

**Food Science Graduate Course:
Food Science 525
“Food Chemical Toxicology: Risk Benefit Analysis”.**

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Course Preamble: Food chemical toxicology is an important scientific discipline, which studies the source, makeup and formation of chemical toxicants in foods; the evaluation and development of methods for detection and analysis of potential risk for deleterious effects on consumers. The manifestations and mechanisms of toxicokinetic behavior and the analysis of risk/benefit assessment attributed to the presence of xenobiotics in food is also a vital component for Food Toxicologists.

Learning Objectives: To instruct the student on the principles of Food Toxicology and Risk Assessment. In order to evaluate potential hazard, the occurrence of risk, potential toxicities and risk-benefit analysis of alternatives together with principles of toxicokinetics will be provided to the student to develop a foundation for understanding the factors regulating the absorption, digestion transformation, metabolic transformation, and deposition of the food toxicant. Evaluation of methods for assessing risk, regulation of chemical reactions leading to toxic potentials and the evaluation of methodologies to assess exposure of the subject to the toxin will be covered in this course.

Reference Texts/Journals:

1. Foodborne disease handbook: 2001 Y.H. Hui, Kitts, D.D. and Stanfield, P.S. 2nd Edition., Marcel Dekker, N.Y..
- 2 Xenobiotics in Foods and Feeds. Finley, J.W. and Schwass, D.E. (eds). ACS Symposium Series 234. 1983.
4. Food Toxicology: Contaminants and Additives, Volumes 1 and 2., J.M. Concon. Marcel Dekker, Inc., 1988.
5. Food Toxicology. (allergy section) IFT Basic Symposium Series. Taylor, S.L. and Scanlan, R.A. (eds). Marcel Dekker, Inc., 1989.

Food Chemical Toxicology- Woodward Library.
Food Agriculture Food Chemistry- McMillan Library
J. Toxicology Environmental Health.- Woodward Library.

Lecture Topics For Food Toxicology and Risk Assessment.

Class 1

Introduction, definition and classifications of Toxicology
Dose-Response Curve

Class 2

Toxicokinetics of potentially hazardous agents
Absorption, distribution (accumulation), biotransformation, excretion

Class 3

Nutritional factors, Food allergy (immunological and non-immunological reactions)
and sensitivity (intolerances)

Class 4

Natural occurring toxicants

a) Toxic constituents of marine origin:

Marine toxins: paralytic shellfish poisoning; Puffer fish (tetrodotoxin), ciguatera poisoning (ciguatoxin).

b) Toxic constituents of plant origin/Antinutritive substances
antiproteins, antiminerals, antivitamin

Class 5

Toxic constituents of fungal origin: mycotoxins

Class 6

Reaction products

a) Benzo(a) pyrene

b) Heterocyclic amines

c) Nitrates, nitrites and nitrosamines

Class 7

Heavy Metal Contaminants

a) Cadmium

b) Mercury

c) Chromium

Class 8

Food additives

a) Preservatives: benzoic acid and sodium benzoate

b) Sweeteners: Saccharin, Aspartame, Sucralose

c). Coloring agents

d). Packaging materials.

Class 9

Environmental contaminants: Organic compounds

a). Pesticides:

- Insecticides: DDT, Organophosphates, Cycodiene

- Herbicides: Bipyridylium

b). Hydrocarbons: Polychlorinated biphenyls (PCBs), Polyaromatic hydrocarbons

Class 10

Nanoscience- Regulations

Class 11

Toxicological testing methods

- 1) Oral ingestion studies
 - a) Acute Toxicity Tests
 - b) Subchronic
 - c) Chronic
- 2) Genetic toxicity
 - a) AMES test
- 3) Specialized Oral Ingestion Studies
 - a) Reproductive toxicity
 - b) Developmental toxicity

Class 12

Risk Assessment Concept and Practice.

B. Student Participation:

- Students will give 2 group oral presentation/critique on a selected topic of Food Toxicology and Risk Assessment. Students in the Group will lead the class discussion on the experimental design, methods and interpretation of data derived from their review. All students in the class will be required to prepare on the topic before hand and make meaningful contributions to the group presentation.
- A final paper going into more depth on selected topics for the group presentation will be prepared by the students.
- Students in the group will be given an Oral exam on the principles of Food Toxicology and Risk Assessment as they relate to their presentation.

C: Coures Grade Student Evaluation:

Midterm Exam:	20%
Group Oral Projects	15%
Group Research Paper	25%
Final Oral Exam	40%