UNSW Course Outline

# CEIC2001 Fluid and Particle Mechanics - 2024

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## General Course Information

**Course Code :** CEIC2001
**Year :** 2024
**Term :** Term 1
**Teaching Period :** T1
**Is a multi-term course? :** No
**Faculty :** Faculty of Engineering
**Academic Unit :** School of Chemical Engineering
**Delivery Mode :** In Person
**Delivery Format :** Standard
**Delivery Location :** Kensington
**Campus :** Sydney
**Study Level :** Undergraduate
**Units of Credit :** 6

**Useful Links**

Handbook Class Timetable

## Course Details & Outcomes

### Course Description

Chemical, chemical product, biomedical and food engineers design processes where fluids or particulate materials are transported at scale. Such processes range from artificial hearts to pump blood around the human body, to industrial processes that mix large amounts of flour,

sugar, and butter to make delicious biscuits, to water treatment systems that ensure households have access to clean drinking water. It is only by knowing how fluids and particles behave that an engineer will be able to create and manage systems that efficiently and cost-effectively carry out these tasks.

This course teaches the science and technology related to the handling and processing of fluids and particulate materials at scale. You will learn how we describe the behaviour of different fluids and particles in terms of their properties (e.g., rheology), and then how they transmit pressure and flow (fluid statics and dynamics). Then applying this knowledge, you will learn how we handle fluids in process systems (using pipes and pumps), and how we can model their motion (e.g., differential and dimensional analysis). Finally, you will return to the study of particulate systems to learn how they are described and processed, including key unit operations like classification, mixing, segregation and communition.

## Course Aims

This course aims to develop the students' knowledge and conceptual understanding of the properties and behaviours of fluids and particles. Chemical Engineering, Chemical Product Engineering, Biomedical Engineering and Food Engineering students will be prepared to apply the principles of fluid and particle mechanics in advanced courses of their specialisations.

## Relationship to Other Courses

CEIC2001 has the following prerequisites: PHYS1121 or PHY1131 or DPST1021 or DPST1023, and MATH1231 or MATH1241 or MATH1251 or DPST1014 courses.

## Course Learning Outcomes

| Course Learning Outcomes |
| --- |
| CLO1 : Quantitatively describe the fundamental properties of fluids and particulate materials. |
| CLO2 : Explain how mathematical and statistical models or methods (including scientific models, integral analysis, differential analysis, dimensional analysis method, probability distributions and population balance modelling) can be used to describe and predict the behaviour of fluid and particle systems, or the relationships between different fluids and particles properties. |
| CLO3 : Apply fluid mechanics principles in an engineering context, including the design of piping systems, pump selection and sizing. |
| CLO4 : Apply particle mechanics principles in an engineering context, including the design and optimisation of particle processes such as mixing, segregation, comminution, granulation, classification, settling, filtration, and fluidisation. |

| Course Learning Outcomes | Assessment Item |
|---|---|
| CLO1 : Quantitatively describe the fundamental properties of fluids and particulate materials. | • Test and reflection cycle 1<br>• Test and reflection cycle 2<br>• Test and reflection cycle 3<br>• Final exam |
| CLO2 : Explain how mathematical and statistical models or methods (including scientific models, integral analysis, differential analysis, dimensional analysis method, probability distributions and population balance modelling) can be used to describe and predict the behaviour of fluid and particle systems, or the relationships between different fluids and particles properties. | • Test and reflection cycle 1<br>• Test and reflection cycle 2<br>• Test and reflection cycle 3<br>• Final exam |
| CLO3 : Apply fluid mechanics principles in an engineering context, including the design of piping systems, pump selection and sizing. | • Test and reflection cycle 2<br>• Test and reflection cycle 3 |
| CLO4 : Apply particle mechanics principles in an engineering context, including the design and optimisation of particle processes such as mixing, segregation, comminution, granulation, classification, settling, filtration, and fluidisation. | • Final exam |

## Learning and Teaching Technologies

Moodle - Learning Management System | Microsoft Teams | Review - Assessment/Feedback Tool

# Other Professional Outcomes

**Course Learning Outcomes**

After successfully completing this course, you should be able to:

| Learning Outcome | EA Stage 1 Competencies |
|---|---|
| 1. Quantitatively describe the fundamental properties of fluids and particulate materials. | PE1.1, PE3.4 |
| 2. Explain how mathematical and statistical models or methods (including scientific models, integral analysis, differential analysis, dimensional analysis method, probability distributions and population balance modelling) can be used to describe and predict the behaviour of fluid and particle systems, or the relationships between different fluids and particles properties. | PE1.2 |
| 3. Apply fluid mechanics principles in an engineering context, including the design piping system, pump selection and pump sizing. | PE2.2 |
| 4. Apply particle mechanics principles in an engineering context, including the design and optimisation of particle processes such as mixing, segregation, comminution, granulation, classification, settling, filtration, and fluidisation. | PE2.2 |

**Engineers Australia, Professional Engineer Stage 1 Competencies**

This course contributes to your develpment of the following EA Professional Engineer competencies:

PE1.1 Comprehensive, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline

PE1.2 Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline

PE2.2 Fluent application of engineering techniques, tools and resources

PE3.4 Professional use and management of information

This course is part of UNSW Food Science specialisations approved (2021-2026) by the Institute of Food Technologists Higher Education Review Board (IFT HERB).

# Additional Course Information

Time Commitment

UNSW expects students to spend approximately 150 hours to successfully complete a 6 UOC course like CEIC2001. Of the 150 hours, 70 hours will be spent participating in face-to-face classes, 10 hours in completing examinations, with the remaining 70 hours provided for private study, including revising the lecture notes, completing the worksheet worksheets and preparing for examination. Therefore, outside the lectures and workshops, you should be spending at least 7 hours per week on this course.

A student who has a deficit in study and time management skills would be required to seek assistance from UNSW Student Support and Success. A student who has ongoing personal or health issue that is interfering their course work and attendance should register with UNSW Equitable Learning Services and discuss their study needs with the course convener prior to or at the commencement of the course. The census date for this course is 11:59 PM 10 March 2024. The census date is the last day you can withdraw from a course without financial penalty. There may be circumstances where the student will be advised to withdraw from the study, seek program leave or program discontinuation after the census date. See fee remission, financial and academic penalty for further information.

Participation

Participation in learning activities in the lectures and lectorials (face-to-face or online) are highly encouraged in this course. Watching the lecture in the week it was recorded, taking notes, asking questions, completing formative assessment tasks (take-home assignment, mock quizzes) and engaging in group learning activities have been shown to lead to better academic attainment and wellbeing in this course. UNSW expects university commitments such lecture, workshop and examination (including supplementary examination) will take precedence over work activities, sports, holidays etc. There is currently no provision for personal instruction by the lecturer or demonstrators of this course.

# Assessments

## Assessment Structure

| Assessment Item | Weight | Relevant Dates |
|---|---|---|
| Test and reflection cycle 1<br>Assessment Format: Individual | 10% | Start Date: 22/02/2024 02:30 PM<br>Due Date: 22/02/2024 05:00 PM |
| Test and reflection cycle 2<br>Assessment Format: Individual | 20% | Start Date: 14/03/2024 02:30 PM<br>Due Date: 14/03/2024 05:00 PM |
| Test and reflection cycle 3<br>Assessment Format: Individual | 30% | Start Date: 08/04/2024 02:30 PM<br>Due Date: 08/04/2024 05:00 PM |
| Final exam<br>Assessment Format: Individual | 40% | Start Date: Not Applicable<br>Due Date: Exam Period |

## Assessment Details

### Test and reflection cycle 1

Assessment Overview

Students will complete a test, peer feedback, and reflection covering the fundamental concepts in fluid mechanics, particularly fluid properties and behaviours, and the rheology of fluids and semi-solids.

Course Learning Outcomes

- CLO1 : Quantitatively describe the fundamental properties of fluids and particulate materials.
- CLO2 : Explain how mathematical and statistical models or methods (including scientific models, integral analysis, differential analysis, dimensional analysis method, probability distributions and population balance modelling) can be used to describe and predict the behaviour of fluid and particle systems, or the relationships between different fluids and particles properties.

Detailed Assessment Description

**Assessment 1: Examination EM01 Submission**

Start date: 22/02/2024 02:30 PM

Assessment length: 2.5 hours (2 hours examination + 0.5 hour for submission) Submission notes: Moodle submission

Due date: 22/02/2023 05:00 PM

Marks returned: 04/03/2024

Examination EM01 Submission will cover the following topics:

- LM01A • Fluid Properties and Behaviours

- LM01B • Rheology of Fluids and Semi-Solids

The assessment will consist of a 2-hour test which will contribute to 8 marks for this task. You may find the rheology exam to be an interesting assessment because it tests your understanding of the behaviour of fluids under different conditions. This is a critical concept in chemical engineering, as it allows you to predict how materials will behave in various processes and make informed design decisions. Additionally, a foundational understanding of rheology can be useful in your future studies and career, as it is relevant to a range of industries including food, pharmaceuticals, and materials processing.

#### Assessment Length

2.5 hours (2 hours examination + 0.5 hour for submission)

#### Submission notes

Moodle submission

#### Assessment information

**Assessment 1-2: Examination EM01 Peer Assessment and Feedback**

Start date: 23/02/2024 05:00 PM
Submission notes: Moodle submission
Due date: 29/02/2024 05:00 PM
Marks returned: 04/03/2024

The assessment will consist of a peer assessment and feedback of Examination EM01, all of which will contribute 2 marks for this task.

## Test and reflection cycle 2

#### Assessment Overview

Students will complete a test, peer feedback, and reflection covering fluid statics and dynamics.

#### Course Learning Outcomes

- CLO1 : Quantitatively describe the fundamental properties of fluids and particulate materials.
- CLO2 : Explain how mathematical and statistical models or methods (including scientific models, integral analysis, differential analysis, dimensional analysis method, probability distributions and population balance modelling) can be used to describe and predict the behaviour of fluid and particle systems, or the relationships between different fluids and particles properties.
- CLO3 : Apply fluid mechanics principles in an engineering context, including the design of

piping systems, pump selection and sizing.

Detailed Assessment Description

**Assessment 2: Examination EM02 Submission**

Start date: 14/03/2024 02:30 PM
Assessment length: 2.5 hours (2 hours examination + 0.5 hour for submission) Submission notes: Moodle submission
Due date: 14/03/2024 05:00 PM
Marks returned: 02/04/2024

Assessment 2 will cover the following topics:

- LM02 • Fluid Statics
- LM03A • Fluid Dynamics
- LM03B • Differential Analysis of Fluid Flow

The assessment will consist of a 2-hour test which will contribute to 16 marks for this task. You may find the exam on fluid statics and dynamics to be an interesting assessment because it tests your understanding of fundamental principles of fluid mechanics. This is a crucial topic in chemical engineering, as it is relevant to many applications including fluid flow in pipes, heat transfer in reactors, and the design of separation processes. Furthermore, a strong grasp of fluid statics and dynamics can be beneficial to your future studies and career, as it is applicable to a wide range of industries including oil and gas, environmental engineering, and biotechnology.

Assessment Length

2.5 hours (2 hours examination + 0.5 hour for submission)

Submission notes

Moodle submission

Assessment information

**Assessment 2-2: Examination EM02 Peer Assessment and Feedback**

Start date: 15/03/2024 05:00 PM
Submission notes: Moodle submission
Due date: 28/03/2024 05:00 PM
Marks returned: 02/04/2024

The assessment will consist of a peer assessment and feedback for Examination EM02, all of

which will contribute 4 marks for this task.

## Test and reflection cycle 3

**Assessment Overview**

Students will complete a test, peer feedback, and reflection covering fluid handling and modelling.

**Course Learning Outcomes**

- CLO1 : Quantitatively describe the fundamental properties of fluids and particulate materials.
- CLO2 : Explain how mathematical and statistical models or methods (including scientific models, integral analysis, differential analysis, dimensional analysis method, probability distributions and population balance modelling) can be used to describe and predict the behaviour of fluid and particle systems, or the relationships between different fluids and particles properties.
- CLO3 : Apply fluid mechanics principles in an engineering context, including the design of piping systems, pump selection and sizing.

**Detailed Assessment Description**

**Assessment 3: Examination EM03 Submission**

Start date: 08/04/2024 02:30 PM
Assessment length: 2.5 hours (2 hours examination + 0.5 hour for submission) Submission notes: Moodle submission
Due date: 08/04/2024 05:00 PM
Marks returned: 22/04/2024

Assessment 3 will cover the following topics:

LM04A • Flow in Pipes
LM04B • Pump and Pumping
LM05 • Dimensional Analysis and Similitude

The assessment will consist of a test which will contribute 24 marks for this task. You may find the exam on pipe flow, pumps, and dimensional analysis to be an interesting assessment because it challenges your understanding of key concepts in chemical engineering. The exam covers topics such as pump design and performance, dimensional analysis for scaling and modelling, and differential analysis for solving complex systems. These skills are essential for a chemical engineer, as they are used in various areas including process design, energy conservation, and chemical reaction engineering. Additionally, a strong understanding of these

concepts can be useful in your future studies and career, as they are applicable to a wide range of industries including mining, petrochemical, metallurgy, pharmaceutical, and biotechnology.

Assessment Length

2.5 hours (2 hours examination + 0.5 hour for submission)

Submission notes

Moodle submission

Assessment information

**Assessment 3-2: Examination EM03 Peer Assessment and Feedback**

Start date: 09/04/2024 05:00 PM
Submission notes: Moodle submission
Due date: 18/04/2024 05:00 PM
Marks returned: 21/04/2024

The assessment will consist of a peer assessment and feedback for Examination EM03, all of which will contribute 6 marks for this task.

## Final exam

Assessment Overview

Students will complete a timed, written examination covering a range of topics in particle mechanics, these may include particle sizes and their distributions, particle-based processes and particle processing.

Course Learning Outcomes

- CLO1 : Quantitatively describe the fundamental properties of fluids and particulate materials.
- CLO2 : Explain how mathematical and statistical models or methods (including scientific models, integral analysis, differential analysis, dimensional analysis method, probability distributions and population balance modelling) can be used to describe and predict the behaviour of fluid and particle systems, or the relationships between different fluids and particles properties.
- CLO4 : Apply particle mechanics principles in an engineering context, including the design and optimisation of particle processes such as mixing, segregation, comminution, granulation, classification, settling, filtration, and fluidisation.

Detailed Assessment Description

**Assessment 4: Examination EM04 Submission**

Start date: Exam Period
Assessment length: 2.5 hours (2 hours examination + 0.5 hour for submission) Submission notes: In person. Details to be announced.
Due date: Exam Period
Marks returned: 18/05/2024

The final examination will cover the following topics:

LM06 • Particle Size and Size Distribution
LM07A • Classification
LM07B • Mixing and Segregation
LM07C • Comminution
LM08 • Particle Settling - Single Particle
LM09A • Particle Bed - Fundamentals of Packed Bed
LM09B • Particle Bed - Fluidization

The assessment will consist of a 2-hour test which will contribute to 40 marks for this task. You may find the exam on particle system and processing to be an interesting assessment because it tests your knowledge of the characteristic and behaviour of particles. This is a crucial topic in chemical engineering, as it is relevant to many applications including particle size analysis, sedimentation, fluidisation and filtration. Additionally, a strong understanding of particle mechanics can be beneficial to your future studies and career, as it is applicable to a wide range of industries including mining, environmental engineering, and biotechnology.

**Assessment Length**

2.5 hours (2 hours examination + 0.5 hour for submission)

# General Assessment Information

Assessment Implementation

Summative assessments in the form of four written examinations are used to determine and quantify the students' achievement by assigning marks and grades. The first three examinations, worth 10%, 20% and 30% of the total course mark respectively, will be held online at the date and time shown in the Assessment task section. The final examination, worth 40% of the course mark, will be held during the exam period at a time that will be announced on myUNSW.

The examination script can be downloaded from Moodle on the day of the examination. All submissions must be made as a single PDF file that is less than 200 MB in size. Instructions on

how to convert handwritten documents to a single PDF file can be found here.

Students should start their submission process at 4:30 PM AEST and have until 5:00 PM AEST to notify the course convenor of any issues with the submission process. Late submissions will not be accepted.

Examination scripts will be peer-reviewed, marked and returned approximately 10 days after the examination via Moodle. Students can check and appeal their marks using the submission links in Moodle before the due date and time indicated in Moodle.

If you were granted Special Consideration, your supplementary examinations will be held at a to-be-confirmed date, time and venue between 14 May 2024 and 24 May 2024.

**Grading Basis**

Standard

# Course Schedule

| Teaching Week/Module | Activity Type | Content |
|---|---|---|
| Week 1 : 12 February - 18 February | Lecture | LM00 • Course Orientation Course Orientation & Introduction to Fluid Mechanics<br>LM01A • Fluid Properties and Physical Quantities Characteristics of Matter Fluid Properties and Physical Quantities - Mass and Weight Properties - Force, Stress and Pressure - Surface Tension - Viscosity<br>LM01B • Rheology of Fluids and Semi- Solids Rheology of Fluids and Semi-Solids - Time Independent • Show Yield Stress - Time Independent • No Yield Stress - Time Dependent Steady-State Rheological Model of Herschel-Buckley<br>LM02 • Fluid Statics Static Pressure Variation at a Point Static Pressure Variation from Point to Point Hydrostatic Force on Submerged Surface - Part 1 Formula Method Hydrostatic Force on Submerged Surface - Part 2 Integration Method |
| | Workshop | TM01B • Rheology of Fluids and Semi- Solids |
| Week 2 : 19 February - 25 February | Lecture | LM02 • Fluid Statics Hydrostatic Force on Submerged Surface - Part 3 Geometrical Method Hydrostatic Force on Submerged Surface - Part 4 Projection Method Buoyancy, Flotation and Stability Pressure Measurement Absolute Pressure and Gauge Pressure |
| | Workshop | TM02-1 • Fluid Statics |
| | Assessment | Examination EM01 Submission: Moodle submission |
| Week 3 : 26 February - 3 March | Lecture | LM03A • Fluid Dynamics 2H00M Bernoulli's Equation Kinematics - Eulerian Specification of the Flow Field - Velocity and Velocity Field Finite Control Volume Analysis - Continuity Equation - Momentum Equation - Angular Momentum<br>LM03B • Differential Analysis of Fluid Flow Continuity Equation Momentum Equation - General Form Navier-Stokes Equations |
| | Workshop | TM02-2 • Fluid Statics<br>TM03 • Fluid Dynamics |
| | Assessment | EM01 • Examination 1 Peer Assessment and Feedback |
| Week 4 : 4 March - 10 March | Lecture | LM04A • Flow in Pipes I Relative Roughness of a Pipe Reynolds Number Friction Losses Minor Losses<br>LM04A • Flow in Pipes II Relative Roughness of a Pipe Reynolds Number Friction Losses Minor Losses |
| | Workshop | TM03B • Differential Analysis of Fluid Flow TM04A • Flow in Pipes |
| Week 5 : 11 March - 17 March | Lecture | LM04B • Pump and Pumping Pump Classification Hydraulic Head, Suction Head, Discharge Head and Total Dynamic Head Pump Performance Curve - Single Pump Pump Performance Curve - Multiple Pumps System Resistance Cavitation Specific Speed |
| | Workshop | TM04B-1 • Pump and Pumping |
| | Assessment | Examination EM02 Submission: Moodle submission |
| Week 6 : 18 March - 24 March | Other | Flexibility week T1 |
| Week 7 : 25 March - 31 March | Lecture | LM05 • Dimensional Analysis and Similitude 2H00M Buckingham π Theorem Dimensionless Groups from Indicial Method Dimensionless Groups from Group Method<br>LM06 • Particle Size and Size Distribution 2H00M Particle Size Size of Single Particles Size Distribution of Multiple Particles Particle Surface, Mass and Volume Distributions from Number Distribution Mode, Median and Mean of a Distribution |
| | Workshop | TM04B-2 • Pump and Pumping TM05 • Dimensional Analysis and Similitude |
| | Assessment | Examination EM02 Peer Assessment and Feedback: Moodle submission |
| Week 8 : 1 April - 7 April | Lecture | LM07A • Classification Industrial Scale Sizing and Classification Classification with Cyclone and Hydrocyclone Mass Balance in Cyclones and Hydrocyclones Separation Efficiency and Grade Efficiency Cyclone and Hydrocyclone Configuration LM07B • Mixing and Segregation Particle Segregation Quality of Mixture |
| | Workshop | TM06 • Particle Size and Size Distribution |
| Week 9 : 8 April - 14 April | Lecture | LM07C • Comminution 2H00M Introduction to Comminution Energy Requirement for Communition Change in Size Distribution After Communition |
| | Workshop | TM07A • Classification |
| | Assessment | Examination EM03 Submission: Moodle submission |
| Week 10 : 15 April - 21 April | Lecture | LM08 • Particle Settling - Single Particle Single Particle Settling |

| | | |
|---|---|---|
| | | LM09A • Particle Bed - Fundamentals Packed Bed LM09B • Particle Bed - Fluidization Fluidization |
| | Workshop | TM07C • Comminution TM08 • Particle Settling - Single Particle TM09 • Particle Bed |

## Attendance Requirements

Students are strongly encouraged to attend all classes and review lecture recordings.

# Course Resources

## Prescribed Resources

Lecture slides, lecture recordings, workshop worksheets, and links to Microsoft Team and Microsoft Stream sites will be available from Week 0 of Term 1 from the course's Moodle site.

Additional resources are available from the UNSW Library.

## Recommended Resources

### Textbooks

Munson, Young and Okiishi's Fundamentals of Fluid Mechanics, by P. M. Gerhart, A. L. Gerhart, J. I. Hochsterin, Wiley.
Introduction to Particle Technology, by M. Rhodes, Wiley.

### Handbooks

Perry Chemical Engineering Handbook, by D. W. Green, M. Z. Southard, R. H. Perry, McGraw-Hill.
Chemical Properties Handbook, by C. L. Yaws, McGraw Hill.
The Properties of Gases and Liquids, by B. E. Poling, J. M. Prausnitz, J. P. O'Connell, McGraw Hill.
Lange's Handbook of Chemistry, by J. G. Speight, McGraw Hill.
Fluid Flow Handbook, by J. M. Saleh, McGraw Hill.
Piping Handbook, by M. L. Nayyar, McGraw Hill.
Valve Handbook, by P. L. Skousen, McGraw Hill.
Pump Handbook, by I. J. Karassik, J. P. Messina, P. Cooper, C. C. Heald, McGraw Hill.
Pump Users Handbook, by R. Rayner,  Elsevier Advanced Technology.
Sulzer Centrifugal Pump Handbook, by Sulzer Pump,  Butterworth-Heinemann.
Handbook of Civil Engineering Calculations, by T. G. Hicks, McGraw Hill.
Handbook of Mechanical Engineering Calculations, by T. G. Hicks, McGraw Hill.

Marks' Standard Handbook for Mechanical Engineers, by A. M. Sadegh, W. M. Worek, McGraw Hill.

## Course Evaluation and Development

**Course Evaluation**

Formal feedback will be gathered at the end of term using myExperience survey. Informal feedback will be gathered throughout the terms using Moodle Feedback activity.

**Course Development**

2024 • Academic Success Monitor within Data Insights for Student Learning and Support project
2022 • PVC Education and Student Experience hybrid delivery pilot.
2021 • Change in assessment question types. 2020 • Large Cohort Active Learning Initiative pilot with UNSW PVC Education.
2020 • Student support in the form of virtual study room in Microsoft Team.
2020 • Development of students' evaluative judgement skill in formative and summative assessment.
2019 • Use of Padlet to share learning artifacts and provide feedback in active learning.
2019 • Use of metacognitive wrapper to develop students' ability to self-monitor and self-evaluate.
2018 • $10,000 to Develop Adaptive Paper Tutor for UNSW3+.2017 • Sewer Vent Shaft Design Work Integrated Learning micro-project with SVSR.
2016 • $30,000 for the Digital Uplift of CEIC2001, CVEN2501 and MMAN2600.2016 • $8000 to develop Moodle Question Bank for CEIC2001 Fluid and Particle Mechanics.

# Staff Details

| Position | Name | Email | Location | Phone | Availability | Equitable Learning Services Contact | Primary Contact |
|---|---|---|---|---|---|---|---|
| Demonstrator | Zhenhai Xia | | | | Microsoft Teams | No | No |
| Convenor | Chi Cheng | | 522 Hilmer Building (E10) | | Microsoft Teams | No | Yes |

# Other Useful Information

## Academic Information

**I. Special consideration and supplementary assessment**

If you have experienced an illness or misadventure beyond your control that will interfere with your assessment performance, you are eligible to apply for Special Consideration prior to, or within 3 working days of, submitting an assessment or sitting an exam.

Please note that UNSW has a Fit to Sit rule, which means that if you sit an exam, you are declaring yourself fit enough to do so and cannot later apply for Special Consideration.

For details of applying for Special Consideration and conditions for the award of supplementary assessment, please see the information on UNSW's Special Consideration page.

**II. Administrative matters and links**

All students are expected to read and be familiar with UNSW guidelines and polices. In particular, students should be familiar with the following:

- Attendance
- UNSW Email Address
- Special Consideration
- Exams
- Approved Calculators
- Academic Honesty and Plagiarism
- Equitable Learning Services

**III. Equity and diversity**

Those students who have a disability that requires some adjustment in their teaching or learning environment are encouraged to discuss their study needs with the course convener prior to, or at the commencement of, their course, or with the Equity Officer (Disability) in the Equitable Learning Services. Issues to be discussed may include access to materials, signers or note-takers, the provision of services and additional exam and assessment arrangements. Early notification is essential to enable any necessary adjustments to be made.

**IV. Professional Outcomes and Program Design**

Students are able to review the relevant professional outcomes and program designs for their streams by going to the following link: https://www.unsw.edu.au/engineering/student-life/student-resources/program-design.

*Note: This course outline sets out the description of classes at the date the Course Outline is published. The nature of classes may change during the Term after the Course Outline is published.*

*Moodle or your primary learning management system (LMS) should be consulted for the up-to-date class descriptions. If there is any inconsistency in the description of activities between the University timetable and the Course Outline/Moodle/LMS, the description in the Course Outline/ Moodle/LMS applies.*

## Academic Honesty and Plagarism

UNSW has an ongoing commitment to fostering a culture of learning informed by academic integrity. All UNSW students have a responsibility to adhere to this principle of academic integrity. Plagiarism undermines academic integrity and is not tolerated at UNSW. *Plagiarism at UNSW is defined as using the words or ideas of others and passing them off as your own.*

Plagiarism is a type of intellectual theft. It can take many forms, from deliberate cheating to accidentally copying from a source without acknowledgement. UNSW has produced a website with a wealth of resources to support students to understand and avoid plagiarism, visit: student.unsw.edu.au/plagiarism. The Learning Centre assists students with understanding academic integrity and how not to plagiarise. They also hold workshops and can help students one-on-one.

You are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for research, drafting and the proper referencing of sources in preparing all assessment tasks.

Repeated plagiarism (even in first year), plagiarism after first year, or serious instances, may also be investigated under the Student Misconduct Procedures. The penalties under the procedures can include a reduction in marks, failing a course or for the most serious matters (like plagiarism in an honours thesis or contract cheating) even suspension from the university. The Student Misconduct Procedures are available here:

www.gs.unsw.edu.au/policy/documents/studentmisconductprocedures.pdf

## Submission of Assessment Tasks

Work submitted late without an approved extension by the course coordinator or delegated authority is subject to a late penalty of five percent (5%) of the maximum mark possible for that assessment item, per calendar day.

The late penalty is applied per calendar day (including weekends and public holidays) that the assessment is overdue. There is no pro-rata of the late penalty for submissions made part way through a day. This is for all assessments where a penalty applies.

Work submitted after five days (120 hours) will not be accepted and a mark of zero will be awarded for that assessment item.

For some assessment items, a late penalty may not be appropriate. These will be clearly indicated in the course outline, and such assessments will receive a mark of zero if not completed by the specified date. Examples include:

- Weekly online tests or laboratory work worth a small proportion of the subject mark;
- Exams, peer feedback and team evaluation surveys;
- Online quizzes where answers are released to students on completion;
- Professional assessment tasks, where the intention is to create an authentic assessment that has an absolute submission date; and,
- Pass/Fail assessment tasks.

## Faculty-specific Information

Engineering Student Support Services – The Nucleus - enrolment, progression checks, clash requests, course issues or program-related queries

Engineering Industrial Training – Industrial training questions

UNSW Study Abroad – study abroad student enquiries (for inbound students)

UNSW Exchange – student exchange enquiries (for inbound students)

UNSW Future Students – potential student enquiries e.g. admissions, fees, programs, credit transfer

**Phone**

(+61 2) 9385 8500 – Nucleus Student Hub

(+61 2) 9385 7661 – Engineering Industrial Training

(+61 2) 9385 3179 – UNSW Study Abroad and UNSW Exchange (for inbound students)

## School-specific Information

### Course Workload

Course workload is calculated using the Units-Of-Credit (UOC). The normal workload expectation for one UOC is approximately 25 hours per term. This includes class contact hours, private study, other learning activities, preparation and time spent on all assessable work.

Most coursework courses at UNSW are 6 UOC and involve an estimated 150 hours to complete, for both regular and intensive terms. Each course includes a prescribed number of hours per week (h/w) of scheduled face-to-face and/or online contact. Any additional time beyond the prescribed contact hours should be spent in making sure that you understand the lecture material, completing the set assignments, further reading, and revising for any examinations. Most 6 UoC courses will involve approximately 10-12 hours per week of work on your part. If you're not sure what to do in these hours of independent study, the resources on the UNSW Academic Skills pages offer some suggestions including: making summaries of lectures, read/ summarise sections from the textbook, attempt workshop problems, reattempting workshop problems with some hints from the solutions, looking for additional problems in the textbook.

Full-time enrolment at university means that it is a *full-time* occupation for you and so you would typically need to devote 35 hours per week to your studies to succeed. Full-time enrolment at university is definitely incompatible with full-time employment. Part-time/casual employment can certainly fit into your study schedule but you will have to carefully balance your study obligations with that work and decide how much time for leisure, family, and sleep you want left after fullfilling your commitments to study and work. Everyone only gets 168 hours per week; overloading yourself with both study commitments and work commitments leads to poor outcomes and dissatisfaction with both, overtiredness, mental health issues, and general poor quality of life.

### On-campus Class Attendance

Most classes at UNSW are "In Person" and run in a face-to-face mode only. Attendance and participation in the classes is expected. As an evidence-driven engineer or scientist, you'll be interested to know that education research has shown students learn more effectively when they come to class, and less effectively from lecture catch-up recordings. If you have to miss a class due to illness, for example, we expect you to catch up in your time, and within the coming couple of days.

For most courses that are running in an "in person" mode:

- Lectures are normally recorded to provide an opportunity to review material after the lecture; lecture recordings are not a substitute for attending and engaging with the live class.
- Workshops/tutorials are not normally recorded as the activities that are run within those sessions normally cannot be captured by a recording. These activities may also include assessable activities in some or all weeks of the term.
- Laboratories are not recorded and require in-person attendance. Missing laboratory sessions may require you to do a make-up session later in the term; if you miss too many laboratory sessions, it may be necessary to seek a Permitted Withdrawal from the course and reattempt it next year, or end up with an Unsatisfactory Fail for the course.
- Assessments will often require in-person attendance in a timetabled class or a scheduled examination.

**Submission of Assessment Tasks**

In the School of Chemical Engineering, all written work will be submitted for assessment via Moodle unless otherwise specified. Attaching cover sheets to uploaded work is *not* required unless specifically requested for a specific assessment task; when you submit work through Moodle for assessment you are agreeing to uphold the Student Code.

Some assessments will require you to complete the work online and it may be difficult for the course coordinator to intervene in the system after the due date. You should ensure that you are familiar with assessment systems well before the due date. If you do this, you will have time to get assistance before the assessment closes.

All submissions are expected to be neat and clearly set out. Your results are the pinnacle of all your hard work and should be treated with respect. Presenting results clearly gives the marker the best chance of understanding your method; even if the numerical results are incorrect. Please make it easy for the markers who are looking at your work to see your achievement and give you due credit.

Marking guidelines for assignment submissions will be provided at the same time as assignment details to assist with meeting assessable requirements. Submissions will be marked according to the marking guidelines provided.

**Academic Integrity**

**Academic integrity** is fundamental to success at university. Academic integrity can be defined as a commitment to six fundamental values in academic pursuits: honesty, trust, fairness, respect,

responsibility and courage (International Center for Academic Integrity, 'The Fundamental Values of Academic Integrity', T. Fishman (ed), Clemson University, 2013). At UNSW, this means that your work must be your own, and others' ideas should be appropriately acknowledged. If you don't follow these rules, plagiarism may be detected in your work.

Further information about academic integrity and plagiarism can be located at:

- The Current Students site
- The ELISE training site

The Conduct and Integrity Unit provides further resources to assist you to understand your conduct obligations as a student: https://student.unsw.edu.au/conduct.

To help describe what we are looking for, here are some things that we consider to be quite acceptable (even desirable!) actions for many assessments, and some that we consider to be unacceptable in most circumstances. Please check with the instructions for your assessments and your course coordinator if you're unsure. As a rule of thumb, if you don't think you could look the lecturer in the eye and say "this is my own work", then it's not acceptable.

*Acceptable actions*

 reading/searching through material we have given you, including lecture slides, course notes, sample problems, workshop problem solutions

 reading/searching lecture transcripts

 reading/searching resources that we have pointed you to as part of this course, including textbooks, journal articles, websites

 reading/searching through your own notes for this course

 all of the above, for any previous courses

 using spell checkers, grammar checkers etc to improve the quality of your writing

 studying course material with other students

*Unacceptable actions*

 asking for help completing an assessment from other students, friends, family

 asking for help on Q&A or homework help websites

 searching for answers to the specific assessment questions online or in shared documents

 copying material from any source into your answers

 using generative AI tools to complete or substantially complete an assessment for you

 paying someone else to do the assessment for you

**Referencing** is a way of acknowledging the sources of information that you use to research your assignments. You need to provide a reference whenever you draw on someone else's words, ideas or research. Not referencing other people's work can constitute plagiarism. Further information about referencing styles can be located at https://student.unsw.edu.au/referencing.

For assessments in the School of Chemical Engineering, we recommend the use of referencing software such as Mendeley or EndNote for managing references and citations. Unless required otherwise specified (i.e. in the assignment instructions) students in the School of Chemical Engineering should use either the APA 7th edition, or the American Chemical Society (ACS) referencing style as canonical author-date and numbered styles respectively.

**Artificial intelligence tools** such as ChatGPT, CodePilot, and built-in tools within Word are modern tools that are useful in some circumstances. In your degree at UNSW, we're teaching you skills that are needed for your professional life, which will include how to use AI tools responsibly plus lots of things that AI tools cannot do for you. AI tools already are (or will soon be) part of professional practice for all of us. However, if we were only teaching you things that AI could do, your degree would be worthless, and you wouldn't have a job in 5 years.

Whether the use of AI tools in an assessment is appropriate will depend on the goals of that assessment. As ever, you should discuss this with your lecturers – there will certainly be assessments where the use of AI tools is encouraged, as well as others where it would interfere with your learning and place you at a disadvantage later. Our goal is to help you learn how to ethically and professionally use the tools available to you. To learn more about the use of AI, see this discussion we have written where we analyse the strengths and weaknesses of generative AI tools and discuss when it is professionally and ethically appropriate to use them.

While AI may might provide useful tools to help with some assessments, UNSW's policy is quite clear that taking the output of generative AI and submitting it as your own work will never be

appropriate, just as paying someone else to complete an assessment for you is serious misconduct.

### Asking Questions

Asking questions is an important part of learning. Learning to ask good questions and building the confidence to do so in front of others is an important professional skill that you need to develop. The best place to ask questions is during the scheduled classes for this course, with the obvious exception being questions that are private in nature such as special consideration or equitable learning plans. Between classes, you might also think of questions — some of those you might save up for the next class (write them down!), and some of them you might ask in a Q&A channel on Teams or a Q&A forum on Moodle. Please understand that staff won't be able to answer questions on Teams/Moodle immediately but will endeavour to do so during their regular working hours (i.e. probably not at midnight!) and when they are next working on this particular course (i.e. it might be a day or two). Please respect that staff are juggling multiple work responsibilities (teaching more than one course, supervising research students, doing experiments, writing grants, …) and also need to have balance between work and the rest of their life.

## School Contact Information

For assistance with enrolment, class registration, progression checks and other administrative matters, please see the Nucleus: Student Hub. They are located inside the Library – first right as you enter the main library entrance. You can also contact them via http://unsw.to/webforms or reserve a place in the face-to-face queue using the UniVerse app.

For course administration matters, please contact the Course Coordinator.

Questions about the this course should normally be asked during the scheduled class so that everyone can benefit from the answer and discussion.