FOOD 2002 - Fall 2025
Food Processing

Department of Chemistry

--- COURSE OUTLINE ---

Course Description: The principles of the major techniques used in food processing and preservation are covered. The processing of specific food groups including fruits & vegetable, cereals, oilseeds, dairy, meat, beverages, chocolate, and frozen foods is covered. Product developments, specific problems and R&D role in food industry and food system are discussed. Introduction to food adulterations, toward food regulations will be covered.
Note: Mid-term and final exam include case studies/problem solving

Course Instructor: Farah Hosseinian

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Student Hours: In-person:Wed: 2:30pm to 3:30 pm, Office: 318 Steacie Building

Virtual: By email confirmation

Office Location: Room 318, Steacie Building

Class Location: Please check Carleton Central for the room location

Class Times: Monday & Wednesday, 11:35am – 2:25pm

Prerequisite(s): FOOD 1001

Department/Unit: Chemistry

Course TAs: Teaching Assistant: None

Topics Covered and Learning Outcomes

Equity, Diversity, and Inclusion (EDI) Philosophy

An inclusive and equitable philosophy (EDI) in teaching a food processing course applies creating a learning environment that values diversity, ensures equal access to resources, and fosters belonging for all students. Use diverse examples and global perspectives to broaden understanding and highlight the role of food processing. The major teaching strategy for this course is training students based on problem solving, ongoing assignment questions and hypothesis exercises, promoting student's tangible strengths, and leadership development; fulfil their academic mission with excellent societal outcomes. Promoting inclusion remains a priority by encouraging students to contribute and engage with various group of students' activities on case studies and presentations, reducing barriers and limitations and thereby, enhancing accessibility to learning. Small group presentations provide a highly motivated class with self-driven students, dedicated working closely on their projects (problem solving cases) in individually and in collaboration environment. This will provide students with an opportunity to transfer their knowledge to other students while also adding to their knowledge base. Additionally, scientific communication will strengthen their leadership development and professional skills. Working in an intradisciplinary/multidisciplinary class environment with this

variety of development opportunities is designed to support students on a broad range of learning. Integrating EDI principles helps all students succeed and prepares them for their contributing diverse future carriers especially, in food-related industry.

Topics to be Covered:

Module	Topic/Content
1	**Lec 1: Introduction to thermal and non-thermal food processing techniques (LOs 1,2,3,4,5)** • Basic processing theory. • Effect of heating or cooling processing techniques such as pasteurization, sterilization, evaporation, drying and freezing on quality of foods. • The effects of processing on chemical, physical and nutritional characteristics of foods. • The effects of processing on sensory characteristics of foods.
2	**Lec 2: Processing of oilseeds (LOs 1,2,3,4,5,6)** • Crude vegetable oil production a. mechanical extraction b. solvent extraction • Refining of crude oil/processing of RBD oil a. degumming (by water and acid) b. bleaching c. deodorization • By-product utilization a. meal production and applications
3	**Lec 3: Adulteration of vegetable oils (LOs 3, 4, 5, 6)** • Identify the appropriate methods of analysis for food adulteration/food fraud • Understand and evaluate the advantage & disadvantage of different analysis methods
4	**Lec 4: Processing of milk and dairy products (LOs 1,2,3,4,5)** • Milk processing a. composition and structure b. processing and effects on sensory and nutritional qualities • Cheese and whey a. composition and chemistry b. production c. type of cheese and quality d. type of whey and quality e. utilization of whey/by-product **Lec 4a: (Assignment_dairy) (LOs 3, 4 and 6)** Practical evaluation of milk volume for dairy products **Lec 4b: Adulteration of dairy products (LOs 1,2,3,4,5)**

5	**Lec 5: Canning (LOs 1,2,3,4,5)** • Heat sterilization • factors that influence length of time of sterilization of foods • D and Z values • heat penetration into foods • Commercial sterilization **Lec 5a: (Assignment_canning) (LOs 3, 4 and 6)** Practical evaluation of heat for canning
6	**Lec 6: Processing of fruits & vegetable (LOs: 1,2,4,5,6)** • Composition of fruits and vegetables • Quality during processing • Juicing • Drying • Freezing, canning • And jelly manufacture **Lec 6a: Adulteration of juices and beverages (LOs 1,2,3,4,5)**
7	**Lec 7: Freezing (LOs 1,2,3,4,5)** • Freezing curve • Six components of the curve • Ice crystal formation • Rate of mass transfer • Rates of heat transfer • Changes in foods due to a. freezing b. frozen storage c. thawing
8	**Lec 8: R&D and quality control system in in food process (LOs 4,5,6)** • Importance of R&D in food industry and food system • Government involvement in food industry R&D • R&D Fundamental to marketing and entrepreneurship • Consumer role in product development • Delivering skills • Supporting Research & Innovation

Learning Outcomes:

1. **Describe** the physical, chemical, and microbiological properties of foods.
   Assessment: mid-term & final exam.
2. **Apply** principles of food processing to commodities to achieve preservation.
   Assessment: **Mid-term and final exam: case studies/problem solving**
3. **Know** the effects of processing factors on physical and chemical characteristics of foods.
   Assessment: **Mid-term and final exam: case studies/problem solving**
   Breakdown the basic food processing principles (eg. systematic processing steps) & Food adulterations involved in the production of a specific food type.
   Assessment: Assessment: **Mid-term and final exam: case studies/problem solving**, artifact (assignment) and presentation
4. **Recommend/Evaluate** a theoretical concept for the manufacture of foods and some of the challenges faced in food processing & Food adulteration.
   Assessment: mid-term test, final exam, artifact (assignment) and presentation
5. **Create and Establish** critical thinking skills to solve issues arising from new situations, especially new processes. Critical thinking for problem solving for food industry.
   **Assessments: artifact (problem solving/case study from exams) and presentation related to all the above Los

Assessments

There will be **no formal exam** in this course. Instead, students must complete and submit Assignments: Take home/Case studies//problem solving.

Grade Breakdown

Component	Grade	Date
Midterm: Take home/Case studies/problem solving	**30%**	**TBA, by students' vote**
Final: Take home/Case studies/problem solving	**40%**	**TBA, by students' vote**
Presentation	**20%**	**TBA, by students' vote**
Participation in class discussion and other students' presentations	**10%**	**During class**
Attendance	**0.0%**	

DEATAILS:

Presentation:

Presentation (practical performance): Individual and related to specific food. Each student will present part of the topic individually. Total time of presentation is (20 min/each student) plus 10 min to answer questions. See below for the breakdown marks for Student Performance on Presentations.

Expectation &Assessment:

Breakdown marks for Student Performance on Presentations (out of 20%).

Performance	Mark	Student name	Student name
Ability to understand the topic	2		
Clearly talking about objectives	2		
Contribution to discussion	3		
Promote others to be involve in the discussion	3		
Speaking audibly and clearly	2		
Beginning and ending properly	2		
Ability to make conclusion	2		
Answering questions	2		
Timing	2		
Overall ranking			

Comments:

Presentation, Option 1 for selecting topic

New Technology in Food Processing: Using any relevant lecture materials, present a new technology with compare to traditional technology for a particular food processing ("except" those are covered in the lectures). Explain in details how the new technology affects physical, rheological and chemical properties of food during processing. Discuss how major factors (emphasize on physical and chemical factors/e.g. heat, light, enzymes, chemical reactions..) will affect specific food processing.

Presentation, Option 2 for selecting topic:

Food Adulteration: Using any relevant lecture materials, select a particular food processing, ("except" those are covered in the lectures)

Explain in details how food adulteration can be identified (e.g. adulteration of olive oil with canola oil or maple syrup with corn syrup). Discuss how food adulteration affects food quality safety.

Expectations:

It is important to be knowledgeable on the topic and terms in order to perform a worthy knowledge transfer to the audiences. For example, if the sources of processing method, adulteration, their chemistry, and safety are included in the presentation, you need to understand them in order to transfer the knowledge to others. You act as an educator!!

All presentations will be after mid-term break. Participate in other students' presentation is important.

Accommodations and Missed Term Work:

Accommodations

Carleton University is committed to ensuring academic accessibility for all students.
If you require special arrangements to meet your academic obligations during the term, please refer to the **Academic Accommodations** website: students.carleton.ca/course-outline.

This site outlines:

- How to request accommodations
- The **Academic Consideration Policy** for medical or other extenuating circumstances
- Required documentation and timelines

Missed Term Work

1. **Without Accommodation**
    - **Late submissions** will be penalized **10% per day**.
    - Work will **not be accepted** more than **5 days** after the original deadline.

2. **Short-Term Accommodation (5 days or less)**
   If extenuating circumstances prevent you from completing term work for up to five days, you may request academic consideration in line with the Academic Consideration Policy:
   - Contact your instructor **as soon as possible** (normally within **24 hours** of the deadline).
   - Complete the **Online Academic Consideration Coursework Form**. academic considerations form
   - If approved, you may receive up to **five extra days** to submit without penalty.
   - Submit your work within the approved extension period.

3. **Missed term work for longer term incapacitation (5 days or longer):**

   If you require accommodations for this course that are longer than the 5-day (short-term) period, please email me to discuss how/whether accommodation needs could be met for this course.
   Extenuating circumstances are:
   - Beyond your control
   - Significantly affecting your ability to meet academic obligations
   - Not reasonably preventable

   Note: Requests are not automatically approved. The instructor decides whether and how accommodations are granted.

Learning Material(s) and Other Course/Lab-Related Resources

Mandatory texts and/or handouts: none
Students are not required to purchase textbooks or other learning materials for this course.

Mandatory required materials: a computer and an internet connection as online research, answering questions, and participating in class discussions (including problem-solving activities) may be required.

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/).

AI use in this course:

In this course, students are encouraged to use generative AI tools (such as ChatGPT, Microsoft Copilot, Google Gemini, etc.) as collaborative partners to support learning, problem-solving, and skill-building. These tools can be used to help you think critically, refine your ideas, and better

understand the course material, but should not replace your own intellectual work e.g. in the assignments.

- Research: Summarizing or finding sources (e.g., "Find articles on caffeine and performance.")
- Problem Solving: Explaining or troubleshooting concepts and methods.
- Skill Building: Asking AI to assess your understanding and suggest study plans.
- Drafting: Generating outlines or rough drafts to revise and expand.
- Reading Support: Simplifying complex articles (but always read the original).

Documenting use of AI: You must clearly acknowledge any AI use in your work. AI use should be a tool—not a replacement for learning

Why have I adopted this policy? AI is reshaping how we learn and work. This policy helps you develop AI literacy and responsible use, preparing you for academic and professional success while maintaining academic integrity.

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 or drop in during student hours and I will do my best to address your concern. If I am unable to address your concern, the next points of contact are (in this order):

Note: You can also bring your concerns to Ombuds services

Assistance for Students

Writing Services: Writing Sessions - Centre for Student Academic Support

Peer Assisted Study Sessions (PASS): PASS workshops helping students succeed - Teaching and Learning Services

Math Tutorial Centre: Math Tutorial Centre (MTC) - School of Mathematics and Statistics

Science Student Success Centre: Science Student Success Centre - Current Students : Current Students