



FOOD3005 | Food Microbiology

Time/Location: Time: 08:35 - 09:55 Building: Richcraft Hall Room: 1201 /Wednesdays and Fridays.

Term/Year: Fall/2023, IN PERSON

Instructor: Rowida M. PhD. Department of Chemistry and Health Science

PDF-Faculty of Medicine-Department of Cellular and Molecular Medicine (CMM)

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Office Hours: by Request or/and Appointment

Credit: 0.5

Course Description:

This course focuses on the study of foodborne diseases, microbial growth and survival, food spoilage, and food fermentation. Students will learn techniques for detecting and quantifying microorganisms in foods. The course covers topics such as the sources and routes of contamination, factors influencing microbial growth, and the identification and control of pathogens. Additionally, students will explore the principles and methods of food spoilage prevention and control. The course also provides insights into the role of microorganisms in food fermentation processes and their manipulation for the production of fermented food products.

Learning Objectives

Understand the principles and mechanisms of foodborne diseases, including the identification of pathogens and toxins that can contaminate food and cause illnesses in humans. Apply knowledge of microbial growth and survival to assess and control the factors that contribute to the proliferation of microorganisms in food. Identify various types of food spoilage organisms, evaluate their metabolic activities, and implement strategies to prevent and control food spoilage. Comprehend the principles and techniques of food fermentation, including the selection and cultivation of microbial strains, environmental manipulation, and quality control during the fermentation process. Demonstrate proficiency in techniques for detecting and quantifying microorganisms in foods, such as traditional culture-based methods, molecular techniques, immunological methods, and rapid enumeration methods.

Course Format

The concepts in this course will be introduced to you the student through a combination of lecture and presentation, which for the most part are based on case studies, will be used to illustrate the applicability in an industrial setting of the theories introduced in the lectures. Case studies have proved to bring interesting real-world situations into the classroom. You will discover that decision making often is a confrontational activity involving people with different points of view. By working

through the case studies, you will learn how to work toward consensus while tolerating legitimate differences in opinions and it will prepare you for great challenges in your future (or current) job.

Learning Activities

Participation is mandatory in class and (online) during the lecture and attendance will be taken. It is anticipated that we will use Zoom to work on projects and presentations (in case of lockdown).

Email

When you email me, please write the course number you are writing about. I teach multiple courses and I need to know which course you are writing about. On weekdays, I will try my best to respond to the emails within 24 hours. I do not guarantee a response on the weekends and holidays. If an email is sent to inform me that you are unable to attend the class or something that doesn't require a response from me, I will not respond. You must email me via the Carleton U email account as per the University policy.

What's Expected Of You

- Wherever group work is required, I expect students to work professionally and complete their share of work on-time. Try to resolve your conflicts, if any, at the group level. Even though all students in a group will get the same marks, if there is enough evidence that a group member has not done his/her share of work, that student may get lower marks than the other group members.
- Students may use their computers/notebooks to take notes in the class.
- When I ask a question in the class or initiate a discussion, I expect students to respond but I do not expect perfection.
- Use real life examples in explaining concepts.
- I will treat you with respect and would appreciate the same courtesy in return.

What You Can Expect Of Me

My role is to help you make sense of the course contents and gain new understandings. My aim, therefore, is to provide support so that all students who engage with this course and its objectives will pass. You can expect me:

- Treat you fairly, and with respect.
- Remain in the classroom for 10-30 minutes after class to answer any immediate questions.
- Repeat/clarify any part of a lecture that is not clear to you.

Course Policies

- Each students must sign into Bright Space learn to get access to all the course materials
- Any technical issues please email me ahead of time and do not leave to last minute, I require 24 hour notification
- If you miss a midterm your weight of midterm will be moved to your final.
- Attendance is mandatory at the beginning of each class and its part of your assessment

Academic Calendar (Make sure you check the updated version online)

- September 6, 2022: Fall term begins. Full fall, early fall, and fall/winter classes begin.
- September 12, 2023: Last day for registration and course changes (including auditing) in early fall courses.
- September 30, 2023: Last day to withdraw from full fall and fall/winter courses with a full fee adjustment.
- October 6, 2023: December examination schedule (fall term final and fall/winter mid-terms) available online.
- October 9, 2023: Statutory holiday. University closed.
- October 23-27, 2023: Fall break, no classes.
- December 8, 2023: Fall term ends.
- December 9, 2023: No classes or examinations take place.
- December 10-22, 2023: Final examinations in full fall and late fall courses and mid-term examinations in fall/winter courses will be held. Examinations are normally held all seven days of the week
- December 25, 2023 through January 3, 2024 inclusive University closed.

Lab component	30%
Presentation	15%
Midterm	25% (October 20th) in class 8:35-10:55am (No Make-up midterm)
Final Exam	40%

Learning Outcomes

- **Introduction to Food Microbiology**
 - Microbial growth and metabolism in food
 - Beneficial microorganisms in food
 - Foodborne illnesses and their impact on public health
- **Microbial Ecology in Food**
 - Psychrophilic, mesophilic, and thermophilic microorganisms
 - The role of pH, temperature, and water activity in microbial growth
 - Biofilms and their formation in food processing environments
- **Foodborne Pathogens**
 - Salmonella: characteristics, transmission, detection methods
 - Escherichia coli: pathogenic strains, virulence factors, control measures
 - Listeria monocytogenes: growth conditions, control strategies, risk assessment
 - Campylobacter jejuni: prevalence, sources, and prevention in poultry products
- **Food Spoilage Microorganisms**
 - Yeasts: spoilage mechanisms, prevention in bakery products
 - Molds: types, mycotoxins, control measures
 - Gram-negative spoilage bacteria: Pseudomonas, Acinetobacter, and their impact on refrigerated foods
- **Food Preservation Methods**
 - Thermal processing: pasteurization techniques, sterilization methods
 - Modified atmosphere packaging (MAP) and vacuum packaging
 - High-pressure processing: principles, applications, and microbial inactivation
- **Food Fermentation**
 - Lactic acid bacteria: role in dairy, vegetable, and meat fermentations
 - Yeast fermentation in breadmaking and brewing
 - Probiotics: definition, health benefits, and product development
- **Microbiological Quality Assurance in Food Industry**
 - Emerging Issues in Food Microbiology
- **Norovirus outbreaks: prevention and control measures**
 - Antibiotic-resistant bacteria in food: implications and strategies
- **Novel food processing technologies: pulsed electric field, cold plasma, UV-C treatment**
- **Laboratory Techniques in Food Microbiology**
 - Streak plate technique for isolation and purification
 - Molecular methods for microbial identification: PCR, DNA sequencing
 - Enumeration of total viable count and indicator organisms
 - Antibiotic sensitivity testing for pathogen detection
- **Food Safety Regulations and Compliance**

GRADING SYSTEM

Letter grades assigned in this course will have the following percentage equivalents:

A+ = 90-100	B = 73-76	C - = 60-62
A = 85-89	B - = 70-72	D+ = 57-59
A - = 80-84	C+ = 67-69	D = 53-56
B+ = 77-79	C = 63-66	D - = 50-52

F Failure. No academic credit

ABS Absent from the final examination

DEF Official deferral (see "Petitions to Defer")

FND "Failed, no Deferral" – assigned when the student is absent from the final exam and has failed the course on the basis of inadequate term work as specified in the course outline.

Standing in a course is determined by the course instructor subject to the approval of the Faculty Dean.

Academic Integrity

It is your responsibility to understand and abide by the standard integrity policy of Carleton University.

<http://calendar.carleton.ca/undergrad/regulations/academicregulationsoftheuniversity/acadregsuniv14/>

Special Arrangements

If you require any special requirement to meet academic obligations during the term write to me during first two lecture classes or as soon as possible after the need for accommodation is known to exist. For more details visit the Equity Services website http://www.carleton.ca/equity/accommodation/student_guide.htm.

Religious obligation: write to me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details visit the Equity Services website http://www.carleton.ca/equity/accommodation/student_guide.htm.

Students with disabilities

If you require any academic accommodations in this course must register with the Paul Menton Centre for Students with Disabilities (PMC) for a formal evaluation of disability-related needs within the first two weeks. Paul Menton Centre (PMC) for Students with Disabilities, 501 University Center T: 613-520-6608, e: pmc@carleton.ca, www1.carleton.ca/pmc/students/

If you are already registered with the PMC, contact your PMC coordinator to send me your Letter of Accommodation at the beginning of the term, and no later than two weeks before the midterm test or exam requiring accommodation (if applicable). For the deadline to request accommodations for the formally scheduled exam (if applicable), please consult the PMC website: www1.carleton.ca/pmc/students/dates-and-deadlines/

Plagiarism

The University Senate defines plagiarism as “presenting, whether intentionally or not, the ideas, expression of ideas or work of others as one's own”. This can include:

- Reproducing or paraphrasing portions of someone else's published or unpublished material, regardless of the source, and presenting these as one's own without proper citation or reference to the original source;
- Submitting a written assignment, in whole or in part, by someone else;
- Using ideas or direct, verbatim quotations, or paraphrased material, concepts, or ideas without appropriate acknowledgment in any academic assignment;
- Using another person's data or research findings;
- Failing to acknowledge sources through the use of proper citations when using
- another's works and/or failing to use quotation marks;
- Handing in “substantially the same piece of work for academic credit more than once without prior written permission of the course instructor in which the submission occurs.”

Plagiarism and cheating at the graduate level are viewed as being particularly serious and the sanctions imposed are accordingly severe. A student found to have plagiarized an assignment may be subject to one of several penalties including: expulsion; suspension from all studies at Carleton; suspension from full-time studies; and/or a reprimand; a refusal of permission to continue or to register in a specific degree program; academic probation; award of Fail. To avoid plagiarism:

Acknowledge every source from which you have drawn information or ideas for your paper

- That is, even if you are not quoting directly from a source, you should still reference where the idea, argument, or information came from.
- Place every direct quote from a source in quotation marks (or indent it), and give a citation for the source. Nevertheless, try not to use quotes too frequently. Quotes should be used when they so beautifully or aptly sum something up that you couldn't say it any better. A well-written paper is not a collection of quotes.
- Express other authors' ideas in your own words. If you are outlining someone else's argument, for example, outline it in your own words, and acknowledge the author at the end of your summation of his or her argument or idea/s. Any words not in quotation marks must be your own words. This advice has a legal as well as an intellectual purpose: being able to express an author's ideas in your own words is part of your learning process.
- Students are expected to familiarize themselves with and follow the Carleton University
- Student Academic Integrity Policy (See <http://carleton.ca/senate/wpcontent/uploads/Academic-Integrity-Policy1.pdf>). The Policy is strictly enforced and binding on all students.
- Many of the assessed activities in this course were designed to be completed by an individual working alone. Unless it is explicitly stated otherwise, the use of any artificial-intelligence based tools will be considered academic misconduct.

- This includes, but is not limited to, chatbots (e.g., ChatGPT, Google Bard, Bing Chat), research assistants (e.g., Elicit), and image generators (e.g., Stable Diffusion, Dall-E), etc.
- An exception to the above rule is made for automated grammar and punctuation checking tools (such as Grammarly).

Assistance for Students

A note about COVID-19 and Mental Health: The global pandemic has led to extra stress and uncertainty for everyone, and while we may all be experiencing the same storm, this does not mean that we are all in the same boat! If you are struggling, please do not hesitate to reach out. I am happy to listen, and/or direct you to resources that might help.

Remember that Carleton also offers an array of academic and well-being resources:

- 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/>
- Online Student Support Services: <https://carleton.ca/academics/support/>
- Mental Health & Well-being Services: <https://carleton.ca/wellness/>

Equity Diversity and Inclusion (EDI)

Your professor, the faculty, and Carleton University are dedicated to fostering a secure environment that promotes personal and intellectual growth. This environment is free from any form of injustice, discrimination, or harassment and is characterized by understanding, respect, peace, trust, and fairness. This course aims to facilitate learning and offer professional development opportunities that are accessible to everyone, regardless of age, gender, race, ethnic origin, color, religion, sexual orientation, marital status, or geographical location. Embracing the principles of Equity, Diversity, and Inclusion (EDI) is an ongoing journey that requires continuous action and introspection. I acknowledge the significance of this commitment in cultivating a thriving classroom community and supporting its members. Both students and members of the teaching team share the commitment and responsibility to:

- Respect and appreciate every individual, valuing their unique characteristics, backgrounds, and experiences.
- Treat all individuals impartially, without any form of preferential treatment.
- Recognize and address the strengths and needs of each person.
- Learn from a diverse range of perspectives, fostering a collaborative learning environment.
- Strive for transparency, openness, and fairness in policies and communication.
- Regularly evaluate and reflect upon the course's activities and outcomes in terms of EDI, making updates as needed.

As our classroom community evolves, I wholeheartedly welcome your feedback on enhancing our dedication to EDI. Please share your suggestions with me via email. If you encounter any concerns related to harassment or discrimination based on factors such as age, ancestry, citizenship, color, creed (religion), disability, ethnic origin, family status, gender

expression, gender identity, marital status, place of origin, race, sex (including pregnancy), or sexual orientation, please feel free to reach out to me, your instructor, and/or the Department of Equity and Inclusive Communities, as appropriate

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Week	Dates	Materials
Week 1	September 6 & 8	Introduction: Food Microbiology
Week 2	September 13 th & 15 th	Food Fermentation Part 1 and 2
Week 3	September 20 th & 22 nd	Pathogenic Bacteria-Part 1 and 2
Week 4	September 27 th & 29 th	Pathogenic Bacteria Part 3 and 4 Paper for your presentation should be selected
Week 5	October 4 th & 6 th	Pathogenic Bacteria Part 5
Week 6	October 11 th and 13 th	Spoilage Microorganisms Spoilage Microorganisms
Week 7	October 18 th & 20 th	Review & Midterm
Week 8	October 23-27 th	Fall Break
Week 9	November 1 st & 3 rd	Presentations
Week 10	November 8 th & 10 th	Viruses
Week 11	November 22 nd & 24 th	Prions
Week 12	November 29 th & 20 th	Food Safety and Review
Week 13	December 1 st	Final Exam-In class (not cumulative)
Week 14	December 6 th	Exam Final Marks posted
Final Exam will be held In-class (December 1st, 2023)		