COURSE OUTLINE

MEC402 Heat Transfer

School: School of Science, Technology and Engineering

2026 | Trimester 1

UniSC Sunshine Coast
UniSC Moreton Bay

BLENDED LEARNING

Most of your course is on campus but you may be able to do some components of this course online.

Please go to unisc.edu.au for up to date information on the teaching sessions and campuses where this course is usually offered.

1. What is this course about?

1.1. Description

Heat transfer studies the mechanisms of conduction, convection, radiation and their applications through an engineering perspective. Proficient engineers require a good fundamental understanding of heat transfer. In this course, you will learn and apply fundamental concepts of heat transfer for a variety of engineering systems and processes.

1.2. How will this course be delivered?

ACTIVITY	HOURS	BEGINNING WEEK	FREQUENCY
BLENDED LEARNING			
Learning materials – Asynchronous weekly learning material	1hr	Week 1	12 times
Seminar – On campus	1hr	Week 2	2 times
Tutorial/Workshop 1 – On campus	2hrs	Week 1	12 times
Laboratory 1 – On campus	2hrs	Week 9	3 times

1.3. Course Topics

Topics may include:

- Basic concepts of heat transfer
- Steady heat conduction
- Forced convection
- Heat exchangers
- Transient heat conduction
- Natural convection
- Thermal radiation
- Radiation heat transfer

2. What level is this course?

400 Level (Graduate)

Demonstrating coherence and breadth or depth of knowledge and skills. Independent application of knowledge and skills in unfamiliar contexts. Meeting professional requirements and AQF descriptors for the degree. May require pre-requisites where discipline specific introductory or developing knowledge or skills is necessary. Normally undertaken in the third or fourth full-time study year of an undergraduate program.

3. What is the unit value of this course?

12 units

4. How does this course contribute to my learning?

COURSE LEARNING OUTCOMES On successful completion of this course, you should be able to...	GRADUATE QUALITIES MAPPING Completing these tasks successfully will contribute to you becoming...	PROFESSIONAL STANDARD MAPPING * Engineers Australia Stage 1 Professional Engineer Competency Standards
1 Explain heat transfer theories and the principles and concepts which govern the methods of utilisation of energy and heat.	Knowledgeable	1, 1.1.a, 1.1
2 Critically evaluate and transform established theories and concepts to generate and transmit solutions to complex problems in the area of heat transfer.	Creative and critical thinker	2, 2.1.a, 2.1.f, 2.1
3 Exercise critical thinking and judgement in developing new understanding in the area of heat transfer.	Creative and critical thinker	2, 2.1.d, 2.1
4 Apply initiative and judgement in professional practice scholarship in relation to the area of heat transfer.	Ethical Engaged	3, 3.5.b, 3.5
5 Demonstrate responsibility for own learning and professional development and collaborate with others on technical and analytical engineering projects.	Engaged	3, 3.5.a, 3.5.b, 3.6.a, 3.5, 3.6

COURSE LEARNING OUTCOMES	GRADUATE QUALITIES MAPPING	PROFESSIONAL STANDARD MAPPING *
On successful completion of this course, you should be able to...	Completing these tasks successfully will contribute to you becoming...	Engineers Australia Stage 1 Professional Engineer Competency Standards
6 Explain the importance of efficiency and its impact on economy and sustainability.	Sustainability-focussed	1, 1.6.c, 1.6

* Competencies by Professional Body

CODE	COMPETENCY
ENGINEERS AUSTRALIA STAGE 1 PROFESSIONAL ENGINEER COMPETENCY STANDARDS	
1	Elements of competency: Knowledge and Skill Base
1.1.a	Knowledge and Skill Base - Comprehensive, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline: Engages with the engineering discipline at a phenomenological level, applying sciences and engineering fundamentals to systematic investigation, interpretation, analysis and innovative solution of complex problems and broader aspects of engineering practice.
1.6.c	Knowledge and Skill Base - Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline: Appreciates the social, environmental and economic principles of sustainable engineering practice.
1.1	Knowledge and Skill Base: Comprehensive, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline.
1.6	Knowledge and Skill Base: Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline.
2	Elements of competency: Engineering Application Ability
2.1.a	Engineering Application Ability - Application of established engineering methods to complex engineering problem solving: Identifies, discerns and characterises salient issues, determines and analyses causes and effects, justifies and applies appropriate simplifying assumptions, predicts performance and behaviour, synthesises solution strategies and develops substantiated conclusions.
2.1.f	Engineering Application Ability - Application of established engineering methods to complex engineering problem solving: Conceptualises alternative engineering approaches and evaluates potential outcomes against appropriate criteria to justify an optimal solution choice.
2.1.d	Engineering Application Ability - Application of established engineering methods to complex engineering problem solving: Investigates complex problems using research-based knowledge and research methods.
2.1	Engineering Application Ability: Application of established engineering methods to complex engineering problem solving.
3	Elements of competency: Professional and Personal Attributes
3.5.b	Professional and Personal Attributes - Orderly management of self, and professional conduct: Understands the importance of being a member of a professional and intellectual community, learning from its knowledge and standards, and contributing to their maintenance and advancement.
3.5.a	Professional and Personal Attributes - Orderly management of self, and professional conduct: Demonstrates commitment to critical self-review and performance evaluation against appropriate criteria as a primary means of tracking personal development needs and achievements
3.6.a	Professional and Personal Attributes - Effective team membership and team leadership: Understands the fundamentals of team dynamics and leadership.
3.5	Professional and Personal Attributes: Orderly management of self, and professional conduct.
3.6	Professional and Personal Attributes: Effective team membership and team leadership.

5. Am I eligible to enrol in this course?

Refer to the UniSC Glossary of terms for definitions of “pre-requisites, co-requisites and anti-requisites”.

5.1. Pre-requisites

MEC200 and (MEC305 or MEC302)

5.2. Co-requisites

Not applicable

5.3. Anti-requisites

Not applicable

5.4. Specific assumed prior knowledge and skills (where applicable)

Not applicable

5.5. Microcredential Information

Not applicable

6. How am I going to be assessed?

6.1. Grading Scale

Standard Grading (GRD)

High Distinction (HD), Distinction (DN), Credit (CR), Pass (PS), Fail (FL).

6.2. Details of early feedback on progress

Early feedback will be provided through completion of weekly activities in workshops. Furthermore, feedback on each assessment will be provided which will be used to help with the following assessment.

6.3. Assessment tasks

DELIVERY MODE	TASK NO.	ASSESSMENT PRODUCT	INDIVIDUAL OR GROUP	WEIGHTING %	WHAT IS THE DURATION / LENGTH?	WHEN SHOULD I SUBMIT?	WHERE SHOULD I SUBMIT IT?
All	1	Oral and Written Piece	Group	35%	1500-word written report (group) and 10-minute oral presentation	Week 7	Online Assignment Submission with plagiarism check
All	2	Practical / Laboratory Skills, and Written Piece	Individual	35%	Two lab sessions. Pre-lab quiz questions and individual laboratory reports (1200 word equivalent)	Week 12	Online Assignment Submission with plagiarism check
All	3	Examination - Centrally Scheduled	Individual	30%	3 hours	Exam Period	Online Assignment Submission with plagiarism check

All - Assessment Task 1: Group Report and Presentation

GOAL:	The goal of this task is to investigate and apply principles of heat transfer through a given engineering context. You will be required analyse, discuss and present a heat-transfer-related topic.
PRODUCT:	Oral and Written Piece
AUTHORSHIP STATEMENT:	
FORMAT:	The written group report will be approximately 1500 words while the corresponding group oral presentation will be approximately 10 minutes followed by a Q&A time.

CRITERIA:

No.		Learning Outcome assessed
1	Critical evaluation and transformation of established theories and concepts to generate and transmit solutions to complex problems in the area of heat transfer.	1 2 3
2	Execution of critical thinking and judgement in developing new understanding in the area of heat transfer.	1 2 3
3	Application of initiative and judgement in professional practice scholarship in relation to the area of heat transfer.	3 4 5
4	Demonstration of responsibility for own learning and professional development and collaboration with others on technical and analytical engineering projects.	4 5
5	Explanation of heat transfer theories and the principles and concepts which govern the methods of utilisation of energy and heat.	1 3
6	Explanation of the importance of efficiency and its impact on economy and sustainability.	6

GENERIC SKILLS:	Communication, Collaboration, Organisation, Information literacy

All - Assessment Task 2: Laboratory Reports

GOAL:	The goal of this task is to investigate fundamental principles of heat transfer through experimental applications and subsequent analyses.
PRODUCT:	Practical / Laboratory Skills, and Written Piece
AUTHORSHIP STATEMENT:	
FORMAT:	Prior to each session, you will complete a series of pre-lab questions online. During the lab session, you will conduct an experiment and start working on a report. The experimental work will be conducted in a group format, however the pre-lab questions and the lab reports are to be submitted individually by all students.

CRITERIA:

No.		Learning Outcome assessed
1	Critical evaluation and transformation of established theories and concepts to generate and transmit solutions to complex problems in the area of heat transfer.	1 2
2	Application of initiative and judgement in professional practice scholarship in relation to the area of heat transfer.	2 3 4
3	Demonstration of responsibility for own learning and professional development and collaboration with others on technical and analytical engineering projects.	3 4 5

GENERIC SKILLS:	Communication, Collaboration, Problem solving, Organisation, Applying technologies, Information literacy

All - Assessment Task 3: Examination

GOAL:	The goal of this task is to evaluate your knowledge of concepts of heat transfer and to demonstrate the use of standard methods to analyse problems within the subject area.
PRODUCT:	Examination - Centrally Scheduled
AUTHORSHIP STATEMENT:	
FORMAT:	Centrally scheduled 3-hour examination.
CRITERIA:	

No.		Learning Outcome assessed
1	Critical evaluation and transformation of established theories and concepts to generate and transmit solutions to complex problems in the area of heat transfer.	1 2
2	Explanation of heat transfer theories and the principles and concepts which govern the methods of utilisation of energy and heat.	1 2

GENERIC SKILLS:	Problem solving, Information literacy

7. Directed study hours

A 12-unit course will have total of 150 learning hours which will include directed study hours (including online if required), self-directed learning and completion of assessable tasks. Student workload is calculated at 12.5 learning hours per one unit.

8. What resources do I need to undertake this course?

Please note: Course information, including specific information of recommended readings, learning activities, resources, weekly readings, etc. are available on the course Canvas site– Please log in as soon as possible.

8.1. Prescribed text(s) or course reader

You need regular access to the resource(s) below. Many texts are available as ebooks through the Library at no additional cost.

REQUIRED?	AUTHOR	YEAR	TITLE	EDITION	PUBLISHER
Required	Yunus A. Çengel, Afshin J. Ghajar	0	Heat And Mass Transfer, 6th Edition, Si Units	5th Edition or later	McGraw-Hill
Recommended	Cengel,John M. Cimbala,Robert H. Turner	0	Fundamentals of Thermal-Fluid Sciences (SI Units)	5th Edition or later	McGraw-Hill

8.2. Specific requirements

Not applicable

9. How are risks managed in this course?

Health and safety risks for this course have been assessed as low. It is your responsibility to review course material, search online, discuss with lecturers and peers and understand the health and safety risks associated with your specific course of study and to familiarise yourself with the University's general health and safety principles by reviewing the online induction training for students, and following the instructions of the University staff.

10. What administrative information is relevant to this course?

10.1. Assessment: Academic Integrity

Academic integrity is the ethical standard of university participation. It ensures that students graduate as a result of proving they are competent in their discipline. This is integral in maintaining the value of academic qualifications. Each industry has expectations and standards of the skills and knowledge within that discipline and these are reflected in assessment.

Academic integrity means that you do not engage in any activity that is considered to be academic fraud; including plagiarism, collusion or outsourcing any part of any assessment item to any other person. You are expected to be honest and ethical by completing all work yourself and indicating in your work which ideas and information were developed by you and which were taken from others. You cannot provide your assessment work to others. You are also expected to provide evidence of wide and critical reading, usually by using appropriate academic references.

In order to minimise incidents of academic fraud, this course may require that some of its assessment tasks, when submitted to Canvas, are electronically checked through Turnitin. This software allows for text comparisons to be made between your submitted assessment item and all other work to which Turnitin has access.

10.2. Assessment: Additional Requirements

Eligibility for Supplementary Assessment

Your eligibility for supplementary assessment in a course is dependent of the following conditions applying:
(a) The final mark is in the percentage range 47% to 49.4%; and
(b) The course is graded using the Standard Grading scale

Eligibility for Supplementary Assessment Your eligibility for supplementary assessment in a course is dependent of the following conditions applying: - The final mark is in the percentage range 47% to 49.4% - The course is graded using the Standard Grading scale - You have not failed an assessment task in the course due to academic misconduct

10.3. Assessment: Submission penalties

Late submissions may be penalised up to and including the following maximum percentage of the assessment task's identified value, with weekdays and weekends included in the calculation of days late:
(a) One day: deduct 5%;
(b) Two days: deduct 10%;
(c) Three days: deduct 20%;
(d) Four days: deduct 40%;
(e) Five days: deduct 60%;
(f) Six days: deduct 80%;
(g) Seven days: A result of zero is awarded for the assessment task.

The following penalties will apply for a late submission for an online examination:
Less than 15 minutes: No penalty
From 15 minutes to 30 minutes: 20% penalty
More than 30 minutes: 100% penalty

10.4. Links to relevant University policy and procedures

For more information on Academic Learning & Teaching categories including:

- Assessment: Courses and Coursework Programs
- Review of Assessment and Final Grades
- Supplementary Assessment
- Central Examinations
- Deferred Examinations
- Student Conduct
- Students with a Disability

For more information, visit https://www.usc.edu.au/explore/policies-and-procedures#academic-learning-and-teaching

10.5. Student Charter

UniSC is committed to excellence in teaching, research and engagement in an environment that is inclusive, inspiring, safe and respectful. The Student Charter sets out what students can expect from the University, and what in turn is expected of students, to achieve these outcomes.

10.6. General Enquiries

For course-specific questions, contact your teaching staff or Course Coordinator.

For other enquiries or to access support, please contact Student Central:

- UniSC Student Central
- UniSC Adelaide Student Central