

FDSCTE 5600 - Food Chemistry

Course Credit: 3-credits

Course Requirements:

Prereq: FDSCTE 2400, CHEM 2510 or Grad standing (with no Food Science degree)

Prereq or concur: BIOCHEM 4511

Offering Semester: Fall 2020

Instructor Dr. Farnaz Maleky
319 Parker Food Science and Technology 9
Phone: 614-688-1491; e-mail: maleky.1@osu.edu

Co-Instructor Dr. Lynn Knipe
321 Parker Food Science and Technology
Phone: 614-292-4877; e-mail: knipe.1@osu.edu

TAs:

- 3-4 Grad students (Assigned each year by the Department)

Course Description

- Describe the sources and compositions of food components
- Develop a relationship between the composition of the individual food components and their chemical and physical properties
- Understanding the chemistry of food components during processing and storage

Course Objective

- ✓ To understand the principles underlining the modification of foods
- ✓ Develop understanding of how individual food components contributes to the overall quality of foods.
- ✓ Recognize reactions and mechanisms important in food chemistry.
- ✓ Be capable of designing and conducting experiments and interpreting data to understand important food chemistry principles.
- ✓ To know the important characteristics of safe and high quality foods

Class Time:

- **Lectures (Online Synchronous)** M, W 9:10 – 10:05 am;
- **Labs (In person)** : Tu 10:15 – 12:35 am or Tu 1:50 – 4:10 pm.

Office hours:

- In person meetings by appointments on Tuesdays (9am-5 pm).
- If Tuesday does not work for the students, Zoom meetings will be scheduled for virtual office hours.
- TAs communications with the students will be done by emails and if needed with Zoom meetings.
- Students emails will be responded within 24 hours on school days.

How this course works

Mode of Delivery: Hybrid

- **Lectures (Online):** M, W 9:10 – 10:05 am.
 - Synchronous Lecturing.
 - Lectures will be offered via Zoom (see Course Technology)
 - Lectures PowerPoint will be posted in Carmen at least 1 hours before each session.

- **Labs (In person) :** Tu 10:15 – 12:35 am or Tu 1:50 – 4:10 pm.
 - All the labs explanation and experiments, including pre-assignments checking will be done in person.
 - Lab notes and pre-assignments will be posted in Carmen at least 3 days before each lab.
 - Lab data discussions (one week after collecting data) will be done online on Tuesdays.

Attendance policy and participation requirements:

- Students attendance in online lecture sessions are not required.
- Student attendance in all the labs and lab data discussion sessions are required. (Grading Policy explains penalty for lab missing.)

* In case of emergencies or other issues (e.g., connectivity) that might cause studentsto miss an entire week of class or any labs, discuss it with the instructor *as soon as possible*.Accommodations will be made with appropriate documentation on a case-by-case basis

Course materials and technologies

Main Textbook (Optional):

- Food Chemistry, 4th edition", Srinivasan Damodaran, Kirk L. Parkin, Owen R. Fennema (Editors), CRC Press/Taylor & Francis, 2008.

Reference Texts

- Introductory Food Chemistry, John W. Brady, Cornell University Press, 2013

- Principles of Food Chemistry, 3rd Edition (J.M. deMan), Springer Science, NY. 1999

- Crystallization and solidification properties of lipids, Neil Widlak; Richard W Hartel; Suresh Narine : AOCS Press,2001.

- Principles of Food Chemistry, Second Edition (J.M. deMan), Van Nostrand Reinhold, NY. 1990

- Food Chemistry – A Laboratory Manual, Dennis D. Miller. 1998. John Wiley & Sons, 1998

Course technology

For help with your password, university e-mail, Carmen, or any other technology issues, questions, or requests, contact the OSU IT Service Desk. Standard support hours are available at <https://ocio.osu.edu/help/hours>, and support for urgent issues is available 24x7.

- Self-Service and Chat support: <http://ocio.osu.edu/selfservice>
- Phone: 614-688-HELP (4357)
- Email: 8help@osu.edu
- TDD: 614-688-8743

Baseline Technical Skills for Online Courses

- Basic computer and web-browsing skills
- Navigating Carmen: for questions about specific functionality, see the [Canvas Student Guide](#).

Required Technology Skills Specific to This Course

- CarmenZoom virtual meetings

Required Equipment

- Computer: current Mac (OS X) or PC (Windows 7+) with high-speed internet connection
- Webcam: built-in or external webcam, fully installed and tested
- Microphone: built-in laptop or tablet mic or external microphone
- Other: a mobile device (smartphone or tablet) or landline to use for BuckeyePass authentication

Required Software

- [Microsoft Office 365](#): All Ohio State students are now eligible for free Microsoft Office 365 ProPlus through Microsoft's Student Advantage program. Full instructions for downloading and installation can be found [at go.osu.edu/office365help](http://go.osu.edu/office365help).

Carmen Access

You will need to use [BuckeyePass](#) multi-factor authentication to access your courses in Carmen. To ensure that you are able to connect to Carmen at all times, it is recommended that you take the following steps:

- Register multiple devices in case something happens to your primary device. Visit the [BuckeyePass - Adding a Device](#) help article for step-by-step instructions.

- Request passcodes to keep as a backup authentication option. When you see the Duo login screen on your computer, click **Enter a Passcode** and then click the **Text me new codes** button that appears. This will text you ten passcodes good for 365 days that can each be used once.
- Download the [Duo Mobile application](#) to all of your registered devices for the ability to generate one-time codes in the event that you lose cell, data, or Wi-Fi service.

If none of these options will meet the needs of your situation, you can contact the IT Service Desk at 614-688-4357 (HELP) and IT support staff will work out a solution with you.

Grading Policy

- | | |
|-------------------------------|-----|
| • In Person Exams (4 Quizzes) | 45% |
| • Lab reports | 40% |
| • Comprehensive final exam | 15% |
| • Bonus (explained in Page 5) | 3% |

In Person Exams: Quizzes will be given to test your knowledge on concepts covered in the lecture materials. These cannot be made up unless you have a documented health reason. All 4 quizzes will be in person. Examinations will only be re-graded if originally written in permanent ink.

Lab Reports: Permanently bound lab notebooks will be used to record all data during labs and must be available for review by the TAs or Instructors at any time during a laboratory session. All lab reports and homework assignments must be prepared using an appropriate word processor and spreadsheet program. Eye protection must be worn at all times during lab exercises, a penalty of 5 points will be deducted (for each lab report) from any student found without appropriate eye protection. Absence from a laboratory session (including lab data discussion sessions) will be an automatic zero for that lab report unless a valid documentable/written excuse is provided. If you are more than 10 minutes late for a lab session, or a lab data discussion sessions, this will also constitute an absence. Detailed rubric for the lab reports and how to develop the labreport based on the experimental data will be given in the lab data discussion sections.

Health and Safety Requirements: For in Person lab session or meetings, all the participants are required to comply with and stay up to date on all university safety and health guidance (<https://safeandhealthy.osu.edu>), which includes wearing a face mask in any indoor space and maintaining a safe physical distance at all times. Non-compliance will result in a warning first, and disciplinary actions will be taken for repeated offenses. All should complete required training and sign the [Buckeye Pledge](#). Before entering this class studnets must complete a daily health assessment. While in the room students must maintain physical distance, wear a safe mask, and practice current safety procedures on the [Safe and Healthy Buckeyes](#) site. Anyone who does not practice safety requirements will be reminded of how to do this and given the opportunity to comply. If non-compliance is intentional or chronic they must leave class and be marked absent. Repeated violations of safety protocols may result in a grade reduction or suspension with a report to [Student Conduct](#) to implement [accountability measures](#).

Final Exam: The final exam is comprehensive and will assess students' learning of topics throughout the semester. Final exam will be Online.

Bonus: Up to 3 % bonus will be given to students who attend the sessions and participate in the discussions and extra homework. Hence student's attendance in each session will be recorded.

Grading scale

| | | | |
|----|------------|----|------------|
| A | ≥93% | C+ | ≥ 77% <80% |
| A- | ≥90% <93% | C | ≥73% <77% |
| B+ | ≥87% <90% | C- | ≥70% <73% |
| B | ≥83% <87% | D+ | ≥ 67% <70% |
| B- | ≥ 80% <83% | D | ≥ 63% <67% |
| | | E | Below 63% |

Late assignments

Lab Report Grade Deductions:

Deductions will be made to lab reports as follows:

- **10 points** will be deducted per day late, including weekends. Labs are due at 11:59 pm on the specified due date, no exceptions.
- **5 points** will be deducted from your laboratory report if you do not complete the pre-laboratory assignment.
- **5 points** will be deducted from the lab reports of the entire lab section if the lab is not clean following an exercise. This includes cleaning glassware, countertops, and ensuring all waste is disposed of properly. Additional cleaning due to Covid-19 Pandemic may be requested, as well.
- In case of any emergencies or illness that impacts lab reports submission contact the instructor immediately for guidelines, otherwise the following policy is applied.

Make-up Exam, Laboratory Exercises and Assignment Policy

Students are expected to take exams, perform laboratory exercises and turn in assignments at the regularly scheduled time. If a student cannot complete the specified coursework because of illness, that student must notify the professor *prior* to the exam, lab exercise or assignment due date. Appropriate documentation (e.g. Physician notes), will be required in order to be considered an excused absence. For an unexcused absence, an automatic grade of 0 pts will be assigned for the missed exam or laboratory exercise/report.

Exams and assignments will not be re-graded at the end of the semester. A late penalty (detailed above) will be deducted from each assignment turned in late, including weekend days. No late assignments will be accepted after the final exam. Students are expected to attend every lab session and the data discussion sessions.

Basic Lab Requirements:

- Wear close-toed shoes
- Wear a lab coat (can also be old button up shirt)
- Keep a lab notebook
- Be courteous to others in the lab
- Follow the directions of the instructors and teaching assistants
- Wear eye protection at all times
- NEVER wear contact lenses in lab
- No eating, drinking, chewing gum or pipetting by mouth in the lab
- Use appropriate waste containers
- Wear gloves when handling chemicals and samples

University Statements and Policies:

Ohio State's academic integrity policy

Academic integrity is essential to maintaining an environment that fosters excellence in teaching, research, and other educational and scholarly activities. Thus, The Ohio State University and the Committee on Academic Misconduct (COAM) expect that all students have read and understand the university's *Code of Student Conduct* (studentconduct.osu.edu), and that all students will complete all academic and scholarly assignments with fairness and honesty. Students must recognize that failure to follow the rules and guidelines established in the university's *Code of Student Conduct* and this syllabus may constitute "Academic Misconduct."

The Ohio State University's *Code of Student Conduct* (Section 3335-23-04) defines academic misconduct as: "Any activity that tends to compromise the academic integrity of the university or subvert the educational process." Examples of academic misconduct include (but are not limited to) plagiarism, collusion (unauthorized collaboration), copying the work of another student, and possession of unauthorized materials during an examination. Ignorance of the university's *Code of Student Conduct* is never considered an excuse for academic misconduct, so I recommend that you review the *Code of Student Conduct* and, specifically, the sections dealing with academic misconduct.

If I suspect that a student has committed academic misconduct in this course, I am obligated by university rules to report my suspicions to the Committee on Academic Misconduct. If COAM determines that you have violated the university's *Code of Student Conduct* (i.e., committed academic misconduct), the sanctions for the misconduct could include a failing grade in this course and suspension or dismissal from the university. If you have any questions about the above policy or what constitutes academic misconduct in this course, please contact me.

Other sources of information on academic misconduct (integrity) to which you can refer include:

- Committee on Academic Misconduct web page (go.osu.edu/coam)
- *Ten Suggestions for Preserving Academic Integrity* (go.osu.edu/ten-suggestions)

- *Eight Cardinal Rules of Academic Integrity* (go.osu.edu/cardinal-rules)

Copyright for instructional materials

The materials used in connection with this course may be subject to copyright protection and are only for the use of students officially enrolled in the course for the educational purposes associated with the course. Copyright law must be considered before copying, retaining, or disseminating materials outside of the course.

Creating an environment free from harassment, discrimination, and sexual misconduct

The Ohio State University is committed to building and maintaining a community to reflect diversity and to improve opportunities for all. All Buckeyes have the right to be free from harassment, discrimination, and sexual misconduct. Ohio State does not discriminate on the basis of age, ancestry, color, disability, ethnicity, gender, gender identity or expression, genetic information, HIV/AIDS status, military status, national origin, pregnancy (childbirth, false pregnancy, termination of pregnancy, or recovery therefrom), race, religion, sex, sexual orientation, or protected veteran status, or any other bases under the law, in its activities, academic programs, admission, and employment. Members of the university community also have the right to be free from all forms of sexual misconduct: sexual harassment, sexual assault, relationship violence, stalking, and sexual exploitation.

To report harassment, discrimination, sexual misconduct, or retaliation and/or seek confidential and non-confidential resources and supportive measures, contact the Office of Institutional Equity:

1. Online reporting form at equity.osu.edu,
2. Call 614-247-5838 or TTY 614-688-8605,
3. Or Email equity@osu.edu

The university is committed to stopping sexual misconduct, preventing its recurrence, eliminating any hostile environment, and remedying its discriminatory effects. All university employees have reporting responsibilities to the Office of Institutional Equity to ensure the university can take appropriate action:

- All university employees, except those exempted by legal privilege of confidentiality or expressly identified as a confidential reporter, have an obligation to report incidents of sexual assault immediately.
- The following employees have an obligation to report all other forms of sexual misconduct as soon as practicable but at most within five workdays of becoming aware

of such information: 1. Any human resource professional (HRP); 2. Anyone who supervises faculty, staff, students, or volunteers; 3. Chair/director; and 4. Faculty member.

This course adheres to The Principles of Community adopted by the College of Food, Agricultural, and Environmental Sciences. These principles are located on the Carmen site for this course; and can also be found at <https://go.osu.edu/principlesofcommunity>. For additional information on Diversity, Equity, and Inclusion in CFAES, contact the CFAES Office for Diversity, Equity, and Inclusion (<https://equityandinclusion.cfaes.ohio-state.edu/>). If you have been a victim of or a witness to a bias incident, you can report it online and anonymously (if you choose) at <https://studentlife.osu.edu/bias/report-a-bias-incident.aspx>.

Your mental health

As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce a student's ability to participate in daily activities. No matter where you are engaged in distance learning, The Ohio State University's Student Life Counseling and Consultation Service (CCS) is here to support you. If you find yourself feeling isolated, anxious or overwhelmed, on-demand resources are available at go.osu.edu/ccsondemand. You can reach an on-call counselor when CCS is closed at 614- 292-5766, and 24-hour emergency help is also available through the 24/7 National Prevention Hotline at 1-800-273-TALK or at suicidepreventionlifeline.org. The Ohio State Wellness app is also a great resource available at go.osu.edu/wellnessapp.

Accessibility accommodations for students with disabilities

Requesting accommodations

The university strives to make all learning experiences as accessible as possible. If you anticipate or experience academic barriers based on your disability including mental health, chronic or temporary medical conditions, please let me know immediately so that we can privately discuss options. To establish reasonable accommodations, I may request that you register with Student Life Disability Services. After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. **SLDS contact information:** slds@osu.edu; 614-292-3307; 098 Baker Hall, 113 W. 12th Avenue.

Accessibility of course technology

This online course requires use of CarmenCanvas (Ohio State's learning management system) and other online communication and multimedia tools. If you need additional services to use these technologies, please request accommodations with your instructor.

- [Canvas accessibility \(go.osu.edu/canvas-accessibility\)](http://go.osu.edu/canvas-accessibility)
- Streaming audio and video
- CarmenZoom accessibility (go.osu.edu/zoom-accessibility)
- Collaborative course tools

Course Lectures' Outline (Online)

Week 1:

- Introduction, Energy of activation

Week 2

- EA & Reactions rate
- Water: Functional Properties

Week 3

- Water Crystals and Glassy
- Water Activity and Stability

Week 4

- Lipids source and calcifications
- Lipids modifications and reactions

Week 5

- Lipids oxidations
- Antioxidants

Week 6

- Lipids crystallizations
- Polymorphism

Week 7

- Lipids Physical Properties

Week 8

- Carbohydrates structure

Week 9

- Carbohydrates reactions
- Browning & Caramelization

Week 10

- Maillard reaction and control
- Carbohydrates: Enzymatic browning

Week 11

- Amino acids

Week 12

- Proteins Structure

Week 13

- Functional properties of Proteins in Food
- Proteins nutritional properties

Week 14

- Proteins Modifications
- Enzymes

Course Labs' Activity (In person)

Lab 1:

- Moisture Isotherm

Lab2:

- Lipids Oxidation and Extraction

Lab3:

- Lipids Analysis (DSC, NMR, XRD, TPA, PLM)

Lab4:

- Non-Enzymatic Browning

Lab5:

- Protein Functionality (Solubility)

Lab6:

- Protein Functionality (PI)

Lab7:

- Emulsions and Foaming