

SEE4121: GAS ENGINEERING

Effective Term

Semester A 2023/24

Part I Course Overview

Course Title

Gas Engineering

Subject Code

SEE - School of Energy and Environment

Course Number

4121

Academic Unit

School of Energy and Environment (E2)

College/School

School of Energy and Environment (E2)

Course Duration

One Semester

Credit Units

3

Level

B1, B2, B3, B4 - Bachelor's Degree

Medium of Instruction

English

Medium of Assessment

English

Prerequisites

SEE2002 Chemical Sciences for Energy and Environmental Engineers; and
SEE2101 Engineering Thermofluids I

Precursors

Nil

Equivalent Courses

Nil

Exclusive Courses

Nil

Part II Course Details

Abstract

This course is mainly related to gas engineering theories and technologies that are commonly used in our society. Operation principles of basic gas production, gas transportation systems and gas utilization systems, their advantages, and major drawbacks will be taught in the course.

Course Intended Learning Outcomes (CILOs)

CILOs		Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Describe the basic principles of different gases (e.g. Interchangeability of gases, gas measurement fundamental, etc.). Familiarize the world gas and energy market and HK gas regulations.	10		x	
2	Describe the production / extraction principle of different types of gas, conventional and unconventional E.g. NG, LPG, SNG, Town Gas, Coal bed methane, Coke Oven Gas, etc. Perform the HAZOP study and risk assessment of a production plant.	30		x	
3	Describe the gas transportation means. Analyses and design the supply and demand network to household. Identify the innovative technologies used in gas industry.	30		x	
4	Describe and compare different gas utilization systems (domestic, commercial and industrial, gas measurement) and their principles in society.	30		x	

A1: Attitude

Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability

Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

A3: Accomplishments

Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

Teaching and Learning Activities (TLAs)

TLAs		Brief Description	CILO No.	Hours/week (if applicable)
1	Lecture	Explain key concepts, such as theories related to gas engineering	1, 2, 3, 4	3
2	Tutorial, class demo, site visit	Solidify students' concepts with practice	1, 2, 3, 4	

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Assignments Several assignments will be given throughout the semester. Through the assignments, students will demonstrate their understanding of the underlying concepts of the measurements, handling, design, operation, and applications of various gases (gas systems).	1, 2, 3, 4	35	
2	In-class test Students will complete a mid-term test to demonstrate their ability to apply knowledge to analyze and solve problems related to gas engineering.	1, 2, 3, 4	25	

Continuous Assessment (%)

60

Examination (%)

40

Examination Duration (Hours)

2

Additional Information for ATs

Final exam will test students' ability to integrate knowledge learned throughout the course to analyze and solve problems related to gas engineering.

Examination duration: 2 hrs

Percentage of coursework, examination, etc.: 60% by coursework; 40% by exam

To pass a course, a student must do ALL of the following:

- 1) obtain at least 30% of the total marks allocated towards coursework (combination of assignments, pop quizzes, term paper, lab reports and/ or quiz, if applicable);
- 2) obtain at least 30% of the total marks allocated towards final examination (if applicable); and
- 3) meet the criteria listed in the section on Assessment Rubrics.

Assessment Rubrics (AR)**Assessment Task**

1. Assignment

Criterion

Ability to analyze and solve questions related to gas engineering

Excellent (A+, A, A-)

Excellent understanding of concepts and ability to analyze and solve problems related to gas engineering

Good (B+, B, B-)

Good understanding of concepts and ability to analyze and solve problems related to gas engineering

Fair (C+, C, C-)

Acceptable understanding of concepts and ability to analyze and solve problems related to gas engineering

Marginal (D)

Marginally acceptable understanding of concepts and ability to analyze and solve problems related to gas engineering

Failure (F)

Poor understanding of concepts and ability to analyze and solve problems related to gas engineering

Assessment Task

2. In-class test

Criterion

Ability to analyze and solve practical problems related to gas engineering

Excellent (A+, A, A-)

Excellent understanding of concepts and ability to analyze and solve problems related to gas engineering

Good (B+, B, B-)

Good understanding of concepts and ability to analyze and solve problems related to gas engineering

Fair (C+, C, C-)

Acceptable understanding of concepts and ability to analyze and solve problems related to gas engineering

Marginal (D)

Marginally acceptable understanding of concepts and ability to analyze and solve problems related to gas engineering

Failure (F)

Poor understanding of concepts and ability to analyze and solve problems related to gas engineering

Assessment Task

3. Final exam

Criterion

Ability to analyze and solve practical problems related to gas engineering

Excellent (A+, A, A-)

Excellent understanding of concepts and ability to analyze and solve problems related to gas engineering

Good (B+, B, B-)

Good understanding of concepts and ability to analyze and solve problems related to gas engineering

Fair (C+, C, C-)

Acceptable understanding of concepts and ability to analyze and solve problems related to gas engineering

Marginal (D)

Marginally acceptable understanding of concepts and ability to analyze and solve problems related to gas engineering

Failure (F)

Poor understanding of concepts and ability to analyze and solve problems related to gas engineering

Part III Other Information**Keyword Syllabus**

Gas and energy market; interchangeability of gases; gas measurement fundamentals; gas ordinance; gas exploration and production methods; gas plant operation; coal gasification; gas plant maintenance; process safety; gas transportation means; flow properties; gas network development; gas network operation and maintenance; residential gas applications; commercial and industrial gas applications

Reading List**Compulsory Readings**

Title	
1	Nil

Additional Readings

Title	
1	Natural Gas Engineering Handbook, Guo, Boyan, Ghalambor, Ali, 2nd ed. Elsevier Science, 2012.
2	Advanced Natural Gas Engineering, Wang, Xiuli, Economides, Michael. Elsevier Science, 2013
3	Natural Gas Engineering and Safety Challenges: Downstream Process, Analysis, Utilization and Safety, Nasr, G.G., Connor, N. E., Springer 2014
4	Combustion Engineering and Gas Utilisation, third edition, edited by J. R. Cornforth, British Gas
5	Gas Engineers Handbook, Industrial Press Inc. (1968)
6	Tolley' s Domestic Gas Installation Practice (Gas Service Technology Volume 2), Edited by Frank Saxon