

FOOD2320, FOOD8320

Food Microbiology

Term 3, 2022



Course Overview

Staff Contact Details

Convenors

Name	Email	Availability	Location	Phone
Jian Zhao	jian.zhao@unsw.edu.au	By email appointment	Room 421, Hilmer building (E8)	+61435980 888

Lecturers

Name	Email	Availability	Location	Phone
Alison Jones	alison.jones@unsw.edu.au	By email appointment	Room 433, SEB (E8)	

Lab Staff

Name	Email	Availability	Location	Phone
Richard Li	richard.li@unsw.edu.au	By email appointment		

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

This is a lecture-laboratory course that introduces the basic concepts of food microbiology, covering the ecology, biochemistry, isolation, enumeration and identification of bacteria, yeasts, fungi and viruses associated with foods and beverages. Food spoilage: specific food microorganism associations; taxonomy and biochemistry of major spoilage species; chemical and physical changes to food properties; spoilage of specific commodities. Foodborne microbial disease: foods as vectors of disease and food poisoning; statistics and epidemiology; ecology and taxonomy of foodborne pathogenic microorganisms; control and prevention by hygiene, microbiological standards and legislation. Food fermentation: microbial ecology and biochemistry of fermentations; fermentations of alcoholic beverages, bakery products, dairy products, meats, vegetables, cocoa beans, soy sauce; production of food ingredients and processing aids by fermentation. Microbiological examination of foods: sample preparation and sampling plans; sublethal injury; standard methods for determination of total plate counts, indicator organisms, foodborne pathogenic species, principal spoilage species. Microbiological quality assurance: specifications and standards; decision criteria; hazard analysis and critical control point (HACCP) concept; cleaning and sanitation.

Having taken MICR2011 Microbiology 1 will give additional meaning to FOOD2320 and enable greater depth of knowledge. Students who have not taken MICR2011 can still enrol in FOOD2320 and will still be able to successfully complete the course.

Course Aims

This course is aimed at applying the principles of microbiology to the production and service of foods and beverages, and introducing students to the discipline of food microbiology. Following a brief introduction to the history of food microbiology and the diversity of microorganisms associated with foods and beverages, the course considers the following topics:

- The occurrence and significance of microorganisms in foods
- Factors affecting the presence, growth and survival of microorganisms in foods (microbial ecology of foods)
- The biochemical activities of microorganisms in foods and their impacts on food quality and food safety
- Food spoilage by microorganisms; specific food/beverage commodities; specific microbial groups.
- Microorganisms in foods and public health (food borne disease and food poisoning)
- Microorganisms in the production of fermented foods and beverages
- Microorganisms as probiotics, biocontrol agents and in the production of food ingredients, additives and processing aids
- Microbiological analysis of foods; lecture-laboratory component
- Microbiological risk assessment for foods; quality assurance and control.

Course Learning Outcomes

1. Develop broad knowledge and understanding of how microorganisms impact on the production, quality and safety of foods and beverages, and see the social and commercial significance of food microbiology
2. Become proficient in basic skills for the microbiological examination of foods and beverages, including the presentation and interpretation of analytical data
3. Develop a practical understanding and knowledge on how to manage and control the impact of microorganisms on the quality and safety of foods and beverages

Food2320 is part of UNSW Food Science specialisations approved (2021-2026) by the Institute of Food Technologists Higher Education Review Board (IFT HERB).

Teaching Strategies

Food Microbiology is a core lecture-laboratory course in food science and technology programs. Lectures involve delivery of core concepts, through reference to textbooks and articles published in research journals and use of practical industry-community examples. There is a strong ecological theme running throughout the course, designed to show the relationships between microorganisms and foods and, ultimately, society. The laboratory component not only reinforces aspects of the lecture component but develops technical and analytical skills. Assessment tasks are designed to evaluate understanding and application of core concepts, while those in the practical component also determine the competency of students with respect to analytical techniques and interpretation of analytical data. As a core course within the broader discipline of food science and technology, it is necessary to provide the framework of knowledge that defines the boundaries of food microbiology. Lectures and reading materials serve this purpose, with assessment tasks designed to ensure grasp of the concepts, at both low level (through recall) and high level (through application and synthesis). For a practical science such as food microbiology, it is crucial that students engage in practical activities. Further, those activities should be as authentic as possible. Thus, the laboratory component of the course builds practical skills and, through analysis of real food samples, exposes students to both conventional and modern/rapid methods used by the food industry and government authorities for the microbiological analysis of foods. Selected practical exercises require students to perform all steps in the analytical process, providing further authentic experience. In keeping with the professional nature of food science programs, generic skills are emphasised, with group work activities in both lecture and laboratory components of the course, and technical writing a core part of the assessment.

Additional Course Information

Some parts of the practical component will be delivered in collaboration with industry partners to further enhance their "real world" authenticity.

Assessment

Assessment task	Weight	Due Date	Course Learning Outcomes Assessed
1. Quiz	10%	04/10/2022 10:00 PM	1, 2, 3
2. Group Assignment	30%	Week 6 and Week 10	1, 2, 3
3. Practical Exam	20%	14/11/2022 03:00 PM	1, 2, 3
4. Final Exam	40%	Exam Period	1, 2, 3

Assessment 1: Quiz

Start date: 04/10/2022 04:00 PM

Due date: 04/10/2022 10:00 PM

Marks returned: 1 week after the quiz

The quiz (1 hour duration) consists of multiple choice and short answer (typically paragraph-length) questions and will be held in week 4. The quiz will be based on content relating to both the lecture and laboratory components of the course in the first 3 weeks (1-3) of term. The quiz will be conducted online and scheduled during a 6-hour period on Tuesday, week 4. Feedback will be provided in week 4. The quiz encourages regular study and engagement with core concepts in food microbiology.

Assessment 2: Group Assignment

Submission notes: Moodle submission

Due date: Week 6 and Week 10

Marks returned: 1- 2 weeks after each submission

The class will be divided into groups of 4 students. Each group will be given a food product. The assignment has two components: 1) a theory component which requires the students to write a set of microbiological specifications for the product; 2) a laboratory component in which the students are required to carry out laboratory analysis of the product to determine whether it meets the microbiological specifications. This assignment is designed to assess student's ability to: 1) apply the concept of microbiological criteria in real food products; 2) conduct microbiological analysis of foods in an open-ended manner; and 3) analyse and interpret microbiological analysis data to make critical judgement on the microbiological quality and safety of food products.

The theory component (microbiological specifications) is due in week 6.

The microbiological analysis report is due in week 10.

Details of the assignment including assessment criteria will be given in week 1.

Assessment criteria

Details of the assignment including assessment criteria will be given in week 1

Assessment 3: Practical Exam

Start date: 14/11/2022 02:00 PM

Due date: 14/11/2022 03:00 PM

Marks returned: 1-2 weeks after the exam

A practical examination will be conducted in the last week of session. This will involve observation of basic laboratory skills, as well as interpretation of materials provided at laboratory workstations. This item assesses practical skills and reflects the professional need to interpret microbiological cultures and data.

Assessment 4: Final Exam

Due date: Exam Period

Marks returned: Two weeks after the exam

The exam will consist of several essay-style questions, with some limited choice either between or within questions, and will cover material from the entire lecture and laboratory components of the course. This exam is designed to test basic knowledge and understanding of all aspects of food microbiology and how students apply this information to examples in the industry and the community.

Attendance Requirements

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

Course Schedule

[View class timetable](#)

Timetable

Date	Type	Content
O-Week: 5 September - 9 September	Online Activity	Reading of Course Outline; class introduction.
Week 1: 12 September - 16 September	Lecture	Introduction to food microbiology: scope, history; microbial ecology of foods; food spoilage.
	Laboratory	Laboratory safety and microbiology basics.
Week 2: 19 September - 23 September	Lecture	Microbiological examination of foods: microbiological criteria; sampling plans; selective and differential media; identification.
	Laboratory	Examination of food by microscopy and standard plate counts.
Week 3: 26 September - 30 September	Lecture	Microbiological examination of foods: indicator organisms; limitations and need for new methods; modern methods of analysis - impedance, optical growth monitoring; immunoassay; bioluminescence; molecular methods.
	Laboratory	Examination of food by contemporary methods (in collaboration with 3M).
Week 4: 3 October - 7 October	Lecture	Foodborne microbial disease: epidemiology, investigation, statistics, commercial and community impact. Foodborne infections; Gram negative pathogens: <i>Salmonella</i> , <i>Campylobacter</i> , <i>E. coli</i> , <i>Vibrio spp.</i>
	Assessment	Quiz (The quiz will be conducted online within a 6-hour period between 4 and 10 pm on Tuesday, 4th October).
	Assessment	Quiz
Week 5: 10 October - 14 October	Lecture	Gram positive pathogens: <i>Listeria</i> , <i>Clostridium perfringens</i> , <i>Bacillus cereus</i> , <i>Clostridium botulinum</i> , <i>Staphylococcus aureus</i> .

		<p>Foodborne intoxications (<i>Clostridium botulinum</i>, <i>Staphylococcus aureus</i>, <i>Bacillus cereus</i>).</p> <p>Spore forming pathogenic bacteria (<i>Clostridium spp.</i>, <i>Bacillus cereus</i>).</p>
	Laboratory	Primary beer and kombucha fermentation.
Week 6: 17 October - 21 October	Laboratory	Secondary beer and kombucha fermentation (voluntary).
Week 7: 24 October - 28 October	Lecture	<p>Other foodborne pathogenic bacteria; foodborne viruses; parasites.</p> <p>Mycotoxigenic fungi; toxigenic algae.</p>
	Laboratory	<p>Analysis of foodborne pathogens.</p> <p>Lab component of group assignment.</p>
Week 8: 31 October - 4 November	Lecture	<p>Food and beverage fermentations; ecology and biochemistry.</p> <p>Fermentation of alcoholic beverages.</p>
	Laboratory	<p>Analysis of foodborne pathogens.</p> <p>Lab component of group assignment.</p>
Week 9: 7 November - 11 November	Lecture	<p>Fermented dairy products - general considerations, cheese, yoghurt.</p> <p>Fermented bakery products: bread.</p> <p>Asian fermented foods: soy sauce, tempeh.</p>
	Laboratory	<p>Analysis of foodborne pathogens.</p> <p>Lab component of group assignment.</p>
Week 10: 14 November - 18 November	Lecture	<p>Fermented foods and beverages of indigenous peoples - Africa, S America.</p> <p>Probiotic microorganisms.</p> <p>Food microbiology; quality assurance and control; risk assessment.</p> <p>Course review.</p>
	Assessment	<p>Practical exam (1 hour).</p> <p>Beer and kombucha sensory evaluation.</p>
	Assessment	Practical Exam

Resources

Prescribed Resources

The textbook for this course is:

Food Microbiology, M.R. Adams and M.O. Moss, 4th Edition, The Royal Society of Chemistry, Cambridge, 2015.

Recommended Resources

Research or review articles, selected from a range of journals and books dealing with or covering food microbiology, will be mentioned at specific lectures. Students aiming for higher grades should consult these articles. Key research journals for the field are.

- International Journal of Food Microbiology
- Food Microbiology

Course Evaluation and Development

It is very important to gather feedback on courses, so whenever practicable to do so, courses can be modified to improve them. To that end, there will be the normal on-line MyExperience survey for this course. Additional formal or informal feedback activities may also be conducted during the duration of the course.

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.