

**NFS386H1F: Food Chemistry****Course Syllabus**

- 1) **Lectures:** Tuesdays 9:00 am - 12:00 pm EST
  
- 2) **Course Description:** This course deals with the chemical composition of food; physical, chemical, and biochemical reactions, and the impact of these reactions on food quality during postharvest/post-mortem processing, storage, and utilization.
  
- 3) **Prerequisite:** CHM138H/CHM139H/CHM135H/CHM136H or equivalent 1<sup>st</sup> year university chemistry course  
Recommended preparation: NFS284H

**4) Learning objectives:**

By the end of this course, you will be able to:

- a) describe the relationship between the chemical composition of food and food quality.
- b) explain why certain ingredients are used in foods.
- c) explain the rationale for certain food processes.

**5) Instructor contact information:**

**Course Instructor:** Matilda Essandoh Laar

**Email:** [matilda.laar@utoronto.ca](mailto:matilda.laar@utoronto.ca)

**Office:** Medical Sciences Building, Room 5267 (1 King's College Circle).

**Office Hours:** Thursdays 2:00 - 3:30 pm (Sep 3 to Dec 3, 2024), no appointment necessary.

If you cannot make office hours, please book a virtual appointment:

<https://calendly.com/matilda-laar/nfs386-virtual-office-hours>

**6) Course Delivery, Website, Notifications, Expectations:**

**Course Delivery:** This is an in-person course. The materials are a combination of lecture slides and readings listed under sections 7 & 8 of the syllabus (materials are available online from the library).

**Course website:** The course website is available on Quercus.

**Notifications:** Announcements are posted on the course website and it is the student's responsibility to read these regularly and to regularly check the course website for new content. It is strongly recommended that students leave their Quercus notifications on, to be automatically advised of Quercus announcements, posting of new course content, upcoming due dates, the releasing of grades, and other important course information.

**Course Expectations:** It is expected that students will attend lectures and actively participate in class activities and discussions.

## 7) Textbooks:

There is no required textbook for this course. However, recommended readings (available online from the library), from the texts below have been provided under section 8. You may also find these basic texts useful for your assignment:

Belitz HD, Grosch W, Schieberle P. 2008. Food Chemistry. Springer-Verlag.  
<https://link-springer-com.myaccess.library.utoronto.ca/book/10.1007/978-3-540-69934-7>

Clark, S ; Jung, S ; Lamsal, B. 2014. Food processing: principles and applications. Wiley Blackwell.  
<http://books.scholarsportal.info.myaccess.library.utoronto.ca/viewdoc.html?id=/ebooks/ebooks3/wiley/2014-07-31/1/9781118846315>

Coulter, T. P. (2023). Food - The Chemistry of its Components (7th Edition). Royal Society of Chemistry.  
<https://doi-org.myaccess.library.utoronto.ca/10.1039/9781837670369>

Simpson B. K. (2012). Food biochemistry and food processing 2<sup>nd</sup> ed. Blackwell Publishing Professional.  
<https://books-scholarsportal-info.myaccess.library.utoronto.ca/en/read?id=/ebooks/ebooks2/wiley/2012-11-20/1/9781118308035#page=5>

Nielsen, S. S. 2010. Food analysis. Springer.  
<http://books.scholarsportal.info.myaccess.library.utoronto.ca/viewdoc.html?id=/ebooks/ebooks2/springer/2011-04-28/5/9781441914781>

Ramaswamy, H. S. and Marcotte, M. 2006. Food processing: principles and applications. CRC Press.

<http://books.scholarsportal.info.myaccess.library.utoronto.ca/viewdoc.html?id=/ebooks/ebooks2/taylorandfrancis/2013-03-25/2/9780203485248>

Ruiz-Capillas C. (2021) Sensory Analysis and Consumer Research in New Product Development Basel, Switzerland MDPI - Multidisciplinary Digital Publishing Institute.

[https://librarysearch.library.utoronto.ca/permalink/01UTORONTO\\_INST/14bjeso/alma991107131721206196](https://librarysearch.library.utoronto.ca/permalink/01UTORONTO_INST/14bjeso/alma991107131721206196)

Vaclavik VA, Christian EW. 2014. Essentials of Food Science. Springer

<https://books-scholarsportal-info.myaccess.library.utoronto.ca/en/read?id=/ebooks/ebooks3/springer/2014-04-01/1/9781461491385>

Venkatesh Mannar, M. G., & Hurrell, R. F. (Eds.). (2018). *Food fortification in a globalized world*. Academic Press.

[https://librarysearch.library.utoronto.ca/permalink/01UTORONTO\\_INST/14bjeso/alma991106848392706196](https://librarysearch.library.utoronto.ca/permalink/01UTORONTO_INST/14bjeso/alma991106848392706196)

Zeece, M. (2020). *Introduction to the Chemistry of Food*. Academic Press.

<https://www.sciencedirect-com.myaccess.library.utoronto.ca/book/9780128094341/introduction-to-the-chemistry-of-food>

The library has also created a resource page for this course that lists encyclopedias and dictionaries that may be helpful:

<https://guides.library.utoronto.ca/c.php?g=250612&p=5012907>

**In addition, print books available at short term loan in the Gerstein library include:**

- Damodaran and others. 2008. Fennema's Food Chemistry 4<sup>th</sup> ed. Boca Raton CRC Press.
- Wong DWS 1989. Mechanism and theory in food chemistry. New York. Van Nostrand Reinhold.

**8) Course Outline:**

WEEK	DATE	TOPIC	RECOMMENDED READING
1	Sept 3	Course Overview; Common chemical reactions in food; Sensory Evaluation; Food Processing	<p>Chapter 1- Introduction. - Coultate, T. P. (2023). Food - The Chemistry of its Components (7th Edition). Royal Society of Chemistry. <a href="https://doi-org.myaccess.library.utoronto.ca/10.1039/9781837670369">https://doi-org.myaccess.library.utoronto.ca/10.1039/9781837670369</a></p> <p>Part 1: Principles/Food Analysis- Browning Reactions (pg 56 - 83) <a href="https://books-scholarsportal-info.myaccess.library.utoronto.ca/en/read?id=/ebooks/ebooks2/wiley/2012-11-20/1/9781118308035#page=5">https://books-scholarsportal-info.myaccess.library.utoronto.ca/en/read?id=/ebooks/ebooks2/wiley/2012-11-20/1/9781118308035#page=5</a></p> <p>Pages 12-15. Ruiz-Capillas C. (2021) Sensory Analysis and Consumer Research in New Product Development, Basel, Switzerland MDPI - Multidisciplinary Digital Publishing Institute. <a href="https://librarysearch.library.utoronto.ca/permalink/01UTORONTO_INST/14bjeso/alma991107131721206196">https://librarysearch.library.utoronto.ca/permalink/01UTORONTO_INST/14bjeso/alma991107131721206196</a></p>
2	Sept 10	Water and Discussion of Assignments	<p>Chapter 1 - Chemical properties of water and pH. <a href="https://www-sciencedirect-com.myaccess.library.utoronto.ca/book/9780128094341/introduction-to-the-chemistry-of-food">https://www-sciencedirect-com.myaccess.library.utoronto.ca/book/9780128094341/introduction-to-the-chemistry-of-food</a></p> <p>Chapter 13 - Water Coultate, T. P. (2023). Food - The Chemistry of its Components (7th Edition). Royal Society of Chemistry. <a href="https://doi-org.myaccess.library.utoronto.ca/10.1039/9781837670369">https://doi-org.myaccess.library.utoronto.ca/10.1039/9781837670369</a></p>

3	Sept 17	Carbohydrate Chemistry: Monosaccharides , disaccharides, artificial sweeteners, polyols, polysaccharides <b>Food Chemistry reading paper (Online quiz): Tuesday Sept 24 at 9 AM.</b>	Chapter 2- Sugars Coultate, T. P. (2023). Food - The Chemistry of its Components (7th Edition). Royal Society of Chemistry. <a href="https://doi-org.myaccess.library.utoronto.ca/10.1039/9781837670369">https://doi-org.myaccess.library.utoronto.ca/10.1039/9781837670369</a>  Part II: Carbohydrates in Food. Online version available at: <a href="https://books-scholarsportal-info.myaccess.library.utoronto.ca/en/read?id=/ebooks/ebooks3/springer/2014-04-01/1/9781461491385">https://books-scholarsportal-info.myaccess.library.utoronto.ca/en/read?id=/ebooks/ebooks3/springer/2014-04-01/1/9781461491385</a>
4	Sep 24	Carbohydrate Chemistry concluded <b>Assignment Question (online submission): Oct 1 at 9 AM</b>	
5	Oct 1	Lipid chemistry: fatty acid chemistry; commercially-important fats and oils; manufacture of regular and calorie-reduced margarines; oxidation and rancidity; emulsions and emulsifiers; salad dressing; fat replacers	Chapter 4 - Lipids Coultate, T. P. (2023). Food - The Chemistry of its Components (7th Edition). Royal Society of Chemistry. <a href="https://doi-org.myaccess.library.utoronto.ca/10.1039/9781837670369">https://doi-org.myaccess.library.utoronto.ca/10.1039/9781837670369</a>  Part IV: Fats in Food. Online version available at: <a href="https://books-scholarsportal-info.myaccess.library.utoronto.ca/en/read?id=/ebooks/ebooks3/springer/2014-04-01/1/9781461491385">https://books-scholarsportal-info.myaccess.library.utoronto.ca/en/read?id=/ebooks/ebooks3/springer/2014-04-01/1/9781461491385</a>
6	Oct 8	Lipid chemistry: fatty acid chemistry; commercially-important fats and oils;	

		<p>manufacture of regular and calorie-reduced margarines; oxidation and rancidity; emulsions and emulsifiers; salad dressing; fat replacers</p> <p><b>Annotated bibliography:</b>  <b>online submission: Oct 22 at 9 AM</b></p>	
7	Oct 15	<p><b>TEST: In person (multiple choice questions) – Open book Oct 15 at 10:00 AM</b></p>	
8	Oct 22	<p>Protein chemistry: amino acid chemistry; peptides; flavour enhancers; hydrolyzed vegetable protein; browning reactions; milk proteins; casein and casein micelles; whey proteins; fluid milk and pasteurization; yogurt and cheese; egg proteins; sweet proteins</p>	<p>Chapter 5-Protein          Coultate, T. P. (2023). Food - The Chemistry of its Components (7th Edition). Royal Society of Chemistry.  <a href="https://doi-org.myaccess.library.utoronto.ca/10.1039/9781837670369">https://doi-org.myaccess.library.utoronto.ca/10.1039/9781837670369</a></p> <p>Part III: Proteins in Food. Online version available at:  <a href="https://books-scholarsportal-info.myaccess.library.utoronto.ca/en/read?id=/ebooks/ebooks3/springer/2014-04-01/1/9781461491385">https://books-scholarsportal-info.myaccess.library.utoronto.ca/en/read?id=/ebooks/ebooks3/springer/2014-04-01/1/9781461491385</a></p>
9	Oct 29	<b>NO CLASS - Fall Reading Week</b>	

10	Nov 5	<p>Protein chemistry: amino acid chemistry; peptides; flavour enhancers; hydrolyzed vegetable protein; browning reactions; milk proteins; casein and casein micelles; whey proteins; fluid milk and pasteurization; yogurt and cheese; egg proteins; sweet proteins</p> <p><b>Research paper due online Nov 19 at 9 AM.</b></p>	
11	Nov 12	<p>Protein chemistry, concluded</p> <p>Meat products: post-mortem changes; myoglobin pigments and the curing of meats; comminuted meat products</p>	
12	Nov 19	<p>Plant products: major cereal grains; legumes; vegetable pigments and flavouring compounds; fruits and the ripening process; coffee and tea</p>	<p>Part 5 - Fruits, Vegetables and Cereals  <a href="https://books-scholarsportal-info.myaccess.library.utoronto.ca/en/read?id=/ebooks/ebooks2/wiley/2012-11-20/1/9781118308035#page=5">https://books-scholarsportal-info.myaccess.library.utoronto.ca/en/read?id=/ebooks/ebooks2/wiley/2012-11-20/1/9781118308035#page=5</a></p> <p>Chapter 7 - Flavours          Coultate, T. P. (2023). Food - The Chemistry of its Components (7th Edition). Royal Society of Chemistry.</p>

			<a href="https://doi-org.myaccess.library.utoronto.ca/10.1039/9781837670369">https://doi-org.myaccess.library.utoronto.ca/10.1039/9781837670369</a>
13	Nov 26	Technologies in the vitamin and mineral fortification of food	Venkatesh Mannar, M. G., & Hurrell, R. F. (Eds.). (2018). <i>Food fortification in a globalized world</i> . Academic Press. Online version available at: <a href="https://librarysearch.library.utoronto.ca/permalink/01UTORONTO_INST/14bjeso/alma991106848392706196">https://librarysearch.library.utoronto.ca/permalink/01UTORONTO_INST/14bjeso/alma991106848392706196</a>
14	Final Assessment Period	Cumulative Final Examination (scheduled by Registrar)	

### 9) Assessments:

Assessment	Weight (%)	Due Date
Food Chemistry Reading paper: Online Quiz	2	Sept 24 (9 AM)
Assignment Question: online submission	2	Tues Oct 1 (9 AM)
Term Test (MCQ): In-person test (Open Book-multiple choice—on all material covered up to the end of Week 5, including Food Chemistry Reading Assignment)	25	Tues Oct 15 (10:00 AM)
Annotated bibliography: online submission	4	Tues Oct 22 (9 AM)
Research Paper- online submission	32	Tues Nov 19 (9AM)
Final Exam (Open book-multiple choice questions- In-person exam- covers all lecture material. Cumulative: 20% on material also covered on term test; 80% lecture material not covered on term test)	35	Cumulative Final Examination (scheduled by Registrar)
Total	100	

#### About tests and final assessment format

**The term test and final exam are open-book (multiple choice questions) and will be held in person.** They are timed tests and open book, which means that you can refer to your course materials during the test. You can bring any information into the test that you feel will assist you (please be mindful of printing); this can be course materials from Quercus, e.g., PowerPoint slides, your notes, publications, textbooks, dictionaries, etc. **To prepare for your tests you should concentrate on understanding the course content and study sufficiently to be able to recall most of the course information, in a way that is no different from a conventional**



**closed-book test.** The advantage of the open-book exam is that you can double check information. But to exploit this advantage fully, you must know your work well enough to answer most questions without having to look things up and to organize your course material in a way that will allow you to find information quickly. Please do not get lulled into a false sense of security. You won't have time to check every single question; you still need to know the course material going into the test.

#### **10) Late submission of assignments:**

**NO ASSIGNMENT WILL BE ACCEPTED after the due date and time for online submission** except for compelling reasons such as illness, personal distress, family emergency or other unforeseen circumstance. Please contact Dr Laar by e-mail ([Matilda.laar@utoronto.ca](mailto:Matilda.laar@utoronto.ca)) OR book a time on <https://calendly.com/matilda-laar/nfs386-virtual-office-hours> to request an extension, prior to the due date, if possible. A very brief explanation of why you are requesting an extension is required. This can be a written explanation from you or a medical certificate: <http://www.illnessverification.utoronto.ca/index.php> (Verbal explanations can be provided either in face-to-face discussion). All information is treated as confidential. Students dealing with intense or ongoing personal distress or chronic illness, who may need special and continuing accommodation are advised to discuss their situation with their college registrar and consider contacting Accessibility Services (See item #17 below).

**Please note that not being aware of deadline for submission, poor time management, having several assignments due at the same time, having to study for term tests, etc are generally NOT compelling reasons for an extension.** Extensions, for such reasons, are granted only in rare situations. Students are expected to complete their assignments as best they can, hand them in on time, even if incomplete, and accept that they may not get as high a grade as they would like. The Academic Success Centre provides workshops on study skills to help students manage their time effectively (See item #18 below).

If you feel you have a compelling reason that cannot be easily documented or are uncertain if your reasons are compelling, you should ideally discuss this with Dr. Laar before the assignment's due date. If this is not possible, then **FIRST** hand in as much of the assignment as you possibly can on the due date and **THEN** contact Dr Laar to discuss your situation. All discussions are kept confidential.

**Accessibility Services:** If you are registered with Accessibility Services, extensions are provided in accordance with the terms of your letter of accommodation. (See also # 17 below).

**11) Assignment re-reads:** If you have concerns about your grading, a re-read can be requested. Instructions on how to submit re-read requests will be provided during the term.

**12) Plagiarism Detection Tool (Turnitin):**

*"Normally students will be required to submit their assignments to Turnitin.com for a review of textual similarity and detection of possible plagiarism. In doing so, students will allow their assignments to be included as source documents in the Turnitin.com reference database, where they will be used solely for the purpose of detecting plagiarism. The terms that apply to the University's use of the Turnitin.com service are described on the Turnitin.com website."*

All students are expected to either submit to Turnitin, which is voluntary, or provide an alternative. On Quercus, online submissions will automatically be submitted to Turnitin, but you will have to agree to the Turnitin license agreement. If you have issues with Turnitin, please contact Dr. Laar to arrange an alternate submission. Briefly, for those who do not submit to Turnitin, as an alternative you will be expected to meet with Dr Laar for a short **oral test** during which you will be asked questions about the writing of the assignment and its content. Your assignment grade may be changed based on how well you answer these questions.

Dr. Laar reviews the Turnitin submissions and will e-mail students if there are any concerns about their writing. Often this is no more than a discussion of how to properly paraphrase and/or cite references, but the deduction of marks may also result. Failure to respond to such an e-mail will result in the deduction of assignment marks. If a serious case of plagiarism is suspected, the student's assignment will be forwarded to the Office of Academic Integrity for review and possible sanction.

**13) Policy regarding missed term test:**

**Except for compelling reasons**, such as illness, personal distress, or similar unforeseeable circumstances, all students will be given a grade of **ZERO** if they miss the term test. There are **NO MAKE-UP tests**. If you miss your term test (worth 25%), for compelling reasons, your final exam will be worth 60% of your final grade (25% + 35%).

You are required to provide a very brief explanation for your absence. This can be a written explanation from you or a medical certificate

<http://www.illnessverification.utoronto.ca/index.php>. See Dr. Laar during her office hours on Thursdays 1:30 - 3:00 pm (MS 5267) OR book a time on <https://calendly.com/matilda-laar/nfs386-virtual-office-hours>. If you are dealing with intense or ongoing personal distress or chronic illness and may need special and continuing accommodations, students are advised to discuss their situation with your college registrar and consider contacting Accessibility Services (See item #17 below).

**14) Policy regarding missed final exam:**

Policy regarding missed final exam is determined by the Faculty of Arts and Science. If you have compelling reasons for missing your final exam, contact your college registrar to file a petition; do this quickly as there are deadlines. You must provide documentation to support your

petition. If your petition is accepted, you will be permitted to write a deferred exam. A deferred exam fee must be paid.

**15) Lecture material, audio recordings, and intellectual property:**

Please note that the lecture presentations, videos, and other course documents are the intellectual property of the instructor. The Copyright Act and copyright law protect every original literary, dramatic, musical and artistic work, including lectures by University instructors. The distribution, transmission, reproduction or re-posting of the NFS386 course materials, including audio and video recordings, in whole or part, is not permitted without the consent of the instructor. All students enrolled in NFS386 are permitted to use the material for personal use and study. You may also make audio recordings of the lecture for personal use only.

**16) Academic Integrity:**

Students are expected to conduct themselves with academic integrity. The Code of Behavior clearly describes activities that are considered academic misconduct:

<http://www.governingcouncil.utoronto.ca/policies/behaveac.htm>

For more information, also see <http://www.artsci.utoronto.ca/osai> and <http://academicintegrity.utoronto.ca>.

**17) Accessibility Needs:**

Students with diverse learning styles and needs are welcome in this course. If you have an acute or ongoing disability issue or accommodation need, you should register with Accessibility Services (AS) at the beginning of the academic year by visiting <http://www.studentlife.utoronto.ca/as/new-registration>. Without registration, you will not be able to verify your situation with your instructors, and instructors will not be advised about your accommodation needs. AS will assess your situation, develop an accommodation plan with you, and support you in requesting accommodation for your course work. Remember that the process of accommodation is private: AS will not share details of your needs or condition with any instructor, and your instructors will not reveal that you are registered with AS.

**18) Help with Academic Skills:**

**Academic Success Centre:** The Academic Success Centre provides workshops, peer mentoring, and other resources to help all students improve their academic skills. Check out the available services at: <http://www.asc.utoronto.ca/>

**English Language Learning:** Provides support to students for whom English is a second language. It also supports native speakers who would like to improve their language skills. Check out available services at: <http://www.artsci.utoronto.ca/current/advising/ell>

**Writing Centres:** Writing Centers provide assistance with writing assignments for all students. Check out available services at: <http://www.writing.utoronto.ca/writing-centres>

### **19) Conduct Expectations & Equity, Diversity & Inclusion**

The University welcomes and includes students, staff, and faculty from a wide range of backgrounds, cultural traditions, and spiritual beliefs. All students share the responsibility of maintaining a positive environment for the academic and personal growth of all U of T community members, whether in person or online. These expectations are described in the Code of Student Conduct (<https://governingcouncil.utoronto.ca/secretariat/policies/code-student-conduct-december-13-2019>).

*The University of Toronto is committed to equity, human rights, and respect for diversity. All members of the learning environment in this course should strive to create an atmosphere of mutual respect where all members of our community can express themselves, engage with each other, and respect one another's differences. U of T does not condone discrimination or harassment against any persons or communities.*

### **20) Use of generative artificial intelligence (AI) tools:**

Students are expected to use generative artificial intelligence tools for the research paper assignment, such as Microsoft Copilot, and must include with every assignment a short reflection on how they made use of generative artificial intelligence tools in the development of their assignment.

Any content produced by an artificial intelligence tool must be cited appropriately. Many organizations that publish standard citation formats are now providing information on citing generative AI (view the [U of T Libraries Citation Guide for Artificial Intelligence Generative Tools](#)).

### **21) Extreme circumstances**

The University reserves the right to change the dates and deadlines for any or all courses in extreme circumstances (e.g., severe weather, labour disruptions, etc.). Changes will be communicated through regular U of T communication channels, such as Quercus and/or U of T email.