

COURSE INFORMATION

Department/ Faculty:	Energy Engineering/Faculty of Chemical and Energy Engineering	Page:	1 of 5
Course code:	SETG 2133	Academic Session/Semester:	2024/2025 -2
Course name:	Combustion Engineering and Gas Utilisation	Pre/co requisite (course name and code):	None
Credit hours:	3 Credits		

Course synopsis	This course enables students to understand the basic concept of combustion and related calculations as well as to expose them to the concept of flame, explosion, and detonation and its related safety aspects. In addition, it permits students to explain the use of gaseous fuels and its related energy generating technologies and equipment. The important concept and methods of fuel inter-changeability will be highlighted. The course also covers some fundamental aspects of gas utilization and equipment for various applications.			
Course owner	Ts. Dr. Miss Hasimawaty Mat Kiah			
Course lecturer(s)	Name	Office	Contact no.	E-mail
	Dr. Mohd Nazri Mohd Sokri	N01-243	017-7996378	nazrisokri@utm.my
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Mapping of the Course Learning Outcomes (CLO) to the Programme Learning Outcomes (PLO), Teaching & Learning (T&L) methods and Assessment methods:

No.	CLO	PLO	Weight (%)	Taxonomies and generic skills	T&L methods	Assessment methods
CLO1	Explain the origin and importance of different resources of energy and general fossil fuel properties	PLO1 (KW)	5 %	C2 (Comprehend)	Active learning	AS, Q, T, F
CLO2	Explain and compare the fundamental knowledge of combustion, flame and explosion including basic terminologies, mechanism and parameters and related properties	PLO1 (KW)	15%	C4 (Analyse)	Active learning	AS, Q, T, F
CLO3	Calculate the various physical and chemical properties of fossil fuels and combustion-related properties	PLO2 (THPA)	20%	C3 (Solve)	Active learning	AS, Q, T, F
CLO4	Perform and analyse the mass and energy balance calculations of a system involving combustion reaction	PLO2 (THPA)	20%	C4 (Analyse)	Active learning	AS, Q, T, F
CLO5	Explain the fundamental concept of fuel inter-	PLO2 (THPA)	15%	C3 (Solve)	Active learning	AS, Q, T, F

Prepared by:	Certified by:
Name: Ts. Dr. Miss Hasimawaty Mat Kiah	Name: Assoc. Prof. Dr. Hasrinah Hasbullah
Signature:	Signature:
Date: 13 th March 2024	Date:

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	changeability and perform gas burner conversion calculations					
CLO6	Discuss and compare the various uses and factors affecting the use of natural gas in various sectors as well as describe and compare energy generating equipment used in each sector of natural gas utilization	PLO1 (KW)	15%	C4 (Analyse)	Active learning	AS, Q, T, F
CLO7	Cooperate in a team to complete case studies, assignments, etc.	PLO10 (TW)	10%	A3 (Commit)	Project-based learning	PR, Microsoft Excel
T – Test; Q – Quiz; AS – Assignment; PR – Project; Pr – Presentation; F – Final Exam						

Program Learning Outcomes (PLO) related to the course:

- PLO1** Apply general knowledge, sciences, engineering fundamentals and chemical engineering principles to solve complex chemical engineering problems.
- PLO2** Identify, formulate, conduct research literature, and analyze complex engineering problems using first principles of mathematics and engineering sciences
- PLO10** Work independently, and as a member or a leader in a team to manage project in multi-disciplinary environment.

Details on Innovative T&L practices:

No.	Type	Implementation
1.	Student-centered learning - cooperative learning, active learning	In-class activities, test, assignment, quiz, final examination
2.	Project-based learning	Mini project, problem solving through Excel spreadsheet and presentation

Weekly Schedule:

Time		Topics	Learning outcome - It is expected that students will be able to
Week 1	1.0	Energy and Fuel	explain the origin and importance of different resources of energy and general fossil fuel properties
Week 2-4	2.0	Fundamentals of Combustion, Fire and Explosion	explain and compare the fundamental knowledge of combustion, fire and explosion including basic terminologies, mechanism and parameters and related properties

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Week 5-7		3.0	Combustion-Related Fuel Property Calculations	calculate and compare the various physical and chemical properties of fossil fuels and combustion-related properties
Week 8-10		4.0	Combustion Calculations – Mass and Energy Balance	perform and analyse the mass and energy balance calculations of a system involving combustion reaction
Week 11-12		5.0	Gas Burner Conversion	explain the fundamental concept of fuel inter-changeability and perform gas burner conversion calculations
Week 13-14		6.0	Natural Gas Utilisation & Equipment	discuss the various uses and factors affecting the use of natural gas in various sectors as well as describe and compare energy generating equipment used in each sector of natural gas utilization.

Transferable skills (generic skills learned in course of study which can be useful and utilised in other settings):

By the end of the course, students shall

1. apply general knowledge, sciences, engineering fundamentals and chemical engineering principles to solve complex chemical engineering problems.
2. identify, formulate, and analyze complex engineering problems using first principles of mathematics and engineering sciences
3. work independently, and as a member or a leader in a team to solve assignments and mini projects.

Student learning time (SLT) details:

Distribution of SLT course outline content					Teaching and Learning Activities		Total SLT
	Guided Learning (face to face)				Guided Learning (non face to face)	Independent Learning (non face to face)	
CLO	L	T	P	O			
CLO1	3					3	6
CLO2	6				6	3	15
CLO3	9			3	6	3	21
CLO4	9			3	6	3	21
CLO5	6			3	6	3	18
CLO6	6					3	15
CLO7				10			10
Total SLT	42			19	30	15	106

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Continuous Assessment		PLO	Percentage	Total SLT (hr)
1	Quiz 1-CLO1	KW	2	0.25
2	Quiz 2-CLO2	KW	2	0.25
3	Quiz 3-CLO3	THPA	3	0.50
4	Quiz 4-CLO4	THPA	3	0.50
5	Quiz 5-CLO5	THPA	2	0.25
7	Quiz 6-CLO6	KW	2	0.25
8	Test 1-CLO1,2	KW	8	0.5
9	Test 1-CLO3	THPA	7	0.5
10	Test 2-CLO4	THPA	7	0.5
11	Test 2-CLO5	THPA	8	0.5
12	Assignment 1-CLO3	THPA	2	2.5
13	Assignment 2-CLO4	THPA	2	2.5
14	Assignment 2-CLO5	THPA	2	2.5
15	Team working –CLO8	TW	10	
Final Assessment		PLO	Percentage	Total SLT
16	Final 1	KW	4	0.25
17	Final 2	THPA	8	0.5
18	Final 3	THPA	8	0.5
19	Final 4	THPA	10	0.625
20	Final 5	KW	10	0.625
Grand Total SLT				120 hrs

Special requirement to deliver the course (e.g.: software, computer lab, simulation room):

Microsoft Excel software

Learning resources:

Text book & Main Reference

1. Azeman Mustafa, **Combustion Engineering and Gas Utilization**, © Teaching Module/Note, SKT, UTM

Additional references

1. Goodger, E.M., *Combustion Calculations*, MacMillan Press Ltd., 1977.
2. Strahle, W.C., *An Introduction to Combustion*, Combustion Science & Technology Book Series, Vol. 1, Gordon and Breach Science Publishings, 1993.
3. Turns, S.R., *An Introduction to Combustion*, Mechanical Engineering Series, McGraw-Hill International Editions, 1996.
4. Cornforth, J.R, *Combustion Engineering and Gas Utilization*, British Gas School of Fuel Management, F & FN Spon Publishing Company Limited, UK, 1992.
5. Natural Gas Utilisation for Industrial Users, TOKYO GAS, 1992.

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Academic honesty and plagiarism:

Copying of work (texts, simulation results etc.) from other students/groups or from other sources is not allowed. Brief quotations are allowed and then only if indicated as such. Existing texts should be reformulated with your own words used to explain what you have read. It is not acceptable to retype existing texts and just acknowledge the source as a reference. Be warned: students who submit copied work will obtain a mark of zero for the assignment and the faculty may take disciplinary steps. It is also unacceptable to do somebody else's work, to lend your work to them or to make your work available to them to copy. The University has a strict policy on academic integrity. Any form of plagiarism or academic dishonesty will NOT be tolerated. If you have any questions, please consult your lecturer.

Other additional information (Course policy, any specific instruction etc.):

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