FOOD 4010 Food Processing 2

Credits: 3
Description: The processing of specific food groups is covered. The functions and changes in the primary chemical components of the commodities receive special consideration. New technologies including thermal/non-thermal and radiative processing, extrusion, minimal processing and other advanced processing methods will be studied.
Prerequisite: FOOD 3010 or equivalent

Instructor: Dr. Filiz Koksel (Room 205 Ellis Building), Telephone: 204-474 6486 (office)
Office Hours: Arrangement of mutually convenient time
(Send an e-mail to Filiz.Koksel@umanitoba.ca)

Teaching Assistant, Grader/Marker: Xinyang Sun (Room 242 Ellis Building)
Office Hours: Arrangement of mutually convenient time
(Send an e-mail to sunx34@myumanitoba.ca)

Classes: Tues, Thurs at 1 pm in Room 245 Ellis Building
Labs, Tours: Tues at 2.30 pm in Room 216 Ellis Build., Lab groups will be assigned in Week 2.

Textbook: None
Selected References:

Marking: (marks from the mid-term examination and at least one lab session will be available prior to the voluntary withdrawal date).
In class activities: 12.5% [participation (2.5%) + short presentation (5%), peer evaluations of short presentations (2.5%), quizzes (2.5%)] (the dates of short presentations will be arranged in week 2)
Mid-term examination: 25% (date will be announced in week 2)
Lab sessions, tours and their write-ups: 30%
Final examination: 32.5%
Important dates (from 2017-2018 Academic Schedule):
Sept. 7 to Dec. 8, 2017 – Fall Term
Oct. 5 to 6, 2017 – Fall Term Break
Nov. 17, 2017 - Fall Term classes, Voluntary Withdrawal (VW) deadline
Dec. 11 to 21, 2017 - Fall Term Exam Period

Objectives: By the end of the course, the student should:
1. Understand food chemistry principles in order to assess how the properties of various food components limit the shelf life of foods.
   - Describe the role that components within food with a higher energy state have on shelf life, and assess how processing tools can be employed to limit the dynamics of deterioration.
   - Summarize the effect of various physical processes employed in food processing on the chemistry of various food components, particularly high molecular weight components such as starch and proteins.

2. Identify the extent to which specific processing methods preserve foods by inactivation or destruction of microorganisms.
   - State the principles of food preservation by fermentation processes. Quantify the extent to which certain physical processes, e.g. electrical or thermal energy, affect the survival of pathogenic and spoilage organisms. Define the extent to which microorganism type and numbers affect processing strategies in specific agricultural commodities.

3. Analyze the mechanisms by which a range of physical processes are employed in various advanced food processing operations to optimize food quality and extend shelf life of foods.
   - Distinguish the source and variability of raw food material and how it affects various food processing operations.
   - Point out the principles that permit various advanced food technologies to make a food product safe for consumption.
   - Compare the role of transport processes and unit operations in food processing. Show how various unit operations are linked to produce a given food product.
   - Construct process flow diagrams from visits to food processing facilities, and critique the flow for critical control points related to product safety and quality.
   - Differentiate the principles and practices in advanced processing techniques and distinguish the effects of processing parameters on product quality.
   - Understand why specific practices of cleaning and sanitation are followed in food processing operations.

4. Apply basic physical and chemical principles to food science issues.
   - Solve real processing and food quality problems by applying food chemistry principles. Use statistical principles to solve food processing applications.
   - Apply food processing principles to control and assure the quality of food products.
   - Be aware of current topics of importance to the food industry and how consumer pressure and government regulations affect processing strategies.
5. Synthesize specific success skills to prepare for a career in the food industry.

- Demonstrate effective written communication skills. Organize critical thinking skills to solve issues arising from new situations, especially new processes.
- Explain why skills established on scientific principles will permit one to continually educate oneself.
- Improve upon information acquisition skills and organizational skills.

Policy on class communication:
The University requires all students to activate an official University email account. For full details of the Electronic Communication with Students please visit: http://umanitoba.ca/admin/governance/media/Electronic_Communication_with_Students_Policy_-_2014_06_05.pdf
Please note that all communication between me and you as a student must comply with the electronic communication with student policy (http://umanitoba.ca/admin/governance/governing_documents/community/electronic_communication_with_students_policy.html). You are required to obtain and use your U of M email account for all communication between yourself and the university.

Policy on Plagiarism and Cheating (from University calendar): Please ensure that you know what is meant by the term "Academic Integrity". The University’s Student Advocacy office has a set of tutorials on this subject and you are encouraged to work through them. They are available at: http://umanitoba.ca/student/resource/student_advocacy/AI-and-Student-Conduct-Tutorials.html.

Lab Reports and Assignments: Lab reports are due two weeks after a lab. Lab Periods not used for lab sessions are to be considered tutorial sessions that can be used to accomplish the assignments. Late reports and assignments will lose 10% of credit for submission after the due date, and 10% for each additional day late.

Recording Class Lectures: Dr. Koksel and the University of Manitoba hold copyright over the course materials, presentations and lectures which form part of this course. No audio or video recording of lectures or presentations is allowed in any format, openly or surreptitiously, in whole or in part without permission of Dr. Koksel’s.
Class Topics:
A. Introduction

B. Heat Transfer Processes
   1. General Concepts/Definitions
   2. Aseptic Processing
   3. Direct Steam Infusion
   4. Ohmic Heating
   5. Radiative Heat Processes
      a. Micronization
      b. Radio frequencies
      c. Microwave
   6. Low-Temperature Processes
      a. Pulsed light
      b. Pulsed electric field

C. Water Management (Guest Lecturer: Senior Scholar Dr. Arnold Hydamaka)

D. Mass Transfer Processes
   1. General Concepts/Definitions
   2. Liquid Extraction Technologies
      a. Blanchers/diffusers
      b. Solvent extraction
   3. Supercritical Fluid Extraction
   4. Solids Separation Technologies
      a. Sifters and sieving
      b. Air classification
   5. Concentration Processes
      a. Filtration
      b. Reverse osmosis
      c. Freeze concentration
      d. Osmotic dehydration

E. Biological Processes
   1. Modified Atmosphere Storage
   2. Fermentation

F. Momentum Transfer Processes
   1. General Concepts/Definitions
   2. Mixing
   3. High Pressure Processing

G. Food Preservation by use of:
   1. Salt
   2. Smoke
   3. Sugar
   4. Other Chemical Additives
**Student Accessibility:** If you are a student with a disability, please contact SAS for academic accommodation supports and services such as note-taking, interpreting, assistive technology and exam accommodations. Students who have, or think they may have, a disability (e.g. mental illness, learning, medical, hearing, injury-related, visual) are invited to contact SAS to arrange a confidential consultation.

Student Accessibility Services http://umanitoba.ca/student/saa/accessibility/
520 University Centre
204 474 7423
Student_accessibility@umanitoba.ca

**Other Student Services:**

**Writing and Learning Support:**
The Academic Learning Centre (ALC) offers services that may be helpful to you throughout your academic program. Through the ALC, you can meet with a learning specialist to discuss concerns such as time management, learning strategies, and test-taking strategies. The ALC also offers peer supported study groups called Supplemental Instruction (SI) for certain courses that students have typically found difficult. In these study groups, students have opportunities to ask questions, compare notes, discuss content, solve practice problems, and develop new study strategies in a group-learning format.

You can also meet one-to-one with a writing tutor who can give you feedback at any stage of the writing process, whether you are just beginning to work on a written assignment or already have a draft. If you are interested in meeting with a writing tutor, reserve your appointment two to three days in advance of the time you would like to meet. Also, plan to meet with a writing tutor a few days before your paper is due so that you have time to work with the tutor’s feedback. These Academic Learning Centre services are free for U of M students. For more information, please visit the Academic Learning Centre website at:
http://umanitoba.ca/student/academiclearning/
You can also contact the Academic Learning Centre by calling 204-480-1481 or by visiting 201 Tier Building.

**University of Manitoba Libraries (UML):**
As the primary contact for all research needs, your liaison librarian can play a vital role when completing academic papers and assignments. Liaisons can answer questions about managing citations, or locating appropriate resources, and will address any other concerns you may have, regarding the research process. Liaisons can be contacted by email or phone, and are also available to meet with you in-person. A complete list of liaison librarians can be found by subject or by name: http://bit.ly/1tJ0bB4. In addition, general library assistance is provided in person at 19 University Libraries, located on both the Fort Garry and Bannatyne campuses, as well as in many Winnipeg hospitals. For a listing of all libraries, please consult the following: http://bit.ly/1sXe6RA. When working remotely, students can also receive help online, via the Ask-a-Librarian chat found on the Libraries’ homepage:www.umanitoba.ca/libraries.

**Student Counselling Centre (SCC):**
Contact SCC if you are concerned about any aspect of your mental health, including anxiety, stress, or depression, or for help with relationships or other life concerns. SCC offers crisis services as well as individual, couple, and group counselling. Student Counselling Centre:
http://umanitoba.ca/student/counselling/index.html
474 University Centre or S207 Medical Services, (204) 474-8592
**Student Support Case Management:**
Contact the Student Support Case Management team if you are concerned about yourself or another student and don’t know where to turn. SSCM helps connect students with on and off campus resources, provides safety planning, and offers other supports, including consultation, educational workshops, and referral to the STATIS threat assessment team.

520 University Centre, (204) 474-7423
For 24/7 mental health support, contact the Mobile Crisis Service at 204-940-1781.

**University Health Service:**
Contact UHS for any medical concerns, including mental health problems. UHS offers a full range of medical services to students, including psychiatric consultation.
University Health Service [http://umanitoba.ca/student/health/](http://umanitoba.ca/student/health/)
104 University Centre, Fort Garry Campus
(204) 474-8411 (Business hours or after hours/urgent calls)

**Health and Wellness:**
Contact our Health and Wellness Educator if you are interested in information on a broad range of health topics, including physical and mental health concerns, alcohol and substance use harms, and sexual assault.
Health and Wellness Educator [http://umanitoba.ca/student/health-wellness/welcome.html](http://umanitoba.ca/student/health-wellness/welcome.html)
Katie.Kutryk@umanitoba.ca
469 University Centre, (204) 295-9032

**Live Well @ UofM:**
For comprehensive information about the full range of health and wellness resources available on campus, visit the Live Well @ UofM site:

**Your Rights and Responsibilities:**
As a student of the University of Manitoba you have rights and responsibilities. It is important for you to know what you can expect from the University as a student and to understand what the University expects from you. Become familiar with the policies and procedures of the University and the regulations that are specific to your faculty, college or school. The Academic Calendar [http://umanitoba.ca/student/records/academiccalendar.html](http://umanitoba.ca/student/records/academiccalendar.html) is one important source of information. View the sections University Policies and Procedures and General Academic Regulations.

While all of the information contained in these two sections is important, the following information is highlighted.

- If you have questions about your grades, talk to your instructor. There is a process for term work and final grade appeals. Note that you have the right to access your final examination scripts. See the Registrar’s Office website for more information including appeal deadline dates and the appeal form [http://umanitoba.ca/registrar/](http://umanitoba.ca/registrar/)
- You are expected to view the General Academic Regulation section within the Academic Calendar and specifically read the Academic Integrity regulation. Consult the course syllabus or ask your instructor for additional information about demonstrating academic integrity in your academic work. Visit the Academic Integrity Site for tools and support [http://umanitoba.ca/academicintegrity/](http://umanitoba.ca/academicintegrity/) View the Student Academic Misconduct procedure for more information.
The University is committed to a respectful work and learning environment. You have the right to be treated with respect and you are expected conduct yourself in an appropriate respectful manner. Policies governing behavior include:

- **Respectful Work and Learning Environment**
- **Student Discipline**
  [http://umanitoba.ca/admin/governance/governing_documents/students/student_discipline.html](http://umanitoba.ca/admin/governance/governing_documents/students/student_discipline.html)
- **Violent or Threatening Behavior**
  [http://umanitoba.ca/admin/governance/governing_documents/community/669.htm](http://umanitoba.ca/admin/governance/governing_documents/community/669.htm)
- If you experience Sexual Assault or know a member of the University community who has, it is important to know there is a policy that provides information about the supports available to those who disclose and outlines a process for reporting. The Sexual Assault policy may be found at:
  More information and resources can be found by reviewing the Sexual Assault site
- For information about rights and responsibilities regarding Intellectual Property view the policy
  [http://umanitoba.ca/admin/governance/media/Intellectual_Property_Policy_-_2013_10_01.pdf](http://umanitoba.ca/admin/governance/media/Intellectual_Property_Policy_-_2013_10_01.pdf)
- For information on regulations that are specific to your academic program, read the section in the Academic Calendar and on the respective faculty/college/school web site
  [http://umanitoba.ca/faculties/](http://umanitoba.ca/faculties/)
- Contact an Academic Advisor within our faculty/college or school for questions about your academic program and regulations
  [http://umanitoba.ca/academic-advisors/](http://umanitoba.ca/academic-advisors/)

**Student Advocacy:**
Contact Student Advocacy if you want to know more about your rights and responsibilities as a student, have questions about policies and procedures, and/or want support in dealing with academic or discipline concerns.
520 University Centre, 204 474 7423
student_advocacy@umanitoba.ca