Course Syllabus

General Course Information

Course Number: HZMT 1912

Course Title: Industrial Hygiene and Toxicology

Credit Hours: 3 Credit Hours

Division and Discipline: Technical Education Division

Course Description

A review of the research done in determining the systematic health effects of exposures to chemicals. Determination of risk factors, routes of entry, control measures, and acute and chronic effects are discussed.

General Policy

Students and faculty of Barton County Community College constitute a special community engaged in the process of education. The college assumes that its students and faculty will demonstrate a code of personal honor that is based upon courtesy, integrity, common sense, and respect for others both within and outside the classroom. The college reserves the right to suspend a student for conduct that is detrimental to the college's educational endeavors as outlined in the college catalog. Academic dishonesty in any academic endeavor at Barton County Community College will not be tolerated.

Regular participation is an obligation assumed by each student at the time of registration. It is the student's responsibility to fulfill all of the requirements of a course as prescribed by the instructor and it is the instructor's responsibility to establish and utilize methods for validating student participation. Students who miss deadlines for the completion of self-directed activities may be allowed to make up, in a reasonable and appropriate manner, work missed for a school-related activity, verifiable illness, personal emergency, for death of a family member or close friend within the time frame established by the instructor. According to policy, if students miss more than 25% of the course, he or she cannot receive a passing grade. Class drops must be coordinated through the appropriate authorities. Instructors cannot drop students from courses.

Anyone seeking an accommodation under provisions of the Americans with Disabilities Act should notify the instructor.

Required Materials

Environmental Toxicology (Third Edition), Sigmund F. Zakrzewski, Oxford University Press 2002.

Internet: Extensive use of the internet

Course as Viewed in Total Curriculum

Industrial Hygiene and Toxicology is a required course for the Hazardous Materials Certification program and the Hazardous Materials Management Program. The material provided in this course is used during Environmental Management, Industrial Processes, and Chemical Spills and Release Response courses to develop safe and effective policies regarding the use, storage, and disposal of hazardous materials.

The transferability of all college courses will vary among institutions, and perhaps even among departments, colleges, or programs within an institution. Institutional requirements may also change without prior notification. It is the students responsibility to obtain relevant information from intended transfer institutions to insure that the course the student enrolls in are the most appropriate set of courses for the transfer program.

Course Outcomes

Barton County Community College is committed to the assessment of student learning and to quality education. Assessment activities provide a means to develop an understanding of how students learn, what they know, and what they can do with their knowledge. Results from these various activities guide Barton as a learning college, in finding ways to improve student learning.

I. Introduction to Environmental Toxicology
II. Toxicology Concepts
III. Dose-Response Relationships
IV. Absorption of Toxicants
V. Distribution and Storage of Toxicants
VI. Biotransformation and Elimination of Toxicants
VII. Target Organ Toxicity
VIII. Teratogenesis, Mutagenesis, and Carcinogenesis
IX. Environmental Toxicants
X. Risk Assessment

XI. Occupational Toxicology
XII. Pollution and Pollution Control

Competencies

I. Introduction to Environmental Toxicology

1. Define environmental toxicology
2. Describe the history of toxicology
3. Distinguish descriptive, mechanistic, and regulatory disciplines of toxicology
4. Recognize the multidisciplinary approaches to environmental toxicology
5. Summarize the relevance of environmental toxicology to the human species

II. Toxicology Concepts

1. Define toxicity
2. Discuss the different types of toxicity
3. Describe toxicokinetics and toxicodynamics
4. Explain how toxicants are classified
5. Outline the steps involved in toxicity testing

III. Dose-Response Relationships

1. Explain the difference between causal and associative relationships
2. Discuss the role of epidemiology in establishing associative relationships
3. Describe the relationship between dose and response
4. Interpret frequency and cumulative dose-response curves
5. Recognize sub-threshold, threshold, and ceiling effect doses
6. Summarize effective, toxic, and lethal doses
7. Define potency, efficacy, mixed or reversed toxicity, and margin of safet

IV. Absorption of Toxicants

1. Describe the ways in which toxicants interact with cells
2. Recognize how the molecular characteristics of toxicants affect entrance into a cell
3. Explain human anatomy as related to integumentary, respiratory, and digestive systems
4. Summarize integumentary, respiratory, and digestive routes of toxicant absorption

V. Distribution and Storage of Toxicants

1. Identify the ways toxicants are distributed in the body
2. Recognize the relationship between a specific route of absorption and the related pathways for distribution of a toxicant
3. Describe the factors affecting distribution of toxicants to tissues
4. Define volume of distribution
5. List the sites for toxicant storage
6. Discuss how storage influences the half-life of a toxicant

VI. Biotransformation and Elimination of Toxicants

1. Explain the role of biotransformation in toxicokinetics
2. Describe how biotransformation facilitates the elimination of toxicants or their metabolites from the body
3. Distinguish between phase I and phase II biotransformation reactions
4. Define bioactivation or toxication
5. Identify the tissues responsible for biotransformation reactions
6. List the factors affecting biotransformation in humans
7. Summarize the role of elimination in toxicokinetics
8. Describe processes occurring in the kidney, liver, and lung as related to the elimination of toxicants

VII Target Organ Toxicity

1. Define target organ toxicity
2. Explain the basis for the specificity of organ toxicity
3. Contrast the toxicity mechanisms for various types of toxicity
4. Describe examples of target organ toxicity
5. Discuss the characteristics evaluative procedures for determining toxicity in target organs

VIII Teratogenesis, Mutagenesis, and Carcinogenesis

1. Define teratogenesis, mutagenesis, and carcinogenesis
2. Describe the relevance of replication, transcription, and translation to teratogenesis, mutagenesis, and carcinogenesis
3. Summarize the mechanism of action for teratogens, mutagens, and carcinogens
4. Discuss examples of known teratogens, mutagens, and carcinoge

IX Environmental Toxicants

1. Define environmental toxicants
2. Recognize the contribution of environmental toxicants to worldwide morbidity and mortality
3. Discuss representative categories of environmental toxicants, including examples
4. Describe the mechanisms of toxicity within categories of environmental toxicants

X. Risk Assessment

1. Define risk and safety
2. Describe the use of the terms probability and incidence as related to risk

3. Identify factors that contribute to differences in risk perception
4. List the processes of risk assessment
5. Summarize the parameters needed to estimate risk
6. Recognize the importance of risk management
7. Discuss the Safe Human Dose Formula
8. Explain the contributions of environmental toxicology to the survival of all organisms

Grading Policy

Evaluation and grading schedule:

A = 90 – 100%

B = 80 – 89%

C = 70 – 79%

D = 60 – 69%

F = 0 – 59%

Exams 2 ea. = 50%

Topic paper = 30 %

Assignments and Class Participation Activities = 20%