School of Chemical Engineering

UNSW Engineering

FOOD4110, FOOD8110

Advanced Food Chemistry

Term 3, 2022

Course Overview

Staff Contact Details

Convenors

Name	Email	Availability	Location	Phone
Alice Lee	alice.lee@unsw.edu.au	Friday 11:00 – 12:00	Science & Engineering Building (SEB), Office 419	+61-2-9385-4363

Lecturers

Name	Email	Availability	Location	Phone
Albert Fahrenbach	a.fahrenbach@unsw.edu.au	Via email or by appointment	Science & Engineering Building (SEB), Office 719	+61-2-9385-4574
Christopher Hansen	christopher.hansen@unsw.edu.au	Via email or by appointment	Science & Engineering Building, Office 602	+61-29065-3085
Siobhan Wills	siobhan.wills@unsw.edu.au	Via email or by appointment	Dalton Building, Office 103	+61-2-9385-6477

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

Units of Credit 6

Summary of the Course

In the era of increasing life expectancy and climate change that threatens our future, a healthy nation, and sustainable food production are important national agendas for any country. How can food shape our quality of life? how can food heal us? and how food science tackles climate change? These are some of the grand challenging questions that need to be addressed with innovative science and technology in the future.

Welcome to Advanced Food Chemistry FOOD4110. In this course, you will develop the knowledge base and technical skills to control and manipulate food molecules and their reactions. You will learn how to stabilise food molecules to prolong shelf life (e.g., food additives), how to make food more appealing and pleasant to eat (e.g., food colourants and food flavours), how to make food processing more environmentally sustainable (e.g., food enzymes), and how to make foods that heal (e.g., bioactive phytochemicals). By integrating food chemistry knowledge and skills into food science and technology, you will be able to design and formulate innovative food products of your desire.

Course Aims

To enable you to develop a deeper understanding of the relationships between the structure and functional properties of food molecules (particularly food enzymes, plant bioactive constituents (e.g, polyphenols, food additives, food colourants and food aromas) and how they may be manipulated through food technology and processing.

Course Learning Outcomes

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

Learning Outcome	EA Stage 1 Competencies
1. Demonstrate understanding of foundational knowledge of food chemistry building on Food Chemistry 1 (CHEM2921).	PE1.3
2. Distinguish how the functionality and reactions of food ingredients influence the specific quality attributes of foods.	PE1.5
3. Design an appropriate analytical approach to solve a practical food chemistry problem (building on CHEM2921 and CHEM2041).	PE2.1, PE2.3
4. Formulate potential solutions to a chosen food challenge using food chemistry principles.	PE2.2, PE3.2, PE3.3

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

The following is the alignment of the UNSW Course Learning Outcomes to the IFT Essential Learning Outcomes:

Course Learning Outcome 1:

FC.1. Discuss the major chemical reactions that limit shelf life of foods.
FC.2. Explain the chemistry underlying the properties and reactions of various food components.

Course Learning Outcome 2:

FC.1. Discuss the major chemical reactions that limit shelf life of foods.
FC.2. Explain the chemistry underlying the properties and reactions of various food components.
FC.3. Apply food chemistry principles used to control reactions in foods.

Course Learning Outcomes 3:

FC.6. Explain the principles behind analytical techniques associated with food.

FC.8. Design an appropriate analytical approach to solve a practical problem.

Course Learning Outcomes 4:

CT 2 Apply critical thinking skills to solve problems.

CT 3 Apply principles of food science in practical, real-world situations and problems.

CT 5 Evaluate scientific information.

PL 1 Demonstrate the ability to work independently and in teams.

FC = Food Chemistry; CT = Critical Thinking; PL = Professionalism and Leadership

Teaching Strategies

This course will teach principles of food chemistry to facilitate understanding of concepts and increase the knowledge base of food chemistry. Students become more engaged in the learning process if they can see the relevance of their studies to professional, disciplinary and/or personal contexts. Thus, the course adopts contextualising approach by providing opportunities to relate the leant food chemistry concepts to the real food systems via product surveys and group assignments. This is also to facilitate critical thinking and judgement for the development of a creative mind for future food innovation (i.e., "thinking outside the box"), as well as further develop several graduate attribute skills such as writing professional reports and communicating.

Additional Course Information

Pre-requisite(s): FOOD2921 Food Chemistry

Assumed knowledge: FOOD2921, CHEM2041

Assessment

To pass the course, you would need to achieve **at least 40%** in your final (written) exam. The written assignment is assessed based on the set of criteria given with the assignment and assessment rubrics.

Assessment task	Weight	Due Date	Course Learning Outcomes Assessed
1. Assignment 1 - Product Survey of Food Ingredients and Functionality	10%	30/09/2022 11:59 PM	1, 2
2. Progress Exam	15%	24/10/2022 10:00 AM	1, 2, 3
3. Assignment 2 - Written report	40%	18/11/2022 11:59 PM	1, 2, 3, 4
4. Final Exam	35%	Exam Period	1, 2, 3

Assessment 1: Assignment 1 - Product Survey of Food Ingredients and Functionality

Due date: 30/09/2022 11:59 PM

This is a group assessment based on the food ingredients and functionality through a product survey. Please refer to the Assignment 1 sheet for detailed assessment criteria.

Assessment 2: Progress Exam

Assessment length: Approx 1.5 hours
Due date: 24/10/2022 10:00 AM

Individual assessment on the knowledge and understanding of the chemical fundamentals presented Weeks 1-3 and application to problem-based inquiry. First two topics will be examined - more information about the progress exam will be given later. The progress exam is intended primarily as formative assessment, but is counted towards the final mark at a significant level to encourage you to take it seriously.

Assessment 3: Assignment 2 - Written report

Due date: 18/11/2022 11:59 PM

This assignment will be assessed on thoroughness in a review of the chosen topic; clarity in expression and logical discussion supported by evidence; and critical thinking and reasoned judgment. This task is to facilitate independent and reflected learning by applying food chemistry knowledge to an understanding of a specific food innovation.

Additional details

Individual and group assessments on review and critical analysis of one current (chemical-based) food challenge and develop/assess one potential solution (problem-based critical thinking). Please refer to the Assignment 2 sheet for detailed assessment criteria. There are three sub-components of this assignment:

Week 4 (individual topic proposal - individual assessment 5%)

Week 5 (review outline - peer assessment 5%)

Week 10 (final report 30%)

Assessment 4: Final Exam

Assessment length: 2 hours
Due date: Exam Period

The final exam is given because the course learning outcomes include a significant level of knowledge learning. The final exam will be assessed on all the lecture materials.

Assessment criteria

To pass the course, you would need to achieve at least 40% in your final exam.

Hurdle requirement

To pass the course, you would need to achieve at least 40% in your final exam.

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: 12 September - 16 September	Lecture	Introduction Phytochemicals in plant foods and their bioactivity: polyphenols (AL)
	Tutorial	Phytochemicals in plant foods (AL)
Week 2: 19 September - 23 September	Lecture	Analysis of antioxidants in foods (AL) Food additives (AF)
	Tutorial	Analysis of antioxidants in foods (AL)
Week 3: 26 September - 30 September	Lecture	Food additives (AF)
	Tutorial	Food additives (AF)
	Assessment	Assignment 1 due on Friday, 30th September at 11:59 pm
Week 4: 3 October - 7 October	Lecture	Food enzymes (AL)
	Tutorial	Food enzymes (AL)
	Assessment	Assignment 2 - Task 1 Individual Topic Proposal due on Friday, 7th October at 11:59 pm.
Week 5: 10 October - 14 October	Lecture	Applications of food enzymes in food industry (AL)
	Tutorial	Applications of food enzymes in food industry (AL)
	Assessment	Assignment 2 - Task 2 Report Outline (peer assessment) due on Friday, 14th October at 11:59 pm.
Week 6: 17 October - 21 October	Group Work	Group consulation by appointment

Week 7: 24 October - 28 October	Lecture	Food Colourants (CH)
	Tutorial	Food Colourants (CH)
	Assessment	Progress Exam on Monday, 24th October at 10:00 am.
Week 8: 31 October - 4 November	Lecture	Food Colourants (CH)
	Tutorial	Food Colourants (CH)
Week 9: 7 November - 11 November	Lecture	Aroma and flavour substances (SW)
	Tutorial	Aroma and flavour substances (SW)
Week 10: 14 November - 18 November	Lecture	Aroma and flavour substances (SW)
	Tutorial	Aroma and flavour substances (SM)
	Assessment	Assignment 2 - Task 3 Final Written Report due on Friday, 18th November at 11.59pm.

Resources

Recommended Resources

Principles of Food Chemistry 3rd Ed (John M Deman, John W Finley, W Jeffrey Hurst, Chang Yong Lee) Springer 2018

Fennema's Food Chemistry, 5th edition (Srinivasan Damodaran, Kirk L. Parkin Eds). Copyright 2017 (4th ed is also useful)

Useful:
Food Chemistry 3rd Ed (Hans-Dieter Belitz, Werner Grosch, Peter Schieberle) Springer 2009

Course Evaluation and Development

The School of Chemical Engineering evaluates each course each time it is run through (i) myExperience Surveys, and (ii) Focus Group Meetings. As part of the myExperience process, your student evaluations on various aspects of the course are seriously considered; the Course Coordinator prepares a summary report for the Head of School. Any problem areas are identified for remedial action, and ideas for making improvements to the course are noted for action the next time that the course is run. Focus Group Meetings are conducted each term. Student comments on each course are collected and disseminated to the Lecturers concerned, noting any points which can help improve the course.

All of the activities in this course from the online lessons through to the team assignments have been designed in response to student feedback.

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.

Note: UNSW does not require a medical certificate for COVID-related absences of 7 days or less, however you must provide formal evidence from your local/state health provider (e.g. NSW Health) that clearly states your name and the date you tested positive (i.e. confirmation of your RAT registration, PCR test result). Longer absences due to extended 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 advice 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	