Syllabus

FOOD 3210: FOOD ENGINEERING FUNDAMENTALS

(Winter 2022)

Faculty of Agricultural & Food Sciences

University of Manitoba

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COURSE DETAILS

Course Title & Number:	FOOD ENGINEERING FUNDAMENTALS, FOOD 3210
Number of Credit Hours:	3 CH
Class Times & Days of Week:	Lectures → 1:00 pm - 2:15 pm Tuesdays and Thursdays Labs → 2:30-5:25 Thursdays
Location for classes:	Virtual classes (UM Learn – Cisco Webex) All classes will be recorded and be available to students for review
Location for labs:	Computer lab: Remote All other labs: Food Science Pilot Plant (Ellis Building)
Pre-Requisites:	BIOE 3530

Instructor Contact Information

Instructor Name & Preferred Form of Address:	Filiz Koksel I will respond to any civil form of address such as Filiz, Dr. Filiz, Dr. Koksel, etc.
Office Location:	Due to the pandemic: Virtual via UM Learn Cisco Webex
Office Hours or Availability:	To schedule an appointment, contact me via email at least 2 work days in advance.
Email:	Filiz.Koksel@umanitoba.ca (preferred method of communication) *Note*: All emails should contain FOOD 3210 at the subject line and must conform to the Communicating with Students university policy. Please introduce yourself in your emails, and avoid using emoticons. I will respond to emails within 2 work days.
Contact:	Email is the preferred method of communication.

Teaching Assistant (TA) & Grader/Marker (GM) Contact Information

TA/GM Name:	Siwen Luo
Office Location:	Due to the pandemic: Virtual via UM Learn Cisco Webex
Office Hours or Availability:	To schedule an appointment, contact via email at least 1 work day in advance.
Email:	*luos345@myumanitoba.ca* *Note*: All email communication must conform to the Communicating with Students university policy. Expect return emails within 2 work days.

ATTENTION: Students residing outside Winnipeg

As this is a remote learning course, all instructional activities and deadlines will be Winnipeg time (Central Time). Please make sure your calendars are adjusted to reflect any time changes. Please inform Dr. Koksel as soon as possible if you are taking the course while residing outside of Winnipeg, specifically:

- If you are in a rural Canadian area affected by poor internet connections that may impact completing assessments and exams on time.
- If you are in another time zone within or outside Canada, specify where you are, and if you foresee any challenges with attending classes and completing assessments and exams on time.

NOTE: It is your responsibility to communicate with Dr. Koksel well in advance of tests/exams/lab report due dates, of any ongoing issues, OR immediately once an issue arises that may impact your ability to complete course work.

Lab sessions of this course are not taught remotely. See information under Course Details on Page 3.

Course Description

U of M Course Calendar Description

Applications of engineering fundamentals to unit operations in the food industry.

General Course Description

This course is designed to teach students the fundamentals required for food engineering. Students will acquire knowledge of food engineering principles in food processing, such as flow characteristics of fluids, heat and mass transfer (and their combination), refrigeration, and an introduction to the interaction of electromagnetic radiation with food materials, in order to apply these fundamentals to various unit operations in the food industry.

Course Goals

By the end of the course, the student should be able to:

1. Identify the mechanisms by which various unit operations in food processing optimize food quality and extend the shelf life of foods.
2. Apply physical principles to understand why food components are processed in specific ways.
3. Justify the application of basic mathematical principles to food processing issues.
4. Acquire specific success skills to prepare for a career in the food industry.

Course Learning Objectives

By the end of the course, the student should be able to:

- Explain the principles that permit various food technologies to make a food product safe for consumption
- Understand principles of heat and mass transfer phenomena
- Explain basic fluid dynamics characteristics of liquid foods
- Recall the unit operations used to produce a range of food products
- Describe the theories of refrigeration and freezing
- Restate the principles and practices of processing techniques and the effects of processing parameters on product yield, quality and safety

- Understand how various physical processes employed in food processing affect the quality and safety of food
- Understand the source and variability of raw food material and their impact on food processing operations
- Manipulate mass and energy balances for a given food processing operation
- Analyze transport processes and unit operations in food processing as demonstrated both conceptually and in practical laboratory settings
- Understand the unit operations required to produce a given food product
- Categorize the principles and current practices of processing techniques and the effects of processing parameters on product quality
- Employ computers to solve food engineering and food process problems
- Critique practical, real-world food process situations and problems using food engineering concepts
- Plan food processing strategies to control and assure the quality of food products
- Generate process flows to attain specific process strategies
- Predict the effect of specific heat and mass transfer operations on product quality and safety
- Demonstrate effective written communication skills
- Apply critical thinking skills to new situations, especially processing problems.

Textbook, Readings, and Course Materials

There is no required textbook for the course, but much of the course material is taken from: "Introduction to Food Engineering" (Singh & Heldman). Any edition of this book works (you do not need the latest edition). Full-text version of the textbook is available online through University of Manitoba Libraries.

Required course material will be given as web-pages, hand-outs or class notes.

Required materials: Scientific calculator for lectures, lab sessions and exams.

Using Copyrighted Material

Please respect copyright. We will use copyrighted content in this course. I have ensured that the content I use is appropriately acknowledged and is copied in accordance with copyright laws and university guidelines. Copyrighted works, including those created by me, are made available for private study and research and must not be distributed in any format without permission. Do not upload copyrighted works to a learning management system (such as UM Learn), or any website, uncles an exception to the *Copyright Act* applies or written permission has been confirmed. For more information, see the University's Copyright Office website at http://umanitoba.ca/copyright/ or contact um_copyright@umanitoba.ca.

Course Technology

Required course material will be given as web-pages or class notes through UM Learn. Tablets, cellphones and laptops can be used during the lectures and labs to take notes, in a responsible, efficient, ethical and legal manner.

Students are expected to turn their cameras on at the beginning of each class and keep them on throughout the class, as this facilitates better interaction. If you have any specific reason(s) why you are unable to turn on your camera, you should contact Dr. Koksel during the first week of the classes. You can also get in touch with Student Accessibility Services.

Class participation will be recorded via iClicker through UM Learn. Students are required to install iClicker Student - formerly known as iClicker Reef - on their phone.

Expectations: I Expect You To

- Make yourself familiar with and follow Respectful Work and Learning Environment Policy.
- Attend the classes and lab sessions regularly and punctually.
- Attend the discussions actively and answer questions I may ask (to the best of your ability). Active class participation is worth 10% of your overall grade.
- Use your laptop/phone/tablet in the class for course-related purposes only, and not interrupt the others.
- Not leave the class before it ends.
- Follow the policies around Class Communication, Academic Integrity, and Recording Class Lectures as described below.

Class Communication:
You are required to obtain and use your University of Manitoba email account for all communication between yourself and the university. All communication must comply with the Electronic Communication with Student Policy:
http://umanitoba.ca/admin/governance/governing_documents/community/electronic_communication_with_students_policy.html.

Academic Integrity:
Each student in this course is expected to abide by the University of Manitoba Academic Integrity principles. Always remember to reference the work of others that you have used. Also be advised that you are required to complete your assignments independently unless otherwise specified. If you are encouraged to work in a team, ensure that your project complies with the academic integrity regulations. You must do your own work during exams. Inappropriate collaborative behavior and violation of other Academic Integrity principles, will lead to the serious disciplinary action. Visit the Academic Calendar, Student Advocacy, and Academic Integrity web pages for more information and support. Lab group members must ensure that a group project (during each lab session) adheres to the principles of academic integrity.

Recording Class Lectures:
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. Filiz Koksel. Course materials (both paper and digital) are for the participant's private study and research.

Student Accessibility Services:
The University of Manitoba is committed to providing an accessible academic community. Students Accessibility Services (SAS) offers 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, 520 University Centre
Phone: (204) 474-7423, Email: Student_accessibility@umanitoba.ca

Expectations: You Can Expect Me To

I will be in class for 10 minutes prior to and after the class time to discuss any questions or comments you may have.

CLASS SCHEDULE AND COURSE EVALUATION

This schedule is subject to change at the discretion of the instructor and/or based on the learning needs of the students but such changes are subject to Section 2.8 of ROASS.

Date	Class Content & Teaching Strategies	Required Readings or any Pre-class Preparation	Evaluation		
			Type of Assessment	Due Date	Value of Final Grade
25-Jan	Units &Dimensions	Course syllabus	iClicker	Instantaneous (I)	0.45%
27-Jan	Mass & Energy Balances	-	iClicker	I	0.45%
01-Feb	Mass & Energy Balances	Example question	iClicker	I	0.45%
03-Feb	Fluid mechanics	Video	iClicker	I	0.45%
08-Feb	Fluid mechanics	-	iClicker	I	0.45%
10-Feb	Mechanical energy balances	-	iClicker	I	0.45%
15 Feb	Mechanical energy balances	Example question	iClicker	I	0.45%
17 Feb	Steady state heat tr.	-	iClicker	I	0.45%
22-Feb	Reading week	-	-	-	-
24-Feb	Reading week	-	-	-	-
1 Mar	No class (problem set will be provided)	-	-	-	-
3-Mar	Steady state heat tr. + Quiz	Example question	Problem solving	10-Mar	**2.5%** + 0.5%
8-Mar	Unsteady state heat tr.	-	iClicker	I	0.45%
10-Mar	Unsteady state heat tr.	Example question	iClicker	I	0.45%
15-Mar	Midterm	-	Problem solving	29-Mar	**25%**
17-Mar	Mass tr.	-	iClicker	I	0.45%
22-Mar	Mass tr.	Example question	iClicker	I	0.45%
24-Mar	Mass tr.	Example question	iClicker	I	0.45%
29-Mar	Refrigeration	-	iClicker	I	0.45%
31-Mar	Refrigeration	Example question	iClicker	I	0.45%
05-Apr	Freezing	-	iClicker	I	0.45%
07-Apr	Freezing + Quiz	Example question	Problem solving	14-Apr	**2.5%** + 0.5%
12-Apr	Psychrometry	Required reading	iClicker	I	0.45%
14-Apr	Psychrometry	-	iClicker	I	0.45%
19-Apr	Psychrometry	-	iClicker	I	0.45%
21-Apr	Interaction of waves with foods	Required reading	iClicker	I	0.45%
TBA	Final exam	-	Problem solving	TBA	**30%**
				Labs:	**30%**
				TOTAL:	**100%**

Lab Expectations

- Any communication related to the lab sections of the course should be directed to your teaching assistant (TA) and grader/marker (GM). If you need further clarifications on the labs or your reports, you can reach Dr. Koksel via email.
- You are expected to arrive to the lab on time. For every minute you are late, you will lose 1% of your total lab report mark.
- Lab attendance is mandatory. The lab manuals and videos will be available prior to the lab session date on UM Learn.
- 100% of the mark allocated to a lab will be deducted if absent without a doctor's note or documentation of a substantiated and compelling personal matter in writing. Students are not allowed to handover lab reports without attending the lab sessions.
- Students will work in groups as assigned for labs, and each group will be provided different data sets for their reports. Each student will submit their own report. Any evidence of plagiarism in lab reports (e.g., whether from another lab partner, or group, or lab report from previous courses or years) will result in "0" mark, and the matter will be subject to disciplinary action in accordance with university policy on academic misconduct.
- Lab reports are due 2 weeks after a lab. Late write-ups will lose 10% of credit for submission after the due date, and 10% for each additional day late. Please see the lab report rubrics on UM Learn.

Lab Schedule

Lab session topics include: computer lab, mass and energy balance, viscosity, pumps, thermal properties determination, rate of heat transfer, heat exchanger, psychrometry. Each student will perform five labs out of the 8 topics listed above. Every student will perform the computer lab.

Grading

Letter Grade	Percentage out of 100	Grade Point Range	Final Grade Point
A+	95-100	4.25-4.5	4.5
A	86-94	3.75-4.24	4.0
B+	80-85	3.25-3.74	3.5
B	72-29	2.75-3.24	3.0
C+	65-71	2.25-2.74	2.5
C	60-64	2.0-2.24	2.0
D	50-59	Less than 2.0	1.0
F	Less than 50		0

Voluntary Withdrawal

Feb 4, 2022: Last day to drop Winter Term courses without penalty.

Apr 25, 2022: Voluntary Withdrawal deadline. Students who do not drop the course by the deadline would be assigned a final grade. The withdrawal courses will be recorded on official transcript. Refer to the Registrar's Office web page for more information.

LAB REPORT DESCRIPTIONS

Lab report instructions and evaluation criteria (rubric) will be provided (Section 2.5 ROASS) through UM Learn. All lab reports must be uploaded onto UM Learn in .pdf format (unless otherwise stated). Lecture notes and lab handouts are not acceptable sources to be cited in your lab reports.

Referencing Style

Lab reports should use the reference style of "Journal of Food Engineering" as outlined in: https://www.elsevier.com/journals/journal-of-food-engineering/0260-8774/guide-for-authors

Lab Report Feedback

Lab report feedback will be provided in the formative (i.e., comments) and summative (i.e., grade) form via UM Learn. You can expect to receive your graded lab reports within 2 weeks after you hand them in. You can also expect the midterm exam and quiz grades 2 weeks and 1 week after you write them, respectively.

Lab Report Extension and Late Submission Policy

Lab reports must be received through UM Learn before midnight on its the due date. For every late day, you will lose 10% of the total mark for that lab report. You must attend all the lab sessions to pass the course (unless you have a doctor's note or documentation of a substantiated and compelling personal matter in writing). All lab reports need to be submitted to pass the course.

UNIVERSITY SUPPORT OFFICES & POLICIES

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 205 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: http://bit.ly/WcEbA1 or 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.

For 24/7 mental health support, contact the Mobile Crisis Service at 204-940-1781.

Student Counselling Centre
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.
Student Support Intake Assistant http://umanitoba.ca/student/case-manager/index.html
520 University Centre
(204) 474-7423

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/
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
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:

http://umanitoba.ca/student/livewell/index.html

All students are required to respect copyright as per Canada's *Copyright Act*. Staff and students play a key role in the University's copyright compliance as we balance user rights for educational purposes with the rights of content creators from around the world. The Copyright Office provides copyright resources and support for all members of the University of Manitoba community. Visit http://umanitoba.ca/copyright for more information.

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 is one important source of information. View the sections *University Policies and Procedures* and *General Academic Regulations*.

- 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/

- 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/ 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 the:

Respectful Work and Learning Environment

http://umanitoba.ca/admin/governance/governing_documents/community/230.html

Student Discipline
http://umanitoba.ca/admin/governance/governing_documents/students/student_discipline.html and,

Violent or Threatening Behaviour
http://umanitoba.ca/admin/governance/governing_documents/community/669.html

- 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:

http://umanitoba.ca/admin/governance/governing_documents/community/230.html More information and resources can be found by reviewing the Sexual Assault site http://umanitoba.ca/student/sexual-assault/

- 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

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/

Contact an **Academic Advisor** within our faculty/college or school for questions about your academic program and regulations 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.
http://umanitoba.ca/student/advocacy/
520 University Centre
204 474 7423
student_advocacy@umanitoba.ca

Learning Environment at the University of Manitoba during COVID-19 pandemic

The University of Manitoba (the "UM") is committed to maintaining a safe learning environment for all students, faculty, and staff. Should campus operations change because of health concerns related to the COVID-19 pandemic or other campus-wide emergency, it is possible that this course will move to a fully remote delivery format. Should the instructor be required to stay at home for an extended period and an alternate instructor not be available, the course may move temporarily to a remote delivery format. In that instance, you may be provided with an asynchronous option to minimize the impact the change may have on your schedule.

PPE and Mask Wearing
In a face-to-face environment, our commitment to safety requires students to observe all physical distancing (2m) and personal protective equipment (PPE) guidelines set by the University (https://umanitoba.ca/coronavirus)

While on campus and in class, you must wear PPE (Personal Protective Equipment) as stipulated in current University policies, procedures, and guidelines. Students who fail to comply are subject to disciplinary action in accordance with the Student Discipline Bylaw and the Non-Academic Misconduct and Concerning Behaviour Procedure.

Medical-grade 3-ply masks are available at many locations on campus, including specific classroom locations, designated by your unit, the Elizabeth Dafoe Library (Fort Garry Campus) and the Brodie Centre main doors (Bannatyne Campus). Additional PPE, if necessary for a specific learning environment, will be provided to you by the teaching unit.

If you do not follow masking and other requirements you will be asked to leave the learning space and may only return to the class already in progress when you have complied with these requirements. Repeated issues will result in disciplinary action as previously noted.

Students should not eat or drink during class time.

Illness

Remember: **STAY HOME IF YOU HAVE SYMPTOMS OR ARE ILL.** If you become sick or are required to self-isolate you should notify your instructor by email so you can develop a plan to complete the course learning outcomes while you are absent.

If you have symptoms, do not come to campus or any UM facilities. Complete the self-assessment on the Manitoba Public Health site and follow the guidelines, which may include booking a COVID-19 test.

What to do if you become ill while at UM:

1. Leave the classroom, lab or workspace immediately. Continue to wear your mask while leaving the premises and/or while waiting for transportation.

2. Perform hand hygiene (soap and water or hand sanitizer) and avoid contact with others, and minimize contact with the physical environment.

3. Once at home, complete the MB self-assessment and follow the directions that are provided.

4. Inform your supervisor(s), instructor(s) or, if in residence, the appropriate individual.

5. You must remain off campus and all UM facilities until cleared to return in accordance with self-assessment, testing results, or MB Health requirements.

Recommended transportation options (in order):

1. Drive yourself home.

2. Pick-up by family or friend – remember to keep your mask on and to distance as much as possible, and where possible, open a window to improve ventilation.

3. Pickup by taxi/Uber:

- Remain masked and perform hand hygiene before entering the vehicle.
  - Avoid touching the inside of the vehicle
  - Keep your mask on for the duration of the ride
  - Where possible, open a window to improve ventilation.

4. Winnipeg Transit buses - Winnipeg Transit has indicated that individuals that are ill **must not use Transit.**