School of Chemical Engineering

UNSW Engineering

CEIC4008

Product Design Project Thesis B

Term 2, 2022

Course Overview

Staff Contact Details

Convenors

Name	Email	Availability	Location	Phone
Patrick Spicer	p.spicer@unsw.edu.au		318 Hilmer	

School Contact Information

Enquiries related to the course (e.g. course content, assessment instructions) should be raised during the scheduled classes, office hours, or in Teams channels/Moodle forums designated for that purpose.

Learning and question etiquette:

- Please be prepared for classes and attend the timetabled classes so that you can ask questions during the class time.
- Please respect that demonstrators and tutors have scheduled the class time to help you learn and are likely to be busy with other responsibilities outside those times; questions asked outside of class times will take longer to be answered.
- PhD students and other casuals who are teaching classes are normally only expected to look after the timetabled class and not to provide follow-up one-on-one assistance.
- Please don't ask questions in private that could be reasonably asked in a way that everyone can learn from the discussion.
- As a member of a community of learners, please try answering each other's questions!
- Please limit private messages to staff (via email or Teams) to *confidential* matters related to course administration.

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.

Course Details

Units of Credit 6

Summary of the Course

Design and creative development is the engine of growth for economies and industry product portfolios. Chemical products touch consumers the world over, delivering innovations in pharmaceuticals, advanced materials, cosmetics, and foods. This course will enable students to explore global corporate innovations through case studies and active working groups, map consumer and market needs, and develop an intellectual property strategy as well as a working product prototype. Industry partners will work with students to explore, create, and assess their products as they go. Whether interested in developing new innovations for existing companies or for their own entrepreneurial efforts, students will gain confidence and independence that will make real contributions to the global economy.

In CEIC4008, students will prototype and develop their ideas for a commercially viable chemical product, culminating in the creation of a full product formulation, prototype, and accompanying documentation for their idea.

Course Aims

The Product Design Thesis requires students to apply knowledge from previous course to research, design, and plan a chemical product commercialisation strategy. Designing and delivering new products to market is a complex process. Open-ended problems must be solved, requiring creativity, study, and quantitative analysis of results. Multiple correct approaches can exist for these problems, and student innovation and creativity will be rewarded.

The Product Design Thesis poses these problems in the context of chemical or food product development, so the challenges draw on the food science and chemical engineering curriculum as well as a student's initiative, innovation, and entrepreneurship. Students will work through the design process, define consumer and product requirements, and pose the needs as an engineering problem. Students will collaborate with each other, map competitive and supportive literature and patents, and work constructively with others in a research and development environment.

Students will be able to:

- Apply engineering and general design principles to product design through case studies and self-directed identification and study of examples.
- Practice consumer and market research using publicly available and intellectual property documentation.
- Define consumer need and link technological barriers and enablers to the need.
- Develop a prototype product.
- Assess the performance of the prototype against the defined consumer need.

Course Learning Outcomes

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

Learning Outcome	EA Stage 1 Competencies
1. Develop a product design following industry and professional engineering standards.	PE2.1, PE2.2, PE2.3, PE2.4
2. Critically reflect on a specialist body of knowledge, literature, patent, and others, related to their design goal.	PE1.3
3. Apply scientific and engineering methods to solve a practical commercial design problem	PE2.1
4. Analyse past and preliminary data objectively using quantitative and mathematical methods	PE1.2, PE2.1, PE2.2
5. Demonstrate oral and written communication in professional and lay domains	PE3.2

Teaching Strategies

Like other undergraduate thesis projects, the pair CEIC4007+CEIC4008 is designed to be a capstone experience. There is considerable scope for enquiry-based learning and students are expected to make use of the literature to help design and deliver a project over two terms. These courses will:

- Use real-world examples of failed and successful product designs, and their history, to motivate students to search and map additional product examples based on their own interests, social causes, or career goals.
- Connect working product designers and developers, as well as consumers of products, to students in order to motivate their own exploration and design concept development.
- Use in-class examples and outside class exercises to provide students with hands-on practice and self-directed exploration of new products, technologies, and market needs.

The Product Design Thesis (CEIC4007+CEIC4008) is designed to be a Thesis project course within the Faculty of Engineering's Thesis rules and procedures.

Course aims

The Product Design Thesis requires students to bring together their knowledge from previous years of study to research, design and plan a commercialisation strategy for a chemical product. Designing and delivering a new product to market is a complex process in which open-ended problems must be addressed, requiring creativity and the acquisition, analysis and interpretation of results. There are multiple correct approaches to the problem and the creativity of the students is rewarded. The Product Design Thesis poses these problems through the lens of the development of a chemical product, and challenges cover the technical chemical engineering curriculum as well as innovation and entrepreneurship. Students will work through the design process, undertaking a requirements analysis and then working out how to reframe that in engineering terms. Students will collaborate with each other, look for literature support for their plans and to learn to work in a research and development environment.

Course Learning Outcomes

The Product Design Thesis CLOs are copied from the Thesis guide with editorial changes to be specific to the product design process.

Assessment Procedure

The weightings and activities recommended in the thesis guide are implemented within CEIC4007/4008. For the purposes of delivery within the entrepreneurship model adopted for these courses, the elements of the assessment items are regrouped as shown in the course outline.

Assessment

Assessment task	Weight	Due Date	Course Learning Outcomes Assessed
1. Concept Interviews	25%	20/06/2022 07:00 PM	2, 3, 4, 5
2. Final Product Design	40%	07/08/2022 05:00 PM	1, 2, 3, 4, 5
3. Group Poster & Presentation	35%	10/08/2022 12:00 PM	1, 4, 5

Assessment 1: Concept Interviews

Due date: 20/06/2022 07:00 PM

Commercial and practical discussion of product concept, status, and plans. Written documentation of progress and status will be provided in advance of each interview. This should include a summary and any slides used.

Assessment 2: Final Product Design

Due date: 07/08/2022 05:00 PM

Substantial documentation and organization of key aspects of product design, performance, satisfaction of client needs, feasibility, and financials. The group report will be cohere

Assessment 3: Group Poster & Presentation

Due date: 10/08/2022 12:00 PM

Presentation of final product concept and prototype demonstration for public audience. Assessment of indivdual contributions to this work will be made during the group presentation.

Attendance Requirements

Lab attendance is mandatory for T2.

Course Schedule

View class timetable

Timetable

Date	Type	Content
Week 4: 20 June - 24 June	Assessment	Concept Interviews
Study Week: 8 August - 11 August	Assessment	Group Poster & Presentation

Resources

Recommended Resources

1. Bröckel, Ulrich, Willi Meier, and Gerhard Wagner, eds. *Product design and engineering: formulation of gels and pastes*. Wiley, 2013.
2. Norton and Fryer, *Formulation Engineering of Foods*, Wiley, 2013.
3. Traitler, H., Coleman, B., & Burbidge, A. *Food Industry R&D: A New Approach*, Wiley, 2016.
4. Cussler and Moggridge, Chemical Product Design, Cambridge, 2011.
5. Sensory and Consumer Research in Food Product Design and Development, Howard R. Moskowitz and Jacqueline H. Beckley, 2012
6. Good Food, Great Business: How to Take Your Artisan Food Idea from Concept to Marketplace by Susie Wyshak, 2014
7. New food product development: from concept to marketplace, G.W. Fuller, CRC Press, 2011.
8. Developing new food products for a changing marketplace, ed. A.L. Brody and J.B. Lord, Lancaster: Technomic, 2000.

Course Evaluation and Development

This course uses extensive discussion and lab time to explore product development and gain experience in striking a balance between practical, technical, aesthetic, and financial constraints to produce a novel item. Feedback and discussion during these periods constantly informs the following lecture and lab sessions.

Laboratory Workshop Information

This class has a mandatory lab for all in-person students and full attendance of all group members is required. Because of the shortness of trimesters we will start lab in Week 1 and begin work immediately. You will need to bring safety googles and be inducted into the lab. You will be issued a lab coat specific to this lab along with a bag to keep it in. Please do not bring lab coats from other courses as they are not allowed in the food-grade lab we will be using. You are responsible for bringing your new lab coat with you to all lab meetings.

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 5% 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 need to provide some documentary evidence to support absences from any assessments missed because of COVID-19 public health measures such as isolation. UNSW will **not** be insisting on medical certificates for COVID-related absences of 7 days or less, with the positive PCR or RAT result being sufficient. Longer absences due to self-isolation or COVID-related illness will still need documentation such as a medical certificate.

Applications for special consideration **will still be required** for assessment and participation absences related to COVID-19. Special consideration requests should not be lodged for missing classes if there are no assessment activities in that class.

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

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

Dr Peter Wich

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	