

FOS 4321c - FOOD ANALYSIS (4 credits, Fall 2024)

Instructor:

Dr. Liwei Gu

Room 4

Food & Environmental Toxicology Lab (FETL)

on RTS bus route 9

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FETL room 11

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Course Description and Objectives

Students will learn chemical and instrumental methods to determine the content of various food components and nutrients necessary for food processing, nutritional value, and labeling.

- Gain a better understanding of analytical chemistry, instrumental analysis, and official methods in food science
- Apply physical and chemical methods to analyze a variety of food matrices.
- Identify analytical problems associated with food analysis, giving a sample for evaluation.
- Apply established analytical methods to determine physical and chemical characteristics, given a sample for analysis.
- Quantify, report, and interpret analytical data.
- Gain problem-solving skills applicable to the analysis of foods of various matrices.

Lecture

ARCH 0213

M, W, F - Period 3 (9:35-10:25 am)

Office hours

Wednesday 1:00-3:00 pm (Room 4 in FETL). I have an open-door policy outside of office hours. Call, email, or stop by our offices for questions or additional help. If you want to stop by, ensure we are there before going out – so call first.

Course Prerequisites

CHM 2200, CHM 2200L or CHM 2210, CHM 2211, CHM 2211L

Lab

Time: Friday 10:40-1:40 pm, FSHN building, room 310 (the FSHN teaching lab)

Format: The class will be divided into six groups (G1-G6), with 4-5 students per group.

Requirement:

1. You must **keep and bring a laboratory notebook** to **every** lab meeting.
2. You will always be expected to wear a lab coat and safety glasses.
3. Appropriate dress is expected for the lab. This includes always wearing closed-toe shoes (no sandals, flip-flops, or other shoes that do not completely cover your feet).
4. You **will be dismissed** from the lab on days where your safety may be compromised due to your attire, and you will remain responsible for class activities.

#	Content	Date	Participation points	Lab notebook	Quiz	Lab report points
1	Orientation and safety review	08/23/2024	3	n/a	n/a	No report
2	Titrateable Acidity & pH	08/30	3	4	5	25
3	Soluble Protein	09/06	3	4	5	25
4	Ascorbic acid analysis	09/13	3	4	4	25
5A	Lipid analysis - FFA/peroxide value	09/20	3	4	5	40 (combined report)
5B	Lipid analysis - Melonaldehyde (TBARS)	09/27	3	4	5	
6A/B	TLC and SPE separation of Dyes	10/04	3	4	8	40
7	HPLC analyses of caffeine in the beverage	10/11	3	4	5	25
8A	Proximate Analysis, moisture & ash	10/25	3	4	6	20 (protocol*)+45
8B	Proximate Analysis, protein & fat	11/01 (G1&2)	3	4	5	
8B	Proximate Analysis, protein & fat	11/15 (G3&4)				
8B	Proximate Analysis, protein & fat	11/22 (G5&6)				
Sum			30	36	48	225+20

*Each group must write and turn in a detailed protocol for Lab 8A&B. This will be given as a group assignment.

Lab Participation Points Scale

Items	Pts	Explanation
Attendance	1.0	A student arrives in the lab on time
	0.5	Extremely late; leave the lab too early.
	0	Unexplained absence - Note: This will also result in a zero for the lab report.
Safety and equipment use	1.0	Practices good safety habits; handles equipment correctly.
	0.5	Poor safety habits; Needs improvement in handling equipment.
	0	Unsafe practices; misuse/abuse of equipment
Clean-up	1.0	Areas well cleaned; general use areas clean
	0.5	Some areas are overlooked or not properly cleaned.
	0	Areas left unclean and unorganized.

Laboratory Notebooks (40 pts)

Notebooks must be some type of bound book, i.e., laboratory notebook, computation book, spiral-bound notebook, etc. It does not have to be expensive but should contain at least 100 pages.

- Before the lab: experimental outline procedures. It is up to the individual how they wish to do this (outline form, flow chart, or numbered steps are all acceptable).
- During the lab: record visual or sensory observations; record results as tables; record procedure changes, etc.
- Additional information sheets can be taped, stapled, or glued inside the notebook.
- Your lab notebook will be checked and signed at the beginning and after the lab. **It is the student's responsibility to make sure their lab notebook has been signed.**

Laboratory report and format (245 pts, for a total of 7 Lab reports)

Group components (one copy is required for each group)

Title/cover page: include names of your group members, number, title, and the date of the lab session

I. Introduction: background, objectives, reaction mechanisms, etc.

II. Materials and methods: you are not expected to copy and paste everything. You can cite the lab handouts.

III. Results: your data, standard curves, calculation, etc.

Individual components (each group member will write their own)

IV. Discussions (**bold text that answers required questions in lab handout**)

V. Conclusions

VI. References

Lab reports are due one and a half weeks after the laboratory exercise. They will be graded on aspects of data accuracy, format, accuracy of data reporting, and originality/accuracy of discussion. Late reports will be deducted 5 points per day.

Grading Criteria for Lab Report (25 pts)

Category	Reasons for points deductions	Points deducted
Title/ Cover Page (1 pt)	Names of participants missing	-1.0 only once
	Signatures missing	
	The report title and lab number are missing.	
I. Introduction (2 pts)	a) Omitted purpose or objectives	-0.5 each
	b) Copied handout without any creative thoughts	
	c) No introduction	-2.0
II. Materials and Methods (2 pts)	a) Omitted procedural changes	-1.0
	b) Omitted reference of textbook or lab handout	-1.0
	c) No material & method section	-2.0
III. Results (8 pts)	a) Omitted data, tables, or figures when necessary	-1.0 each
	b) Omitted calculations or statistics where necessary	
	c) Tables of data overlap, confusing	
	d) Tables or Figures not numbered or incorrectly numbered	
	e) The arrangement of data is confusing	
	g) No result section	-8.0
IV. Discussion (7pts)	a) No discussion of the actual data accumulated	-1.0
	b) Did not refer to which data was being discussed (i.e., which figure, table, etc.)	-1.0
V. Conclusions (3 pts)	c) Did not answer required questions in lab handout; did not bold answers in text; discussion of results are confusing or incorrect	-1.0 each
	d) Did not cite references to information used in the discussions	-1.0
	e) Omitted discussion of statistics when necessary	-1.0
	f) No recognizable conclusion statements	-2.0
	g) No discussion section	-7.0
	h) No conclusion section	-3.0
VI. References (2 pts)	a) References cited in text not listed here or vice versa	-0.5 each
	b) Reference incomplete or not in the required format (for example, lack of page numbers or author names for cited journal articles or book chapters)	
	c) No references used other than class texts and handout; misplaced reference section (for example, having reference section between results and discussion)	
	d) No references section	-2.0

- References should be in the style and format of your *Food Analysis* textbook.
- The class text (Nielsen) and lab handout shall be cited as references.
- There must also be at least one source from journal articles or sources other than the class text.

- NO internet references other than official governmental or university sites.

Required Text

S. Suzanne Nielsen. *Food Analysis, Fourth Edition*. (Springer Publishing Co.). An e-book is accessible through the UF library at <http://www.uflib.ufl.edu/>. You can download a PDF of each chapter from this e-book.

Course content

Lectures contain food analysis, data handling, and interpretation principles. Laboratory exercises will be introduced during weekly discussion sections, which will detail the principles of each lab exercise. There will be **three** 50-minute lectures and **one** 2.5-hour lab experience per week. Plan on spending at least **6** hours a week with your class! All course content is available at hppt://elearning.ufl.edu.

- **Session I - Foundational Knowledge and Chemical/Physical Methods (I)**
 - Chapter 1-3 READ on your OWN!!!
 - Ch. 13 pH and Titratable Acidity
 - Ch. 4 Evaluation of Analytical Data
 - Ch. 5 Sampling and Sample Preparation
 - Ch. 6 Moisture and Total Solids
 - Ch. 7 Ash Analysis
- **Session II - Spectroscopic & Chromatographic Methods**
 - Ch. 21 Basic principle of spectroscopy
 - Ch. 22 UV, VIS, Fluorescence Spectroscopy
 - Ch. 27 Chromatography
 - Ch. 28 High-Performance Liquid Chromatography (HPLC)
 - Ch. 29 Gas Chromatography (GC)
- **Session III - Chemical/Physical Methods (II)**
 - Ch. 10 Carbohydrate and Fiber Analysis
 - Ch. 8 Crude Fat Analysis
 - Ch. 14 Fat Characterization
 - Ch. 9 Protein Analysis
 - Ch. 15 Protein Characterization
 - Ch. 26 Mass spectrometry

Grading

1. Exams include multiple choice, short answers, essays, and problems.
2. Three non-cumulative examinations will be given on the following dates - 09/20/2024, 10/25/2024, 12/04/2024.
3. Content review in class and a study guide will be provided before each exam.
4. Makeup will only be given with the advance permission of the instructor.

NOTE: Late materials will be deducted 5 points per day. Any dispute on the grade should be sent to Dr. Gu within five days after a grade is released on e-learning. A late dispute will not be considered. Final grades will be assigned according to cumulative averages. Grades will be assigned according to UF grading policy.

Items and grade scales	Points
Exams (3 @ 155 pts)	465
Assignments	
• Foundational knowledge (I, II, III, IV)	60
• Writing Assignment (10+40+15)	65
• Peer review of writing assignment	25
• Lab-8 protocol group assignment	20
Laboratory	
Lab participation points (3x10)	30
Lab report points	225
Laboratory notebook (4x9)	36
Quiz in lab	48
Quiz in class	26
Total	1000

Grades	GPA	Percentage
A	4.00	94-100%
A-	3.67	88-94%
B+	3.33	82-88%
B	3.00	77-82%
B-	2.67	73-77%
C+	2.33	70-73%
C	2.00	68-70%
C-	1.67	66-68%
D+	1.33	64-66%
D	1.00	62-64%
D-	0.67	60-62%
E	0.00	<60%

Classroom Policies and Attendance

Students must attend all lectures and lab sessions. Justified absence and the UF attendance policy are available at <https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>. Non-justified absence for the lab will result in a **ZERO** for the lab participation and lab report. Special circumstances need to be addressed with the instructor and will be assessed on a case-by-case basis. Cellular phones are disruptive and must be turned off in the classroom and laboratory.

Academic Honesty

In 1995 the UF student body enacted an honor code and voluntarily committed itself to the highest standards of honesty and integrity. When students enroll at the university, they commit themselves to the standard drafted and enacted by students.

The Honor Pledge: We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity

On all work submitted for credit by students at the university, the following pledge is either required or implied: "***On my honor, I have neither given nor received unauthorized aid in doing this assignment.***"

Students should report any condition that facilitates dishonesty to the instructor, department chair, college dean, Student Honor Council, or Student Conduct and Conflict Resolution in the Dean of Students Office.

(Source: 2012-2013 Undergraduate Catalogs)

It is assumed all work will be completed independently unless the assignment is defined as a group project, in writing by the instructor.

This policy will be vigorously upheld at all times in this course.

Software Use:

All faculty, staff and students of the university are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against university policies and rules, disciplinary action will be taken as appropriate.

Campus Helping Resources

Students experiencing crises or personal problems that interfere with their general well-being are encouraged to utilize the university's counseling resources. The Counseling & Wellness Center provides confidential counseling services at no

cost for currently enrolled students. Resources are available on campus for students having personal problems or lacking clear career or academic goals, which interfere with their academic performance.

- University Counseling & Wellness Center, 3190 Radio Road, 352-392-1575, www.counseling.ufl.edu/cwc/
 - Counseling Services
 - Groups and Workshops
 - Outreach and Consultation
 - Self-Help Library
 - Training Programs
 - Community Provider Database
- Career Resource Center, First Floor JWRU, 392-1601, www.crc.ufl.edu/

Services for Students with Disabilities

The Disability Resource Center coordinates the needed accommodations of students with disabilities. This includes registering disabilities, recommending academic accommodations within the classroom, accessing special adaptive computer equipment, providing interpretation services and mediating faculty-student disability related issues.

Reid Hall, 352-392-8565, www.dso.ufl.edu/drc/