

# FOOD 3003

## FOOD PACKAGING AND SHELF LIFE

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### COURSE DESCRIPTION

An introduction to the materials used for food packaging, including their chemical and physical characteristics. Interactions of these materials with food products, and the effects on food storage and quality. Pre-requisites: FOOD 1001, FOOD 2001.

### COURSE SCHEDULE

Lectures are on Wednesdays and Fridays 11:35 am – 12:55 am  
Office hours by request.

### REQUIRED TEXTBOOK

None.

### Recommended resources available in reserve at the library:

Food Packaging: Principles and Practice, 2005, Gordon L. Robertson, 2<sup>nd</sup> edition, CRC Press. ISBN-13: 978-0849337758

Food Packaging and Shelf life: A Practical Guide, 2010, Gordon L. Robertson, CRC Press. ISBN: 978-1-4200-7844-2.

Food Packaging Science and Technology, 2008, Dong Sun Lee, CRC Press. ISBN: 9780824727796.

### CLASS COMMUNICATION

This course will be supported by the *cuLearn*. It will be used to post announcements, lecture material, and marks. Students should ensure to sign-on to *cuLearn* in the first week of classes and refer to the *cuLearn* page for this course on a weekly basis. Failure to check electronic communication will not be accepted as an excuse for not meeting course requirements.

## **COURSE LEARNING OUTCOMES**

After successful completion of this course, students will be able to:

- 1. Describe major food packaging materials (glass, metal, paper, plastic polymers, bio-based)**
  - a. Describe the sources/origin of major food packaging materials
  - b. Draw chemical structures of packaging materials
  - c. Explain physical properties of packaging materials based on chemical structures
  - d. Explain and draw manufacturing processes of packaging materials
  - e. Describe applications for each major food packaging materials
  - f. Describe basic regulatory framework for standard food packaging materials
  
- 2. Describe novel types of active and intelligent packaging materials**
  - a. Differentiate active and intelligent packaging
  - b. Write the balanced equations taking place in active packaging materials
  - c. Describe chemical and/or physical principles of intelligent packaging materials
  - d. Describe applications of active and intelligent packaging materials
  
- 3. Compare strengths and weaknesses of food packaging materials**
  - a. Compare strength, rigidity, flexibility, melting point, cost, and other properties
  - b. Evaluate food packaging permeability to gases, moisture, light, and temperature
  - c. Evaluate interactions between food and specific types of packaging materials
  
- 4. Propose packaging solutions to minimize deteriorative reactions in specific foods**
  - a. Describe mechanisms by which intrinsic and extrinsic factors influence deteriorative reactions in food
  - b. Identify appropriate deteriorative reactions in specific food commodities
  - c. Calculate shelf life of food based on known limiting quality index
  - d. Postulate how such reactions are occurring in standard food packaging
  - e. Propose packaging solutions to overcome these deteriorative reactions
  
- 5. Interpret recent advances in food packaging and technology**
  - a. Identify and extract credible sources of information in novel food packaging
  - b. Interpret and present recent advances in food packaging to a scientific audience of peers
  - c. Interpret primary literature which assesses the effectiveness of food packaging
  - d. Propose study designs to test effectiveness of food packaging

## COURSE OUTLINE

DATE	DAY	THEME	OUTCOMES	ASSESSMENT
Sep 05	W	Syllabus, introduction lecture		
Sep 07	F	Glass packaging	1 a-e, 3 a-c	Midterm: Describe Draw Explain Write reactions Evaluate
Sep 12	W	Metal packaging	1 a-e, 3 a-c	
Sep 14	F	Paper packaging	1 a-e, 3 a-c	
Sep 19	W	Plastic polymers packaging	1 a-e, 3 a-c	
Sep 21	F	Permeability	3 a-c	
Sep 26	W	<b>Assignment 1: Summarizing packaging materials</b>	1 a-d, 3 a-c	
Sep 28	F	Bio-based food packaging	1 a-e, 3 a-c	
Oct 03	W	Microwavable packaging	2 a-d	
Oct 05	F	Aseptic and modified atmosphere packaging	2 a-d	
Oct 10	W	Active and intelligent packaging	2 a-d	
Oct 12	F	<b>Review exercises</b>		
Oct 17	W	<b>Midterm</b>		
Oct 19	F	Food Packaging Regulations	1 f	
<b>Oct 24</b>	<b>W</b>	<b>Fall break</b>		
<b>Oct 26</b>	<b>F</b>	<b>Fall break</b>		
Oct 31	W	Deteriorative reactions in foods	4 a-c	Final exam: Identify Describe Calculate
Nov 02	F	Deteriorative reactions in foods	4 a-c	
Nov 07	W	Shelf life, packaging of meat	4 d-e, 5 c-d	
Nov 09	F	<b>Assignment 2: Interpreting scientific literature</b>	5 c	Final exam: Interpret Postulate Design
Nov 14	W	Shelf life, packaging of fish	4 d-e, 5 c-d	
Nov 16	F	Shelf life, packaging of liquid milk	4 d-e, 5 c-d	
Nov 21	W	Shelf life, packaging of dairy products	4 d-e, 5 c-d	
Nov 23	F	<b>Assignment 3: Designing food packaging studies</b>	5 d	
Nov 28	W	Shelf life, packaging of cereals products	4 d-e, 5 c-d	
Nov 30	F	Shelf life, packaging of beverages	4 d-e, 5 c-d	
Dec 05	W	Shelf life, packaging of horticultural products	4 d-e, 5 c-d	

Theme 1: Food packaging materials and properties

Theme 2: Shelf life and packaging of specific commodities

## COURSE ASSIGNMENTS AND GRADING

News report presentations	5% (2x2.5)	Reserve your own dates
Assignment 1	10%	September 28 <sup>th</sup> 8pm
Midterm	30%	October 17 <sup>th</sup> in-class
Assignment 2	10%	November 11 <sup>th</sup> 8pm
Assignment 3	10%	November 25 <sup>th</sup> 8pm
Final exam	35%	Formally scheduled

**This grading distribution is non-negotiable.**

### News report presentations (LOs 5 a-b) –

Each student will be responsible for reading, summarizing and explaining **two brief news reports (2 x 2.5%)** in the field of food packaging and shelf life. Students are encouraged to sign up to the *Food Production Daily Newsletter* (<http://www.foodproductiondaily.com/>) or other credible online sources for inspiration. The presentation focus is on content. Presentation delivery will be informal and should last 5-6 minutes.

### Assignment 1: Summarizing packaging materials (LOs 1 a-d, 3 a-c) –

Students will work in groups of three to organize and summarize food packaging materials in a large table. For glass, metal, paper, and plastic packaging, describe each of the following criteria: chemical composition, physical properties, manufacturing process, environmental impact, permeability to moisture and gases. For each criteria, ensure to include pros and cons. Students will work on the assignment in class, and submit it in groups, in the following 48h.

### Midterm examination (LOs 1 a-e, 2 a-c, and 3 a-c) -

The midterm examination will consist of short and medium length essay questions. Be prepared to demonstrate your ability to meet learning outcomes 1, 2, and 3.

### Assignment 2: Interpreting food packaging primary literature (LO 5c) -

Students will work in groups of three to interpret food packaging primary literature selected by the instructor. To demonstrate accurate interpretation of the literature, students will read the selected literature and answer a series of specific questions. There will be one mock assignment in class, followed by a new scientific paper to interpret. Students will submit their work in the following 48h.

### Assignment 3: Designing food packaging studies (LO 5d) -

Students will work in groups of three to practice designing food packaging studies. To demonstrate ability to design a food packaging study, students will be given a scenario of an existing packaging material in need of improvement. Students will design a study to test an improved packaging against the standard packaging. There will be one mock assignment in class, followed by a new scenario. Students will submit their work in the following 48h.

### Final examination (LOs 4 a-e and 5 c-d) -

The final examination will consist of short and medium length essay questions. Be prepared to demonstrate your ability to meet learning outcomes 4 and 5.

## **MISSING EXAMS**

If you miss a midterm, you must notify the Professor within 24 hours after the date of the exam. A make-up exam will be permitted under two conditions only: illness or bereavement. Document is required to schedule an alternative time for the midterm. If no documentation is provided, you will receive a grade of zero for the midterm. If you miss the final exam, you must contact the Registrar's Office within the time period specified in the 2015-2016 Undergraduate Calendar. You will need to fully document your application.

## **PLAGIARISM AND CHEATING**

It is an instructional offense to use or pass off as one's own an idea or product which is the work of another without expressly giving credit to that other. It is also an instructional offense to copy the work of a fellow student. If students do plagiarize or cheat, the Dean's Office will be notified and appropriate action will be taken.

## **COURSE SHARING WEBSITES**

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

## **ACADEMIC ACCOMMODATIONS**

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

### **Pregnancy obligation**

Please contact your instructor 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: [carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf](http://carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf)

### **Religious obligation**

Please contact your instructor 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: [carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf](https://carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf)

### **Academic Accommodations for Students with Disabilities**

If you have a documented disability requiring academic accommodations in this course, please contact the Paul Menton Centre for Students with Disabilities (PMC) at 613-520-6608 or [pmc@carleton.ca](mailto:pmc@carleton.ca) for a formal evaluation or contact your PMC coordinator to send your instructor your Letter of Accommodation at the beginning of the term. You must also contact the PMC no later than two weeks before the first in-class scheduled test or exam requiring accommodation (if applicable). After requesting accommodation from PMC, meet with your instructor as soon as possible to ensure accommodation arrangements are made.

[carleton.ca/pmc](https://carleton.ca/pmc)

### **Survivors of Sexual Violence**

As a community, Carleton University is committed to maintaining a positive learning, working and living environment where sexual violence will not be tolerated, and its survivors are supported through academic accommodations as per Carleton's Sexual Violence Policy. For more information about the services available at the university and to obtain information about sexual violence and/or support, visit: [carleton.ca/sexual-violence-support](https://carleton.ca/sexual-violence-support)

### **Accommodation for Student Activities**

Carleton University recognizes the substantial benefits, both to the individual student and for the university, that result from a student participating in activities beyond the classroom experience. Reasonable accommodation must be provided to students who compete or perform at the national or international level. Please contact your instructor 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. <https://carleton.ca/senate/wp-content/uploads/Accommodation-for-Student-Activities-1.pdf>

For more information on academic accommodation, please contact the departmental administrator or visit: [students.carleton.ca/course-outline](https://students.carleton.ca/course-outline)