

## FOOD 2002, Food Processing Credits: 0.5

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### SCHEDULE

Lectures are on Wednesdays & Fridays, 8:35 to 9:55 am, (Richcraft Hall 3202)

**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**

**Learning Outcomes (LOs):** by the end of the course, the student should:

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

### 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.

### **OFFICE HOUR/COMMUNICATING OUTSIDE OF CLASS:**

Wednesday 10 to 11 am. Also, by email, I am generally prompt to reply by email (email me first to schedule a time to come see me at my office). Make sure to check for updates on Brightspace on a weekly basis as I may post/update lectures as late as the evening before or at times the morning of the coming lecture. In addition, Brightspace is the best way for students to communicate with one another outside of class and there are news forums in which students can post questions, initiate group discussions and share ideas.

### **COURSE EVALUATIONS**

Midterm: Take home/Case studies/problem solving	30%
Final: Take home/Case studies/problem solving	40%
Presentation	20%
Participation in class discussion and other students' presentations	10.0%
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.

## **SPECIAL ARRANGEMENTS**

PLEASE REFER TO CARLETON UNIVERSITY ACADEMIC REGULATIONS REGARDING ACADEMIC INTEGRITY, EXAMINATION POLICIES, ETC.

<https://calendar.carleton.ca/undergrad/regulations/academicregulationsoftheuniversity/>

You may need special arrangements to meet your academic obligations during the term. For an accommodation request the processes are as follows:

**Pregnancy 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](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](http://www.carleton.ca/equity/accommodation/student_guide.htm).

**Students with disabilities requiring 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. Documented disabilities could include but are not limited to mobility/physical impairments, specific Learning Disabilities (LD), psychiatric/psychological disabilities, sensory disabilities, Attention Deficit Hyperactivity Disorder (ADHD), and chronic medical conditions. Registered PMC students are required to contact the PMC, 613-520-6608, every term to ensure that I receive your Letter of Accommodation, no later than two weeks before the first assignment is due or the first in-class test/midterm requiring accommodations. If you only require accommodations for your formally scheduled exam(s) in this course, please submit your request for accommodations to PMC by the deadlines published on the PMC

**Policy on Plagiarism and Cheating (University Calendar)**

<http://people.scs.carleton.ca/~kranakis/students/plagiarism.html>

**The following topics will be covered during the course:**

**Lec 1: Introduction to thermal and non-thermal food processing techniques (LOs 1,2,3,4,5)**

1. Basic processing theory.
2. Effect of heating or cooling processing techniques such as pasteurization, sterilization, evaporation, drying and freezing on quality of foods.
3. The effects of processing on chemical, physical and nutritional characteristics of foods.
4. The effects of processing on sensory characteristics of foods.

**Lec 2: Processing of oilseeds (LOs 1,2,3,4,5,6)**

1. Crude vegetable oil production
  - a. mechanical extraction
  - b. solvent extraction
2. Refining of crude oil/processing of RBD oil
  - a. degumming (by water and acid)
  - b. bleaching
  - c. deodorization
3. By-product utilization
  - a. meal production and applications

**Lec 2a: Adulteration of vegetable oils**

- a. Identify the appropriate methods of analysis for food adulteration/food fraud
- b. Understand and evaluate the advantage & disadvantage of different analysis methods

**(LOs 3, 4, 5, 6)**

Systematic mass balance in processing of oilseeds

**Lec 3: Processing of milk and dairy products (LOs 1,2,3,4,5)**

1. Milk processing
  - a. composition and structure
  - b. processing and effects on sensory and nutritional qualities
2. 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 3a: (Assignment\_dairy) (LOs 3, 4 and 6)**

Practical evaluation of milk volume for dairy products

**Lec 3b: Adulteration of dairy products (LOs 1,2,3,4,5)**

**Lec 4: Canning (LOs 1,2,3,4,5)**

1. Heat sterilization
  - a. factors that influence length of time of sterilization of foods
  - b. D and Z values
  - c. heat penetration into foods
  - d. Commercial sterilization

**Lec 4a: (Assignment\_canning) (LOs 3, 4 and 6)**

Practical evaluation of heat for canning

**Lec 5: Processing of fruits & vegetable (LOs: 1,2,4,5,6)**

1. Composition of fruits and vegetables
2. Quality during processing
3. Juicing
4. Drying
5. Freezing, canning
6. And jelly manufacture

**Lec 5a: Adulteration of juices and beverages (LOs 1,2,3,4,5)**

**Lec 6: Freezing (LOs 1,2,3,4,5)**

1. Freezing curve
2. Six components of the curve
3. Ice crystal formation
4. Rate of mass transfer
5. Rates of heat transfer

6. Changes in foods due to
  - a. freezing
  - b. frozen storage
  - c. thawing

**Lec 7: R&D and quality control system in in food process (LOs 4,5,6)**

- a. Importance of R&D in food industry and food system
- b. Government involvement in food industry R&D
- c. R&D Fundamental to marketing and entrepreneurship
- d. Consumer role in product development
- e. Delivering skills
- f. Supporting Research & Innovation

**RECOMMENDED BOOKS (NOT MANDATORY):**

1. Food Processing, Principles and Applications. Edited by J. Scott Smith and Y. H. Hui. Blackwell Publishing Ltd (2004).
2. Potter, N.N., and Hotchkiss, J.H. 1998. Food Science. 5nd Edition. Avi Publishing Co. (1998).