UNSW Course Outline

CEIC8102 Advanced Process Control - 2024

Published on the 29 Aug 2024

General Course Information

Course Code : CEIC8102
Year : 2024
Term : Term 3
Teaching Period : T3
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, Postgraduate
Units of Credit : 6

Useful Links

[Handbook](#) [Class Timetable](#)

Course Details & Outcomes

Course Description

This course introduces the concepts and knowledge of some of the key advanced process control techniques applied in process industries to chemical engineers. It covers the concepts of linear time invariant Multi-Input Multi-Output (LTI MIMO) systems, state-space representation of

process systems, controllability and observability analysis, Lyapunov stability analysis, frequency-domain multivariable analysis, stability analysis for interconnected systems, linear optimal control and state observers (soft sensors). An introduction to robust control and model predictive control is also provided, with an emphasis on the philosophy and applications of these approaches. Process control is an integral part of every modern processing plant and this course will give you skills which can be applied to improve process safety, product quality, and process operation economy.

Course Aims

The aim of the subject is to equip the students with knowledge of some of the key advanced process control techniques widely applied in process industries and develop skills to analyze multivariable process dynamics and design multivariable control systems, including linear optimal control, robust control and model predictive control.

Relationship to Other Courses

This course is concerned with quantitative system analysis and control design for multivariable processes. The prerequisite of this course is CEIC3006 Process Dynamics and Control or an equivalent entry-level process control subject.

Course Learning Outcomes

Course Learning Outcomes
CLO1 : Develop and analyse dynamic models for multivariable processes in the state-space representation.
CLO2 : Analyse interactions among inputs and outputs of multivariable processes and their dynamic features using frequency response techniques.
CLO3 : Analyse process controllability, observability, operability and model uncertainties from process models and stability and robustness of closed-loop control systems.
CLO4 : Design multivariable optimal control approaches (including Linear Quadratic Regulator, Linear Quadratic Gaussian control) and model predictive control.

Course Learning Outcomes	Assessment Item
CLO1 : Develop and analyse dynamic models for multivariable processes in the state-space representation.	• Assignments • In-Session Exam • Major Project with Laboratory Component
CLO2 : Analyse interactions among inputs and outputs of multivariable processes and their dynamic features using frequency response techniques.	• Assignments • In-Session Exam • Major Project with Laboratory Component
CLO3 : Analyse process controllability, observability, operability and model uncertainties from process models and stability and robustness of closed-loop control systems.	• Assignments • In-Session Exam • Major Project with Laboratory Component
CLO4 : Design multivariable optimal control approaches (including Linear Quadratic Regulator, Linear Quadratic Gaussian control) and model predictive control.	• Assignments • In-Session Exam • Major Project with Laboratory Component

Learning and Teaching Technologies

Moodle - Learning Management System | Microsoft Teams | Echo 360

Learning and Teaching in this course

This subject is about quantitative and rigorous control analysis and development, based on mathematical derivations. Therefore, the philosophy behind mathematical theory will be emphasized in lectures, such as, what motivates the approach, how it works and why. The relevance of this subject to chemical engineering practice will also be highlighted. In order to encourage a deep-approach to learning, emphasis is placed on the understanding of the control

theory via problem solving. This subject has three main components: lectures, tutorials and a design project (including lab sessions): The key theory and concepts will be taught during lectures (4 hours per week). Deeper understanding of the theory will be achieved via solving workshop questions (2 hours per week) and assignment problems. The students will have an opportunity to gain more thorough understanding of the techniques they have learned in this subject by implementing them judiciously in a control project. The description of the major project will be released in Week 7.

The project is about controlling a multivariable process (e.g., a distillation column). The theoretical aspect of the project (system analysis and theoretical design) will be covered in some tutorial classes and assignments. You can use any method taught in this subject or their combination. You will perform the control system design using Matlab and simulate your design using Simulink. You will compare the performance of different control designs and assess their cost-effectiveness. Your report will be assessed based on the critical analysis of your results and control methods. Students are expected to enter CEIC8102 having developed competencies in all the material covered in the pre-requisite courses, at least. Little time is available to remediate any deficiencies in your knowledge of those topics. Over the course of the term, you will be developing new competencies and to illustrate the standards we expect.

Other Professional Outcomes

Engineers Australia, Professional Engineer Stage 1 Competencies

This course contributes to your development 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
- PE1.3 In-depth understanding of specialist bodies of knowledge within the engineering discipline
- PE2.1 Application of established engineering methods to complex engineering problem solving
- PE2.2 Fluent application of engineering techniques, tools and resources
- PE2.3 Application of systematic engineering synthesis and design processes

https://www.unsw.edu.au/engineering/student-life/student-resources/program-design

Additional Course Information

Focused on the key concepts of modern control theory, this subject is suitable for students who are interested in the career of process control engineers/consultants or researchers in the field of control theory.

Assessments

Assessment Structure

Assessment Item	Weight	Relevant Dates
Assignments Assessment Format: Individual	30%	Start Date: Not Applicable Due Date: Week 3, Week 7
In-Session Exam Assessment Format: Individual	40%	Start Date: Not Applicable Due Date: Week 9
Major Project with Laboratory Component Assessment Format: Individual	30%	Due Date: Week 11

Assessment Details
Assignments

Assessment Overview

Students will solve a series of problems involving advanced process control techniques. These problems are designed to provide students with the chance to practice and receive feedback on their comprehension of the lecture material. The outcomes of the exercises will will indicate to the student their progress in attaining the course learning outcomes.

Course Learning Outcomes

- CLO1 : Develop and analyse dynamic models for multivariable processes in the state-space representation.
- CLO2 : Analyse interactions among inputs and outputs of multivariable processes and their dynamic features using frequency response techniques.
- CLO3 : Analyse process controllability, observability, operability and model uncertainties from process models and stability and robustness of closed-loop control systems.
- CLO4 : Design multivariable optimal control approaches (including Linear Quadratic Regulator, Linear Quadratic Gaussian control) and model predictive control.

Detailed Assessment Description

Assignment 1: state-space representation, multivariable analysis, stability analysis, operability analysis

Assignment 2: Observability and controllability analaysis, state observer design, LQR and LQG

control design

Assessment information

Assignments should be completed independently.

Assignment submission Turnitin type

Not Applicable

Generative AI Permission Level

No Assistance

This assessment is designed for you to complete without the use of any generative AI. You are not permitted to use any generative AI tools, software or service to search for or generate information or answers.

For more information on Generative AI and permitted use please see here.

In-Session Exam

Assessment Overview

The course learning outcomes include a significant level of technical learning. The in-session exam is designed to ensure that students are able to apply advanced techniques to the analysis and design of complicated process control systems. The questions will require students to demonstrate their knowledge and skill in solving advanced process control problems.

Course Learning Outcomes

- CLO1 : Develop and analyse dynamic models for multivariable processes in the state-space representation.
- CLO2 : Analyse interactions among inputs and outputs of multivariable processes and their dynamic features using frequency response techniques.
- CLO3 : Analyse process controllability, observability, operability and model uncertainties from process models and stability and robustness of closed-loop control systems.
- CLO4 : Design multivariable optimal control approaches (including Linear Quadratic Regulator, Linear Quadratic Gaussian control) and model predictive control.

Detailed Assessment Description

Covers materials taught from Week 1 to Week 8.

Assessment Length

2 hours

Assignment submission Turnitin type

Not Applicable

Generative AI Permission Level

No Assistance

This assessment is designed for you to complete without the use of any generative AI. You are not permitted to use any generative AI tools, software or service to search for or generate information or answers.

For more information on Generative AI and permitted use please see here.

Major Project with Laboratory Component

Assessment Overview

The project gives the students an opportunity to use the techniques they learned in this subject to design a multivariable control system and implement it in the process control laboratory. Students will submit a report that compares the performance of different control designs and assess their cost-effectiveness. The report will be assessed based on students' critical analysis of results and control methods.

Course Learning Outcomes

- CLO1 : Develop and analyse dynamic models for multivariable processes in the state-space representation.
- CLO2 : Analyse interactions among inputs and outputs of multivariable processes and their dynamic features using frequency response techniques.
- CLO3 : Analyse process controllability, observability, operability and model uncertainties from process models and stability and robustness of closed-loop control systems.
- CLO4 : Design multivariable optimal control approaches (including Linear Quadratic Regulator, Linear Quadratic Gaussian control) and model predictive control.

Detailed Assessment Description

The project is about multivariable control design and will be implemented using Siumlink/Matlab.

Assessment information

Individual report.

Assignment submission Turnitin type

This assignment is submitted through Turnitin and students can see Turnitin similarity reports.

Generative AI Permission Level

No Assistance

This assessment is designed for you to complete without the use of any generative AI. You are not permitted to use any generative AI tools, software or service to search for or generate information or answers.

For more information on Generative AI and permitted use please see [here](#).

General Assessment Information

Assignment problems are designed to ensure that lecture material is comprehended through personal practice and hence achievement of indicated learning outcomes. Individual work. While working in groups is permitted, independent reporting (distinct to each student) is required.

The project gives the students an opportunity to use the techniques they learned in this subject to design a multivariable control system.

All written work will be submitted for assessment via Moodle unless otherwise specified. If you are unable to submit the work via Moodle, you should email the work to the project coordinator as soon as possible. The time the email is received will be considered the submission time. If the content is too big to email, you can share it via your UNSW OneDrive.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.

When you submit work through Moodle for assessment you are assumed to be assenting to the standard plagiarism declaration. A copy of the plagiarism declaration is available from this course's Moodle page. You should not include a plagiarism declaration with your submissions as it will lead to false positives in the plagiarism detection system.

Submissions received after the due date and time will be penalised at a rate of 5% per day or part thereof. No submission will be accepted 3 days after the deadlines.

Timely, constructive, and meaningful feedback will be provided to student within two weeks of assessment submission. The assessment tasks and marking rubrics are designed to reflect the expected learning outcomes specified in "Professional Outcomes" section. You are expected to pass this course if you demonstrate good understanding of the key concepts of multivariable system representation and analysis, and the basic ideas, strength and limitations of the control methods and application of these techniques. You are expected to achieve higher scores if you demonstrate deep understanding of the above concepts and the ability of applying these

concepts in solving process control problems. The teaching staff will apply these marking guides fairly and provide you with feedback so you can continue to improve over the term and beyond.

Grading Basis

Standard

Requirements to pass course

Total assessment no less than 50.

Course Schedule

Teaching Week/Module	Activity Type	Content
Week 1 : 9 September - 15 September	Lecture	Introduction and background; signal and systems; frequency response analysis; Bode plots; multivariable systems - state space representation; transfer function matrices
	Workshop	Solving problems related to Week 1 lecture.
Week 2 : 16 September - 22 September	Lecture	Multivariable analysis; Poles and zeros of multivariable systems
	Workshop	Solving problems related to Week 2 lecture.
Week 3 : 23 September - 29 September	Lecture	Lyapunov stability; internal stability; controllability analysis; Process operability analysis based on frequency responses; operability analysis for multivariable processes
	Workshop	Solving problems related to Week 3 lecture.
	Assessment	Assignment 1 due.
Week 4 : 30 September - 6 October	Lecture	Control design: Linear Optimal Control (LQR)
	Workshop	Solving problems related to Week 4 lecture.
Week 5 : 7 October - 13 October	Lecture	Control design: State observer (observability) and LQG control
	Workshop	Solving problems related to Week 5 lecture.
Week 6 : 14 October - 20 October	Blended	Flexibility week
Week 7 : 21 October - 27 October	Lecture	Introduction to Model Predictive Control
	Workshop	Solving problems related to Week 7 lecture.
	Assessment	Assignment 2 due.
Week 8 : 28 October - 3 November	Lecture	Introduction to design project
Week 9 : 4 November - 10 November	Project	Design project
	Workshop	Design project workshop.
	Assessment	In-session exam.
Week 10 : 11 November - 17 November	Project	Design project
	Workshop	Design project workshop.
Week 11 : 18 November - 24 November	Assessment	Design project due.

Attendance Requirements

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

General Schedule Information

There are 4 hour lectures and 2 hour workshop classes every week, which cover the contents detailed in the course schedule.

Course Resources

Prescribed Resources

[Online resources](#)

The following recourses are available on Moodle or MS Teams:

- Lecture slides (on Moodle)
- Lecture notes and suggested readings (on Moodle)
- Tutorial exercises and solutions (on Moodle)
- Links to other online resources (on Moodle)
- Online discussion forum (on MS Teams)
- Echo 360 lecture recording

These will be progressively released as the semester progresses OR These are all currently available on the course website.

[Prescribed text](#)

Skogestad, S. (2nd Ed). Multivariable Feedback Control - Analysis and Design. John Wiley & Sons. ISBN(0470011688) (paperback).

The textbook is available from the University bookshop and the UNSW library:

https://www.bookshop.unsw.edu.au/details.cgi?ITEMNO=9780470011683

You can also use the older edition (Edition 1, 1996).

[Computer software](#)

You need to use Mathowrks MATLAB software to do control design and perform computer simulations in this course.

You can download MATLAB through: https://www.it.unsw.edu.au/students/software/matlab.html

You need sign up a mathworks account with your UNSW email. @student.unsw.edu.au

https://au.mathworks.com/academia/tah-support-program/eligibility.html

Once you have a mathworks account you can access the MATLAB Onramp training via the self-

paced courses in a browser. https://matlabacademy.mathworks.com/

For the Simulink training you will need to access this via the Desktop/Laptop version of your downloaded MATLAB. Once in the program you can click on 'Simulink' and 'Simulink Onramp'.

MATLAB and Simulink are also available online through https://www.myaccess.unsw.edu.au/.

Computers with Matlab (including toolboxes of control systems, MPC and Simulink) are required in the quiz.

Other resources

You can access the full text of online resources available from the UNSW library using the UNSW VPN Service (https://www.it.unsw.edu.au/staff/vpn/#AccessingLibraryJournals).

You can download MATLAB through: https://www.it.unsw.edu.au/students/software/matlab.html

You should sign up a mathworks account with your UNSW email. @student.unsw.edu.au

https://au.mathworks.com/academia/tah-support-program/eligibility.html

Once you have a mathworks account you can access the MATLAB Onramp training via the self-paced courses in a browser. https://matlabacademy.mathworks.com/

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MATLAB and Simulink are also available online through https://www.myaccess.unsw.edu.au/.

Computers with Matlab (including toolboxes of control systems, MPC and Simulink) are required in the quiz.

Course Evaluation and Development

Course delivery is influenced by student feedback in order to ensure continuous improvement. This is done through the administration of UNSW's myExperience questionnaire during the course, the student/staff meetings held by the School, as well as direct feedback to the lecturer/ tutors from time to time. Several improvements of this course, for example, greater emphasis on control applications, increased tutorial hours and a better assessment scheme have been made

based on previous student feedback. Your constructive suggestions would help in securing a better teaching and learning experience for future students.

Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
Convenor	Jie Bao		Room 301 SEB	x56755	By appointment, Teams messages/ emails and Teams discussion forum	No	Yes
Tutor	Shuangyu Han		Room 302 SEB			No	No
Demonstrator	Shail Godiwala		Room 302 SEB			No	No

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 suceed. 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 an individual 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.