



Universitas Negeri Surabaya
Faculty of Postgraduate School,
Master of Technology and Vocational Education Study Program

Document Code

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date
Fuel and Lubricants)	8310102002		T=2	P=0	ECTS=4.48	2	July 18, 2024
AUTHORIZATION		SP Developer		Course Cluster Coordinator		Study Program Coordinator	
			Dr. Ir. Achmad Imam Agung, M.Pd.	
Learning model	Project Based Learning						
Program Learning Outcomes (PLO)	PLO study program that is charged to the course						
	Program Objectives (PO)						
	PLO-PO Matrix						
		P.O					
Short Course Description	Fuels and Lubricants is a mandatory subject that Mechanical Engineering students need to study because graduates who will work in industry will later be involved in machinery such as power plants. Most generators use solid, liquid, or gas fuels. College graduates who will become STM teachers must be equipped with this knowledge because STM graduates will also work in industry. Land, sea and air transportation also use engines which definitely require fuel. Lubrication is also important because the effect of engine parts rubbing together creates heat, heat causes engine performance to decrease, especially if it overheats. Therefore, it is necessary to try to cool and lubricate the rubbing parts.						
	References						
References	Main :						
	1. 1. Malev., 1985., Internal Combustion Engine., Mac Graw Hill Book Company 2. Djordjevic, Z, et.all., 2001., Situation and Prospect of preparation and Processing of Coal., VI Colloquium on Preparation of Ores., Belgrade. 3. API 1509, Engine Oil Licensing and Certification System, 15th Edition, 2002. Appendix E, API Base Oil Interchangeability Guidelines for Passenger Car Motor Oils and Diesel Engine Oils (revised) 4. http://pubs.acs.org/cgi-bin/article.cgi/esthag/2004/38/i02/pdf/es034236p.pdf						
Supporting lecturer	Supporters:						
	Prof. Dr. Ir. I Wayan Susila, M.T.						
Week-	Final abilities of each learning stage (Sub-PO)	Evaluation		Help Learning, Learning methods, Student Assignments, [Estimated time]		Learning materials [References]	Assessment Weight (%)
		Indicator	Criteria & Form	Offline (offline)	Online (online)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)

1	Formulate the concept of lubrication	1.1 Able to understand and explain the importance of lubrication in machines. 1.2 Able to arrange machine parts that need lubrication 2.1 Able to analyze various types of lubricant materials. Characteristics, and requirements of lubricant materials	Criteria: Assessment of the level of student participation in terms of attendance/lectures, practice, activeness in attending lectures (asking questions, paying attention, and being serious), and activeness in group discussion activities and class presentations.	Reading literature and listening to students' explanations Reading literature, counting case examples, peer discussion, and Q&A Reading literature, counting case examples, peer discussion, and Q&A 2 X 50			0%
2	Formulate the concept of lubrication	1.1 Able to understand and explain the importance of lubrication in machines. 1.2 Able to arrange machine parts that need lubrication 2.1 Able to analyze various types of lubricant materials. Characteristics, and requirements of lubricant materials	Criteria: Assessment of the level of student participation in terms of attendance/lectures, practice, activeness in attending lectures (asking questions, paying attention, and being serious), and activeness in group discussion activities and class presentations.	Reading literature and listening to students' explanations Reading literature, counting case examples, peer discussion, and Q&A Reading literature, counting case examples, peer discussion, and Q&A 2 X 50			0%
3	Understand and analyze the characteristics of solid, liquid and gas fuels.	3.1 Able to understand fuel characteristics 3.2 Able to explain and analyze the chemical composition of solid, liquid and gas fuels and the influence of chemical elements in the combustion process	Criteria: Assessment of the level of student participation in terms of attendance/lectures, practice, activeness in attending lectures (asking questions, paying attention, and being serious), and activeness in group discussion activities and class presentations.	: Reading literature and listening to students' explanations 2 X 50			0%
4	: Describe the types of coal	: 4.1 Able to understand and differentiate between types of coal and their properties.	Criteria: Assessment of the level of student participation in terms of attendance/lectures, practice, activeness in attending lectures (asking questions, paying attention, and being serious), and activeness in group discussion activities and class presentations.	Reading literature and listening to students' explanations 2 X 50			0%
5	Understand how to analyze coal quality	5.1 Able to understand and explain how to analyze coal quality and the differences between these methods/ 5.2 Able to describe and analyze coal quality	Criteria: Attendance, activeness in questions and answers, seriousness in attending lectures, according to scoring guidelines and presentation rubrics. Full marks are obtained if you do all the questions correctly. Full marks are obtained if you do all the questions correctly.	Reading literature, counting case examples, peer discussions, and 2 X 50 questions and answers			0%

6	: Describes BBM liquid fuel	Able to understand, describe and classify various types of fuel 6.2 Able to understand, describe and classify gasoline fuel 7.1 Able to identify and classify various types of gasoline Able to describe and differentiate types of gasoline from one another	Criteria: Assessment of the level of student participation in terms of attendance/lectures, practice, activeness in attending lectures (asking questions, paying attention, and being serious), and activeness in group discussion activities and class presentations.	Students are given different case studies for their groups, each group must work together to analyze, calculate, and complete the case studies. 2 X 50			0%
7	: Describes BBM liquid fuel	Able to understand, describe and classify various types of fuel 6.2 Able to understand, describe and classify gasoline fuel 7.1 Able to identify and classify various types of gasoline Able to describe and differentiate types of gasoline from one another	Criteria: Assessment of the level of student participation in terms of attendance/lectures, practice, activeness in attending lectures (asking questions, paying attention, and being serious), and activeness in group discussion activities and class presentations.	Students are given different case studies for their groups, each group must work together to analyze, calculate, and complete the case studies. 2 X 50			0%
8	UTS Midterm Exam			2 X 50			0%
9	: Understand fuel limitations	9.1 Able to understand fuel limitations. 9.2 Able to understand the causes of fuel limitations	Criteria: Assessment of the level of student participation in terms of attendance/lectures, practice, activeness in attending lectures (asking questions, paying attention, and being serious), and activeness in group discussion activities and class presentations.	Reading literature, counting case examples, peer discussions, and 2 X 50 questions and answers			0%
10	: Understanding and analyzing biodiesel fuel	10.1 Able to produce biodiesel from various agricultural and industrial waste 10.2 Able to analyze the chemical elements in biodiesel,	Criteria: Assessment of the level of student participation in terms of attendance/lectures, practice, activeness in attending lectures (asking questions, paying attention, and being serious), and activeness in group discussion activities and class presentations.	Reading literature, counting case examples, peer discussions, and Q&A Peer discussions, various forms of Q&A 2 X 50			0%
11	Producing bioethanol fuel	11.1 Be able to explain how to produce bioethanol from agricultural and industrial waste. 11.2 Able to analyze the advantages and disadvantages of bioethanol fuel as a substitute for gasoline. 12.1 Able to analyze and formulate the combustion reaction of bioethanol fuel and the resulting exhaust emissions.	Criteria: Assessment of the level of student participation in terms of attendance/lectures, practice, activeness in attending lectures (asking questions, paying attention, and being serious), and activeness in group discussion activities and class presentations.	Reading literature, listening to student explanations, counting case examples, peer discussion, and peer discussion, and Q&A 2 X 50			0%

12	Producing bioethanol fuel	11.1 Be able to explain how to produce bioethanol from agricultural and industrial waste. 11.2 Able to analyze the advantages and disadvantages of bioethanol fuel as a substitute for gasoline. 12.1 Able to analyze and formulate the combustion reaction of bioethanol fuel and the resulting exhaust emissions.	Criteria: Assessment of the level of student participation in terms of attendance/lectures, practice, activeness in attending lectures (asking questions, paying attention, and being serious), and activeness in group discussion activities and class presentations.	Reading literature, listening to student explanations, counting case examples, peer discussion, and peer discussion, and Q&A 2 X 50			0%
13	: Understand the basic concepts of gas fuel or biogas	: 13.1 Able to understand the basic concepts of how to produce biogas fuel	Criteria: In accordance with the scoring guidelines and presentation rubric, full marks are obtained if you do all the questions correctly, full marks are obtained if you do all the questions correctly, attendance and assignments given to each group/independent written test, oral test, sub-summative exam, summative exam.	Reading literature, 2 X 50			0%
14	Analyzing biomass fuel	14.1 Able to understand how fuel is produced from biomass. 14.2 Able to analyze the chemical elements in biomass fuel.	Criteria: In accordance with the scoring guidelines and presentation rubric, full marks are obtained if you do all the questions correctly, full marks are obtained if you do all the questions correctly, attendance and assignments given to each group/independent written test, oral test, sub-summative exam, summative exam.	Reading literature, counting case examples, peer discussions, and 2 X 50 questions and answers			0%
15	Producing bioavtur fuel	15.1 Able to analyze bioavtur fuel production methods 15.2 Able to analyze raw material requirements to make bioavtur for aircraft fuel	Criteria: Assessment of the level of student participation in terms of attendance/lectures, practice, activeness in attending lectures (asking questions, paying attention, and being serious), and activeness in group discussion activities and class presentations.	Reading literature and listening to students' explanations Reading literature, peer discussion, and Q&A 2 X 50			0%
16							0%

Evaluation Percentage Recap: Project Based Learning

No	Evaluation	Percentage
		0%

Notes

- 1. Learning Outcomes of Study Program Graduates (PLO - Study Program)** are the abilities possessed by each Study Program graduate which are the internalization of attitudes, mastery of knowledge and skills according to the level of their study program obtained through the learning process.
- 2. The PLO imposed on courses** are several learning outcomes of study program graduates (CPL-Study Program) which are used for the formation/development of a course consisting of aspects of attitude, general skills, special skills and knowledge.

3. **Program Objectives (PO)** are abilities that are specifically described from the PLO assigned to a course, and are specific to the study material or learning materials for that course.
4. **Subject Sub-PO (Sub-PO)** is a capability that is specifically described from the PO that can be measured or observed and is the final ability that is planned at each learning stage, and is specific to the learning material of the course.
5. **Indicators for assessing** ability in the process and student learning outcomes are specific and measurable statements that identify the ability or performance of student learning outcomes accompanied by evidence.
6. **Assessment Criteria** are benchmarks used as a measure or measure of learning achievement in assessments based on predetermined indicators. Assessment criteria are guidelines for assessors so that assessments are consistent and unbiased. Criteria can be quantitative or qualitative.
7. **Forms of assessment:** test and non-test.
8. **Forms of learning:** Lecture, Response, Tutorial, Seminar or equivalent, Practicum, Studio Practice, Workshop Practice, Field Practice, Research, Community Service and/or other equivalent forms of learning.
9. **Learning Methods:** Small Group Discussion, Role-Play & Simulation, Discovery Learning, Self-Directed Learning, Cooperative Learning, Collaborative Learning, Contextual Learning, Project Based Learning, and other equivalent methods.
10. **Learning materials** are details or descriptions of study materials which can be presented in the form of several main points and sub-topics.
11. **The assessment weight** is the percentage of assessment of each sub-PO achievement whose size is proportional to the level of difficulty of achieving that sub-PO, and the total is 100%.
12. TM=Face to face, PT=Structured assignments, BM=Independent study.