School of Chemical Engineering

UNSW Engineering

CEIC3005

Process Plant Design

Term 1, 2023

Course Overview

Staff Contact Details

Convenors

Name	Email	Availability	Location	Phone
Emma Lovell	e.lovell@unsw.edu.au	Teams chat	TETB (H6) 350	

Lecturers

Name	Email	Availability	Location	Phone
Peter Neal	peter.neal@unsw.edu.au	Teams chat	Hilmer (E10) 216	
Sarah Grundy	s.grundy@unsw.edu.au	Teams chat	SEB (E8) 433	

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.

If circumstances outside your control impact on submitting assessments, Special Consideration may be granted, usually in the form of an extension or a supplementary assessment. Applications for Special Consideration must be submitted online.

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.

Course Details

Units of Credit 6

Summary of the Course

The course is intended to prepare students for professional engineering practice at the preliminary design stages of a project. You will become familiar with the steps associated with planning and evaluating a new chemical process, collecting and documenting the information needed to proceed through the design stage. Specific requirements for difference process types are addressed. This course focuses on four broad areas in the design of chemical process plants:

1. **Design Documentation** (DD) – prioritising design constraints and objectives, identifying relevant design guidelines and environmental standards, drawing block flow diagrams (BFD), process flow diagrams (PFD), piping and instrumentation diagrams (P&ID) and general arrangement (GA) of equipment in line with industry conventions.
2. **Process Simulation** (PS) – design, simulating and optimising chemical unit operations using commercial simulation software.
3. **Process Safety and Risk** (PRS) – identifying, evaluating and managing hazard and safety issues in a chemical plant or process and using control system design and risk analysis tools such as HAZOP, HAZAN and HACCP.
4. **Process Economics** (PE) – estimating revenue and costs, performing cash flow analysis and using various economic indicators to evaluate engineering projects.

While taught as four distinct modules, they are interrelated aspects of process plant design and are brought together through the design portfolio exercise. Students will demonstrate their competency in all areas through weekly quizzes, the design portfolio and a final exam.

Course Aims

This course aims to equip students with the knowledge and skills required to design, document and evaluate chemical processes at the plant level.

Course Learning Outcomes

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

Learning Outcome	EA Stage 1 Competencies
1. Prepare engineering drawings to sufficient detail for the preliminary design stages of an engineering project	PE1.3, PE1.5, PE1.6
2. Use industry standard specialist software to simulate the performance and establish basic sizing of a range of common unit operations	PE1.2, PE2.2, PE2.3
3. Identify and assess safety and hazards issues in process design	PE2.1, PE3.1, PE3.4
4. Develop budgetary cost estimates, discount cash flow analysis and net present value analysis for chemical engineering processes using standard engineering cost estimating methods	PE1.5, PE2.3, PE2.4

Relationship with the discipline and the rest of your program

Whether you are part of the Chemical Engineering, Chemical Product Engineering or Industrial Chemistry stream, this course is a key part of your training in engineering design. The skills acquired in this course are used by engineers in the development of a business case to upgrade an existing plant, develop a new facility or create new or improved products.

Students considering a career in consulting engineering or project planning would be expected to be familiar with these methods. The course also offers an introduction to the theory behind hazard analysis which is central to the design process, but is also an essential component of construction, commissioning, operation and production activities in all sectors of the engineering industry.

In this course you will use your knowledge of engineering design (DESN1000 and DESN2000) in formulating the design problem, generating and evaluating possible solutions – skills which will be further developed in courses like CEIC3004, CEIC4001 and CEIC4007/8. These design skills will be augmented by training in process economics to bring a commercial perspective to decisions related to the design and deployment of chemical products and processes.

This course requires your knowledge of material and energy balances (CEIC2000), transport phenomena (CEIC2001, CEIC2002) and numerical methods (MATH2089) to prepare preliminary process stream tables for chemical plants and then full computer-based process simulations. These capabilities will be further developed and applied when students take CEIC3004, CEIC3007, CEIC4001 or CEIC4007/8.

You will also employ your knowledge of statistics (MATH2089), chemistry and thermodynamics (CEIC2000) to evaluate process risks and ensure the safe operation of chemical plants – these capabilities will be further developed in CEIC3006.

Finally, you will expand your knowledge of engineering communications, developed through courses like DESN1000, DESN2000 and CEIC2007, by learning about design documentation conventions and engineering drawings used in the chemical process industries. These types of documentation will be

required in CEIC3004 and CEIC4001.

Teaching Strategies

Becoming familiar with the formal aspects and process of engineering design is like learning a language. There are some basic rules on structure and content and many new terms (or vocabulary) to learn. However, design is an applied subject so you will also learn by doing. This will involve looking at different chemical process examples taken from plastics, environmental, mineral processing, petrochemical and pharmaceutical industries. We will not cover the background information on these processes. The students are expected to do their own research and reading on the fundamentals of the process. The rationale for this course is to look in detail on the method of how the design process is applied to an example from one of these industries.

The large group classes in this course blend activities found in both lectures and tutorials (aka lectorial). Our time will be spent moving between instruction (where we introduce you to the language and methods employed in various areas of process design) and practice (working in breakout groups to develop your capabilities in process design).

We will also spend time as a large class in design studio mode. This is a key opportunity for you to work with your design team on your design portfolio and get advice and support from teaching assistants and lecturers. The design portfolio provides you will an opportunity to see how the different areas of this course fit together.

The process simulation component of the course is taught primarily through self-paced online lessons. The dedicated tutorials are provided for you to get advice and support. It will be helpful if you have attempted the lessons before attending the tutorials.

Weekly quizzes are provided to help you assess your learning and provide feedback to you and the teaching staff on your degree of mastery.

At the end of the course, the students will have confidence in their ability to recognize the stages of the design process and understand what type and level of investigation is required at each stage and how the outputs of the design process are used to make decisions on which design is implemented.

Additional Course Information

Integrity and Respect

The UNSW Student Code of Conduct (https://student.unsw.edu.au/conduct) among other things, expects all students to demonstrate integrity in all the academic work and to treat all staff, students and visitors to the University with courtesy, tolerance and respect.

Time commitment

UNSW expects students to spend approximately 150 hours to successfully complete a 6 UOC course like CEIC3005. We expect 71 hours to be spent participating in face-to-face classes, 9 hours completing online quizzes and the final exam, with the remaining 80 hours provided for private study, working on your design portfolio and preparing for the final exam. Therefore, outside class, you should be spending at least 7 hours per week working on CEIC3005.

Competence

Students are expected to enter CEIC3005 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, marking rubrics or guidelines will be provided for all assessments. 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.

Participation

When you attend workshops and studios, we expect you to actively participate in the activities organised. This may mean listening, taking notes, asking questions or engaging in peer discussions. It may also mean working by yourself or in groups on exercises.

To complete the design assignment, you are required to work in a team. We expect all team members to agree on how they will manage the team (e.g. making and documenting decisions), to assign the project work equitably and contribute to the delivery of project outputs to the best of their ability.

Students are expected to contribute to online discussions through the course forum on Moodle. You may wish to discuss challenges faced through this course, ask questions about course content, discuss solutions to practice questions. It is expected that students will help each other, and the lecturers will contribute as required.

Attendance and punctuality

We expect students to be punctual and attend at all classes. University commitments take precedence over regular work activities, holidays etc. Students who attend less than 80% of their possible classes may be refused final assessment. If you miss a class, we expect you to catch up in your time, seminars will be recorded and made available through Moodle.

COVID–19 Safe Return to Campus

In line with NSW Health and Safe Return to Campus orders and guidelines, masks must be worn when attending the face-to-face component of this course as physical distancing is not possible.

Students are required to bring and use their own valveless face mask. Masks can be purchased from IGA Supermarket (Map B8, Lower Campus), campus pharmacy (Map F14, Middle Campus), the post office (Map F22, Upper Campus) and a vending machine in the foyer of the Biological Sciences Building (Map E26, Upper Campus).

Do not come to campus if you have any of the following symptoms: fever (37.5 °C or higher), cough, sore throat, shortness of breath (difficulty breathing), runny nose, loss of taste or loss of smell. If you need to have a COVID-19 test, you should not come to campus and remain in self-isolation until you receive the results of your test.

If you test positive to COVID-19 and have been on campus whilst deemed infectious, you should advise the UNSW immediately by completing and submitting the UNSW COVID-19 Case Notification Form.

Assessment

Assessment task	Weight	Due Date	Course Learning Outcomes Assessed
1. Online Quizzes	20%	See Table	1, 2, 3, 4
2. Design Portfolio	50%	See Table	1, 2, 3, 4
3. Final exam	30%	Exam Period	1, 3, 4

Assessment 1: Online Quizzes

Submission notes: All quizzes will be completed in Moodle. The simulation quizzes will require access to ASPEN Plus.
Due date: See Table

Students are required to complete quizzes on lecture material from the prior week(s). This will include extended quizzes on the Process Simulation module. The quizzes are designed to provide an impetus to study and give you feedback on your understanding of the course materials.

Additional details

The eight quizzes on Design Documentation, Process Economics and Process Risk & Safety are worth 1% each. They will be released on Tuesday and will generally close the following Sunday.

The two Process Simulation quizzes will be released on Friday. The first quiz is worth 4% and will close the following Sunday, while the second quiz is worth 8% and will on the following Friday.

Quiz	Marks	Opens	Closes
DD Quiz 1	1	Wed, 15 Feb	Mon, 20 Feb at 9pm
DD Quiz 2	1	Wed, 22 Feb	Mon, 27 Feb at 9pm
PE Quiz 1	1	Wed, 1 Mar	Mon, 6 Mar at 9pm
PS Quiz 1	4	Tues, 7 Mar	Fri, 10 Mar at 9pm
PE Quiz 2	1	Wed, 8 Mar	Mon, 13 Mar at 9pm
PE Quiz 3	1	Wed, 15 Mar	Mon, 27 Mar at 9pm
PRS Quiz 1	1	Wed, 29 Mar	Mon, 3 Apr at 9pm
PRS Quiz 2	1	Wed, 5 Apr	Tue, 11 Apr at 9pm
PRS Quiz 3	1	Wed, 12 Apr	Mon, 17 Apr at 9pm
PS Quiz 2	8	Tues, 18 Apr	Sun, Apr 21 at 9pm

Assessment 2: Design Portfolio (Group)

Submission notes: All submissions will be through Moodle.
Due date: See Table

Student design teams will complete a preliminary design on a section of a chemical process plant applying their learning from the course. The design process will be documented through a series of deliverables that will apply the content covered in the previous weeks.

As part of this process, students will complete an in-class peer review exercise. This exercise is designed to enable teams to receive feedback before submission. Students will also complete team evaluations exercise to provide feedback to their team mates and moderate grades.

Additional details

Task	Marks	Due
Peer review materials 1	1	Thurs, 2 Mar at 9pm
Peer review report 1	2	Fri, 3 Mar at 9pm
Deliverable 1	12	Thu, 9 Mar at 9pm
Peer review materials 2	1	Thu, 30 Mar at 9pm
Peer review report 2	2	Fri, 31 Mar at 9pm
Deliverable 2	12	Thu, 6 Apr at 9pm
Peer review materials 3	1	Thu, 20 Apr at 9pm
Peer review report 3	2	Fri, 21 Apr at 9pm
Deliverable 3	17	Sun, 23 Apr at 9pm

Marks for the Design Portfolio will be adjusted based upon the Team Evaluations. More details on the process and how marks will be adjusted can be found in the Design Portfolio brief (on Teams and Moodle). The dates for the Team Evaluation are as follows:

1. Week 5, Tuesday, 14th March, 9pm
2. Week 8, Tuesday, 4th April, 9pm
3. Week 9, Tuesday, 11th April, 9pm*
4. Week 11, Sunday, 23rd April, 9pm

* to reduce workload, if you are doing both CEIC3004 + CEIC3005 you will have the option to complete a new evaluation in Week 9, or to use the same Week 8 Evaluation for Week 9.

Assessment 3: Final exam

Submission notes: The exam will be completed in-person.
Due date: Exam Period

Students will complete an in-person exam on the Design Documentation, Process Risk & Safety, and Process Economics components to assess their competency in these topic areas.

Attendance Requirements

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

Course Schedule

View class timetable

Timetable

Date	Type	Content
Week 1: 13 February - 17 February	Homework	Complete Team Builder survey - closes Tuesday, 9pm.
	Laboratory	**Tuesday, 4–5pm in Chem Sci (F10) M03** Process Simulation Module 1 (classes F12A and F14A)
	Seminar	**Wednesday, 10am –12pm in Tyree Energy Technologies Building (TETB, G15)** DD Seminar 1: Course Introduction & Process Plant Design
	Workshop	**Wednesday, 4–5pm in Tyree Energy Technologies Building (TETB, G15)** DD Workshop: Constructing Chemical Process Diagrams (BFDs and PFDs)
	Seminar	**Thursday, 10am–12pm in Tyree Energy Technologies Building (TETB, G15)** DD Seminar 2: Chemical Process Diagrams (includes workshop on research literature and standards)
	Studio	**Friday, 4–6pm inTyree Energy Technologies Building (TETB, G15)** Design Studio: Team building and planning exercises (Gantt chart)
Week 2: 20 February - 24 February	Laboratory	**Tuesday, 4–5pm in Chem Sci (F10) M03** Process Simulation Module 1 (classes F12B and F14B)
	Seminar	**Wednesday, 10am –12pm in Tyree Energy Technologies Building (TETB, G15)**

		DD Seminar 3: Piping and Instrumentation Diagrams (P&ID) 1
	Workshop	**Wednesday, 4–5pm in Tyree Energy Technologies Building (TETB, G15)** DD Workshop: Piping and Instrumentation Diagrams (P&ID)
	Seminar	**Thursday, 10am–12pm in Tyree Energy Technologies Building (TETB, G15)** DD Seminar 4: Piping and Instrumentation Diagrams (P&ID) 2
	Studio	**Friday, 4–6pm inTyree Energy Technologies Building (TETB, G15)** Design Studio: Development of BFD and MEB
Week 3: 27 February - 3 March	Laboratory	**Tuesday, 4–5pm in Chem Sci (F10) M03** Process Simulation Module 2 (classes F12A and F14A)
	Seminar	**Wednesday, 10am –12pm in Tyree Energy Technologies Building (TETB, G15)** PE Seminar 1: Intro to Process Economics. Cost estimation.
	Workshop	**Wednesday, 4–5pm in Tyree Energy Technologies Building (TETB, G15)** PE Workshop: Preparing cost estimates and cash flow analyses
	Seminar	**Thursday, 10am–12pm in Tyree Energy Technologies Building (TETB, G15)** PE Seminar 2: Cash flows, financing and Leasing.
	Studio	**Friday, 4–6pm inTyree Energy Technologies Building (TETB, G15)** Design Studio: In-class peer review of prelim. BFD and MEB
Week 4: 6 March - 10 March	Laboratory	**Tuesday, 4–5pm in Chem Sci (F10) M03** Process Simulation Module 2 (classes F12B and F14B)

	Seminar	**Wednesday, 10am –12pm in Tyree Energy Technologies Building (TETB, G15)** PE Seminar 3: Time value of money
	Workshop	**Wednesday, 4–5pm in Tyree Energy Technologies Building (TETB, G15)** PE Workshop: Preparing cost estimates and cash flow analyses
	Seminar	**Thursday, 10am–12pm in Tyree Energy Technologies Building (TETB, G15)** PE Seminar 2: Cash Flows, Financing and Leasing.
	Studio	**Friday, 4–6pm inTyree Energy Technologies Building (TETB, G15)** Design Studio: Developing your project cost estimates
Week 5: 13 March - 17 March	Laboratory	**Tuesday, 4–5pm in Chem Sci (F10) M03** Process Simulation Module 3 (classes F12A and F14A)
	Seminar	**Wednesday, 10am –12pm in Tyree Energy Technologies Building (TETB, G15)** PE Seminar 5: Inflation and Depreciation.
	Workshop	**Wednesday, 4–5pm in Tyree Energy Technologies Building (TETB, G15)** PE Workshop: Economic evaluation and decision making
	Seminar	**Thursday, 10am–12pm in Tyree Energy Technologies Building (TETB, G15)** PE Seminar 6: Taxation, modelling & risk.
	Studio	**Friday, 4–6pm inTyree Energy Technologies Building (TETB, G15)** Design Studio: Developing your project business case
Week 6: 20 March - 24 March		Flexi-week

Week 7: 27 March - 31 March	Laboratory	**Tuesday, 4–5pm in Chem Sci (F10) M03** Process Simulation Module 3 (classes F12B and F14B)
	Seminar	**Wednesday, 10am –12pm in Tyree Energy Technologies Building (TETB, G15)** PRS Seminar 1: Introduction to PRS
	Workshop	**Wednesday, 4–5pm in Tyree Energy Technologies Building (TETB, G15)** PRS Workshop: Risk Register
	Seminar	**Thursday, 10am–12pm in Tyree Energy Technologies Building (TETB, G15)** PRS Seminar 2: HAZID + Risk register
	Studio	**Friday, 4–6pm inTyree Energy Technologies Building (TETB, G15)** Design Studio: In-class peer review of prelim. cost estimates.
Week 8: 3 April - 7 April	Laboratory	**Tuesday, 4–5pm in Chem Sci (F10) M03** Process Simulation Module 4 (classes F12A and F14A)
	Seminar	**Wednesday, 10am –12pm in Tyree Energy Technologies Building (TETB, G15)** PRS Seminar 3: HAZOP
	Workshop	**Wednesday, 4–5pm in Tyree Energy Technologies Building (TETB, G15)** PRS Workshop: HAZOP
	Seminar	**Thursday, 10am–12pm in Tyree Energy Technologies Building (TETB, G15)** PRS Seminar 4: Quantitative Risk Assessment
Week 9: 10 April - 14 April	Laboratory	**Tuesday, 4–5pm in Chem Sci (F10) M03** Process Simulation Module 4 (classes F12B and F14B)
	Seminar	**Wednesday, 10am –12pm in Tyree Energy Technologies Building (TETB, G15)**

		PRS Seminar 5: Bowtie and LOPA
	Workshop	**Wednesday, 4–5pm in Tyree Energy Technologies Building (TETB, G15)** PRS Workshop: QRA
	Seminar	**Thursday, 10am–12pm in Tyree Energy Technologies Building (TETB, G15)** PRS Seminar 6: Risk evaluation and safeguarding systems
	Studio	**Friday, 4–6pm inTyree Energy Technologies Building (TETB, G15)** Design Studio: HAZOP Development
Week 10: 17 April - 21 April	Seminar	**Wednesday, 10am –12pm in Tyree Energy Technologies Building (TETB, G15)** DD Seminar 5: Plant Layout, Environmental Documentation and Machine Drawing
	Workshop	**Wednesday, 4–5pm in Tyree Energy Technologies Building (TETB, G15)** DD Workshop
	Seminar	**Thursday, 10am–12pm in Tyree Energy Technologies Building (TETB, G15)** DD Seminar 6: DD wrap & project workshop
	Studio	**Friday, 4–6pm inTyree Energy Technologies Building (TETB, G15)** Design Studio: In-class peer review

Resources

Prescribed Resources

Videos, lecture slides and suggested readings, exercises and solutions, plus links to other online resources will be provided on the course Moodle page (http://moodle.telt.unsw.edu.au/). These will be progressively released as the term progresses.

Recommended Resources

There is no set textbook for this course. However, the following texts will be helpful resources in completing the learning activities in this course, additional resources are posted on the CEIC3005 Leganto page.

Text	Library availability	Covers
Sinnott, R. K., Coulson, J. M., & Richardson, J. F. (2005). *Coulson & Richardson's Chemical Engineering: Vol. 6*. Oxford: Elsevier Butterworth-Heinemann.	Knovel	DD, PE, PRS
Standards Australia International & Standards New Zealand (2013). *Risk management: Guidelines on risk assessment techniques*. (SA/SNZ HB 89: 2013).	SAI Global	PRS
Peters, M. S., Timmerhaus, K. D., & West, R. E. (2006). *Plant design and economics for chemical engineers*. Boston: McGraw-Hill.	Hard copy only	DD, PE
Green, D.W., & M.Z. Southland (Eds) (2019). *Perry's Chemical Engineers' Handbook, 9th Edition.* McGraw-Hill Education	Access Engineering	DD, PE, PRS

Other resources

ASPEN Plus is available in the School of Chemical Engineering computer laboratories (Rooms M03 and 713 in the Chemical Sciences Building). ASPEN Plus and @Risk are available online through https://www.myaccess.unsw.edu.au/.

You can access the full text of online resources available from the UNSW library using the UNSW VPN Service (https://www.myit.unsw.edu.au/services/students/remote-access-vpn).

Visio Professional 2021. Can be accessed through Microsoft Azure Platform https://azureforeducation.microsoft.com/devtools

Study space for project courses

Students enrolled in selected project- and laboratory-based courses are granted access to Room 102 on Level 1 of the Science and Engineering Building (Map Ref. E8). Access to this space is subject to the following conditions:

- Students must follow any directions from teaching and technical staff.
- This space is provided for private study and/or small group project meetings related to courses taught by the School of Chemical Engineering.
- Some classes have booked this space and students should vacate the space during these classes.
- Students using the space are expected to leave the space in the same or better condition than they found it. Keeping this in mind, limited consumption of food and drink is permitted.

Failure to observe any of these conditions may result in your access being revoked.

Course Evaluation and Development

We want your feedback on this course whether positive or negative. You can provide verbal or written feedback directly to lecturers, through our course's anonymous feedback forum or through the University's myExperience survey.

Feedback we received from previous offerings has resulted in us

- Coordinating due dates with all year three courses (CEIC3004, CEIC3005, CEIC3000). All year 3 lecturers have a shared communication channel to ensure consistent communication and best align assesment timing.
- Changed the due date of the design portfolio to before the Studio so that Studio time can be spent working toward upcoming deliverables.
- Reducing the number of forums on the Moodle page to make it easier to track conversations and announcements. This was further improved by switching to Microsoft Teams as our main communications platform.
- Simplifying the assessment of the course (e.g. getting rid of the mid-session, having a single stream of quizzes and having one design assignment over the whole term).
- Splitting the design assignment from a single report into a portfolio of connected tasks.
- Reorganising the course structure into a block mode, so that class time is focused on one area at a time. Further, the Process Simulation area has now been spread across the whole term to give students more time to digest and practice the content.
- Dedicating part of class time for a design studio to provide specific guidance and practice on applying course content in the context of the design assignment.
- Rearranging class time to reduce the length of lectures/seminars, increase the length of the studios and add a dedicated workshop for practicing course content separate from the design portfolio.

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.

Late penalties

Unless otherwise specified, submissions received after the due date and time will be penalised at a rate of 5% per day or part thereof (including weekends) and will not be accepted more than 5 days late. For some activities including Exams, Quizzes, Peer Feedback, and Team Evaluation surveys, extensions and late submissions are not possible.

Special consideration

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 submitting an assessment or sitting an exam.

UNSW has a Fit to Sit / Submit rule, which means that if you attempt an exam or submit a piece of assessment, 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.

Please note that for **all** special consideration requests (including COVID-19-related requests), students will need documentary evidence to support absences from any classes or assessments.

Academic Honesty and Plagiarism

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	Unacceptable actions
✓ reading/searching through material we have given you, including lecture slides, course notes, sample problems, workshop problem solutions	✗ asking for help with an assessment from other students, friends, family
✓ reading/searching lecture transcripts	✗ asking for help on Q&A or homework help websites
✓ reading/searching resources that we have pointed you to as part of this course, including textbooks, journal articles, websites	✗ searching for answers to the specific assessment questions online or in shared documents
✓ reading/searching through your own notes for this course	✗ copying material from any source into your answers
✓ all of the above, for any previous courses	✗ using generative AI tools to complete or substantially complete an assessment for you
✓ using spell checkers, grammar checkers etc to improve the quality of your writing	✗ paying someone else to do the assessment for you
✓ studying course material with other students	

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.

Academic Information

To help you plan your degree, assistance is available from academic advisors in The Nucleus and also in the School of Chemical Engineering.

Additional support for students

- Current Student Gateway for information about key dates, access to services, and lots more information
- Engineering Student Life - Current Student Resources for information about everything from getting to campus to our first year guide
- Student Support and Success for our UNSW team dedicated to helping with university life, visas, wellbeing, and academic performance
- Academic Skills to brush up on some study skills, time management skills, get one-on-one support in developing good learning habits, or join workshops on skills development
- Student Wellbeing, Health and Safety for information on the UNSW health services, mental health support, and lots of other useful wellbeing resources
- Equitable Learning Services for assistance with long term conditions that impact on your studies
- IT Service Centre for everything to do with computing, including installing UNSW licensed software, access to computing systems, on-campus WIFI and off-campus VPNs

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

In 2023, most classes at UNSW are running in a face-to-face mode only. Attendance is expected as is

participation in the classes. 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.

This course outline will have further details in the Course Schedule and Assessment sections.

Class numbers are capped in each class to ensure appropriate facilities are available, to maintain student:staff ratios, and to help maintain adequate ventilation in the spaces. Only students enrolled in each specific classes will be allowed in the room. Class rosters will be attached to corresponding rooms and circulated among lab demonstrators and tutors. No over-enrolment is allowed in face-to-face classes.

In certain classroom and laboratory situations where physical distancing cannot be maintained or the staff running the session believe that it will not be maintained, face masks will be designated by the course coordinator as **mandatory PPE** for students and staff. Students are required to bring and use their own face mask. Mask can be purchased from IGA Supermarket (Map B8, Lower Campus), campus pharmacy (Map F14, Middle Campus), the post office (Map F22, Upper Campus) and a vending machine in the foyer of the Biological Sciences Building (Map E26, Upper Campus).

Your health and the health of those in your class is critically important. You must stay at home if you have COVID-19 or have been advised to self-isolate by NSW health or government authorities.

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.

Note: This course outline sets out 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 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 (as updated in Moodle), the description in the Course Outline/Moodle applies.

Image Credit

Pilot Hall with experiment rigs // UNSW Chemical Engineering

CRICOS

CRICOS Provider Code: 00098G

Acknowledgement of Country

We acknowledge the Bedegal people who are the traditional custodians of the lands on which UNSW Kensington campus is located.

Appendix: Engineers Australia (EA) Professional Engineer Competency Standard

Program Intended Learning Outcomes	
Knowledge and skill base	
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	✓
PE1.4 Discernment of knowledge development and research directions within the engineering discipline	
PE1.5 Knowledge of engineering design practice and contextual factors impacting the engineering discipline	✓
PE1.6 Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline	✓
Engineering application ability	
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	✓
PE2.4 Application of systematic approaches to the conduct and management of engineering projects	✓
Professional and personal attributes	
PE3.1 Ethical conduct and professional accountability	✓
PE3.2 Effective oral and written communication in professional and lay domains	
PE3.3 Creative, innovative and pro-active demeanour	
PE3.4 Professional use and management of information	✓
PE3.5 Orderly management of self, and professional conduct	
PE3.6 Effective team membership and team leadership	