FNH 302 Food Analysis Syllabus

Course Details

Course	FNH 302 [3-0-1] (hours/week of [lecture-lab-tutorial])
Prerequisites	Either (a) CHEM 201 or (b) CHEM 205; and either (a) CHEM 203 or (b) CHEM 233
Term/year	Winter Term 2 (January – April 2022)
Class day/time	**M/W/F 12:00-13:00**
Tutorial day/time	**Thursday 12:30-13:30**
Instructor	Dr. Derek Dee
Email	derek.dee@ubc.ca
Office hours	Please email me to schedule a ZOOM meeting
TA	Yuran Zhang
TA contact	yuran98@mail.ubc.ca
TA	Charlotte (Lanfang) Shi
TA contact	charlotte.shi@ubc.ca

Synchronous lecture/tutorial/one-on-one meetings will occur using ZOOM

Lecture:
Meeting ID: **********
Passcode: *******

Tutorial:
Meeting ID: **********
Passcode: ********

In-person lectures (if/when the course switches to in-person—TBD) will be in FNH 60. In-person tutorial sessions will be in ORCH-4074.

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 recently moved my lab to UBC. We study plant and animal proteins at the nanoscale to understand their properties for food and health applications.

Course Objectives

Analyzing the chemical composition of food is of utmost importance. Food analysis is foundational to nutrition and health, toxicology and safety, and microbiological, chemical and physical changes. Analysis of food components is required to provide nutrition labeling for informing the health-conscious consumer, for quality assurance during processing and storage and for regulatory purposes. Food analysis methodology depends on the product being analyzed, the purpose of the analysis and the availability of resources.

FNH 302 emphasizes the principles, advantages and limitations of food analysis methods. Module I includes sample handling and preparation, data reporting, and proximate analysis of moisture, ash, nitrogen, protein and lipids. Module II covers spectroscopy, titration, potentiometry, electrophoresis and chromatography, applied to vitamins, minerals, carbohydrates, proteins, lipids and food additives.

Learning Outcomes

Upon completion of this course students will be able to:

1. Explain technical terminology and scientific units related to food analysis and labelling
2. Perform calculations related to sample and reagent preparation
3. Analyze moisture, ash, nitrogen, protein, lipid and carbohydrate components of food
4. Describe spectroscopy, titration, potentiometry, electrophoresis and chromatography food analysis techniques
5. Contrast quality control and rapid screening techniques with labelling and regulatory compliance methods
6. Explain the importance of accuracy and reproducibility in analysis
7. Explain the principles behind analytical techniques associated with food*
8. Evaluate the appropriate analytical technique when presented with a practical problem*
9. Design an appropriate analytical approach to solve a practical problem*

* *Institute of Food Technologists Essential Learning Objectives* (IFT ELOs)

Course Format

This course will consist of online (ZOOM) classes, with lectures and active discussion activities. The ZOOM lectures will be recorded and made available for the duration of the course (*e.g.*, until the end of December). Students are encouraged to attend the lectures in real-time (*i.e.*, synchronous), but they may also view the lectures on their own time. One-on-one meetings with the instructor are encouraged, particularly for students with difficulties attending the lectures in real-time. Suggested readings, practice questions, case studies, and lecture slides will be posted

to Canvas. Additionally, a one-hour tutorial period will occur weekly, starting the second week of the course.

Course Readings

Textbook (required)

Food Analysis, 5th edition, edited by S. Suzanne Nielsen. Springer International Publishing, 2017. The ebook is available from the UBC library (Permalink: http://tinyurl.com/y45854bb)

Useful (optional) references

Food Analysis Laboratory Manual, 3rd Edition, edited by S. Suzanne Nielsen. Springer International Publishing, 2017. The ebook is available from the UBC library (Permalink: http://tinyurl.com/y6nz88b6)

Useful (optional) web sites on food composition and analysis of food composition

AOAC International
http://www.aoac.org/

Food and Nutrition Information Center
https://www.nal.usda.gov/fnic

Nutrition Labelling, Nutrient Content Claims and Health Claims:
CFIA Compliance Test to Assess the Accuracy of Nutrient Values
http://www.inspection.gc.ca/english/fssa/labeti/nutricon/nutricone.shtml

Learning Resources

UBC Library has a series of undergraduate user guides to support your learning. For the upcoming terms, their Online Learning video tutorial and UBC's Keep Learning website are helpful resources.

Course Schedule

Week	Topic	Assigned Text Readings (Chapter)
1	Introduction to Chemical Analysis Evaluation of Analytical Data Sampling and Sample Preparation	1 4 5
2	Overview of Proximate Analysis; Moisture & Total Solids Analysis Ash Analysis	15 16
3	Fat Analysis	17
3	Protein Analysis	18

4	Carbohydrate Analysis	19
4	*Quiz 1*	
5	Mineral Analysis pH and Titratable Analysis	21 22
6	*Mid-Term Exam (Feb 16, 18th)*	
7	*Reading week – no classes*	
8	Overview of spectroscopy, UV, fluorescence spectroscopy	6, 7
9	Infrared spectroscopy Atomic absorption & emission spectroscopy	8 9
10	Mass spectroscopy	11
10	*Quiz 2*	
11	Principles of Chromatography	12
11	High Performance Liquid Chromatography	13
12	Gas Chromatography	14
13	Immunoassays	27
	Final Exam (TBD)	

Course Assessment

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

Quiz 1 (~Feb 4th) 10%

Midterm Exam (Feb 16th, 18th) 40%

Quiz 2 (~Mar 18th) 10%

Final Exam (TBD) 40% (will mostly cover material after the Midterm exam)

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.

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.