SEE3101: ENGINEERING THERMOFLUIDS II

Effective Term
Semester A 2025/26

Part I Course Overview

Course Title
Engineering Thermofluids II

Subject Code
SEE - School of Energy and Environment
Course Number
3101

Academic Unit
School of Energy and Environment (E2)

College/School
School of Energy and Environment (E2)

Course Duration
One Semester

Credit Units
4

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

Medium of Instruction
English

Medium of Assessment
English

Prerequisites
SEE2101 Engineering Thermofluids I

Precursors
Nil

Equivalent Courses
Nil

Exclusive Courses
Nil

Part II Course Details

Abstract
Building on the basic principles developed in SEE2101 Engineering Thermofluids I, the course aims to educate students on the intermediate level fluid mechanics as well as heat and mass transfer. Focusing on various applications such as pumps,

turbines, heat exchangers and distillation, the course will help students in building a strong appreciation for fundamentals thermosciences, as well as its practical and creative nature in complex processes.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Apply the principles of fluid mechanics to analyze problems related to energy and environment applications.	40		x	
2	Apply the principles of heat transfer in the designs of heat exchangers and other innovative applications.	30		x	
3	Describe the principles of mass transfer and its analogy with heat transfer, and apply in various problems such as distillation columns, as well as other innovative applications.	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.

Learning and Teaching Activities (LTAs)

	LTAs	Brief Description	CILO No.	Hours/week (if applicable)
1	Lectures	Students will engage in lectures which cover theories and concepts of fluid mechanics, heat transfer and mass transfer.	1, 2, 3	
2	Tutorials	Students will engage in the application of theories and concepts in fluid mechanics, heat transfer and mass transfer in practical working examples	1, 2, 3	
3	Lab-based experiment	Students will apply the theories and concepts fluid mechanics, heat transfer and mass transfer on hands-on experiments	1, 2, 3	

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks ("-" for nil entry)	Allow Use of GenAI?
1	Assignments There will be several assignments throughout the semester. Students will apply the knowledge in fluid mechanics, heat transfer and mass transfer covered in the lectures to complete the assignments to demonstrate their ability to apply such knowledge to analyse problems related to energy and environmental applications.	1, 2, 3	20	-	Yes
2	Labs Students will perform experiments in three lab sessions on fluid mechanics, heat transfer and mass transfer. Students will also write individual lab reports to analyse and present their results.	1, 2, 3	15	-	Yes
3	Quiz Students will apply the knowledge to complete in-class quizzes to demonstrate their ability to apply their knowledge in thermofluid problems.	1, 2, 3	15	-	No

Continuous Assessment (%)

50

Examination (%)

50

Examination Duration (Hours)

2

Minimum Continuous Assessment Passing Requirement (%)

30

Minimum Examination Passing Requirement (%)

30

Additional Information for ATs

Students will take the final exam to demonstrate their ability to apply their knowledge learned throughout the course in thermofluid problems. Examination duration: 2 hrs Percentage of continuous assessment, examination, etc.: 50% by continuous assessment; 50% 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 continuous assessment (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. Assignments

Criterion

Ability to analyse and solve problems related to fluid mechanics, heat transfer and mass transfer for energy and environmental applications

Excellent (A+, A, A-)

Excellent analysis and problem solving skills to demonstrate in-depth understanding of fluid mechanics, heat transfer and mass transfer

Good (B+, B, B-)

Good analysis and problem solving skills to demonstrate good understanding of fluid mechanics, heat transfer and mass transfer

Fair (C+, C, C-)

Acceptable analysis and problem solving skills to demonstrate adequate understanding of fluid mechanics, heat transfer and mass transfer

Marginal (D)

Marginally acceptable analysis and problem solving skills to demonstrate some understanding of fluid mechanics, heat transfer and mass transfer

Failure (F)

Poor analysis and problem solving skills and is barely able to demonstrate an understanding of fluid mechanics, heat transfer and mass transfer

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Assessment Task

2. Labs

Criterion

Ability to perform experiments and present results in the form of lab reports related to fluid mechanics, heat transfer and mass transfer for energy and environmental applications

Excellent (A+, A, A-)

Excellent report writing and experimental skills with in-depth understanding of fluid mechanics, heat transfer and mass transfer

Good (B+, B, B-)

Good report writing and experimental skills with good understanding of fluid mechanics, heat transfer and mass transfer

Fair (C+, C, C-)

Acceptable report writing and experimental skills with adequate understanding of fluid mechanics, heat transfer and mass transfer

Marginal (D)

Marginally acceptable report writing and experimental skills with some understanding of fluid mechanics, heat transfer and mass transfer

Failure (F)

Poor report writing and experimental skills with poor understanding of fluid mechanics, heat transfer and mass transfer

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Assessment Task

3. Quiz

Criterion

Ability to analyse and solve problems related to fluid mechanics, heat transfer and mass transfer for energy and environmental applications

Excellent (A+, A, A-)

Excellent analysis and problem solving skills to demonstrate in-depth understanding of fluid mechanics, heat transfer and mass transfer

Good (B+, B, B-)

Good analysis and problem solving skills to demonstrate good understanding of fluid mechanics, heat transfer and mass transfer

Fair (C+, C, C-)

Acceptable analysis and problem solving skills to demonstrate adequate understanding of fluid mechanics, heat transfer and mass transfer

Marginal (D)

Marginally acceptable analysis and problem solving skills to demonstrate some understanding of fluid mechanics, heat transfer and mass transfer

Failure (F)

Poor analysis and problem solving skills and is barely able to demonstrate an understanding of fluid mechanics, heat transfer and mass transfer

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Assessment Task

4. Examination

Criterion

Ability to analyse and solve problems related to fluid mechanics, heat transfer and mass transfer for energy and environmental applications

Excellent (A+, A, A-)

Excellent analysis and problem solving skills to demonstrate in-depth understanding of fluid mechanics, heat transfer and mass transfer

Good (B+, B, B-)

Good analysis and problem solving skills to demonstrate good understanding of fluid mechanics, heat transfer and mass transfer

Fair (C+, C, C-)

Acceptable analysis and problem solving skills to demonstrate adequate understanding of fluid mechanics, heat transfer and mass transfer

Marginal (D)

Marginally acceptable analysis and problem solving skills to demonstrate some understanding of fluid mechanics, heat transfer and mass transfer

Failure (F)

Poor analysis and problem solving skills and is barely able to demonstrate an understanding of fluid mechanics, heat transfer and mass transfer

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Part III Other Information

Keyword Syllabus

Fluid mechanics; control volume analysis; turbomachines; life and drag forces; boundary layers, open channel flow; heat exchangers; mass transfer fundamentals; diffusion mass transfer, phase equilibrium; distillation columns.

Reading List

Compulsory Readings

	Title
1	Nil

Additional Readings

	Title
1	Cengel, Y.A., Turner, R.H., Cimbala, J.M., Fundamentals of Thermal-Fluid Sciences, 6th ed. McGraw-Hill, 2021.
2	Gerhart, A. L., Hochstein, J. I., Gerhart, P. M., Munson, Young and Okiishi's Fundamentals of Fluid Mechanics, 9th ed., Wiley, 2020.
3	Lavine, A. S., Incropera, F.P., DeWitt, D.P., Bergman, T.L., Fundamentals of heat and mass transfer, 8th ed. Wiley, 2018.
4	Kundu, P. K., Cohen, I. M., Dowling D. R., Fluid mechanics, 6th ed. Academic Press, 2015.
5	Hines, A.L., Maddox, R.N., Mass Transfer: Fundamentals and Applications, Prentice Hall, 1985.