UNSW Course Outline

FOOD9100 Advanced Processing Technologies - 2024

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General Course Information

Course Code : FOOD9100
Year : 2024
Term : Term 3
Teaching Period : T3
Is a multi-term course? : No
Faculty : Faculty of Engineering
Academic Unit : School of Chemical Engineering
Delivery Mode : In Person
Delivery Format : Standard
Delivery Location : Kensington
Campus : Sydney
Study Level : Postgraduate
Units of Credit : 6

Useful Links

Handbook Class Timetable

Course Details & Outcomes

Course Description

Step into the future of food processing with our innovative course on 'Advanced Processing Technologies'. Move beyond the constraints of traditional thermal methods that compromise nutritional quality and alter sensory attributes. Join us on a journey led by food researchers to

explore cutting-edge alternatives, aiming to revolutionize food safety, sustainability, and taste. Explore the realms of physics, such as electromagnetism, plasma, and acoustics, and learn how to harness their power to create the foods processes of tomorrow. From pulsed electric fields to ultrasound processing, UV light, and plasma activated water, uncover the latest technologies designed to enhance food processing efficiency, reduce energy consumption, and elevate sensory characteristics. Do not miss this opportunity to gain invaluable insights and skills that will shape the future of the food industry, and that will equip you to become food scientists at the forefront of food processing innovation!

Course Aims

The primary objective of this course is to comprehend the principles underlying non-thermal and novel-thermal food processing technologies. Students will gain understanding and the ability to apply key aspects of each technology covered, including:

1. Mechanism of actions
2. Physical and engineering aspects
3. Effects on microorganisms
4. Effects on food chemistry and nutritional profiles

This knowledge equips students with the foundation to implement novel-thermal and non-thermal food processing operations, thereby enhancing the quality of food products and refining existing traditional food processing methods. Through in-depth literature research, students will develop the capability to propose and theoretically design innovative food processes by integrating these advanced technologies.

Course Learning Outcomes

Course Learning Outcomes
CLO1 : Describe the physical principles and engineering considerations, as well as the microbiological and nutritional aspects associated with advanced food processing technologies.
CLO2 : Assess and critically evaluate food processing technologies through independent literature research.
CLO3 : Apply advanced and integrated knowledge of food technology to theoretically design and develop new industrial processes that enhance the quality and nutritional aspects of existing products or to produce innovative new foodstuffs.

Course Learning Outcomes	Assessment Item
CLO1 : Describe the physical principles and engineering considerations, as well as the microbiological and nutritional aspects associated with advanced food processing technologies.	• Quiz
CLO2 : Assess and critically evaluate food processing technologies through independent literature research.	• Project Presentation • Project Report • Quiz
CLO3 : Apply advanced and integrated knowledge of food technology to theoretically design and develop new industrial processes that enhance the quality and nutritional aspects of existing products or to produce innovative new foodstuffs.	• Project Presentation • Project Report

Learning and Teaching Technologies

Moodle - Learning Management System

Learning and Teaching in this course

The instructional method employed in this course is based on students reading and studying the material in advance to find gaps in the knowledge, connecting different parts of the literature, to propose new applications and solutions to improve the quality of foods and the efficiency of food processes with novel-thermal and non-thermal technologies. This strategy develops cognitive skills and critical thinking at a postgraduate level. Students are expected to investigate, generate and synthesize complex ideas and concepts, critically evaluate them and articulate them for discussion in class. Those concepts and new generated insights should be applied to develop new food process and products towards the end of the teaching period working on groups. Lecturers will introduce those technologies and will guide students on their learning process.

With this approach students will not only advance their knowledge on advance food processing technologies but also will develop critical thinking and analytical skills to solve complex problems in an innovative manner. Students will also develop skills to articulate and communicate their ideas to solve specific problems. To succeed in this course students should demonstrate personal independence and team accountability as well as technical skills to apply basic principles to solve current problems on the food processing industry.

Assessments

Assessment Structure

Assessment Item	Weight	Relevant Dates
Quiz Assessment Format: Individual	60%	Due Date: Friday 4 to 5 pm on Weeks 3, 5, 7, 9, 10
Project Presentation Assessment Format: Group	15%	Due Date: 08/11/2024 06:00 PM
Project Report Assessment Format: Group	25%	Due Date: 15/11/2024 06:00 PM

Assessment Details

Quiz

Assessment Overview

You will complete five quizzes through the term that will evaluate 1) the basic concepts covered during lectures, and 2), your in-depth and independent researching of the scientific literature. The quizzes are designed to encourage learning and provide feedback on your understanding of the fundamental knowledge required for the remainder of the course and assessment tasks. You will receive feedback online via a mark and seeing the correct answers.

Course Learning Outcomes

- CLO1 : Describe the physical principles and engineering considerations, as well as the microbiological and nutritional aspects associated with advanced food processing technologies.
- CLO2 : Assess and critically evaluate food processing technologies through independent literature research.

Assignment submission Turnitin type

Not Applicable

Generative AI Permission Level

No Assistance

This assessment is designed for you to complete without the use of any generative AI. You are not permitted to use any generative AI tools, software or service to search for or generate information or answers.
For more information on Generative AI and permitted use please see here.

Project Presentation

Assessment Overview

Working with other students in a group, you will investigate an advanced thermal or non-thermal technology and apply that knowledge to either (1) design and develop a new food process, (2) improve a traditional food processing technology, or (3) enhance the quality and nutritional aspects of a traditional or a new food product.

You will present your findings in a pre-recorded video intended to inform a wider audience of the problem, solutions, major findings and analysis. The exact timing, format and content will be specified in the course outline or in the learning management system. Feedback will be provided following submission along with a final mark. Your final mark will be individualised using peer evaluation after the submission of the report.

Course Learning Outcomes

- CLO2 : Assess and critically evaluate food processing technologies through independent literature research.
- CLO3 : Apply advanced and integrated knowledge of food technology to theoretically design and develop new industrial processes that enhance the quality and nutritional aspects of existing products or to produce innovative new foodstuffs.

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Project Report

Assessment Overview

Working in the same groups as for the Project Presentation, you will prepare a final report on your selected technology, either (1) designing and developing a new food process, (2) improving a traditional food processing technology, or (3) enhancing the quality and nutritional aspects of a traditional or a new food product.

While the video presentation was intended to inform a wider audience, the written report must contain an in-depth scientific analysis and discussion of the problem and its solution. Further

details about the report will be provided via the course outline or the learning management system. Feedback will be provided as notes on the written document and the final mark. Your final mark will be individualised using peer evaluation after the submission of the report.

Course Learning Outcomes

- CLO2 : Assess and critically evaluate food processing technologies through independent literature research.
- CLO3 : Apply advanced and integrated knowledge of food technology to theoretically design and develop new industrial processes that enhance the quality and nutritional aspects of existing products or to produce innovative new foodstuffs.

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No Assistance

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General Assessment Information

Grading Basis

Standard

Course Schedule

Teaching Week/Module	Activity Type	Content
Week 1 : 9 September - 15 September	Lecture	Introduction to the course and to Novel Thermal and Non-Thermal food processing
Week 2 : 16 September - 22 September	Lecture	Fluid dynamics and Fluid Rheology in Novel processing Technologies
Week 3 : 23 September - 29 September	Lecture	High Pressure Processing & Discussion on Ideas for the Final Project
	Assessment	Quiz Friday 4:00 pm to 5:00 pm Content of weeks 1 and 2 Tyree Energy Technology LG03 (K-H6-LG03)
Week 4 : 30 September - 6 October	Lecture	Introduction to Plasma physics & Plasma food processing
Week 5 : 7 October - 13 October	Lecture	Pulsed Electric Fields & Radio Frequency Electric Fields
	Assessment	Quiz Friday 4:00 pm to 5:00 pm Content of weeks 3 and 4 Tyree Energy Technology LG03 (K-H6-LG03)
Week 7 : 21 October - 27 October	Lecture	Introduction to linear and non-linear acoustics & Ultrasound
	Assessment	Quiz Friday 4:00 pm to 5:00 pm Content of weeks 5 and 7 Tyree Energy Technology LG03 (K-H6-LG03)
	Online Activity	Web activity: Internet resources as an alternative to lab demonstrations (Ultrasound, High pressure, Plasma, Radio Frequency electric fields). Students are encouraged to watch the provided online videos demonstrating some of the novel technologies learnt in this course.
Week 8 : 28 October - 3 November	Lecture	Modelling the Kinetics of Microbial and Quality Attributes of food during Novel Thermal and Non-Thermal Processes & Ozone
Week 9 : 4 November - 10 November	Lecture	Novel Thermal Heating (ohmic, microwave and infrared heating)
	Assessment	Quiz Friday 4:00 pm to 5:00 pm Content of week 8 Tyree Energy Technology LG03 (K-H6-LG03)
	Assessment	The group Video presentation must be uploaded before Friday 8/11/2024 at 6 PM
Week 10 : 11 November - 17 November	Lecture	ultraviolet and pulsed light
	Workshop	Video presentations and Questions and Answers. Time: Tuesday 12/11/2023 4:00 PM to 6:00 PM Ainsworth 102 (K-J17-102)
	Assessment	Quiz Friday 4:00 pm to 5:00 pm Content of weeks 9 and 10 Tyree Energy Technology LG03 (K-H6-LG03)
	Assessment	The group written report must be uploaded before Friday 15/11/2024 at 6:00 PM

Attendance Requirements

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

Course Resources

Prescribed Resources

- Novel Thermal and Non-thermal Technologies for Fluid Foods. PJ Cullen (Editor), Brijesh K. Tiwari (Editor), Vasilis Valdramidis (Editor). ISBN-10: 0123814707. 2012.
- Nonthermal Processing Technologies for Food. Howard Q. Zhang (Editor), Gustavo V. Barbosa-Canovas (Editor), V. M. Bala Balasubramaniam (Editor), C. Patrick Dunne (Editor), Daniel F. Farkas (Editor),James T. C. Yuan (Editor). ISBN: 978-0-8138-1668-5. 2011.

- Emerging Technologies for Food Processing, Second Edition, edited by Da-Wen Sun. Academic Press, 2014.
- Advances in Thermal and Non-Thermal Food Preservation. Gaurav Tewari (Editor), Vijay Juneja (Editor). ISBN-10: 0813829682. 2007.
- Non-thermal Food Engineering Operations. Enrique Ortega-Rivas. ISBN-10: 1461420377. 2012.
- Multiphysics Simulation of Emerging Food Processing Technologies, edited by Pablo Juliano Kai Knoerzer, Peter Roupas and Cornelis Versteeg. Indianapolis, USA.: Wyley & Sons., 2011.

Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
Lecturer	Francisco Trujillo					No	Yes
	Yong Wang					No	No

Other Useful Information

Academic Information

I. Special consideration and supplementary assessment

If you have experienced an illness or misadventure beyond your control that will interfere with your assessment performance, you are eligible to apply for Special Consideration prior to, or within 3 working days of, submitting an assessment or sitting an exam.

Please note that UNSW has a Fit to Sit rule, which means that if you sit an exam, you are declaring yourself fit enough to do so and cannot later apply for Special Consideration.

For details of applying for Special Consideration and conditions for the award of supplementary assessment, please see the information on UNSW's Special Consideration page.

II. Administrative matters and links

All students are expected to read and be familiar with UNSW guidelines and polices. In particular, students should be familiar with the following:

- Attendance
- UNSW Email Address
- Special Consideration
- Exams

- Approved Calculators
- Academic Honesty and Plagiarism
- Equitable Learning Services

III. Equity and diversity

Those students who have a disability that requires some adjustment in their teaching or learning environment are encouraged to discuss their study needs with the course convener prior to, or at the commencement of, their course, or with the Equity Officer (Disability) in the Equitable Learning Services. Issues to be discussed may include access to materials, signers or note-takers, the provision of services and additional exam and assessment arrangements. Early notification is essential to enable any necessary adjustments to be made.

IV. Professional Outcomes and Program Design

Students are able to review the relevant professional outcomes and program designs for their streams by going to the following link: https://www.unsw.edu.au/engineering/student-life/student-resources/program-design.

Note: This course outline sets out the description of classes at the date the Course Outline is published. The nature of classes may change during the Term after the Course Outline is published. Moodle or your primary learning management system (LMS) should be consulted for the up-to-date class descriptions. If there is any inconsistency in the description of activities between the University timetable and the Course Outline/Moodle/LMS, the description in the Course Outline/Moodle/LMS applies.

Academic Honesty and Plagarism

UNSW has an ongoing commitment to fostering a culture of learning informed by academic integrity. All UNSW students have a responsibility to adhere to this principle of academic integrity. Plagiarism undermines academic integrity and is not tolerated at UNSW. *Plagiarism at UNSW is defined as using the words or ideas of others and passing them off as your own.*

Plagiarism is a type of intellectual theft. It can take many forms, from deliberate cheating to accidentally copying from a source without acknowledgement. UNSW has produced a website with a wealth of resources to support students to understand and avoid plagiarism, visit: student.unsw.edu.au/plagiarism. The Learning Centre assists students with understanding academic integrity and how not to plagiarise. They also hold workshops and can help students one-on-one.

You are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for research, drafting and the proper referencing of sources in preparing all assessment tasks.

Repeated plagiarism (even in first year), plagiarism after first year, or serious instances, may also be investigated under the Student Misconduct Procedures. The penalties under the procedures can include a reduction in marks, failing a course or for the most serious matters (like plagiarism in an honours thesis or contract cheating) even suspension from the university. The Student Misconduct Procedures are available here:

www.gs.unsw.edu.au/policy/documents/studentmisconductprocedures.pdf

Submission of Assessment Tasks

Work submitted late without an approved extension by the course coordinator or delegated authority is subject to a late penalty of five percent (5%) of the maximum mark possible for that assessment item, per calendar day.

The late penalty is applied per calendar day (including weekends and public holidays) that the assessment is overdue. There is no pro-rata of the late penalty for submissions made part way through a day. This is for all assessments where a penalty applies.

Work submitted after five days (120 hours) will not be accepted and a mark of zero will be awarded for that assessment item.

For some assessment items, a late penalty may not be appropriate. These will be clearly indicated in the course outline, and such assessments will receive a mark of zero if not completed by the specified date. Examples include:

- Weekly online tests or laboratory work worth a small proportion of the subject mark;
- Exams, peer feedback and team evaluation surveys;
- Online quizzes where answers are released to students on completion;
- Professional assessment tasks, where the intention is to create an authentic assessment that has an absolute submission date; and,
- Pass/Fail assessment tasks.

Faculty-specific Information

Engineering Student Support Services – The Nucleus - enrolment, progression checks, clash

requests, course issues or program-related queries

Engineering Industrial Training – Industrial training questions

UNSW Study Abroad – study abroad student enquiries (for inbound students)

UNSW Exchange – student exchange enquiries (for inbound students)

UNSW Future Students – potential student enquiries e.g. admissions, fees, programs, credit transfer

Phone

(+61 2) 9385 8500 – Nucleus Student Hub

(+61 2) 9385 7661 – Engineering Industrial Training

(+61 2) 9385 3179 – UNSW Study Abroad and UNSW Exchange (for inbound students)

School-specific Information

Course Workload

Course workload is calculated using the Units-Of-Credit (UOC). The normal workload expectation for one UOC is approximately 25 hours per term. This includes class contact hours, private study, other learning activities, preparation and time spent on all assessable work.

Most coursework courses at UNSW are 6 UOC and involve an estimated 150 hours to complete, for both regular and intensive terms. Each course includes a prescribed number of hours per week (h/w) of scheduled face-to-face and/or online contact. Any additional time beyond the prescribed contact hours should be spent in making sure that you understand the lecture material, completing the set assignments, further reading, and revising for any examinations. Most 6 UoC courses will involve approximately 10-12 hours per week of work on your part. If you're not sure what to do in these hours of independent study, the resources on the UNSW Academic Skills pages offer some suggestions including: making summaries of lectures, read/ summarise sections from the textbook, attempt workshop problems, reattempting workshop problems with some hints from the solutions, looking for additional problems in the textbook.

Full-time enrolment at university means that it is a *full-time* occupation for you and so you would

typically need to devote 35 hours per week to your studies to suceed. Full-time enrolment at university is definitely incompatible with full-time employment. Part-time/casual employment can certainly fit into your study schedule but you will have to carefully balance your study obligations with that work and decide how much time for leisure, family, and sleep you want left after fullfilling your commitments to study and work. Everyone only gets 168 hours per week; overloading yourself with both study commitments and work commitments leads to poor outcomes and dissatisfaction with both, overtiredness, mental health issues, and general poor quality of life.

On-campus Class Attendance

Most classes at UNSW are "In Person" and run in a face-to-face mode only. Attendance and participation in the classes is expected. As an evidence-driven engineer or scientist, you'll be interested to know that education research has shown students learn more effectively when they come to class, and less effectively from lecture catch-up recordings. If you have to miss a class due to illness, for example, we expect you to catch up in your time, and within the coming couple of days.

For most courses that are running in an "in person" mode:

- Lectures are normally recorded to provide an opportunity to review material after the lecture; lecture recordings are not a substitute for attending and engaging with the live class.
- Workshops/tutorials are not normally recorded as the activities that are run within those sessions normally cannot be captured by a recording. These activities may also include assessable activities in some or all weeks of the term.
- Laboratories are not recorded and require in-person attendance. Missing laboratory sessions may require you to do a make-up session later in the term; if you miss too many laboratory sessions, it may be necessary to seek a Permitted Withdrawal from the course and reattempt it next year, or end up with an Unsatisfactory Fail for the course.
- Assessments will often require in-person attendance in a timetabled class or a scheduled examination.

Submission of Assessment Tasks

In the School of Chemical Engineering, all written work will be submitted for assessment via Moodle unless otherwise specified. Attaching cover sheets to uploaded work is *not* required unless specifically requested for an individual assessment task; when you submit work through Moodle for assessment you are agreeing to uphold the Student Code.

Some assessments will require you to complete the work online and it may be difficult for the

course coordinator to intervene in the system after the due date. You should ensure that you are familiar with assessment systems well before the due date. If you do this, you will have time to get assistance before the assessment closes.

All submissions are expected to be neat and clearly set out. Your results are the pinnacle of all your hard work and should be treated with respect. Presenting results clearly gives the marker the best chance of understanding your method; even if the numerical results are incorrect. Please make it easy for the markers who are looking at your work to see your achievement and give you due credit.

Marking guidelines for assignment submissions will be provided at the same time as assignment details to assist with meeting assessable requirements. Submissions will be marked according to the marking guidelines provided.

Academic Integrity

Academic integrity is fundamental to success at university. Academic integrity can be defined as a commitment to six fundamental values in academic pursuits: honesty, trust, fairness, respect, responsibility and courage (International Center for Academic Integrity, 'The Fundamental Values of Academic Integrity', T. Fishman (ed), Clemson University, 2013). At UNSW, this means that your work must be your own, and others' ideas should be appropriately acknowledged. If you don't follow these rules, plagiarism may be detected in your work.

Further information about academic integrity and plagiarism can be located at:

- The Current Students site
- The ELISE training site

The Conduct and Integrity Unit provides further resources to assist you to understand your conduct obligations as a student: https://student.unsw.edu.au/conduct.

To help describe what we are looking for, here are some things that we consider to be quite acceptable (even desirable!) actions for many assessments, and some that we consider to be unacceptable in most circumstances. Please check with the instructions for your assessments and your course coordinator if you're unsure. As a rule of thumb, if you don't think you could look the lecturer in the eye and say "this is my own work", then it's not acceptable.

Acceptable actions

 reading/searching through material we have given you, including lecture slides, course notes, sample problems, workshop problem solutions

 reading/searching lecture transcripts

 reading/searching resources that we have pointed you to as part of this course, including textbooks, journal articles, websites

 reading/searching through your own notes for this course

 all of the above, for any previous courses

 using spell checkers, grammar checkers etc to improve the quality of your writing

 studying course material with other students

Unacceptable actions

 asking for help completing an assessment from other students, friends, family

 asking for help on Q&A or homework help websites

 searching for answers to the specific assessment questions online or in shared documents

 copying material from any source into your answers

 using generative AI tools to complete or substantially complete an assessment for you

 paying someone else to do the assessment for you

Referencing is a way of acknowledging the sources of information that you use to research your assignments. You need to provide a reference whenever you draw on someone else's words, ideas or research. Not referencing other people's work can constitute plagiarism. Further information about referencing styles can be located at https://student.unsw.edu.au/referencing.

For assessments in the School of Chemical Engineering, we recommend the use of referencing software such as Mendeley or EndNote for managing references and citations. Unless required otherwise specified (i.e. in the assignment instructions) students in the School of Chemical Engineering should use either the APA 7th edition, or the American Chemical Society (ACS) referencing style as canonical author-date and numbered styles respectively.

Artificial intelligence tools such as ChatGPT, CodePilot, and built-in tools within Word are modern tools that are useful in some circumstances. In your degree at UNSW, we're teaching you skills that are needed for your professional life, which will include how to use AI tools responsibly plus lots of things that AI tools cannot do for you. AI tools already are (or will soon be) part of professional practice for all of us. However, if we were only teaching you things that AI could do, your degree would be worthless, and you wouldn't have a job in 5 years.

Whether the use of AI tools in an assessment is appropriate will depend on the goals of that assessment. As ever, you should discuss this with your lecturers – there will certainly be assessments where the use of AI tools is encouraged, as well as others where it would interfere with your learning and place you at a disadvantage later. Our goal is to help you learn how to ethically and professionally use the tools available to you. To learn more about the use of AI, see this discussion we have written where we analyse the strengths and weaknesses of generative AI tools and discuss when it is professionally and ethically appropriate to use them.

While AI may might provide useful tools to help with some assessments, UNSW's policy is quite clear that taking the output of generative AI and submitting it as your own work will never be appropriate, just as paying someone else to complete an assessment for you is serious misconduct.

Asking Questions

Asking questions is an important part of learning. Learning to ask good questions and building the confidence to do so in front of others is an important professional skill that you need to develop. The best place to ask questions is during the scheduled classes for this course, with the obvious exception being questions that are private in nature such as special consideration or equitable learning plans. Between classes, you might also think of questions — some of those you might save up for the next class (write them down!), and some of them you might ask in a Q&A channel on Teams or a Q&A forum on Moodle. Please understand that staff won't be able to answer questions on Teams/Moodle immediately but will endeavour to do so during their regular working hours (i.e. probably not at midnight!) and when they are next working on this particular course (i.e. it might be a day or two). Please respect that staff are juggling multiple work responsibilities (teaching more than one course, supervising research students, doing experiments, writing grants, …) and also need to have balance between work and the rest of their life.

School Contact Information

For assistance with enrolment, class registration, progression checks and other administrative matters, please see the Nucleus: Student Hub. They are located inside the Library – first right as you enter the main library entrance. You can also contact them via http://unsw.to/webforms or reserve a place in the face-to-face queue using the UniVerse app.

For course administration matters, please contact the Course Coordinator.

Questions about the this course should normally be asked during the scheduled class so that everyone can benefit from the answer and discussion.