FNH 325/326 Food Science Laboratory I/II Syllabus

Course Details

Term/year	Winter term 1 and 2 (Sept 2024 – April 2025)
Class day/time	Tuesdays 1 – 5 pm
Class location	MCML 220 – 240 (main rooms), and MCML 258, FNH 130, 140, and 190
Instructor	Dr. Patricia Hingston
Email	Patricia.hingston@ubc.ca but please contact through Canvas mail
Office	Room 223, MacMillan Building
Office hours	TBA (in-person or virtual through zoom)
TA contact	Please contact through Canvas mail

Meet Your Instructor!

Hello! My name is Patricia Hingston and I am an Assistant Professor of Teaching in food science at UBC. I teach the upper-level laboratory courses in food science as well as food microbiology which is my area of expertise. Teaching is my passion. I thoroughly enjoy mentoring students and observing their growth throughout their program. My main goal in this course is to help you develop the skills that you will need to be successful in your future careers and/or graduate studies. I am a very friendly and approachable person so please feel welcome to connect with me regarding the course or any other matters. Originally from Owen Sound, Ontario, I lived in Halifax, Nova Scotia, Canada and Copenhagen, Denmark before moving to Vancouver for my PhD. I loved Vancouver so much that I decided to stay. In my free time you can find me painting, riding my bike, or doing yoga.

Course Description

Explore food science through experiential learning in FNH 325/326 Food Science Laboratories I and II. This two-part, hands-on course is thoughtfully designed to complement the theoretical knowledge gained in your food chemistry, analysis, microbiology, processing, and product development courses.

FNH 325/326 not only imparts practical knowledge but also equips students with competencies in skills demanded by professionals in the food sector. Learn how to effectively collect, organize, analyze, and present data, source and cite scientific literature, and craft compelling scientific reports. Furthermore, these courses will help you enhance your teamwork and oral communication abilities, both of which are key for success in the food industry and beyond.

Learning Outcomes

Upon completion of this course, learners who effectively engage with the course material will be able to:

1. Explain the key principles of various food production and analysis techniques
2. Conduct unit operations (e.g., drying, filtration) and use common food analysis equipment (water activity meter, pH meter, texture analyzer, colourimeter)
3. Perform laboratory techniques in a safe, precise, and accurate manner
4. Use raw data to calculate experimental results
5. Select and use statistical tools to analyze experimental data
6. Construct visual representations of experimental data that meet scientific journal standards
7. Locate, evaluate and incorporate scientific literature into written and oral forms of communication
8. Compose technical reports that disseminate experimental findings to a variety of audiences
9. Create oral presentations that communicate scientific findings in an organized and clear manner
10. Work effectively both individually and in teams

Institute of Food Technologists (IFT)

UBC's Food Science Program is approved by the Institute of Food Technologists (IFT), an internationally recognized leader in undergraduate education standards for degrees in food science. Programs with this approval badge are recognized as delivering a comprehensive food science education that covers 55 essential learning outcomes (ELOs) of critical importance for food scientists. The highlighted ELOs below are covered in this course.

Institute of Food Technologists Essential Learning Outcomes (IFT ELOs)

Food Chemistry (FC)

FC.1. Discuss the major chemical reactions that limit shelf life of foods.

FC.2. Explain the chemistry underlying the properties and reactions of various food components.

FC.3. Apply food chemistry principles used to control reactions in foods.

FC.4. Demonstrate laboratory techniques common to basic and applied food chemistry.

FC.5. Demonstrate practical proficiency in a food analysis laboratory.

FC.6. Explain the principles behind analytical techniques associated with food.

FC.7. Evaluate the appropriate analytical technique when presented with a practical problem.

FC.8. Design an appropriate analytical approach to solve a practical problem.

Food Microbiology (FM)

FM.1. Identify relevant beneficial, pathogenic, and spoilage microorganisms in foods and the conditions under which they grow.

FM.2. Describe the conditions under which relevant pathogens are destroyed or controlled in foods.

FM.3. Apply laboratory techniques to identify microorganisms in foods.

FM.4. Explain the principles involved in food preservation via fermentation processes.

FM.5. Discuss the role and significance of adaptation and environmental factors (e.g., water activity, pH, temperature) on growth response and inactivation of microorganisms in various environments.

FM.6. Choose relevant laboratory techniques to identify microorganisms in foods.

Food Safety (FS)

FS.1. Identify potential hazards and food safety issues in specific foods.

FS.2. Describe routes of physical, chemical, and biological contamination of foods.

FS.3. Discuss methods for controlling physical, chemical and biological hazards.

FS.4. Evaluate the conditions, including sanitation practices, under which relevant pathogenic microorganisms are commonly controlled in foods.

FS.5. Select appropriate environmental sampling techniques.

FS.6. Design a food safety plan for the manufacture of a specific food.

Food Engineering and Processing (FE)

FE.1. Define principles of food engineering (mass and heat transfer, fluid flow, thermodynamics).

FE.2. Formulate mass and energy balances for a given food manufacturing process.

FE.3. Explain the source and variability of raw food materials and their impact on food processing operations.

FE.4. Design processing methods that make safe, high-quality foods.

FE.5. Use unit operations to produce a given food product in a laboratory or pilot plant.

FE.6. Explain the effects of preservation and processing methods on product quality.

FE.7. List properties and uses of various packaging materials and methods.

FE.8. Describe principles and practices of cleaning and sanitation in food processing facilities.

FE.9. Define principles and methods of water and waste management.

Sensory Science (SS)

SS.1. Discuss the physiological and psychological basis for sensory evaluation.

SS.2. Apply experimental designs and statistical methods to sensory studies.

SS.3. Select sensory methodologies to solve specific problems in food.

Quality Assurance (QA)

QA.1. Define food quality and food safety terms.

QA.2. Apply principles of quality assurance and control.

QA.3. Develop standards and specifications for a given food product.

QA.4. Evaluate food quality assessment systems (e.g. statistical process control).

Food Laws and Regulations (FL)

FL.1. Recall government regulatory frameworks required for the manufacture and sale of food products.

FL.2. Describe the processes involved in formulating food policy.

FL.3. Locate sources of food laws and regulations.

FL.4. Examine issues related to food laws and regulations.

Data and Statistical Analysis (DS)

DS.1. Use statistical principles in food science applications.

DS.2. Employ appropriate data collection and analysis technologies.

DS.3. Construct visual representation of data.

Critical Thinking and Problem Solving (CT)

CT.1. Locate evidence-based scientific information resources.

CT.2. Apply critical thinking skills to solve problems.

CT.3. Apply principles of food science in practical, real-world situations and problems.

CT.4. Select appropriate analytical techniques when presented with a practical problem.

CT.5. Evaluate scientific information.

Food Science Communication (CM)

CM.1. Write relevant technical documents.

CM.2. Create oral presentations.

CM.3. Assemble food science information for a variety of audiences.

Professionalism and Leadership (PL)

PL.1. Demonstrate the ability to work independently and in teams.

PL.2. Discriminate tasks to achieve a given outcome.

PL.3. Describe social and cultural competence relative to diversity and inclusion.

PL.4. Discuss examples of ethical issues in food science

Course Format

This course kicks off with three introductory tutorial-style lectures. These initial sessions will acquaint you with the six vital skills essential for excelling in this course: literature searching, experimental design, data analysis, statistical analysis, data presentation, and scientific writing. Each of these lectures has an associated quiz and assignment that you will complete individually. Once these sessions conclude, we will begin the laboratory portion of the course.

Each week, two different laboratory sessions will take place in MCML 220 and 240. Half of the class will attend one session in MCML 220 and the other half of the class will attend the other session in MCML 240. The following week, the same two sessions will be repeated and students will complete the opposite session. The first two initial labs will be conducted individually and then thereafter; all labs will be conducted in groups of 2 – 3 students. Groups will be randomly created by Canvas.

Each lab session has a quiz and calculation submission associated with it. You must obtain 100% on the quiz before you can attend the lab session. This requirement ensures your familiarity with protocols and safety measures. Calculations will be due the Friday following each Tuesday lab session. Certain labs also feature scientific lab reports or memo reports as part of the experience. These reports showcase your ability to communicate findings effectively.

Once in each term there will be a presentation day. In the fall term, it will be a group presentation on a current food science hot-topic. In the winter term, students will deliver individual lightning talks, taking just 6 minutes to debunk common food science myths. Both presentations require you to submit topics and slides for review in advance. After your presentation, a recording will be available on Canvas for you to reflect on how you can improve in the future.

At the end of each term there is a final exam and a reflective post assignment. Additionally, at the end of the second term, there is a practical lab exam where you'll demonstrate your ability to carry out standard assays in food analysis and microbiology. Details regarding each course activity can be found below.

Course Software

You will be required to use the following software in this course:

- Canvas
- Google Docs, Sheets, and Slides
- Microsoft Word, PowerPoint, and Excel + Analysis ToolPak add-on
- Zotero citation manager
- Jamovi statistical software

Course Activities

Course activity	Description
Lab quizzes	Before joining any laboratory session, each student must achieve 100% on a 10-question quiz. You'll have unlimited time and attempts to accomplish this. The intention behind these quizzes is to confirm your thorough understanding of the lab instructions and to ensure that you're well-informed about the safety protocols in place. These quizzes will not count towards your grade.
Lab calculations and questions	Lab data calculations and accompanying questions are due the Friday following each Tuesday lab session. Excel templates for submitting each set of calculations can be found under the appropriate lab modules on Canvas. Calculations for labs conducted individually should be completed individually, and likewise, calculations for labs conducted in groups should be completed in groups. The grading rubric for each calculation submission is available on Canvas.
Assignments	The first three lectures of the year are each accompanied by a written assignment that you will complete individually. They are due the Tuesday following each lecture.
Scientific reports	Throughout both terms, you will complete three scientific reports: one in the first term and two in the second term. These reports serve a dual purpose – they not only equip you for your future FNH 499 thesis or FNH 425 reports but also provide valuable skills if you decide to pursue graduate studies. Beyond that, mastering scientific writing enables you to effectively convey your research findings and develop a professional writing style. Mock data sets will be provided for students to analyze as laboratory results vary. The first scientific report is to be completed individually and students will have the opportunity to submit their report to the course instructor for feedback prior to re-submitting for evaluation. In the second term, students will complete one scientific report individually and one with their group member(s). Guidelines for the reports can be found in the lab manual and the grading rubric found on Canvas. A scientific report template is also provided.
Memo reports	There are three individual memo reports in this course spread across both terms. In professional settings, memo reports are a staple for succinctly conveying results and recommendations. Each memo report should not exceed 850 words (~three pages). Detailed guidelines, along with a grading rubric and a convenient template, can be accessed on Canvas.

Group presentations	Once per term, students will deliver a 15 min group presentation on a current hot topic in food science. Students will additionally be required to ask questions, provide feedback, and evaluate the presentations. The instructor- and TA-assigned grades will account for 70% of each group's presentation grade and student-assigned grades will account for the remaining 30%. Presentation topics must be confirmed by the instructor no later than three weeks prior to the presentation date. Groups will also be required to submit their slides for feedback prior to presenting. After your presentation, a recording will be available on Canvas for you to reflect on how you can improve in the future.
Reflective learning	There will be a few occasions in both FNH 325 and 326 where you will be asked to reflect on your performance and growth in the course. This includes cover memos on lab reports, post-presentation reflection assignments, and end-of-term reflection discussion posts. It is scientifically proven that learning is enhanced when we reflect on what we have learned, how far we have come, and how we can improve.
Laboratory notebook	At the end of each term, you will be required to submit your laboratory notebook for review. While it may seem tedious, keeping a neat and organized laboratory notebook is important when conducting laboratory experiments. They serve as a place to record your data, observations, reminders, and lessons you've learned. If your data and observations are not recorded in an organized manner, you will have a difficult time interpreting your data and you will also risk communicating false findings to the scientific community. The evaluation rubric and notebook checklist are available in the lab manual.
Final examination	There will be a final exam at the end of each term. The final exams are designed to assess your knowledge and critical thinking skills accumulated throughout the course related to laboratory procedures, scientific principles, calculations, and statistics. The exams will take place in-person and you will be allowed a single-sided memory aid.
Practical lab	At the end of term 2 there will be an in-person, practical exam. The purpose of the exam is to assess your ability to carry out standard assays in food analysis and microbiology, which are critical skills for food scientists. Specifically, you will be asked to create a protein standard curve and to serially dilute and plate a microbial culture. These are straight forward and common laboratory tasks that you will obtain a great amount of experience

	with during the course. The full exam instructions and rubric can be found on Canvas.
Late submission tokens	Each term you will be given two virtual late submission tokens that you can use to turn in an assignment (includes calculations, lesson assignments, memos, and lab reports) up to 3 days late without any late penalty. These can be used for individual or group assignments. To use a token, you need to make a note in the submission portal for the assignment BEFORE the due date. If you wish to apply a token to a group assignment, it is important to ensure that all group members agree to use a token. Note that postponing an assignment could lead to a busy following week, as other assignment dates will remain unchanged.
Professional development bonus marks	Networking is extremely important for undergraduate students. This is how you make connections with people in the food industry, government, and academia who can provide you with valuable advice and assist you in applying for graduate school or finding employment. Networking and professional development are also great ways to expand your food science knowledge and help you become familiar with different work cultures and career opportunities. To encourage you to step outside of your comfort zone, form new connections, and expand your mind, I will add 0.5% to your course grade for attending up to two networking or knowledge acquisition events (total grade increase of 1% possible). To obtain these bonus marks, you must submit a >400-word summary for each event you attend that describes how it has helped you expand your network and/or increased your food science knowledge. A template is posted to the course Canvas page for you. Applicable events will be promoted to the class throughout the year.

Late Submissions

Assignments submitted late (without a late token) will be penalized at 20% per day unless a late submission token has been used. This is to help the TAs complete their grading in a timely manner and accurately predict their busy periods throughout the course.

Returning Following Labs

Certain labs in this course necessitate a follow-up visit later in the week for result analysis. I empathize with this inconvenience and have worked to minimize such instances, and ensure brief visits. Follow-ups typically fall on Thursdays, and should conclude within 30 minutes. Visualizing your results first hand will significantly enhance your learning experience in this course.

Course Readings

There is no required textbook for this course other than the course lab manual. However, there are several useful resource materials posted to Canvas to supplement your learnings in this course.

Course Evaluation Breakdown

Course activity	**FNH 325**		**FNH 326**	
I = Individual; G = Group	**#**	**Weight (%)**	**#**	**Weight (%)**
Lab calculations (I & G)	8	20	10	16
Lab reports (G)	-	-	1	10
Lab reports (I)	1	17	1	16
Memo reports (I)	1	7	2	12
Assignments (I)	3	16	-	-
Class Introduction (I)	1	2	-	-
Reflections (I)	2	4	2	4
Presentation (G)	1	10	1	8
Slide submission (G)	1	2	1	2
Laboratory notebook (I)	1	2	1	2
Practical exam (I)	-	-	1	15
Final exam (I)	1	20	1	15
BONUS MARKS				
Professional development (I)	2	1	2	1

Mark Deductions

For the labs to run smoothly, it is extremely important that every lab start on time and that all students are present for the pre-lab lecture which discusses safety matters related to each lab. Accordingly, a 0.5%-mark deduction will be applied each time you arrive late for a lab (> 1 pm). A 0.5% deduction will also be applied each time your group fails to properly clean your lab bench and analytical balance at the end of a lab.

Missed Labs

Participating in all lab sessions is highly advisable as labs will not be replicated, resulting in missed opportunities to acquire crucial experience in operating diverse analytical equipment. If you find yourself unable to attend a lab due to illness or other valid reasons, promptly inform your instructor. By communicating early, we can work together to address the situation effectively. However, please be aware that unnotified absences from labs will result in a grade of 0 for the associated assignments.