FNH 425 Food Science Laboratory III Syllabus

Course Details

Course	FNH 425 [0-3-0]
Prerequisites	FNH 325, FNH 326
Term/year	Winter terms 1 – 2 (Sept 2022 – Apr 2023)
Class day/time	Fridays 1 - 4 pm
Class location	Fall term: MCML 260 Winter term: MCML 220-240, FNH pilot plant and labs (FNH 190, FNH 290, FNH 260)
Instructor	Dr. Patricia Hingston
Email	Please contact through Canvas
Office	Room 223, MacMillan Building
Office hours	Fridays 1:20 – 3:40 pm
Lab technicians	McMillan lab - Imelda Cheung (imelda.cheung@ubc.ca) FNH labs - Peter Hoffman (peter.hoffman@ubc.ca)
FNH 190 Lab TA	TBA
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

The objectives of the course are to provide students with an opportunity to integrate and apply the skills and knowledge acquired in their food science courses to investigate a problem of relevance to a food company. Additionally, students will build team work and project management skills and expand their network of food industry connections.

Learning Outcomes

Upon completion of this course, you should be able to:

1. Identify key issues of a food industry-related problem
2. Formulate an approach to solving a research question
3. Conduct a literature review related to a research question using reliable sources of information
4. Develop a detailed methodology to investigate a research question
5. Estimate a budget for a proposed methodology
6. Conduct research in a systematic, safe, and accurate and precise manner
7. Analyze and interpret research findings
8. Work effectively both individually and in teams
9. Interact efficiently with team members, industry partner and instructors
10. Communicate effectively through formal written reports and oral presentations

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. ELOs highlighted below in yellow are covered in this course and those highlighted in blue may also be covered depending on the industry project you are assigned to.

Institute of Food Technologists Essential Learning Outcomes (IFT ELOs)

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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

Students will work in groups of 3-4 on a research project that aims to solve a specific objective set out by a food, supplement, or drink producer. The scope of the projects may involve product formulation, process development or improvement, quality assurance, regulatory and nutrition labeling considerations, analysis of chemical, physical, nutritional or sensory properties, microbiological assessment, etc.

Each project will be assigned a faculty supervisor and teaching assistant who will help the students navigate the project's progress and deliverables. The course instructor as well as two laboratory technicians will also provide assistance throughout the course.

Students develop hypotheses, perform a literature review, devise an experimental plan, and then execute experiments followed by data analyses. Prior to starting their experiments, students will develop and submit a budget to industry sponsors for approval, and complete a series of safety trainings and lab orientations.

This course runs over two semesters (Sept - April):

- In the first semester students will become acquainted with their company and faculty supervisors and submit a proposal report that is accompanied by an oral presentation.
- During the second semester students will execute their experimental plans leading to a final written report and oral presentation of their results.

Class time is scheduled on Friday afternoons; however, there are only a handful of times when attendance is mandatory during this time. These include four introductory lectures at the beginning of the course that cover the course structure, literature searching, experimental design, scientific writing, and budget formulation. Additionally, groups will meet with their industry partner on the second week of class, and attend all group proposal presentations in mid-October. Please ensure that you remain available on all of these dates. A summary of all dates is provided under "**Course Schedule"** below.

In term 2 you will predominantly be working in the MCML or FNH labs. While the course is scheduled on Fridays, please keep in mind that many projects will require you to perform laboratory work on other days as well. It is up to you and your team members to manage your time effectively.

Learning Activities

Course activity	Description
Progress updates	Throughout the course you will submit bi-weekly updates on your project progress including previews of data collected, number of hours worked, and summaries of your correspondence with your faculty supervisor, industry partner, or TA. The purpose of this task is to motivate you to use your time effectively in the course, and to help the course instructor understand where you may benefit from some assistance.
Presentations	You will give two group presentations in this course. The first presentation will be 15 minutes and describe your project's objectives and outline your proposed experimental design while the second presentation will be 20 minutes and focus on your results and interpretation of your findings.
Slide submissions	A week in advance of your presentations you will be required to submit your slides to your instructor to review. The purpose of this task is to motivate you to complete your slides well in advance of your presentation to allow you time to practice your oral presentation skills as a group. It also allows the instructor to provide you with feedback that if addressed, will help you achieve a higher grade on your presentation.
Written reports	There are two group written report assignments in this course, a proposal report and a final results report. The proposal report will include an introduction to the project and its objectives, a literature review of relevant topics, and your proposed methodology for accomplishing the project's objectives. The final results report will additionally contain a description of your results, a discussion of what the results mean and how they compare to other literature findings, and a conclusion that includes future directions or recommendations for the company.
Report revisions	To ensure that the industry partners receive clear and accurate reports of the project findings, groups will be required to address the collective feedback from their faculty supervisor, TA, and instructors and resubmit their report for evaluation. This task is worth 10% of your grade and will be evaluated based on the degree of feedback addressed.
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 this course where you will be asked to reflect on your performance and growth. This includes two post-presentation reflection assignments, and one end of the course discussion post.

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 knowledge, 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 500-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 to use as are links to some upcoming opportunities.

Course Readings

There is no required textbook for this course. Please see the Canvas course page for helpful resources.

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

Term:Week	Event	Date scheduled
T1:1	Introductory lecture	Sept 9
T1:2	First meeting with industry partner	Sept 16
T1:3	Literature review and experimental design lecture	Sept 23
T1:4	Scientific writing workshop	Sept 30
T1:6	Slide submission	Oct 12
T1:7	Proposal presentations	Oct 21
T1:8	1. Proposal report working session (opportunity to ask questions and receive feedback) 2. Presentation reflection due	Oct 28
T1:9	1. Submit proposal report 2. Budget formulation workshop	Nov 4
T1:10	1. Submit budget for review (Canvas) 2. Once approved by course Instructor, send to company for approval 3. Complete safety training and laboratory orientations	Nov 11

T1:11 – T2:9	Conduct experiments	Nov 11 – March 10
T2:10	Data analysis lecture	March 10
T2:11	Slide submission	March 15
T2:12	Final presentations	March 24
T2:13	Presentation reflection due	March 31
T2:14	1. Submit final report and raw data	April 7
T2:15	1. Lab cleanup completion 2. List of supplies used due 3. Evaluations due (group, faculty supervisor, TA, industry sponsor) 4. Professional development summaries due	April 14
T2:16	Submit report revisions	April 21

Course Assessment

Course activity	**Weight (%)**
Progress updates (x13)	10
Proposal presentation	10
Proposal report	20
Final results presentation	18
Final report	25
Report revisions	10
Slide submissions (x2)	4
Course reflections (x3)	3

Rubrics for all assignments can be found under the various modules on Canvas or visible on the assignment submission portals.

- Written reports will be graded by the faculty supervisor, teaching assistant, and course instructor.
- Oral presentations will be graded by all food science faculty, all teaching assistants for the course, and the course instructor. Additionally, student evaluations of the presentations will account for 30% of each group's presentation grade.

The following **mark deductions** will be applied to a student's overall grade if necessary. I truly hope to not have to do this but these deductions are in place to help motivate you to stay on task as the course can pass by much quicker than you think and it takes time to obtain quality laboratory results.

- Late submission of budget
    - **1% deduction per day**
- Failure to complete mandatory training and lab orientations on time
    - **1% per requirement per day late**

- Failure to make experimental progress before holiday break in December
    - **1-10% depending on circumstances**
    - It is expected that you complete training/test runs on equipment and obtain some preliminary data before the end of term 1.
- Insufficient cleanup of laboratory space and materials
    - **1 – 10% deduction depending on severity**
- Late or incomplete submission of supplies used list
    - 1% **deduction per day**
- Poor contributions to lab work or course deliverables
    - **1 – 10% for poor contributions to lab work**
    - **Can obtain as low as 0% on course deliverables for poor contributions**

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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