

# FNH 490 Novel plant- and cell-based foods

## Course Details

Course	FNH 490 [3-0-0] (hours/week of [lecture-lab-tutorial])
Prerequisites	FNH 301 (Food Chemistry), or (3rd year standing or higher & permission from the instructor)
Term/year	Winter Term 1 (September – December 2022)
<b>Class day/time</b>	<b>T/Th 9:30-11:00</b>
<b>Location</b>	<b>BIOL 1001</b>
Instructor	Dr. Derek Dee
Email	derek.dee@ubc.ca
Office hours	Please email me to schedule a meeting
TA	Amir Amiri
TA contact	amiram67@mail.ubc.ca

## Instructor's Biographical Statement

I completed my BSc (Hons) in Food Science, and a minor in Chemistry, from the University of Saskatchewan. I did undergraduate research projects on flax oil, biodiesel, and plant phenolics. My main interest was enzymes, so I then did a MSc in Food Science and a PhD in Biophysics at the University of Guelph, studying the biophysics of protein structure and stability. I went further into biophysics as a postdoctoral fellow at the University of Alberta, using optical tweezers to trap and study single molecules of protein (prion protein specifically, related to Mad Cow disease). I then moved back to Food Science at the University of Georgia, studying food protein nanofibrils, and moved my lab to UBC in 2019. We study plant and animal proteins at the nanoscale to understand their properties for food and health applications.

## Course Description

We will examine meat, egg, fish, and dairy analogues made using plants, recombinant proteins, and cell culture, from the molecular to the macroscopic level. Relation of molecular details to physical and sensory properties. Health and sustainability impacts.

## Learning Outcomes

Upon completion of this course students will be able to:

1. Explain technical terminology related to plant proteins, recombinant proteins, and cell tissue culture
2. Discuss structure function relationships of key biomolecules in foods (e.g., proteins, fat, carbohydrates)
3. Contrast the benefits, drawbacks, and challenges of replacing animal-derived foods with novel foods (plant, fermentation-based, other)

4. Summarize and evaluate scientific literature
5. Critically assess information from media (e.g., websites, newspapers, magazines, videos)
6. Present and discuss complex ideas clearly
7. Write a logical and compelling proposal

## Course Format

This class will involve a mix of lectures and student-led discussions. The lectures will provide background material and serve as an entry point to the subject, with assigned readings and student-led discussions used to more deeply explore each subject. The emphasis will be on student participation. Generally, the instructor will lecture on Tuesdays while Thursday will be used for student-led group discussion and activities.

**Required readings and lecture slides will be posted to Canvas.**

## Course Schedule

Week	Dates	Topic
1	Sept 6, 8	Introduction
2	Sept 13, 15	Global Food (Protein) Challenges
3	Sept 20, 22	Protein, Fat, and CHO Chemistry
4	Sept 27, 29	Plant proteins – structure and function
5	Oct 4, 6	Plant-based meat & dairy
6	Oct 11, 13	Fermentation – recombinant proteins & fats <b>Exam 1 (Oct 13 +/-)</b>
7	Oct 18, 20	Fermentation – recombinant proteins & fats
8	Oct 25, 27	Cell culture & tissue engineering
9	Nov 1, 3	Cell culture & tissue engineering
10	Nov 8 (10 – no class)	Food materials and structure
11	Nov 15, 17	Algae, insects, others <b>Proposal outlines due (Nov 17 +/-)</b>
12	Nov 22, 24	<b>Exam 2 (Nov 22 +/-)</b>
13	Nov 29, Dec 1	<b>Proposal Presentations</b>
14	Dec 6	<i>last day</i>

## Course Assignments

### Weekly discussion participation

You will perform weekly tasks assigned by the instructor. Generally, these will be given out 1 week in advance and will consist of completing required reading &/or watching videos (e.g., recorded webinars) and preparing a short **Discussion Journal** &/or presentation. These will be graded as pass/fail for completion. Their purpose will be to keep you engaged in the material and facilitate group discussions and peer-to-peer learning. Each weekly task will be graded out of 2 (2 – fully complete; 1 – partially complete; 0 – incomplete). Students will reflect on the reading,

answer questions assigned, and participate in discussions during class. Students are encouraged to find related literature and share their ideas with the class.

Enter your Discussion Journals in the appropriate discussion board on Canvas.

### Proposal

Each student will prepare a proposal related to some aspect of developing alternatives to animal-based foods

*Recommended steps:* (1) Identify a subject area of interest. (2) Identify knowledge gaps in that subject area. Knowledge gaps could be of a fundamental, mechanistic nature (*i.e.*, we don't know how it works), or of a practical nature (*i.e.*, there is a problem that needs a solution). (3) Think of ways to address that knowledge gap—what needs to be studied to get the mechanistic information, or to solve the problem? (4) Narrow your ideas down to specific objectives and methods used to carry out those objectives. (5) Think about the impacts of your project if it was a success.

The process of developing the proposal will be broken into three assignments: (1) *Proposal Outline*. This will serve as a rough draft of your idea, that you can use to receive feed-back and further refine for step 2. (2) *Proposal presentation*. You will present your idea to the class and receive peer-feedback. (3) *Final written proposal*.

Further details on each assignment (format, requirements, Rubric) will be given later in the course.

Students will complete these assignments independently.

### Course Assessment

This course will be graded on a numeric scale (see below), using the following weighting:

Exam 1	12.5 %
Exam 2	12.5 %
Weekly Discussion participation	25 %
Proposal outline	5 %
Proposal presentation	10 %
Final written proposal	35 %

### Grade scale:

A+	A	A–	B+	B	B–	C+	C	C–	D	F
90-100	85-89	80-84	76-79	72-75	68-71	64-67	60-63	55-59	50-54	0-49

### 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](#).

## Learning Resources

UBC Library has a series of [undergraduate user guides](#) to support your learning.

UBC learning commons has resources for writing: <https://learningcommons.ubc.ca/>

## 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](#).

*Note: the above is a tentative Course Schedule, and the actual lecture content may change in response to student learning needs as the semester progresses. Course content and weighting of assignments/tests may change at the discretion of the instructor.*