

FOOD 3006: Upcycling and Sustainable Food Systems

Department of Chemistry

--- COURSE OUTLINE ---

Course Description: This course explores food system challenges and upcycling as a sustainable solution, addressing food safety, security, and regulations. Topics include production, distribution, consumption, and waste management, with case studies examining social, economic, and environmental issues through lectures and student presentations.

Course Instructor: Aynur Gunenc

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Student Hours:

Virtual: Request by email

Monday: 6:30pm to 7:30 pm

Office Location: Virtual – office hours by email/appointment

Class Location: Loeb B243

Class Times: Mondays, 2:35am – 5:25pm

Prerequisites: See the undergraduate calendar for prerequisite requirements

Department/Unit: Chemistry

Course TAs: Teaching Assistant: TBA

Topics Covered and Learning Outcomes

Equity, Diversity, and Inclusion (EDI) Philosophy

The teaching materials are geared toward Equity, Diversity, and Inclusion (EDI), exploring the principles of Sustainable Development Goals (SDG) to address challenges and concerns within food systems. It emphasizes upcycling as an environmentally sustainable solution, considering aspects of food safety, security, and regulations. The instruction is delivered in a manner that provides equal opportunities to diverse group of students, gain deep knowledge and essential information on Agri-food SDG, with a specific focus on Canada's targets. This approach is designed to support and explore students' higher education journeys. A comprehensive understanding of SDG to improve Canadian food system is used as a strategy helping students for their future careers in academia, government labs, and industry, serving them as end-users.

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; fulfilling their academic mission with excellent societal outcomes. Promoting inclusion remains a priority by encouraging students to contribute and engage with various groups of students' activities on workshops (case studies) and presentations, reducing barriers and limitations and thereby enhancing accessibility to learning. Small group workshops (case studies) and presentations provide a highly motivated class with self-driven students, dedicated to working closely on their projects (problem solving cases) individually and in collaboration environments. 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.

Topics to be Covered:

1. Introduction of upcycled food concepts, and current situations in Canada and in the world (Los 1 to 4)
2. Establish couple of good existing examples and go over each step how they upcycled and produces a new product. This will be foundation to explain each step from diversity perspectives; food science, business, regulation, consumers. (Los 1 to 8)
3. What challenges are limiting factors for most potential food establishment to invest in the sustainable way of production? (Los 3 to 8)
4. What resources are there for the industry to promote them to rescue foods? What type of fundings are available at different government agencies or globally active investors or organizations? (Los 8 to 10)
5. Networking events for students by inviting the experts in the field. (Lo 11)
6. Food safety and regulations specific for upcycled foods and any ongoing applications exist in the field to certify those upcycled food productions. (Los 3, 4, 5, 9)
7. Business aspects of entrepreneurship training for new ideas and business models?
8. Case study/Problem solving (Los 4 to 11)

Learning Outcomes: By the end of the course, the student should:

LO1. Understand and discuss what makes a sustainable food system.

“The Natural Step” sustainability model: which of the system conditions apply to food production? How?

LO2. Describe sources of unsustainability in food production and explain sustainable solutions.

Agriculture, livestock, processing, packaging, transportation, consumer waste.

LO3. Discuss the history of food production and sustainability.

Small farms → Industrial farms and the effect on sustainability

New sustainable methods in food processing that have emerged

LO4. Describe the effects of climate change on the food system.

Unsustainable practices → Climate change → Food crisis → negative impact on Food system

LO5. Discuss how diversity in the food system can contribute to a sustainable food system.

Monoculture is unsustainable

LO6. Discuss how nutrition crisis can be addressed in a sustainable system.

Does a sustainable system have to mean less production? Will a sustainable system make nutritive food available to those who need it?

LO7. Describe how waste product of the food production industry can be repurposed to create benefit.

Added value products

LO8. Discuss future trends in sustainable food systems and the future of food, consider feasibility of novel ideas.

The feasibility of novel ideas **MUST** be considered!

LO9. Understand and discuss food safety and regulations regarding food sustainability and food upcycling.

Food safety and adherence to regulation is a priority for a safe food system.

LO10. Synthesize and communicate food sustainability topics to scientific and non-scientific audiences.

Case studies

LO11. Synthesize and communicate information from guest lecturers.

Final project ‘propose a food rescue product...while incorporating ideas from guest lectures’

Course Evaluation details:

(All components must be completed in order to get a passing grade)

1. Attendance: 0.0

2. *Presentation 1 (20%) – Sustainable Development Strategy elements.

3. *Presentation 2 (20%) – Case studies to explore the role of R&D, innovative techniques and applications of artificial intelligence (AI) for food industry system sustainability.

Food sustainability defence through food safety, showing impacts of upcycling on communities and the food industry.

*** Presentation 1 and 2 are group presentations but “grades are given individually”**

4. Final Examination (40%) – Take Home Exam

5. Participation & Contribution (20%) - Ongoing

Active participation and contribution (20%) are mandatory and include engaging in class discussions, problem-solving activities, responding to and asking questions, brainstorming, sharing and exchanging ideas and perspectives, and contributing constructively to group activities. This is an essential component of learning in this course for a positive and inclusive learning environment.

Details on Presentations:

Presentation 1 (20%) – Students in a group (2 to 3): Presentation 1 will focus on the Federal Sustainable Development Strategy (FSDS), which aligns with Canada's commitment to promote the United Nations' 17 Sustainable Development Goals for 2030. The discussion will delve into Agriculture and Agri-Food Canada's strategy in contributing to these 17 goals, emphasizing the pursuit of a healthier and more sustainable food system, ensuring access to clean and safe water, advancing reconciliation with Indigenous Peoples, taking action to reduce inequality, minimizing waste, transitioning to zero-emission practices, and addressing the impacts of climate change.

Presentation 2 (20%) – Case study/Problem solving. Students in a group (2 to 3) will deliver a presentation focusing on selected case studies or problems and how upcycling can help to food sustainability. Students act as Research and Development (R&D) team and explore the role of R&D for food industry system sustainability. Students will focus how advanced, innovative techniques and applications of artificial intelligence (AI) can enhance food safety across various stages, including food production, post-harvest losses. Additionally, it can explore the application of AI in the fields of food and biochemistry, food and health sciences, and food and engineering. The knowledge transfer/KT will involve in the discussing aiming to the improvement of future sustainable food systems within the framework of Canadian Agriculture, Food, environment, social, and economic aspects.

****** In both presentations, you need to understand the topic very well to transfer the knowledge to others. You act as an educator!!

Final Examination (40%) – Take Home Exam – Case study/Problem solving. 3 to 6 challenging questions relevant to topics in the course. The exam may include guest lecturer and student presentations.

Some resources:

1. <https://agriculture.canada.ca/en/department/initiatives/federal-sustainable-development-strategy/2023-2027-departmental-sustainable-development-strategy>
2. <https://www.fao.org/3/cb8667en/cb8667en.pdf>
3. Outcast Foods at <https://outcastfoods.com/>
4. Upcycled Food Association at <https://www.upcycledfood.org/>
5. Overview of Food Rescue project results at <https://edepot.wur.nl/559890>
6. <https://elearning.fao.org/course/view.php?id=736>

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

<http://www.carleton.ca/cuuc/regulations/acadregsuniv14.html>

In-Class Workshop for Citations & References: Monday (Sep 28 OR Oct 5), we will have a short in-class workshop on how to add citations, references, and use proper reference formatting. The training is for learning Zotero software (free for CU students and efficient) and making a library. Additionally, American Chemical Society (ACS) will be used for references formatting for the (assignments). This skill is essential for including accurate references in your assignments and will also be very useful for your other courses.

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 can use generative AI tools (such as ChatGPT, Microsoft Copilot, Google Gemini, etc.) only as collaborative partners to support learning, problem-solving, and skill-building. These tools can be used to help you think critically, refine your own ideas, and better understand the course material, but should not initiate or generate ideas for you, replace your own intellectual work, or be used to copy and paste AI-generated content into assignments.

- **Research:** Summarizing or finding sources (e.g., “Find articles on caffeine and performance.”) using Zotero.
- **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 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](#)

