FOOD MICROBIOLOGY - Fall 2025

FOOD 3005A

Department of Chemistry

--- COURSE OUTLINE ---

Instructor: Tyler Avis (he/him/his)
Food Science Program
Department of Chemistry and Institute of Biochemistry
Carleton University
How to address me: Tyler

Lectures: **In-person lectures**. Tuesdays and Thursdays, 10:05-11:25 AM. Please see Carleton Central for the room location.

Laboratory: Section A1: Wednesdays, 1:35-4:25 PM. Please see Carleton Central for the room location.

Contact: **Student hours (a.k.a. office hours):**

No set student hours
By appointment (in-person or virtual)

Office: 207G Steacie Building
Phone: 613-520-2600 x3121
Email: tyler.avis@carleton.ca

I can be reached by **email** at almost any time. When possible, I will reply promptly, usually the same day or the next morning.

Land Acknowledgement

At Carleton University, it is important that we acknowledge that the land on which we gather is the traditional and unceded territory of the Algonquin nation.

WELCOME TO THE COURSE

Course Description

FOOD 3005 [0.5 credit] – Food Microbiology
Foodborne diseases, microbial growth and survival, food spoilage, food fermentation. Techniques for detecting and quantifying microorganisms in foods.
Lectures three hours a week, laboratory three hours a week.

Topics may include (in approximate order)

Week starting		Lecture topic	Lab
Sept. 1	R	**Course introduction**	No lab
Sept. 8	T	**Basics of food microbiology**: Introduction to food microbiology; Detection and enumeration methods	Lab check in session
	R	**Basics of food microbiology:** Factors influencing microorganisms in foods; Microbial spores	
Sept. 15	T	**Basics of food microbiology:** Microbiological criteria in foods	Exp. 1: Techniques, enumeration and characterization (part 1)
	R	**Food fermentation:** Lactic acid bacteria fermentation	
Sept. 22	T	**Food fermentation:** Lactic acid bacteria fermentation; Yeast and other fermentations	Exp. 1: Techniques, enumeration and characterization (part 2)
	R	**Food fermentation:** Yeast and other fermentations **Food illness pathogens:** *Salmonella*	
Sept. 29	T	**Food illness pathogens:** *Salmonella*	Exp. 1: Techniques, enumeration and characterization (part 3)
	R	**Food illness pathogens:** *Escherichia coli*	
Oct. 6	T	**Food illness pathogens:** *Shigella*	Exp. 2: Factors influencing microbial growth (part 1)
	R	**Food illness pathogens:** *Campylobacter*	

Oct. 13	T	**Review lecture**	Exp. 2: Factors influencing microbial growth (part 2)
	R	**Midterm examination**	
Oct. 20	T	Fall break	Fall break
	R	Fall break	
Oct. 27	T	**Food illness pathogens:** *Listeria*	Exp. 3: Fermentation (part 1)
	R	**Food illness pathogens:** *Clostridium*	
Nov. 3	T	**Spoilage microorganisms**	Exp. 3: Fermentation (part 2)
	R	**Spoilage microorganisms**	
Nov. 10	T	**Molds and mycotoxins**	Exp. 4: Food spoilage and preservatives (part 1)
	R	**Food viruses**	
Nov. 17	T	**Control methods:** Preservatives	Exp. 4: Food spoilage and preservatives (part 2)
	R	**Control methods:** Preservatives	
Nov. 24	T	**Control methods:** Physical methods	No lab
	R	**Control methods**: Physical methods	
Dec. 1	T	**Control methods**: Biological methods	No lab
	R	**Review lecture**	

Important dates and deadlines can be found here:

https://students.carleton.ca/academic-dates/, including class suspension for fall, winter breaks, and statutory holidays.

Learning outcomes (LOs):

1. **Describe the principles involved in food preservation via fermentation processes**
    a. Identify and characterize different fermentation microorganisms
    b. Explain how specific fermentation processes preserve food
    c. Select and justify appropriate microorganisms for different fermentation processes
    d. Explain biochemical mechanisms of action in how these microorganisms ferment food

2. **Describe the role of pathogenic microorganisms in food and how it is influenced by environmental factors**
    a. Identify and characterize different pathogens
    b. Explain biochemical mechanisms of action in how the microorganisms cause disease
    c. Describe conditions under which specific pathogens grow, multiply and/or adapt
    d. Explain the conditions under which the important pathogens are commonly inactivated, killed or made harmless in foods

3. **Describe the role of spoilage microorganisms in food and how it is influenced by environmental factors**
    a. Identify and characterize different spoilage microorganisms
    b. Explain biochemical mechanisms of action in how the microorganisms cause spoilage
    c. Describe conditions under which spoilage microorganisms grow, multiply and/or adapt
    d. Explain the conditions under which the important spoilage microorganisms are commonly inactivated or killed in foods

4. **Demonstrate proficiency in a food microbiology laboratory**
    a. Understand proper techniques for media preparation, sterilization, and culturing microorganisms
    b. Choose and judge the appropriate techniques for identifying and enumerating specific microorganisms
    c. Assess and critique proficiency and safety techniques when using laboratory equipment, including glassware, software, instruments, and biosafety cabinets

5. **Evaluate data obtained from food microbiology experiments**
    a. Apply appropriate calculations to data to determine amounts of microorganisms in food
    b. Compare calculated food microbiological values to expected values including those from microbiological criteria or other appropriate scientific documents
    c. Select and perform appropriate data analysis methods
    d. Present results in the form of graphs, tables, and prose
    e. Interpret results for a scientific audience of peers

Inclusive teaching:

I am committed to fostering an environment for learning that is inclusive for everyone regardless of gender identity, gender expression, sex, sexual orientation, race, ethnicity, ability, age, class, etc. All students in the class, the instructor, and any guests should be treated with respect during all interactions.

Community Guidelines:

The following values are fundamental to academic integrity and are adapted from the International Center for Academic Integrity*. In our course, we will seek to behave with these values in mind:

	As students, we will…	As a teaching team, we will…
Honesty	• Honestly demonstrate our knowledge and abilities on assignments and exams • Communicate openly without using deception, including citing appropriate sources	• Give you honest feedback on your demonstration of knowledge and abilities on assignments and exams • Communicate openly and honestly about the expectations and standards of the course through the syllabus, and with respect to assignments and exams
Responsibility	• Complete assignments on time and in full preparation for class • Show up to class on time, and be mentally/physically present • Participate fully and contribute to team learning and activities	• Give you timely feedback on your assignments and exams • Show up to class on time, and be mentally & physically present • Create relevant assessments and class activities
Respect	• Speak openly with one another, while respecting diverse viewpoints and perspectives • Provide sufficient space for others to voice their ideas	• Respect your perspectives even while we challenge you to think more deeply and critically • Help facilitate respectful exchange of ideas
Fairness	• Contribute fully and equally to collaborative work, so that we are not freeloading off of others • Not seek unfair advantage over fellow students in the course	• Create fair assignments and exams, and grade them in a fair, and timely manner • Treat all students equitably
Trust	• Not engage in personal affairs while on class time • Be open and transparent about what we are doing in class • Not distribute course materials to others without authorization	• Be available to all students when we say we will be • Follow through on our promises • Not modify the expectations or standards without communicating with everyone in the course
Courage	• Say or do something when we see actions that undermine any of the above values • Accept a lower or failing grade or other consequences of upholding and protecting the above values	• Say or do something when we see actions that undermine any of the above values • Accept the consequences (e.g., lower teaching evaluations) of upholding and protecting the above values

*This class statement of values is adapted from Tricia Bertram Gallant, Ph.D.

Learning Materials and Other Course/Lab-Related Resources

Mandatory texts and/or handouts: Students are **not** required to purchase textbooks or other learning materials for this course

Mandatory required materials: a computer and an internet connection

Evaluation/Grade Breakdown:

Midterm Exam	35%	(October 16, 2025)
Final Exam	35%	Scheduled by Exam Services in the Final Exam period
Laboratory	30%	

There will be **no changes** (reweighting or any other modification) to this evaluation scheme.

Midterm Examination:

The midterm examination will be written in-person during a regularly scheduled class. No notes, textbooks or other material are allowed. All students are **required to write the exam**. The midterm examination will be 1 hour 20 minutes. The midterm will consist of true/false, multiple choice, short answer, and problem-solving/case study questions.

The midterm exam needs to be written, **accommodations** (if approved by the instructor) for short-term and long-term missed work (i.e., in the event that a student misses the scheduled examination) takes the form of a **deferred exam**. A deferred exam is only possible under certain conditions as outlined below.

Missed Midterm Examination

The instructor will apply the **same policies** on exemptions for illness, family emergencies, etc. and academic misconduct to the test and midterm examination as the University applies to formally scheduled final examinations and take-home examinations, as indicated in the Undergraduate Calendar at the following link:
https://calendar.carleton.ca/undergrad/regulations/academicregulationsoftheuniversity/examinations/

Specifically concerning the exemptions, the instructor will apply the policies outlined in Section 4.3 of the aforementioned Undergraduate Calendar to the test and midterm examination as follows as follows:

1. A request for a **deferral** must be made in writing (e.g., by email) to the instructor no later than three working days after the date of the exam; and

2. A request for deferral must be fully supported by appropriate documentation, which must include **completion of the following online form** https://carleton.ca/registrar/academic-consideration-coursework-form/.

Final Examination:

The Final Examination will be written in-person in the final exam period. Date, time, and location of the final exam will be determined at a later date by the University. No notes, textbooks or other material allowed. All students are required to write the final exam. The final examination will be 1 hour 30 minutes. The final exam will resemble the midterm and will therefore consist of true/false, multiple choice, short answer, and problem-solving/case study questions.

Lecture format:

Lectures will begin at 10:05 and, at this time, students are encouraged to ask questions stemming from the previous lecture. After the question period, the presentation of new material will begin and will continue until 11:25.

Lecture material will be presented as PowerPoint slides. The slides will be available on Brightspace. Students are expected to have the slides in class in order to help them take notes when appropriate.

Teaching and learning activities, including lectures, discussions, presentations, etc., by both students and instructors, are copy protected and remain the intellectual property of their respective author(s). All course materials, including PowerPoint presentations, outlines, videos, and other materials, are also protected by copyright and remain the intellectual property of their respective author(s).

Students registered in the course may take notes and make copies of course materials for their own educational use only. Students are **not permitted** to reproduce or distribute lecture notes and course materials publicly for commercial or non-commercial purposes without express written consent from the copyright holder(s).

Assignments (statement):

Exercises, problems, and case studies associated with all of the topics of the course are an **integral part** of this course. In this course, the instructor provides two specific instances in which these learning activities are performed by students. They take place the class immediately preceding the midterm exam and on the last day of class (i.e., before the final exam period). These are performed during regular class hours. It is the responsibility of the student to attend and participate in these assigned exercises as they will help prepare for the exams. They will not be handed in for grading. However, students are free (and encouraged) to ask questions about the exercises during these in class exercise periods.

Academic Accommodations and Regulations

Carleton is committed to providing academic accessibility for all individuals. You may need special arrangements to meet your academic obligations during the term. The accommodation request processes are outlined on the Academic Accommodations website (https://students.carleton.ca/course-outline/).

Statement on Generative AI usage (e.g., Chat GPT):

As the core in-class evaluation items (i.e., the exams) happen without authorized material, it is not permitted to use AI tools for the midterm and final examinations. The following therefore applies in the case of the **laboratory component** of the course as well as if the situation concerning exam delivery should change. Please note the following statement on AI use in this course:

Minimal Use – Basic Assistance Only

AI Use in this course: Students may use AI tools for basic word processing and formatting functions, including:

- Grammar and spell checking (e.g., Grammarly, Microsoft Word Editor)
- Basic formatting and design suggestions (e.g., Microsoft Word's formatting tools, PowerPoint Design editor)

Documenting AI Use: It is not necessary to document the use of AI for the permitted purposes listed above. If you have questions about a specific use of AI that is not listed above, please consult me.

Why have I adopted this policy? This policy ensures that student voices and ideas are prioritized and authentically represented, maintaining the integrity of the work produced by students while allowing basic support to enhance clarity, correctness, layout, and flow of ideas. The goal of adopting a limited use of AI is to help students develop foundational skills in writing and critical thinking by practicing substantive content creation **without** the support of AI.

Statement on Academic Integrity

Students are expected to uphold the values of academic integrity, which include fairness, honesty, trust, and responsibility. Examples of actions that that compromise these values include but are not limited to plagiarism, accessing unauthorized sites for assignments or tests, unauthorized collaboration on assignments or exams, and using artificial intelligence tools such as ChatGPT when your assessment instructions say it is not permitted.

Misconduct in scholarly activity will not be tolerated and will result in consequences as outlined in Carleton University's Academic Integrity Policy. A list of standard sanctions in the Faculty of Science can be found here.

Additional details about this process can be found on the Faculty of Science Academic Integrity website.

Students are expected to familiarize themselves with and abide by Carleton University's Academic Integrity Policy.

Student Rights & Responsibilities

Students are expected to act responsibly and engage respectfully with other students and members of the Carleton and the broader community. See the 7 Rights and Responsibilities Policy for details regarding the expectations of non-academic behaviour of students. Those who participate with another student in the commission of an infraction of this Policy will also be held liable for their actions.

Student Concerns

If a concern arises regarding this course, **your first point of contact is me**: Email and I will do my best to address your concern. If I am unable to address your concern, the next points of contact are the **Chair of the Department of Chemistry**, followed by the **Office of the Dean of Science**.

Note: You can also bring your concerns to Ombuds services.

Assistance for Students

Academic and Career Development Services: http://carleton.ca/sacds/
Writing Services: http://www.carleton.ca/csas/writing-services/
Peer Assisted Study Sessions (PASS): https://carleton.ca/csas/group-support/pass/
Math Tutorial Centre: https://carleton.ca/math/math-tutorial-centre/
Science Student Success Centre: https://sssc.carleton.ca/