FOS 4321c - FOOD ANALYSIS (4 credits, Fall 2025)

Instructor:

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Course Description and Objectives

This course provides students with comprehensive knowledge of chemical and instrumental methods used to analyze the content of food components and nutrients essential for food processing, nutritional evaluation, and labeling. The curriculum emphasizes the application of analytical chemistry and instrumental techniques in the context of food science.

Objective: By the end of this course, students will be able to:

- Develop a solid understanding of analytical chemistry, instrumental analysis, and official methodologies in food science.
- Employ physical and chemical techniques to analyze diverse food matrices.
- Identify and address analytical challenges in food analysis through hands-on sample evaluations.
- Utilize established analytical methods to accurately determine food samples' physical and chemical properties.
- Quantify, interpret, and report analytical data effectively, adhering to professional standards.
- Enhance problem-solving skills applicable to analyzing foods with varied compositions and matrices.

Lecture

WEIM 1076
M, W, F - Period 3 (9:35-10:25 am)

Office hours

I have an open-door policy for in-person meetings. Call, email, or stop by my offices for questions or additional help. If you want to stop by, ensure we are there before going out – so call first. If you do not want to go to my office, email me to schedule a virtual meeting.

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 3-4 students per group.
Requirement:

1. You must **keep and bring a laboratory notebook** to **every** lab meeting.

2. You are expected to wear a lab coat, safety glasses, and gloves during the lab session.
3. Proper lab attire is mandatory. You must wear closed-toe shoes (no sandals, flip-flops, or other shoes that do not completely cover your feet).
4. If your attire compromises safety, you will be dismissed from the lab for that session and remain responsible for any missed class activities.
5. The lab schedule is subject to adjustments due to unforeseen events, such as hurricanes, which often occur on Fridays

#	Content	Date	Participation points	Lab notebook	Quiz	Lab report points
1	Orientation and safety review	08/22/2025	3	n/a	n/a	No report
2	Titratable Acidity & pH	08/29	3	4	5	25
3	Soluble Protein	09/05	3	4	5	25
4	Ascorbic acid analysis	09/12	3	4	4	25
5A	Lipid analysis - FFA/peroxide value	09/19	3	4	5	40 (combined report)
5B	Lipid analysis - Melonaldehyde (TBARS)	09/26	3	4	5	
6A/B	TLC and SPE separation of Dyes	10/03	3	4	8	40
7	HPLC analyses of caffeine in the beverage	10/10	3	4	5	25
8A	Proximate Analysis, moisture & ash	10/31	3	4	6	45
8B	Proximate Analysis, protein & fat	11/07 (G1&2)	3	4	5	
8B	Proximate Analysis, protein & fat	11/14 (G3&4)				
8B	Proximate Analysis, protein & fat	11/21 (G5&6)				
Sum			30	36	48	225

*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 *(36 pts)*

Your laboratory notebook is an essential tool for documenting your work. It must be a bound book such as a laboratory notebook, computation book, or spiral-bound notebook. While it does not need to be expensive or brand new, it should contain at least 100 pages to accommodate all necessary entries.

- **Before the Lab:**
  Prepare an outline of the experimental procedures. The format is flexible, and you may use any of the following:
  - Outline form
  - Flowchart
  - Numbered steps
- **During the Lab:**
  Record the following information in your notebook:
  - Visual or sensory observations
  - Results in table format

- Any changes made to the procedures

- **Additional Information:**
  Supplemental materials (e.g., data sheets and graphs) can be taped, stapled, or glued into the notebook.
- **Notebook Review and Signature:**
  Your lab notebook will be checked and signed at each lab session's beginning and end. It is **your responsibility** to ensure your notebook is signed during these times.

Laboratory report and format *(225 pts, for a total of 7 Lab reports)*

Group Components *(One copy per group)*

1. Cover Page:
   - Include the title and date of the lab session.
   - List your lab group number.
   - Provide an author contribution statement table detailing each group member's roles and contributions using the following example:

Group members	**Contribution to group components**
Member A	Coordination, drafted cover page, and submitted online
Member B	Drafted introduction and materials & methods
Member C	Results: Calculation
Member D	Drafted results

   - Be specific about the nature of your contributions. A contribution statement is required in all research papers with multiple authors.
2. Introduction:
   - Provide relevant background information.
   - Clearly state the objectives of the lab.
   - Include reaction mechanisms and other pertinent details.
3. Materials and Methods:
   - You do not need to copy the entire procedure.
   - Cite the lab handouts where applicable.
   - Detail any procedural changes
4. Results:
   - Present your data clearly and concisely.
   - Include standard curves, calculation examples, and statistical analyses.

Individual Components *(Each group member will write his or her own)*

5. Discussion:
   - Provide a thorough and scientifically sound interpretation of your results.
   - Address all required questions from the lab handout.
   - Highlight answers to discussion questions by bolding them within the text.
6. Conclusion:
   - Summarize your findings briefly.
   - Ensure the conclusion is clear and concise.
7. References:
   - Include all references cited in your report.

Submit your lab report as a single, consolidated document on the e-learning website within 10 calendar days after the laboratory exercise. They will be graded using the following rubric.

Grading Criteria for Lab Report (25 pts)

Category	Reasons for point deductions	Points deducted
Title/ Cover Page (1 pt)	The lab title, group number, or date is missing	-0.5 each
	Omitted the contribution statement table	-0.75
I. Introduction (2 pts)	a) Omitted purpose or objectives	-0.5 each
	b) Copied the 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 when necessary	
	c) Incorrect calculation	
	d) Numbers do not comply with the rule of significant figures	
	d) Tables or figures not numbered or incorrectly numbered	
	e) Part of the results is missing	
	g) No result section	-8.0
IV. Discussion (7pts)	a) Did not refer to which data was being discussed (i.e., which figure, table, etc.)	-1.0 each
	b) Did not answer the required questions in the lab handout	-1.5 each
	c) Did not bold answers for discussion questions in the text	-1.0 each
	d) Discussion of results is confusing or incorrect	-1.0 each
	e) Omitted discussion of statistics when necessary	-1.0 each
	f) Superficial discussion with less than 450 words for a 25-point report or less than 600 words for a 40-point report	-2.0
	g) No discussion section	-7.0
V. Conclusions (3 pts)	a) No clear points in the conclusion	-1.0
	b) Wordy conclusion longer than 200 words	-1.0
	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 must follow the style and format outlined in the Food Analysis textbook by Nielsen.
- Both the class text (Nielsen) and lab handouts should be cited as references where applicable.
- Include at least one additional reference from a peer-reviewed journal article or a credible source other than the class text.
- Internet references are not permitted, except for those from official government or university websites.

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, exams, and grading

1. Class contents are divided into three sessions.
   - **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 principles 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

2. After each session, there will be an exam to test your knowledge. There will be three non-cumulative exams. Exam questions include multiple choices, calculations, and short answers. This class does not have a final exam.
3. Study guide questions will be provided 10 days before each exam. Answer keys to the study guide questions will be provided 5 days before the exam
4. Makeup exams will only be granted with prior approval from the instructor.

Additional Policies:

- Late Submissions: Submissions of reports or assignments past the deadline will incur a deduction of 5 points per day. Conversely, students will receive five additional points per day for late grading exceeding 10 calendar days.
- Grade Disputes: Any grade disputes must be submitted to Dr. Gu within 10 calendar days of the grade being released on e-learning. Late disputes will not be considered.
- Final Grades: Final grades will be assigned based on cumulative averages and follow the University of Florida's grading policy.

Items and grade scales	**Points**
Exams (3 @ 155 pts)	465
Assignments	
• Foundational knowledge (I, II, III)	37
• Writing assignment (10+40+15)	65
• Peer review of writing assignment	20
• Lab-8 protocol group assignment	20

• Textbook questions	54 (16, 12, 12, 14)
Laboratory	
Lab participation points (3x10)	30
Lab report points	225
Laboratory notebook (4x9)	36
Quiz in the lab	48
Total	**1000**

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

Classroom Policies and Attendance

Attendance:

- Attendance is mandatory for all lectures and lab sessions.
- Justified absences will be handled in accordance with the UF atten6dance policy.
- Non-justified absences from lab sessions will result in a **ZERO** for lab participation and the lab report.
- Special circumstances must be discussed with the instructor and will be evaluated on a case-by-case basis.

Classroom Participation:

- This class utilizes the **iClicker response system** to enhance participation.
- Please download a free **iClicker Cloud app** to your smartphone or computer.
- iClicker remotes are no longer required.
- For setup instructions, refer to UF's iClicker Response System guide.

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/