FST 7620: Food and Nutritional Toxicology (2 credits)
Spring Semester Session 1, 2019

Instructor: Jessica Cooperstone, Ph.D.
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Office hours: by appointment

Lecture Hours: Monday/Thursday 9:10-11:00 am, Session 1 (1/7/19 – 2/22/19)

Lecture Location: Parker Food Science and Technology Building 311

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.

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

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: All students need to research and deliver a presentation on a current topic. The presentation will be delivered in class during the semester and written as a final research paper. Students are also expected to contribute actively to class discussions on lecture topics and current issues. One mid-term and one final examination will be given to test on the basic concepts of the course. 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+).

Assessment	***Points***	***Percentage***
Presentation	50	12.5%
Research paper	50	12.5%
Midterm	150	37.5%
Final	150	37.5%

Points	***Grade***	***Percentages***
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	<62.9%

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.

Dates to note:
Term paper topic due: 1/10/19 (email to Jess)

Mid-Term Exam: TBD

Student term projects: 2/14/19, 2/18/19. Research paper due at presentation time

Final Exam: Thursday, 2/21/19, 9am (during the last class period)

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 http://studentconduct.osu.edu/.

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

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.

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.