School of Engineering

MECH3695: Heat Transfer

Singapore PSB
Trimester 1 - 2024 (Singapore)

COURSE OUTLINE

OVERVIEW

Course Description

Students learn the fundamental principles of heat transfer and how they can use them to solve engineering problems, in particular in heat exchanger applications. The course, which nicely blends physical and mathematical concepts, provides an excellent support to the students for expanding/developing the analytical skills built on previous knowledge of mathematics and physics.

On completion, students will demonstrate sufficient skills to enable them for their future careers, and the potential for future self-directed study in this area.

Academic Progress Requirements

Nil

Assumed Knowledge

ENGG2300 Engineering Fluid Mechanics (previously MECH2710).

Contact Hours

Singapore PSB

Laboratory
Face to Face On Campus
1 hour(s) per term
Students will select a laboratory session at the beginning of the semester in consultation with the course coordinator.

Lecture
Face to Face On Campus
3 hour(s) per week(s) for 13 week(s) starting Week 1

Online Activity
Online
1 hour(s) per week(s) for 13 week(s) starting Week 1

Tutorial
Face to Face On Campus
2 hour(s) per week(s) for 13 week(s) starting Week 1

Unit Weighting

10

Workload

Students are required to spend on average 120-140 hours of effort (contact and non-contact) including assessments per 10 unit course.

CONTACTS

Course Coordinator

Singapore PSB
Dr Thi Bang Tuyen Nguyen
Thibangtuyen.Nguyen@newcastle.edu.au
+612 4921 8879
Consultation: via email.

Teaching Staff

Other teaching staff will be advised on the course Canvas site.

School Office

School of Engineering (Callaghan)
SENG-ADMIN@newcastle.edu.au
+61 2 4921 5798

SYLLABUS

Course Content

The course covers various topics including:

1. Introduction to heat transfer
2. Heat exchangers
3. 1D Steady state conduction
4. 2D Steady state conduction (numerical analysis using Matlab)
5. Transient heat transfer using Matlab
6. Convection (External and internal)
7. Radiation

Course Learning Outcomes

On successful completion of this course, students will be able to:

1. Describe, explain and identify various heat transfer mechanisms.

2. Apply the principles of heat transfer for analysing processes in an engineering context.

3. Solve engineering heat transfer problems related to heat exchangers.

4. Perform routine experiments relating to heat transfer and communicate experimental results through written reports.

ASSESSMENTS

This course has 5 assessments. Each assessment is described in more detail in the sections below.

	Assessment Name	Due Date	Involvement	Weighting	Learning Outcomes
1	Assignment 1	Week 4	Individual	20%	1, 2, 3
2	Assignment 2	Week 10	Individual	10%	1, 2, 3
3	Laboratory Report	Two weeks after the completion of the lab session.	Group	15%	1, 2, 3, 4
4	Mid-Semester Quiz	Week 7	Individual	25%	1, 2, 3
5	End-semester non-formal quiz	Week 13	Individual	30%	1, 2, 3

Late Submissions The mark for an assessment item submitted after the designated time on the due date, without an approved extension of time, will be reduced by 10% of the possible maximum mark for that assessment item for each day or part day that the assessment item is late. Note: this applies equally to week and weekend days.

Assessment 1 - Assignment 1

Assessment Type Written Assignment
Purpose 1-To provide the students with the opportunity to show that they have understood the concepts learned in class and acquired the skills to solve problems in applying these concepts.
2- To allow the lecturer to assess the progress of the students during the semester and identify those who might be needing help.
Description Solving a set of problems (individual)
Weighting 20%
Due Date Week 4
Submission Method Online
Assessment Criteria To be advised on Canvas.
Return Method Online
Feedback Provided Online

Assessment 2 - Assignment 2

Assessment Type Quiz
Purpose -To provide the students with the opportunity to show that they have understood the concepts learned in class and acquired the skills to solve problems in applying these concepts.
2- To allow the lecturer to assess the progress of the students during the semester and identify those who might be needing help.
Description Solving a set of problems (individual)
Weighting 10%
Length 45 minutes
Due Date Week 10
Submission Method Online
Assessment Criteria To be advised on Canvas.
Return Method Online
Feedback Provided Online

Assessment 3 - Laboratory Report

Assessment Type Report
Purpose The purpose of group and laboratory activity is to enable peer-to-peer learning; develop oral communication skills and the ability to record data, synthesize an opinion and convey this clearly in a well presented and articulate manner in a written report.
Description Students carry out a laboratory experiment and prepare a group written report. Group report will be submitted via Canvas.
Weighting 15%
Length 1 hour

Due Date	Two weeks after the completion of the lab session.
Submission Method	Online Carrying out experiment face to face, submitting report online.
Assessment Criteria	1- Attendance to the laboratory sessions. 2- Well written and documented report, which should include: Abstract, Introduction, Experimental set up, Results/discussion with an error analysis, Conclusion/Recommendation and a list of references.
Return Method	Online
Feedback Provided	Online

Assessment 4 - Mid-Semester Quiz

Assessment Type	Quiz
Purpose	1-To allow the students to self-assess their progress. 2- To allow the lecturer to assess the progress of the students, and, possibly, identify those who need special help.
Description	One Progressive quiz (individual)
Weighting	25%
Length	90 minutes
Due Date	Week 7
Submission Method	In Class
Assessment Criteria	To be advised on Canvas.
Return Method	Online
Feedback Provided	Online

Assessment 5 - End-semester non-formal quiz

Assessment Type	Quiz
Purpose	1-To allow the students to self-assess their progress. 2- To allow the lecturer to assess the progress of the students, and, possibly, identify those who need special help.
Description	One Progressive quiz (individual)
Weighting	30%
Length	90 minutes
Due Date	Week 13
Submission Method	In Class
Assessment Criteria	To be advised on Canvas.
Return Method	Online
Feedback Provided	Online

ADDITIONAL INFORMATION

Grading Scheme

This course is graded as follows:

Range of Marks	Grade	Description
85-100	High Distinction (HD)	Outstanding standard indicating comprehensive knowledge and understanding of the relevant materials; demonstration of an outstanding level of academic achievement; mastery of skills*; and achievement of all assessment objectives.
75-84	Distinction (D)	Excellent standard indicating a very high level of knowledge and understanding of the relevant materials; demonstration of a very high level of academic ability; sound development of skills*; and achievement of all assessment objectives.
65-74	Credit (C)	Good standard indicating a high level of knowledge and understanding of the relevant materials; demonstration of a high level of academic achievement; reasonable development of skills*; and achievement of all learning outcomes.
50-64	Pass (P)	Satisfactory standard indicating an adequate knowledge and understanding of the relevant materials; demonstration of an adequate level of academic achievement; satisfactory development of skills*; and achievement of all learning

		outcomes.
0-49	Fail (FF)	Failure to satisfactorily achieve learning outcomes. If all compulsory course components are not completed the mark will be zero. A fail grade may also be awarded following disciplinary action.

*Skills are those identified for the purposes of assessment task(s).

Communication Methods

Communication methods used in this course include:

- Canvas Course Site: Students will receive communications via the posting of content or announcements on the Canvas course site.
- Email: Students will receive communications via their student email account.
- Face to Face: Communication will be provided via face to face meetings or supervision.

Course Evaluation

Each year feedback is sought from students and other stakeholders about the courses offered in the University for the purposes of identifying areas of excellence and potential improvement.

Oral Interviews (Vivas)

As part of the evaluation process of any assessment item in this course an oral examination (viva) may be conducted. The purpose of the oral examination is to verify the authorship of the material submitted in response to the assessment task. The oral examination will be conducted in accordance with the principles set out in the Oral Examination (viva) Procedure. In cases where the oral examination reveals the assessment item may not be the student's own work the case will be dealt with under the Student Conduct Rule.

Academic Misconduct

All students are required to meet the academic integrity standards of the University. These standards reinforce the importance of integrity and honesty in an academic environment. Academic Integrity policies apply to all students of the University in all modes of study and in all locations. For the Student Academic Integrity Policy, refer to https://policies.newcastle.edu.au/document/view-current.php?id=35

Adverse Circumstances

The University acknowledges the right of students to seek consideration for the impact of allowable adverse circumstances that may affect their performance in assessment item(s). Applications for special consideration due to adverse circumstances will be made using the online Adverse Circumstances system where:

1. the assessment item is a major assessment item; or
2. the assessment item is a minor assessment item and the Course Co-ordinator has specified in the Course Outline that students may apply the online Adverse Circumstances system;
3. you are requesting a change of placement; or
4. the course has a compulsory attendance requirement.

Before applying you must refer to the Adverse Circumstance Affecting Assessment Items Procedure available at:
https://policies.newcastle.edu.au/document/view-current.php?id=236

Important Policy Information

The Help button in the Canvas Navigation menu contains helpful information for using the Learning Management System. Students should familiarise themselves with the policies and procedures at https://www.newcastle.edu.au/current-students/respect-at-uni/policies-and-procedures that support a safe and respectful environment at the University.

This course outline was approved by the Head of School on 31st November, 2023. No alteration of this course outline is permitted without Head of School approval. If a change is approved, students will be notified and an amended course outline will be provided in the same manner as the original.

This course builds students' capacity in the following University of Newcastle Bachelor of Engineering Graduate Profile Statements (based on 2011 Engineers Australia revised Stage 1 Competency Standards for Professional Engineers):

UON Att.	University of Newcastle Bachelor of Engineering Graduate Profile Statements/ Engineers Australia Stage 1 competency statements	Taught	Practised	Assessed	Skill Level (1-4)
	Professional Attributes				
11	3.1. Ethical conduct and professional accountability		**X**		
12	3.2. Effective oral and written communication in professional and lay domains.		**X**		
13	3.3. Creative, innovative and pro-active demeanour.		**X**		
14	3.4. Professional use and management of information.		**X**		
15	3.5. Orderly management of self, and professional conduct.		**X**		
16	3.6. Effective team membership and team leadership.		**X**		
	Engineering Ability				
7	2.1. Application of established engineering methods to complex engineering problem solving.	**X**	**X**	**X**	**3**
8	2.2. Fluent application of engineering techniques, tools and resources.	**X**	**X**	**X**	**3**
9	2.3. Application of systematic engineering synthesis and design processes.	**X**	**X**		**3**
10	2.4. Application of systematic approaches to the conduct and management of engineering projects.				
	Knowledge Base				
1	1.1. Comprehensive, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline.	**X**	**X**	**X**	**3**
2	1.2. Conceptual understanding of the, mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline.	**X**	**X**	**X**	**3**
3	1.3. In-depth understanding of specialist bodies of knowledge within the engineering discipline.	**X**	**X**	**X**	**3**
4	1.4. Discernment of knowledge development and research directions within the engineering discipline.	**X**	**X**		**3**
5	1.5. Knowledge of contextual factors impacting the engineering discipline.				
6	1.6. Understanding of the scope, principles, norms, accountabilities and bounds of contemporary engineering practice in the specific discipline.				