

# SEE2101: ENGINEERING THERMOFLUIDS I

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## Effective Term

Semester B 2025/26

## Part I Course Overview

### Course Title

Engineering Thermofluids I

### Subject Code

SEE - School of Energy and Environment

### Course Number

2101

### 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

PHY1201 General Physics I;  
MA1200 Calculus and Basic Linear Algebra I or  
MA1300 Enhanced Calculus and Linear Algebra I;  
MA1201 Calculus and Basic Linear Algebra II or  
MA1301 Enhanced Calculus and Linear Algebra II; AND  
SEE1003 Introduction to Sustainable Energy and Environmental Engineering

### Precursors

SEE2001 Electromagnetic Principles for Energy Engineers or equivalent; AND  
MA2181 Mathematical Methods for Engineering

### Equivalent Courses

Nil

### Exclusive Courses

Nil

## Part II Course Details

### Abstract

The course aims to give students an introduction to the basic principles of thermodynamics, fluid mechanics and heat transfer. These basic principles will help the students build a strong foundation for further innovative studies of energy and environment applications.

### Course Intended Learning Outcomes (CILOs)

CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1 Describe the basic principles of thermodynamics, fluid mechanics and heat transfer.	50	x	x	
2 Apply the basic principles to study energy conversion and transfer in energy and environment engineering, and other related innovative applications.	30		x	
3 Apply the basic principles to evaluate the performance of energy cycles.	20		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 and Tutorials	Students will learn theories and concepts.	1, 2, 3	
2 Tutorials	Students will apply theories and concepts on practical examples.	1, 2, 3	
3 Lab-based experiment	Students will apply theories and concepts 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	1, 2, 3	18	-	Yes
2	Labs	1, 2, 3	12	-	Yes
3	Quiz	1, 2, 3	20	-	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**

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 thermodynamics, fluid mechanics and heat transfer for energy conversion

**Excellent (A+, A, A-)**

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

**Good (B+, B, B-)**

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

**Fair (C+, C, C-)**

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

**Marginal (D)**

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

**Failure (F)**

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

**Assessment Task**

2. Labs

**Criterion**

Ability to perform experiments related to thermodynamics and fluid mechanics for energy conversion

**Excellent (A+, A, A-)**

Excellent report writing and experimental skills with in-depth understanding of thermodynamics and fluid mechanics

**Good (B+, B, B-)**

Good report writing and experimental skills with good understanding of thermodynamics and fluid mechanics

**Fair (C+, C, C-)**

Acceptable report writing and experimental skills with adequate understanding of thermodynamics and fluid mechanics

**Marginal (D)**

Marginally acceptable report writing and experimental skills with some understanding of thermodynamics and fluid mechanics

**Failure (F)**

Poor report writing and experimental skills with poor understanding of thermodynamics and fluid mechanics

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**Assessment Task**

3. Quiz

**Criterion**

Ability to analyse and solve problems related to thermodynamics, fluid mechanics and heat transfer for energy conversion

**Excellent (A+, A, A-)**

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

**Good (B+, B, B-)**

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

**Fair (C+, C, C-)**

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

**Marginal (D)**

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

**Failure (F)**

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

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**Assessment Task**

4. Examination

**Criterion**

Ability to analyse and solve problems related to thermodynamics, fluid mechanics and heat transfer for energy conversion

**Excellent (A+, A, A-)**

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

**Good (B+, B, B-)**

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

**Fair (C+, C, C-)**

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

**Marginal (D)**

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

**Failure (F)**

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

## Part III Other Information

**Keyword Syllabus**

First law of thermodynamics; Second law of thermodynamics; Enthalpy; Entropy; Phase equilibrium; Carnot cycle; Refrigeration cycle; Heat pump; Steam turbines; Power cycles; Continuity equation; Bernoulli's equation; Potential flow; Laminar flow; Turbulent flow; Internal flow; External flow; Conductive, convective and radiative heat transfer.

**Reading List****Compulsory Readings**

Title	
1	Nil

**Additional Readings**

Title	
1	Cengel, Y.A., Cimbala, J.M., Ghajar, A.J. Fundamentals of Thermal-Fluid Sciences, 6th edition, McGraw-Hill, 2021.
2	Bruce Munson, Donald F. Young, Theodore H. Okiishi, Fundamentals of Fluid Mechanics, 5th ed., Wiley, 2006.