



CEIC6712

Pharmaceutical Design and Engineering

Term Two // 2021

Course Overview

Staff Contact Details

Convenors

Name	Email	Availability	Location	Phone
Sophia Gu	zi.gu1@unsw.edu.au	Contact by email, via MS Teams or by appointment	Hilmer Building (E10) Room 322	+61 2 93854964

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.

Course Details

Credit Points 6

Summary of the Course

Students will learn how to design, develop and evaluate pharmaceutical and nutraceutical agents in line with research and industry methods, where chemical engineers, nutritionists and medical researchers work together to transform raw materials and small molecular agents to valuable pharma products. The contents will cover a broad range of competencies in pharmaceutical and nutraceutical sectors, including drug delivery, pharmaceutical design and processing, nanotechnology, drug regulation and approval, with emphasis on new technology innovation, translational process and commercialised healthcare-related products. The course will be offered in collaboration with relevant pharmaceutical/nutraceutical/biotechnology companies, allowing students to use knowledge and skills to solve drug development problems currently challenging the pharmaceutical and nutraceutical industry.

Course Aims

CEIC6712 is designed for students who would like to learn knowledge and skills in pharmaceutical science, engineering and industry. The information and reflection gained from the course will not only benefit students' future academic and industry careers in pharmaceutical sectors, but also benefit students who will work in nutraceutical, food, biotechnology, nanotechnology, environment and other relevant fields.

Course Learning Outcomes

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

Learning Outcome	EA Stage 1 Competencies
1. Students should be able to illustrate and explain pharmaceutical design and engineering using examples of pharmaceutical products.	PE1.1, PE1.2, PE1.3, PE1.4, PE1.5, PE1.6
2. Students should articulate the procedure of drug development and features of each component of drug development.	PE1.1, PE1.2, PE1.3, PE1.4, PE1.5, PE1.6
3. Students should be able to demonstrate and analyse the main factors and technologies of manufacturing tablet and liquid pharmaceutical products.	PE1.1, PE1.2, PE1.3, PE1.4, PE1.5, PE1.6, PE2.1, PE2.2, PE2.3
4. Students should gain knowledge on advanced nanotechnology and biotechnology principles and techniques.	PE1.1, PE1.2, PE1.3, PE1.4, PE1.5, PE1.6, PE2.1, PE2.2, PE2.3
5. Students should be able to transform gained knowledge and understanding one or two specific topics in depth and present it in written and oral manners.	PE2.1, PE2.2, PE3.2, PE3.3, PE3.6, PE2.4

Teaching Strategies

The course will include lectures, seminars from industry-related sectors and advanced technique, and group work. With the help of the lectures, students will be able to learn collectively and gain solid understanding. Through assessments students will have the ability to develop their skills toward critical thinking in the context of pharmaceutical technologies.

This course will also enable students to develop informed communication skills relevant to the pharmaceutical sector. The course contents are designed to enable students to apply theoretical content and general understanding in a practical orientation, which also requires students to develop high levels of engagements, collaboration and analytical ability. A large component of the assessment will thus be based on students' ability to build-up knowledge and skills toward critical thinking and practical application.

Assessment

Assessment Tasks

Assessment task	Weight	Due Date	Student Learning Outcomes Assessed
Mini Quiz	10%	10/06/2021 02:30 PM	1, 2
Quiz	20%	10/06/2021 03:00 PM	1, 2, 3
Group Oral Presentation	30%	05/08/2021 05:00 PM	4, 5
Written Report	40%	12/08/2021 05:00 PM	1, 2, 3, 4, 5

Assessment Details

Assessment 1: Mini Quiz

Start date: 10/06/2021 02:00 PM

Details:

Assessment to allow students to monitor, reinforce and reflect on their understanding of the Week 1 topics.

Assessment 2: Quiz

Start date: 24/06/2021 02:00 PM

Details:

Assessment to allow students to monitor, reinforce and reflect on their understanding of the principles and applications of the topics (Week 2 – Week 4).

Assessment 3: Group Oral Presentation

Start date: 05/08/2021 02:00 PM

Details: Assessment to evaluate how students work as a team to illustrate a problem and solutions in the context of pharmaceutical design and engineering. Multiple skills will be developed and reinforced through group oral presentation, including critical thinking, team working ability and communication. The topic and content of the group presentation will be related to advanced pharmaceutical technologies and manufacturing. The assessment details will be introduced in Week 5. All students will be expected to present components of the group presentations and participate in peer assessment of the presentations.

Assessment 4: Written Report

Details:

A written report to discuss contemporary issue(s) of pharmaceutical development provides an opportunity for students to further broaden their visions and improve deep and critical thinking.

The assessment details will be introduced in Week 5.

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: 31 May - 4 June	Lecture	Week 1 - [A]Introduction to the course; B) Drug Design and Development; C) Drug Commercialisation] - 3 hours lecture
Week 2: 7 June - 11 June	Blended	[A) Mini Quiz; B) Pharmaceutical Manufacturing – Tablet (I)] - 0.5 hour quiz & 2.5 hours lecture
Week 3: 14 June - 18 June	Lecture	Week 3 - [Pharmaceutical Manufacturing – Tablet (II)] - 3 hours lecture
Week 4: 21 June - 25 June	Lecture	Week 4 - [Pharmaceutical Manufacturing - Liquid Dosage] - 3 hours lecture
Week 5: 28 June - 2 July	Blended	Week 5 - [A) Quiz; B) Introduction to the Assessments (Oral Presentation & Written Report); C) Pharmaceutical Water Treatment] - 1 hour quiz & 2 hour lecture
Week 6: 5 July - 9 July	Online Activity	Week 6 - Flexibility Week
Week 7: 12 July - 16 July	Lecture	Week 7 - [Pharmaceutical Nanotechnology] - 3 hour lecture
Week 8: 19 July - 23 July	Lecture	Week 8 - [Biopharmaceuticals and Nutraceuticals] - 3 hour lecture
Week 9: 26 July - 30 July	Lecture	Week 9 - [A) Liposomes in Pharma Sector; B) 3D Printing in Pharma Sector] - 3 hour lecture
Week 10: 2 August - 6 August	Assessment	Week 10 - [Group oral presentation] - 3 hours assessment

Resources

Prescribed Resources

Reading materials are available on lecture slides.

Recommended Resources

Practical Pharmaceutical Engineering

By Gary Prager

Wiley-VCH, 2014

[Nanotechnology Applied To Pharmaceutical Technology](#)

Carolina Alves dos Santos editor. ; Mahendra Rai editor. ;

Cham : Springer International Publishing, 2017

[Pharmaceutical technology. Tableting technology](#) M. H Rubinstein; Pharmaceutical Technology Conference (5th : 1986 : Harrogate, England) ; Halsted Press ed., Chichester, West Sussex, England : Ellis Horwood ; New York : Distributed by Halsted Press, 1987

[Pharmaceutical Biotechnology](#)

Giora Z Feuerstein editor. ; Carlos A Guzmán editor. ; SpringerLink (Online service) ;

New York, NY : Springer New York, 2009

[Pharmaceutical Biotechnology : Fundamentals and Applications](#)

Daan J. A Crommelin editor. ; Bernd Meibohm editor. ; Robert D Sindelar editor. ; SpringerLink (Online service) ;

4th ed 2013., New York, NY : Springer New York : Imprint: Springer, 2013

[Pharmaceutical biotechnology : drug discovery and clinical applications](#)

Oliver Kayser ; Rainer H Müller ; John Wiley & Sons, Ltd. ;

Weinheim : Wiley-VCH, ©2004

[Nutrition and Bone Health](#)

Michael F Holick editor. ; Jeri W Nieves editor. ; SpringerLink (Online service) ;

2nd ed 2015., New York, NY : Springer New York : Imprint: Humana Press, 2015

Course Evaluation and Development

Students' feedback (incl. MyExperience survey) is highly valued and could be used to further develop the course to improve teaching and learning outcome.

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 generally not required; 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 due respect. Presenting results clearly gives the marker the best chance of understanding your method; even if the numerical results are incorrect.

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 10% per day or part thereof (including weekends). For some activities including Moodle quizzes 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 students will **not** be required to provide **any** documentary evidence to support absences from any classes missed **because of COVID-19 public health measures such as isolation**. UNSW will **not** be insisting on medical certificates from anyone deemed to be a positive case, or when they have recovered. Such certificates are difficult to obtain and put an unnecessary strain on students and medical staff.

Applications for special consideration **will** be required for assessment and participation absences – but no documentary evidence **for COVID 19 illness or isolation** will be required.

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>.

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.

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](#)
- [Engineering Current Student Resources](#)
- [Student Support and Success](#)
- [Academic Skills](#)
- [Student Wellbeing, Health and Safety](#)
- [Equitable Learning Services](#)
- [IT Service Centre](#)

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.

On-campus class attendance

Physical distancing recommendations must be followed for all face-to-face classes. To ensure this, only students enrolled in those 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 class. Students enrolled in online classes can swap their enrolment from online to a **limited** number of on-campus classes by Sunday, Week 1.

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 are sick or have been advised to self-isolate by [NSW health](#) or government authorities. Current alerts and a list of hotspots can be found [here](#). 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 must not come to campus and remain in self-isolation until you receive the results of your test.

You will not be penalised for missing a face-to-face activity due to illness or a requirement to self-

isolate. We will work with you to ensure continuity of learning during your isolation and have plans in place for you to catch up on any content or learning activities you may miss. Where this might not be possible, an application for fee remission may be discussed. Further information is available on any course Moodle or Teams site.

For more information, please refer to the FAQs: <https://www.covid-19.unsw.edu.au/safe-return-campus-faqs>

Image Credit

Image created by Sophia Gu via BioRender

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	✓