

ADVANCED FOOD CHEMISTRY
FOS 6315C
Fall 2022, 4 credits (Lecture and Lab combined)

Lectures: MCCB 3124 (M, W, F; Period 8, 3-3:50pm)
Lab: FSHN Bldg., Room 310 (Thursday; Period 7-9, 1:55-4:55pm)

Instructor: Dr. Paul Sarnoski
Office: Room 3, FETL Annex (Bldg. 833)
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TA: Lindsey Christman
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Instructor Office Hours: by appointment

Course Description:

The course deals with the chemistry of the principal components of foods, their properties and interactions, and the changes that occur during processing, storage, and utilization. Emphasis will be on evidence derived from research literature, interpretation of research findings, and problem solving based on the scientific principles.

Prerequisites: Undergraduate courses in Organic Chemistry, Biochemistry (BCH 4024), and preferentially Food Chemistry (FOS 4311) or permission of the instructor.

Objectives:

1. Understand the chemical function and properties of major food components.
2. Understand the chemical interactions of food components and their effects on sensory and nutritional quality, functional properties, and safety of foods.
3. Understand the chemical basis of food preservation and the effects of processing and storage on food quality.
4. Familiarize the student with common analytical and experimental methods used in the study of the major food components.
5. Examine the basis of food chemistry-related issues in food safety, regulation, and current events.

Format: In-person. Lectures, laboratory exercises, discussion of scientific literature.
Participation in class discussion is expected.

Exams: Written exams will be given covering approximately each third of the course. The last exam will NOT be cumulative. You will have 2 hours to complete each exam. If our classroom is not available after 3:50pm I will reserve another room for exams.

The exams will be in short essay format and will include questions involving: (a) basic factual material with emphasis on major topics/principles; (b) solving practical problems in food

chemistry by application of food chemistry principles; and (c) application of the course material in the interpretation of research data.

<u>Tentative Exam schedule:</u>	Exam 1	9/30/22 (Fri.)
	Exam 2	11/2/22 (Wed.)
	Exam 3	12/16/22 (Fri.)

Grading:	Percent of Grade
Written examinations (3)	70
Laboratory:	
Reports (~5 written)	30

Please note that the University of Florida grading system includes the use of plus and minus grades, with the corresponding point values for each grade. Please see <https://student.ufl.edu/minusgrades.html> for additional information.

Grade Values for Conversion May 11, 2009 and After												
Letter Grade	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	E, I, NG, S-U, WF
Grade Points	4.0	3.67	3.33	3.00	2.67	2.33	2.00	1.67	1.33	1.00	.67	0.00

Grading Scale

90-100%	A	70-74.9%	C
88-89.9%	A-	68-69.9%	C-
85-87.9%	B+	65-67.9%	D+
80-84.9%	B	60-64.9%	D
78-79.9%	B-	58-59.9%	D-
75-77.9%	C+	Below 58%	E

The grading scale is consistent with the university policies on grading that can be found at: <https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

Book and Class Notes:

There is no current text that is a perfect fit for the graduate level food chemistry course.

However, Fennema's Food Chemistry (2017), 5th Edition (Damodoran, Parkin and Fennema, eds.) is the current best choice that exists at this time and will be our primary text and reference book. We will use this text as the major source of information for the lectures, and I will also assign readings from this textbook. The UF library currently owns a print and eBook version.

The eBook version can be found at the following link:

<https://uf.catalog.fcla.edu/uf.jsp?st=Fennema&ix=kw&fl=bo&V=D&S=0451628524909028&I=0#top>

This is an important book for any Food Scientist. I recommend that you have a copy of either the print or eBook (pdf) version for your own personal reference. If you desire that the page numbers in the notes match you will need the 5th Edition. The lecture notes will be posted on Canvas. We will primarily go through the lecture notes during class time.

In-Class Recording

Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A “class lecture” is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor is prohibited. To “publish” means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

Classroom Policies: Please don't check or send e-mail, texts, etc., during class or lab. Students are expected to be on time for lectures and lab. Students are expected to be familiar with the topic to be covered in lectures and labs and participate in class discussion. Makeup exams are frowned upon and will only be given with the advance permission of the instructor. Late assignments or lab reports will receive deductions at 2pts/day for each day late.

Academic Honesty

UF students are bound by The Honor Pledge which states, “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: “On my honor, I have neither given nor received unauthorized aid in doing this assignment.” The Conduct Code specifies a number of behaviors that are in violation of this code and the possible sanctions. [Click here](#) to read the Conduct Code. If you have any questions or concerns, please consult with the instructor or TAs in this class.

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 Resources

Health and Wellness

U Matter, We Care: If you or someone you know is in distress, please contact umatter@ufl.edu, 352-392-1575, or visit U Matter, We Care website to refer or report a concern and a team member will reach out to the student in distress.

Counseling and Wellness Center: Visit the Counseling and Wellness Center website or call 352-392-1575 for information on crisis services as well as non-crisis services.

Student Health Care Center: Call 352-392-1161 for 24/7 information to help you find the care you need, or visit the Student Health Care Center website.

University Police Department: Visit UF Police Department website or call 352-392-1111 (or 9-1-1 for emergencies).

UF Health Shands Emergency Room / Trauma Center: For immediate medical care call 352-733-0111 or go to the emergency room at 1515 SW Archer Road, Gainesville, FL 32608; Visit the UF Health Emergency Room and Trauma Center website.

GatorWell Health Promotion Services: For prevention services focused on optimal wellbeing, including Wellness Coaching for Academic Success, visit the GatorWell website or call 352-273-4450.

Academic Resources

E-learning technical support: Contact the UF Computing Help Desk at 352-392-4357 or via e-mail at helpdesk@ufl.edu.

Career Connections Center: Reitz Union Suite 1300, 352-392-1601. Career assistance and counseling services.

Library Support: Various ways to receive assistance with respect to using the libraries or finding resources.

Teaching Center: Broward Hall, 352-392-2010 or to make an appointment 352-392-6420.

General study skills and tutoring.

Writing Studio: 2215 Turlington Hall, 352-846-1138. Help brainstorming, formatting, and writing papers.

Student Complaints On-Campus: Visit the Student Honor Code and Student Conduct Code webpage for more information.

On-Line Students Complaints: View the Distance Learning Student Complaint Process.

Disability Statement

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, <https://disability.ufl.edu/>) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be

presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester

Online Course Evaluations

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at <https://gatorevals.aa.ufl.edu/students/>. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-results/>.

Course Outline:

- I. Physical and Chemical Properties of Water (Fennema Chapters 2 & 12)
 - A. Structure and chemical properties
 - B. Solute effects on water: state of water in foods
 - C. Water activity: principles, measurement, control, effects, related concepts
 - D. Acid-base chemistry of foods and common additives

- II. Carbohydrates (Fennema Chapter 3)
 - A. Simple sugars, sugar derivatives and oligosaccharides
 1. Basic chemistry; conformation, anomeric forms, equilibria, reactivity, sweetness
 2. Sugar derivatives: sugar alcohols, glycosides, etc.
 3. Browning and related reactions
 4. Case studies – acrylamide and furan formation in foods
 - B. Polysaccharides
 1. Basic structures and properties: starches, celluloses, gums, modification techniques
 2. Dietary fiber: components, properties, analysis

- III. Lipids (Fennema Chapter 4)
 - A. Content and role in foods
 - B. Analytical methods
 - C. Chemical, nutritional and physical properties
 - D. Processing of fats and oils
 - E. Degradation reactions

- IV. Proteins (Fennema Chapter 5)
 - A. Physical properties of proteins in relation to protein structure
 - B. Analytical methods
 - C. Basic properties: hydration, ionization, colloidal behavior
 - D. Functional properties
 - E. Effects of food processing: changes occurring in chemical, functional & nutritional properties of proteins
 - F. Nitrite function, chemistry and nitrosamine formation

ADVANCED FOOD CHEMISTRY LAB SCHEDULE – Fall 2022 (subject to change as needed)

Dates -----	Topic -----	Relative Point Value -----
8/25/22	No Lab	no report assigned
9/1/22	Lab procedures and safety review; Water activity measurement, principles, demonstration of water activity measurement	20 (Report 1 = Water activity due 9/15/22)
9/8/22	Open Date	
9/15/22	Amylose/Amylopectin Gelatinization and Gelation	30 (Report 2 = gelation due 10/6/22)
9/22/22	Open Date	
9/29/22	Lipid Extraction (Lipids = Three week lab)	
10/6/22	FAME derivatization of Fatty acids	
10/13/22	Interpret lipids data (Dr. Sarnoski will be available)	30 (For all lipid studies; Report 3 due 10/27/22)
10/20/22	Open Date	
10/27/22	Protein Isolation	
11/3/22	Measurement of protein concentration Introduction to online protein databases	30 (Report 4= isolation, measure, and informatics due 11/16/22)
11/10/22	Electrophoresis	20 (Report 5 = PAGE due 12/2/22)
11/17/22	Open Date	
11/24/22	Thanksgiving	
12/7/22	Last day of classes	

Total pts = 130 pts (30% of the FINAL GRADE)