FNH 325 Food Science Laboratory I Syllabus

Course Details

Course	FNH 325 [0-3-0]
Prerequisites	All of FNH 300, FNH 301, FNH 302. These courses can be taken as co-requisites
Term/year	Winter term 1 (Sept – Dec 2022)
Class day/time	Tuesdays 1 – 5 pm
Class location	MCML 220 – 240 (main rooms), MCML 258, FNH 130, 140, and 190
Instructor	Dr. Patricia Hingston
Email	Please contact through Canvas mail
Office	Room 223, MacMillan Building
Office hours	TBA (in-person or virtual through zoom)
TAs	TBA
TA contact	Please contact through Canvas mail
Syllabus version	July 1, 2022

Instructor's Biographical Statement

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, cooking, riding my bike, or doing yoga.

Course Objectives

Laboratory I and II will provide you with the opportunity to integrate your Food Science knowledge to obtain a better understanding of food as a complete entity. The lab exercises have been designed to reinforce the theoretical concepts covered in the core Food Science courses (food microbiology, chemistry, analysis, processing, and product development) and to give you the opportunity to develop practical skills that will be useful in the food industry. These practical skills include communication, teamwork, and commonly used laboratory techniques. You will become familiar with the composition and characteristics of foods, the equipment and procedures used for food analysis and processing, research and data analysis, and presenting information in both written and oral formats.

Learning Outcomes

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

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

Institute of Food Technologists (IFT)

UBC's Food Science Program is one of few in Canada that are 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) established by the IFT organization. For further information on IFT ELOs, click here. 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 will begin with 4 introductory tutorial-style lectures that introduce the 6 main skills that you will require to be successful on your assignments in this course: literature searching, experimental design, data analysis, statistical analysis, data presentation, and scientific writing. Each of these 4 lectures has an associated quiz and assignment that you will complete. After these sessions have finished we will begin the laboratory portion of the course.

Each week the class will be split in half and two different labs will be conducted in MCML 220 and 240. The following week student's will switch sides of the lab and the same two labs will be repeated. Some labs will be completed individually while others will be conducted in groups of 2 to 4, such that there are 10 groups.

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 is for safety purposes. Calculations will be due the Friday following each Tuesday lab session. Some labs additionally have a scientific lab report or memo report associated with them.

Once in each term there will be a group presentation on a current hot-topic in food science. In preparation for the presentation you will be required to submit your presentation topic and slides for review. Once you have completed your presentation a recording will be posted to Canvas for you to watch and reflect on how you can improve in the future.

The course will conclude with an open-book final exam, a reflection discussion post, and submission of optional assignments for bonus marks.

Checklist for Course Preparation

Online portion

The online portion of this course will require you to use the following software:

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

Laboratory sessions

The following items must be brought to each in-person laboratory session:

- Lab coat (cotton preferred)
- Lab goggles
- Hardcover laboratory notebook with sewn in pages
- Scientific calculator
- Black sharpies (small tip) for labelling tubes
- Ruler for notebook data organization

Learning Activities

Course activity	Description
Lab quizzes	To start off each new laboratory session, you will be required to complete a short quiz on Canvas. The quiz will be based on the laboratory methodology and online videos provided for each lab session. You will have unlimited attempts to complete the quizzes but must obtain 100% before you will be able to attend the lab session or submit the session assignments for grading.
Lab calculations	Lab data calculations are **due** the **Friday following each Tuesday lab session** and must be completed **individually**. Excel templates for submitting each set of calculations can be found under the appropriate lab modules on Canvas. The grading rubric and checklist for calculation submissions is also available on Canvas.
Laboratory reports, memos, and assignments	A laboratory report, memo, or assignment is due for each lab conducted in this course. Some reports are individual assignments while others are to be completed in groups. **Individual assignments are weighted heavier than group assignments.** Templates for the various types of written communication can be found on Canvas and the **assignments must be submitted to both Canvas and Turnitin.com.** The due date for each assignment will be decided by the instructor but will most commonly be one or two weeks following the lab session depending on the complexity of the assignment. Overdue assignments will be penalized at the rate of 20% per day, for the first five days, after which a mark of 0 will be assigned. **See late submission tokens below.**
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. If you wish to apply a token to a group assignment, it is important to **ensure that all group members agree to use up a token.** Please be mindful that other assignment dates will remain the same so delaying an assignment may mean your following week becomes very busy.
Reflective learning	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. Accordingly, 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 assignment, and an end of the term reflection discussion post.
Group presentations	Once per term students will give a group presentation. The presentation should be **15 - 20 min** and focus on a current hot topic or trend in Food Science. The presentations will be performed in-person and students will 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.
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 one-page 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 to use as are links to some upcoming opportunities.
Laboratory notebook	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. At the end of each term you will be required to submit your laboratory notebook for review by the instructor. The evaluation rubric and notebook checklist are available on Canvas.
Final examination	An open-book exam will take place 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.

Course Readings

There is no required textbook for this course. However, there are several resource materials listed below that contain information relevant to this course.

Useful References: Books and Websites **(links on Canvas)**

1. The UBC library resource page for FNH 325/326. This site has many links that are useful for finding relevant information and writing reports.
2. Jay, J.M. Modern Food Microbiology 5th edition(ebook). Springer US, 1995.
3. Nielsen, S.S., ed. Food Analysis. 5th edition (ebook), New York: Kluwer Academic/Plenum Publishers, 2010. It is highly recommended that you read this book for this course and FNH 302.
4. Poste, L., Mackie, D.A., Butler, G., Larmond, E. Laboratory Methods for Sensory Analysis of Foods. Agriculture Canada Publication 1864/E, Ottawa, 1991.

5. US Department of Agriculture. Food Composition Database. This site contains the nutrient breakdown for a wide range of food items and will be extremely helpful when writing your lab reports.

Learning Resources

If you require assistance gaining access to or navigating one of the online learning resources or would like additional support regarding online learning in general, the UBC Keep Learning website is a great resource for students: https://keeplearning.ubc.ca/

Course Schedule

Note: *This schedule is tentative. Please see the course schedule page on Canvas for updated due dates and times.*

Week	Topics
1	Introduction (no class) – online tasks
2	**Lesson 1:** Literature Searching
3	**Lesson 2:** Data Analysis
4	**Lesson 3:** Statistical Analysis
5	**Lesson 4:** Scientific Writing + Pipetting Workshop
6	**Lab 1:** Chemistry Basics (groups 1-5) **Lab 2:** Microbiology Basics (groups 6-10)
7	**Lab 1:** Chemistry Basics (groups 6-10) **Lab 2:** Microbiology Basics (groups 1-5)
8	**Lab 3:** Carbohydrate Analysis (groups 1-5) **Lab 4:** Thermal Resistance of Yeast (groups 6-10)
9	**Lab 3:** Carbohydrate Analysis (groups 6-10) **Lab 4:** Thermal Resistance of Yeast (groups 1-5)
10	**Lab 5:** Fruit Leather Formulation and Drying (all groups)
11	**Group Presentations**
12	**Lab 6:** Yogurt Production (groups 1-5) **Lab 7:** Physiochemical Analysis of Food (groups 6-10)
13	**Lab 6:** Yogurt Production (groups 6-10) **Lab 7:** Physiochemical Analysis of Food (groups 1-5)

Course Assessment

Course activity I = Individual; G = Group	FNH 325	
	#	Weight (%)
Lab calculations (I)	7	10
Lab reports (G)	1	12
Lab reports (I)	1	17
Memo reports (I)	1	6
Assignments (I)	4	16
Discussion posts (I)	1	2
Reflections (I)	2	3
Presentation (G)	1	10
Slide submission (G)	1	2
Laboratory notebook (I)	1	2
Final exam (I)	1	20
BONUS MARKS		
Professional development (I)	2	1

Mark Deductions

For the labs to run smoothly, it is extremely important that every lab start on time and that every student shows up completely prepared. To help ensure this, each of the following events is associated with a -0.5%-mark deduction from your overall grade:

- Arriving late to a lab (>1 pm)
- Forgetting your lab coat, lab book, or protective eyewear
- Failure to tie back long hair
- Failure to clean group lab bench or analytical balance at the end of a lab
- Wearing open-toed shoes, shorts, or skirts/dresses in the lab

Course Communication

The instructor will answer e-mails and discussion board posts between 9 am – 5 pm Mon – Fri. Please post questions pertaining to course activities on the designated discussion boards on Piazza available on the Canvas course page. Here, you can post questions anonymously and the instructor or a TA will answer usually within the same day, excluding weekends. It is beneficial to use the discussion boards as much as possible as other students often have similar questions, so your inquiry can help the whole class learn.

Learning Analytics

Learning analytics includes the collection and analysis of data about learners to improve teaching and learning. This course will be using the following learning technologies: Canvas including programs embedded within Canvas. Many of these tools capture data about your activity and provide information that can be used to improve the quality of teaching and learning. In this course, I plan to use analytics data to:

- View overall class progress
- Track your progress in order to provide you with personalized feedback
- Review statistics on course content being accessed to support improvements in the course
- Track participation in discussion forums

Academic Integrity

The academic enterprise is founded on honesty, civility, and integrity. All UBC students are expected to behave as honest and responsible members of an academic community. At the most basic level, this **means submitting only original work done by you and acknowledging all sources** of information or ideas and attributing them to others as required. This also means **you should not cheat, copy, or mislead others about what is your work.**

It is the student's obligation to learn, understand and follow the standards for academic honesty. Students must be aware that standards at the University of British Columbia may be different from those in secondary schools or at other institutions.

Violations of academic integrity lead to the breakdown of the academic enterprise, and therefore serious actions are taken. Plagiarism or cheating may result in a mark of zero on an assignment, exam, or course. More serious consequences may apply if the matter is referred to the President's Advisory Committee on Student Discipline. Academic misconduct may result in a one-year suspension from the University and a notation of academic discipline on the student's record.

The UBC library has a useful Academic Integrity website that explains what plagiarism is and how to avoid it. If a student is in any doubt as to the standard of academic honesty in a particular course or assignment, then the student must consult with the instructor as soon as possible. A more detailed description of academic integrity, including the University's policies and procedures, may be found in the Academic Calendar. All course work is required to be submitted to Turnitin.com for review.

University Policies

UBC provides resources to support student learning and to maintain healthy lifestyles but recognizes that sometimes crises arise and so there are additional resources to access including those for survivors of sexual violence. UBC values respect for the person and ideas of all members of the academic community. Harassment and discrimination are not tolerated nor is suppression of academic freedom. UBC provides appropriate accommodation for students with disabilities

and for religious observances. UBC values academic honesty and students are expected to acknowledge the ideas generated by others and to uphold the highest academic standards in all of their actions.

Details of the policies and how to access support are available on **the UBC Senate website.**

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