

ADVANCED FOOD CHEMISTRY

FOS 6315C

Fall 2019, 4 credits (Lecture and Lab combined)

Lectures: McCarty Hall B (MCCB), Room 1108 (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: Lea Barny
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Email: lea.barny@ufl.edu

Instructor Office Hours: open door policy or 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: 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 final exam will NOT be cumulative. You will have 2 hrs 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	10/2/19 (Wed.)
	Exam 2	11/8/19 (Fri.)
	Exam 3	12/12/19 (Thur. 5:30-7:30pm)

Grading:	Percent of Grade
Written examinations (3)	70
Laboratory:	
Reports (~6 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, 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?ix=kw&st=Fennema&V=D&S=0571564773307713&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.

The lecture notes will be posted on Canvas. We will primarily go through the lecture notes during class time.

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.

Academic Honesty

As a student at the University of Florida, you have committed yourself to uphold the Honor Code, which includes the following 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."* You are expected to exhibit behavior consistent with this commitment to the UF academic community, and on all work submitted for credit 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."*

It is assumed that you will complete all work independently in each course unless the instructor provides explicit permission for you to collaborate on course tasks (e.g. assignments, papers, quizzes, exams). Furthermore, as part of your obligation to uphold the Honor Code, you should report any condition that facilitates academic misconduct to appropriate personnel. It is your individual responsibility to know and comply with all university policies and procedures regarding academic integrity and the Student Honor Code. Violations of the Honor Code at the University of Florida will not be tolerated. Violations will be reported to the Dean of Students Office for consideration of disciplinary action. For more information regarding the Student Honor Code, please see: <http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code>.

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
Wellness Coaching

- U Matter We Care, www.umatter.ufl.edu
- Career Resource Center, First Floor JWRU, 392-1601, www.crc.ufl.edu/

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/>.

Student Complaints:

- Residential Course: https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf

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

V. Enzymes (Fennema Chapter 6)

- A. Factors affecting reaction rate; characteristics of enzymatic reactions
- B. Deleterious enzymes in food systems