawaid and Rianayati Kusmini Pancasari. Mold IV. Yogyakarta: Student Library.
	2. Sugiyono. (2019). Educational research methods (quantitative, qualitative, combination, R&D and educational research). Bandung: Alfabeta.
	Additional Reference (RP)
	1. Suharsimi Arikunto. (2010). Research Procedure A Practical Approach. Revised edition 2010 Jakarta: BinaAksara.
Learning Media	**Software:** **Hardware:**

	SPSS	Computer, LCD Projector and Whiteboard and peripherals
Team Teaching	Prof. Suparno, M.Pd; Dr. Mulianti, M.Pd; Sri Rizki Putri Primandari, MT, Ph.D.	
Assessment	UTS, UAS, Assignments and group presentations	
Requirements Subject		

COURSE OBJECTS

Week	Expected competencies	Topics	Method and strategy for leraning	Assignment	Criterion / Assessment indicattor	References
(1)	**CLO-1:** Students are able to describe a scientific approach in a study	Course description, scope of research methods	Material explanation **[60 ']** Question and answer **[1x40 ']**	• Make a summary and description of the material presented in the resume book	Be able to describe courses and define the scope of research methods	RU-1, RU-2, RP-1

Week	Expected competencies	Topics	Method and strategy for leraning	Assignment	Criterion / Assessment indicattor	References
(2)	**CLO-1:** Students are able to describe a scientific approach in a study	Understanding science and logic, the essence of truth, theories of truth according to philosophy, inductive and deductive thinking, scientific essence	Material explanation **[60 ']** Question and answer **[1x10 ']** group discussion **[1x30 ']**	• Make a summary and description of the material presented in the resume book • Group discussion about Understanding science and logic, the essence of truth, theories of truth according to philosophy, inductive and deductive thinking, scientific essence	Able to describe science and logic, the essence of truth in a, describe the theories of truth according to philosophy, think inductively and deductively, the essence of science	RU-1, RU-2, RP-1
(3)	**CLO-1:** Students are able to describe a scientific approach in a study	Understanding the scientific method, research methods and research taxonomy, drawing conclusions	Material explanation **[60 ']** Question and answer **[1x10 ']** group discussion **[1x30 ']**	• Make a summary and description of the material presented in the resume book • Group discussion about scientific method, research methods and research taxonomy, drawing conclusions	Able to describe scientific method, research methods and research taxonomy, drawing conclusions	RU-1, RU-2, RP-1

Week	Expected competencies	Topics	Method and strategy for leraning	Assignment	Criterion / Assessment indicattor	References
(4)	**CLO-2:** Students master research problems	Definition of general problems and research problems, sources of problems, types of problems, problem criteria, how to identify problems in research, characteristics of problems, form of problems and problem backgrounds	Material explanation **[60 ']** Question and answer **[1x10 ']** group discussion **[1x30 ']**	• Make a summary and description of the material presented in the resume book • Group discussion on general problems and research problems, source of problems, types of problems, problem criteria, how to identify problems in research, characteristics of problems, form of problems and background of problems	Dominategeneral problems and research problems, the source of the problem, the type of problem, the problem criteria, how to identify problems in the research, the characteristics of the problem, the form of the problem and the background of the problem	RU-1, RU-2, RP-1
(5)	**CLO-2:** Students master research problems	Identification of the research problem, the scope of the research problem, the formulation of the problem, the forms of problem formulation, the things that need to be considered in	Material explanation **[60 ']** Question and answer **[1x10 ']** group discussion **[1x30 ']**	• Make a summary and description of the material presented in the resume book • Group discussion about Identification of the research problem, the scope of the research problem, the	Able to wheezeidentification of the research problem, the scope of the research problem, the formulation of the problem, the forms of problem formulation, the things that need to be considered in making the	RU-1, RU-2, RP-1

Week	Expected competencies	Topics	Method and strategy for leraning	Assignment	Criterion / Assessment indicattor	References
		making the problem formulation		formulation of the problem, the forms of problem formulation, the things that need to be considered in making the problem formulation	problem formulation	
(6)	**CLO-3** Students are able to identify research variables	Definition of variables, operational definitions, types of variables, measurement of variables, correlation between variables, paradigms	Material explanation **[60 ']** Question and answer **[1x10 ']** group discussion **[1x30 ']**	• Make a summary and description of the material presented in the resume book • Group discussion about variables, operational definitions, variable types, variable measurement, correlation between variables, paradigms	Be able to identify variables, operational definitions, variable types, variable measurement, correlation between variables, paradigms	RU-1, RU-2, RP-1
7	**CLO-4** Students are able to identify literature reviews that are relevant to research	Definition, function and writing of literature reviews, ways of the relevance of the theory of literature review, the role of	Material explanation **[60 ']** Question and answer **[1x10 ']** group discussion **[1x30 ']**	• Make a summary and description of the material presented in the resume book • Group discussion about pThe meaning, function and writing of literature	Be able to identify function and write literature reviews, ways of the relevance of the theory of literature review, the role of theory in research, theory-building	RU-1, RU-2, RP-1

Week	Expected competencies	Topics	Method and strategy for leraning	Assignment	Criterion / Assessment indicattor	References
		theory in research, theory preparation procedures		reviews, ways of relevance of literature review theory, the role of theory in research, theory-building procedures	procedures	
(8)	MID-TEST EXAM					
(9)	**CLO-5** Students master the frame of mind in a study	Understanding a frame of mind, compiling a research frame of mind, examples of writing a frame of mind, misusing theory in a framework of thinking	Material explanation **[60 ']** Question and answer **[1x10 ']** group discussion **[1x30 ']**	• Make a summary and description of the material presented in the resume book • Group discussion about framework of thinking, compiling a research frame of mind, examples of writing a frame of mind, misuse of theory in a framework of thinking	Dominate framework of thinking, compiling a research frame of mind, examples of writing a frame of mind, misuse of theory in a framework of thinking	RU-1, RU-2, RP-1

Week	Expected competencies	Topics	Method and strategy for leraning	Assignment	Criterion / Assessment indicattor	References
(10)	**CLO-6** Students are able to describe the hypothesis	Definition, function and characteristics of hypotheses, explanation of good hypotheses, testing hypotheses, role of hypotheses in research, types of hypotheses	Material explanation **[60 ']** Question and answer **[1x10 ']** group discussion **[1x30 ']**	• Make a summary and description of the material presented in the resume book • Group discussion about pThe definition, function and characteristics of hypotheses, good hypotheses, testing hypotheses, the role of hypotheses in research, types of hypotheses	Able to describe functions and characteristics of hypotheses, good hypotheses, testing hypotheses, the role of hypotheses in research, types of hypotheses	RU-1, RU-2, RP-1
(11)	**CLO-7** Students are able to describe the methodology	Definition of methodology, research design, research design grouping, research objectives, benefits, research approaches, types of research, various research methods, quantitative research and qualitative	Material explanation **[60 ']** Question and answer **[1x10 ']** group discussion **[1x30 ']**	• Make a summary and description of the material presented in the resume book • Group discussion on understanding methodology, research design, research design grouping, research objectives, benefits, research approaches, types of research,	Able to describe methodology, research design, able to identify research designs, research objectives, benefits, research approaches, types of research, various research methods, quantitative research and qualitative research	RU-1, RU-2, RP-1

Week	Expected competencies	Topics	Method and strategy for lerning	Assignment	Criterion / Assessment indicattor	References
		research		various research methods, quantitative research and qualitative research		
(12)	**CLO-8** Students are able to identify populations, samples and sampling techniques	Definition of population and research sample, population characteristics, population types, sampling technique	Material explanation **[60 ']** Question and answer **[1x10 ']** group discussion **[1x30 ']**	• Make a summary and description of the material presented in the resume book • Group discussion about population and research samples, population characteristics, population types, sampling techniques	• Able to define the population and research sample, population nature, able to identify population and sampling technique	RU-1, RU-2, RP-1
(13)	**CLO-9** Students master research instruments	Definition of research instrumentation, types of research instruments, selection of data collection instruments, instrument requirements and	Material explanation **[60 ']** Question and answer **[1x10 ']** group discussion **[1x30 ']**	• Make a summary and description of the material presented in the resume book • Group discussion about research instrumentation, types of research instruments, selection of data collection	Dominate research instrumentation, types of research instruments, selection of data collection instruments, instrument requirements and instrument preparation	RU-1, RU-2, RP-1

Week	Expected competencies	Topics	Method and strategy for leraning	Assignment	Criterion / Assessment indicattor	References
		instrument preparation		instruments, instrument requirements and instrument preparation		
(14)	**CLO-10** Students master data and appropriate data analysis techniques	Definition of data, data sources and data hierarchies, types of data, distribution of data according to the time of collection, collection sources and measurement scale, data collection techniques and objectives, data analysis and functions	Material explanation **[60 ']** Question and answer **[1x10 ']** group discussion **[1x30 ']**	• Make a summary and description of the material presented in the resume book • Group discussion about data, data sources and data hierarchies, types of data, distribution of data according to the time of collection, collection sources and measurement scales, data collection techniques and objectives, data analysis and functions	Able to describe data, data sources, identify data types, sharing data according to the time of collection, source of collection and scale of measurement, mastering techniques and data collection objectives, functions and data analysis	RU-1, RU-2, RP-1
(15)	**CLO-11:** Able to implement statistics in data analysis techniques using SPSS	Definition of data analysis, types of data analysis, advantages of data analysis, data analysis steps and	Material explanation **[60 ']** Question and answer **[1x10 ']**	• Make a summary and description of the material presented in the resume book • Exercise using SPSs software to analyze	Able to analyze and evaluate data with The appropriate analysis technique is using SPSS software	RU-1, RU-2, RP-1

Week	Expected competencies	Topics	Method and strategy for leraning	Assignment	Criterion / Assessment indicattor	References
		procedures, data analysis techniques, understanding of mean, median and mode, T test	group discussion **[1x30 ']**	data		
(16)	**Final Exam**					

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)

The linkage between CLO and PLO and assessment methods

MES1.61.6105	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	UTS 1; UTS 2	10				V	V	V													V		
CLO-2.1	UTS 2; UTS 3	10				V															V		
CLO-2.2	Duty	5					V														V		
CLO-2.3	Duty	6				V	V	V													V		
CLO-3	UTS 5.a	4				V															V		
CLO-4	UTS 5.b	6				V															V		
CLO-5.1	UAS 1	4				V															V		
CLO-5.2	Duty	5				V	V	V													V		

CLO	Component	Weight																								
CLO-6	UAS 2	4				V																		V		
CLO-7	UAS 3	5				V																		V		
CLO-8	UAS 4	5				V																		V		
CLO-9.1	UAS 5.a	5				V																		V		
CLO-9.2	Duty	1				V	V	V																V		
CLO-9.3	Duty	5				V	V	V																V		
CLO-10.1	UAS 5.b	2	V																					V		
CLO-10.2	UAS 5.c	5	V																					V		
CLO-11	Duty	13	V																	V						
Presence		5																								
TOTAL		100																								

Assessment Components

Midterm exam : 30%

Final exams   : 30%

Duty   : 35%

Presence   : 5%

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				