

FST 7620: Food and Nutritional Toxicology (2 credits)
Spring Semester Session 1, 2021

Meeting dates and location:

Lecture Hours: Monday/Thursday 9:10-11:00 am, Session 1 (1/11/21 – 2/26/21)

Lecture Location: Zoom, Meeting ID: 965 7416 4111, Password: 377506

<https://osu.zoom.us/j/96574164111?pwd=ZEY5QjhuZzhUb1JROG0yZlpTZ0cvQT09>

Students are expected to attend class synchronously during the designated meeting time.

Instructor: Jessica Cooperstone, Ph.D.

Office: 348 Howlett Hall

Email: cooperstone.1@osu.edu (preferred method of contact)

Phone: 614-292-2843 (not a preferred form of contact)

Office hours: by appointment

Co-instructor: Morgan Cichon, Ph.D., Senior Medical Safety Analyst, Abbott Nutrition

Email: morgan.cichon@abbott.com

Credit hours: 2 credits

Pre-requisites: Biochem 4511 or 5613 or equivalent, or approval of instructor

Textbook/readings: no formal textbook is required. Readings will be assigned periodically and provided by the instructor.

Course materials: posted to Carmen.

Course Description:

Basic principles of food and nutritional toxicology with primary emphasis on food components and food toxins. The course will cover an overview of absorption, metabolism and excretion of xenobiotics, allergenic and toxic constituents in plant, animal, marine and fungal origin, the role of diet and nutrients in mutagenesis and carcinogenesis, food processing induced toxins and the procedures, laws and regulation of safety assessment of foods including food additives, environmental contaminants, pesticides, antibiotic residues and dietary supplements.

Objectives:

Students will learn:

1. To understand basic principles of food and nutritional toxicology related to oral exposure routes.
2. To provide an overview of potentially toxic constituents present in the food supply intentionally or naturally-occurring.
3. To understand absorption, metabolism and excretion of xenobiotic compounds.
4. To provide factual information on the topic of food safety involving specific chemical toxicants, food additives, residues, etc. such that they can assimilate and utilize this knowledge as professionals in their field.
5. To be informed of the current laws, regulations and procedures for food safety assessment.

Assessment:

<i>Assessment</i>	<i>Points</i>	<i>Percentage</i>
Presentation	15	15%
Research paper	15	15%
Participation	20	20%
Mid-term reflection	25	25%
Final assignment	25	25%

Presentation: All students need to research and deliver a presentation on a current topic. The presentation will be delivered in class during the semester. Presentations will occur on 2/18 and 2/22/2021 and students will be assigned their presentation date during the first week of class.

Research Paper: All students will complete a research paper on the same topic of their oral presentation. Papers will be due on 3/1/2021 via Carmen.

Participation: Students are also expected to contribute actively to class discussions on lecture topics and current issues. Participation can occur during class orally, through the Zoom chat, and through Carmen discussion boards.

Mid-term reflection: There will be a mid-term which will be conducted individually and involve application of material learned in the course. This will be a take-home assignment and submitted via Carmen. Due date is TBD.

Final assignment: The final assignment will be an in class discussion based on the material presented during this course. You will be provided reading material, and should come to class on 2/25/2021 ready to discuss the topic given to you.

Grading scale: Grades can be adjusted upward but will not be adjusted downward (e.g., an 88 can become an A- but an 81 will not become a C+).

<i>Points</i>	<i>Grade</i>	<i>Percentages</i>
372-400	A	93-100%
360-371	A-	90-92.9%
348-359	B+	87-89.9%
332-347	B	83-86.9%
320-331	B-	80-82.9%
308-319	C+	77-79.9%
292-307	C	73-76.9%
280-291	C-	70-72.9%
268-279	D+	67-69.9%
252-267	D-	63-66.9%
Below 252	E	<63%

Tentative Lecture & Course Content:

Introduction: course description, objectives, content and expectations. Students choose topics for research paper and presentation

Basic Principles of Toxicology: acute vs chronic toxicity, toxic dose, toxicokinetics, LD50, dose-response relationships, local vs systemic toxicity, antagonism, synergism and potentiation.

Structure and function of the GI tract: discussion on the structure and function of the GI tract involved in toxin absorption

Absorption, Distribution, Metabolism, and Excretion of Toxic Agents: the mode of transport and absorption at the cellular levels, enzymes involved and mode of action of phase I and phase II reactions, concepts of metabolic activation, reactive intermediates, conjugation and detoxification.

Excretion of Foodborne Toxins: mechanisms of urinary and biliary excretion of foreign compounds

Dietary Supplements

Food Intolerances and Sensitivities: Lactose intolerance, favism, celiac disease, acute alcohol intolerance

Food Allergies: IgE mediated allergies, diagnosis of hypersensitivity, allergenic food components, treatment of allergies, prevalence of allergies in infants, galactosemia

Mutagens, Carcinogens, and Chemoprevention: etiology of human cancer, fundamentals of genetic toxicology, DNA damage, initiation, promotion, and progression. Ames and mutagenicity assays, species and genetic differences. Antioxidant function and properties of phytochemicals and functional foods.

Toxic Constituents of Plant and Animal Origin: antivitamins, enzyme inhibitors, goitrogens, cyanogenic glycosides, oxalates, phytates, saponins, hemagglutinins, estrogens and oligosaccharides.

Sulfites and Other Food Additives: Occurrence, function, metabolism, and safety of sulfites. Tartrazine, MSG, bisphenol A, recombinant bovine somatotropin, diacetyl, melamine.

Nitrites, Nitrates and Nitrosamines: nitrite use and benefits, metabolism, and bioactivation, prevalence in foods, nitrosamine chemistry and toxicology.

Antibiotic Residues: use in animals, concerns, resistance bacteria.

Toxic Constituents of Marine Origin and Fungal Origin: puffer fish, paralytic shellfish poisoning, ciguatera poisoning, toxic algae, histamine and scombroid. Mushrooms (amanita toxins), hydrazines, and ipomeamarons.

Pesticides: classifications, pest resistance, laws and regulations, organochloride insecticide, organophosphates, carbamates, natural insecticides, herbicides, fungicides, rodenticides, fumigants, PCB's

Risk and Food Safety Assessment: recommended procedures, laws and regulations, quantitative risk assessment, risk-benefit concept, naturally occurring vs added substances, FDA 'de minimis' policy.

FDA Redbook: principles for safety assessment of direct food and color additives, compound classification, required studies, and limitations.

Course calendar:

Date	Day of the week	Topic	Instructor
1/11/2021	Monday	Introduction to the course Basic principles of (food) toxicology Toxicology in the food industry	Jess Jess Morgan
1/14/2021	Thursday	Structure and function of the gastrointestinal tract Risk assessment	Jess Morgan
1/18/2021	Monday	No class, Martin Luther King Jr. day	
1/21/2021	Thursday	Absorption and distribution	Jess
1/25/2021	Monday	Metabolism and xenobiotic transformation	Jess
1/28/2021	Thursday	Excretion Food and drug interactions	Jess
2/1/2021	Monday	Food allergies and intolerances	Morgan & Kim Yeager*
2/4/2021	Thursday	Safety and toxicology of genetically modified foods, discussion	Jess
2/8/2021	Monday	Regulatory	Amy Mackey*
2/11/2021	Thursday	A case study: sweetener toxicology	Morgan
2/15/2021	Monday	Discussion based activity	Jess
2/18/2021	Thursday	Student presentations	
2/22/2021	Monday	Student presentations	
2/25/2021	Thursday	Capstone "final" discussion	Jess

*Dr. Kim Yeager is a Toxicologist Research Manager at Abbott Nutrition. Dr. Amy Mackey is the Directory of Regulatory Affairs at Abbott Nutrition

Course policies:

My primary mode of communication with class will be during class time, and by email. For graded assignments, you can expect feedback within 7 days, and you can expect replies to emails within 24 hours.

Attendance policy: Students are expected to attend class synchronously during the designated meeting time, unless we have discussed otherwise. However, I understand that things happen outside of your control and I will record classes. If a conflict should arise, please let me know ahead of class if possible, and as close to your absence as possible such we can coordinate.

Late assignments: I expect you to turn assignments in on time. However, I am also reasonable and we want to see you master the material in this class. If there are extenuating circumstances that prevent you from turning in an assignment on time, please connect with me as soon as possible after such a situation arises for further discussion. Unexcused late assignments will be docked 10% of total possible points per day late.

Policies:

Academic Misconduct: It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term "academic misconduct" includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct at Student Life <http://studentconduct.osu.edu>.

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*, 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:

- The Committee on Academic Misconduct web pages ([COAM Home](#))
- *Ten Suggestions for Preserving Academic Integrity* ([Ten Suggestions](#))
- *Eight Cardinal Rules of Academic Integrity* (www.northwestern.edu/uacc/8cards.htm)

If you have any questions about the above policy or what constitutes academic misconduct in this course, please reach out to your instructor.

Copyright disclaimer: 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. Intellectual Property (covered by copyright) includes Course materials (Text, Audio, Video, Multimedia, Sims, Apps, etc.), and Student Generated materials

Required Equipment:

- **Computer:** current Mac (MacOS) or PC (Windows 10) 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) to use for BuckeyePass authentication

If you do not have access to the technology you need to succeed in this class, review options for [technology and internet access](https://go.osu.edu/student-tech-access) (go.osu.edu/student-tech-access).

Required Software:

Microsoft Office 365: All Ohio State students are now eligible for free Microsoft Office 365. Visit the [installing Office 365](https://go.osu.edu/office365help) (go.osu.edu/office365help) help article for full instructions.

CarmenCanvas Access

You will need to use [BuckeyePass](https://buckeyepass.osu.edu) (buckeyepass.osu.edu) 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 do each of the following:

- Register multiple devices in case something happens to your primary device. Visit the [BuckeyePass - Adding a Device](https://go.osu.edu/add-device) (go.osu.edu/add-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.
- [Install the Duo Mobile application](https://go.osu.edu/install-duo) (go.osu.edu/install-duo) on 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 \(HELP\)](tel:614-688-4357) and IT support staff will work out a solution with you.

Technology Skills Needed for This Course

- Basic computer and web-browsing skills
- [Navigating CarmenCanvas](https://go.osu.edu/canvasstudent) (go.osu.edu/canvasstudent)
- [CarmenZoom virtual meetings](https://go.osu.edu/zoom-meetings) (go.osu.edu/zoom-meetings)
- [Recording a slide presentation with audio narration and recording, editing and uploading video](https://go.osu.edu/video-assignment-guide) (go.osu.edu/video-assignment-guide)

Technology Support:

For help with your password, university email, CarmenCanvas, or any other technology issues, questions or requests, contact the IT Service Desk, which offers 24-hour support, seven days a week.

- **Self Service and Chat:** go.osu.edu/it
- **Phone:** [614-688-4357 \(HELP\)](tel:614-688-4357)
- **Email:** servicedesk@osu.edu

Disability Services:

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; slds.osu.edu; 098 Baker Hall, 113 W. 12th Avenue.

Requesting accommodations: If you would like to request academic accommodations based on the impact of a disability qualified under the Americans with Disabilities Act and Section 504 of the Rehabilitation Act of 1973, contact your instructor privately as soon as possible to discuss your specific needs. Discussions are confidential. In addition to contacting the instructor, please contact the Student Life Disability Services at 614-292-3307 or ods@osu.edu to register for services and/or to coordinate any accommodations you might need in your courses at The Ohio State University. Go to [Office of Student Life - Disability Services](#) for more information.

Accessibility of course technology: This online course requires use of Carmen (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.

- [Carmen \(Canvas\) accessibility](#)
- Streaming audio and video
- Synchronous course tools
- [Definition OSU](#)
- [Overview of Accessibility at OSU](#)

Counseling and Consultation Services: 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. The Ohio State University offers services to assist you with addressing these and other concerns you may be experiencing. If you or someone you know are suffering from any of the aforementioned conditions, you can learn more about the broad range of confidential mental health services available on campus via the Office of Student Life's Counseling and Consultation Service (CCS) by visiting ccs.osu.edu or calling 614-292-5766. CCS is located on the 4th Floor of the Younkin Success Center and 10th Floor of Lincoln Tower. 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 Suicide Prevention Hotline at 1-800-273-TALK or at suicidepreventionlifeline.org.

David Wirt, wirt.9@osu.edu, is the CFAES embedded mental health counselor. He is available for new consultations and to establish routine care. To schedule with David, please call 614-292-5766. Students should mention their affiliation with CFAES when setting up a phone screening.

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>.