ENVS 312 01E Environmental Toxicology

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COURSE SYLLABUS: Fall 2024

Monday, Wednesday, Thursday 11:00-11:50 AM

Location: BA Room 245

INSTRUCTOR INFORMATION

Instructor: Dr. Naima Khan, PhD.
Office Location: Science Building (STC), 233; Office hours: Thursday: 11 AM- 1:30 PM
University Email Address: Naima.Khan@tamuc.edu

COURSE INFORMATION

Materials – Textbooks, Readings, Supplementary Readings

Textbook(s) Recommended: Title: Newman, M. C. 2010. Fundamentals of ecotoxicology. Fourth or Fifth ed. CRC Press, Taylor and Francis Group.

Course Description

This course is designed to provide an overview of environmental toxicology, including an examination of the major classes of pollutants, their fate in the environment, their disposition in organisms, and their mechanisms of toxicity. An emphasis will also be placed on assessing the toxicity of pollutants in biological and environmental systems.

Instructional Method: **The course is in class (face to face).**

Student Learning Outcomes

Learning Outcomes:

1. **Critical Thinking:** Students will be able to differentiate between fact and opinion; be able to discern between relevant and irrelevant information, recognize bias in source material, and critically examine a diversity of source material. Students will be able to describe the physical mechanisms that combine to form both normal and extreme weather patterns.

2. **Communication:** In written, oral, and/or visual communication, students will communicate in a manner appropriate to audience and occasion, with an evident message and organizational structure. The course is designed to present one contaminant by a student at the end of the semester where students will answer the listed predetermined questions for their preselected contaminant. Class presentation will help students to exchange their research findings on a specific contaminant to the whole class.

3. **Teamwork**: Students will be able to work together toward a shared purpose relevant to the course or discipline with a sense of shared responsibility for meeting that purpose. Students will learn how to work in a group, how to distribute workload among group members, and finally how to solve problems in a group. There will be equal group members for each group.
4. **Empirical and Quantitative Skills:** Students will be able understand and utilize mathematical functions and empirical principles and processes. There are calculations on how to measure the LD50, Average Daily Dose, Life time Average daily Dose, Risk factor etc. for a contaminant, how to do the risk assessment for a contaminant spill.

COURSE REQUIREMENTS

Minimal Technical Skills Needed

Algebra, engineering math, basic chemistry.
In addition, using the learning management system, using Microsoft Word and PowerPoint, using presentation and graphics programs, etc.

Instructional Methods

Conducting lectures, resorting to videos and visual-aid presentations, e.g., “PowerPoint” and “You tube”, solving math problems together with the students in the classroom, expecting student participation in the classroom discussions, assigning Exams and homework assignments, etc.

Student Responsibilities or Tips for Success in the Course

Turn-in all the assigned academic work; actively participate in verbal discussions; take notes and copy written explanations during class periods; take assigned written Exams; log into the course website, regularly; complete the assigned weekly study.

Learning strategies

Lectures
Reading assignments to be discussed in class
Analysis of Case Study Samples
Individual work, analysis of free reading Homework

Assumptions, Expectations, Philosophy

University students are a select group of students soon to be professionals.
Instructors can have high expectations of student performance.
Demanding courses benefit students more than easy courses.
Assignments are due on time unless you have made a prior arrangement with me (only granted for unusual or extenuating circumstances and in case of health issues proper medical excuse is required.

Come to class prepared, having read and thought about the assigned readings; course materials are meant to be studied, not merely read. Actively participate in class discussions; ask questions.

In university, a lot of your learning will occur outside of the classroom, during your own research, and in formal and informal interactions with your peers– both here and at meetings, correspondence, etc. Therefore, I expect you to take full advantage of ALL learning opportunities, including seminars and invited speakers.

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Reading and assimilating information is a critical part of your current and continuing education. This will help you become a better writer, a more rounded individual, and expose you to subjects outside of your immediate knowledge.

Date	Topics (Book Chapters)	Subtopics
Aug 26 – Sept 20	Introduction/Welcome	**Student and Faculty introduction** Toxicology Vs. Environmental Toxicology Evolution of Environmental Law due to Environmental Pollution
	Chapter 1 and 2 Introduction and basic principles of Environmental Toxicology. Major Classes of Contaminants and their behavior of environment.	Most used terms Major Types of Toxicants. Sources, Impacts and Occurrences of major toxicants. Transport of toxicants in the environment: Adsorption, Desorption, Diffusion, Dispersion, Volatilization
	Chapter 3 Uptake, Biotransformation, Detoxification, Elimination, and Accumulation	A. Routes of Uptake Freundlich and Langmuir Isotherm Fick's Law Active Transport and Endocytosis Reaction Orders B. Mechanisms of Biotransformation and Detoxification: Metals and Metalloids (Biomethylation, Biomineralization, Bimetallic binding) Organic contaminants (Phase I and II reactions) C. Mechanisms of Eliminations Depuration, Clearance, Growth dilution…. Multixenobiotic resistance, enterohepatic circulation, gastrointestinal excretion… Modeling for Elimination: Rate constant-based, clearance volume-based, pharmacokinetics-based models) … D. Mechanisms of Accumulations and Case Studies.
Sept 23-24	**Quiz-1** **Exam 1**	**Sept 23** **(Exam and quiz will remain open until Sept 24)**
Sept 25 – Oct 27	Chapter 4, 5, 6 Factors Influencing Bioaccumulation Bioaccumulation from Food and Trophic Transfer Molecular Effects of Biomarker	Bioavailability from water and solid for: - Metals - Organic contaminants Factors affecting bioavailability Quantitative methods to quantify Bioaccumulation: - Metals - Organics
	Chapter 8 and 9 Sublethal Effects of Individuals: Acute and Chronic Lethal Effects to Individuals:	Growth Development Developmental Stability Reproduction, Psychology, Immunology, Behavior Test types for Acute, Chronic, and Life stage lethality Dose-Response
Oct 28th - Oct 29th	**Quiz 2 & Exam 2**	
Oct 30th – Nov 22rd	Assignment discussion Chapter 13	Human Risk Assessment Ecological Risk Assessment

	Risk Assessment of Contaminants	Radiation Risk Assessment
Nov 25-26 Nov 27-29	Quiz 3 Thanksgiving break	
Dec 1- 4	Catch up with any topics that may fall behind during the semester	
	Assignment discussion	
Dec 5	**Presentation of Assignments**	
	Final submission Assignments	
Dec 7-13 Final week	Exam 3 (final exam)	

Grades Distribution:

3 Quizzes (10% each x 3 = 30 %)

2 Exams (15 % each x 2 = 30 %)

Final Exam 20 %

One (1) Assignment (10%)

Class Attendance and Participation (5%)

Assignment (10%)

1. Consider one organic or inorganic environmental toxicant.
2. Why are you interested of that toxicant? Example: explain about their local or regional or worldwide problems.
3. Consider one specific geographic location and specific concentration of that contaminant.
4. Chemical and Physical behavior of that specific toxicant in environment.
5. Potential methods, instruments, or models used for analyzing that specific toxicant.
6. Explain the Uptake, Biotransformation, Detoxification, Elimination, and Accumulation behavior of that specific toxicant.
7. Factors Influencing Bioaccumulation if there is any
8. Calculation and analysis of
    a. Sublethal Effects of Individuals
    b. Acute and Chronic Lethal Effects to Individuals
9. Effects of Communities and Ecosystem
10. Risk Assessment of Contaminants [Use specific method to assess the risk of contaminants]

Assignment Guideline:

3-5 pages, double space, 12 fonts, Time New Roman/Calibri.

Assignment Rubric:

a. Selection of Contaminant of Emerging Concern (CEC): 2 points
b. Writing skill to explain the problem of that specific contaminant in terms of environmental toxicological terms: 5 points
c. Calculation skills on sublethal, acute/chronic lethal effects: 2points
d. Explanation skills on risk assessment for that specific contaminant: 1 point

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AI use in course [Draft 2, May 25, 2023]

Texas A&M University-Commerce acknowledges that there are legitimate uses of Artificial Intelligence, ChatBots, or other software that has the capacity to generate text, or suggest replacements for text beyond individual words, as determined by the instructor of the course.

Any use of such software must be documented. Any undocumented use of such software constitutes an instance of academic dishonesty (plagiarism).

Individual instructors may disallow entirely the use of such software for individual assignments or for the entire course. Students should be aware of such requirements and follow their instructors 'guidelines. If no instructions are provided the student should assume that the use of such software is disallowed.

In any case, students are fully responsible for the content of any assignment they submit, regardless of whether they used an AI, in any way. This specifically includes cases in which the AI plagiarized another text or misrepresented sources.

13.99.99.R0.03 Undergraduate Academic Dishonesty
13.99.99.R0.10 Graduate Student Academic Dishonesty

Assignments (5)

Course and University and Policies

Responsible Use of Technology — It is expected that all students will only use cellphones, PDAs, laptop computers, MP3 players and other technology outside of class time or when appropriate in class. Answering a cell phone, texting, listening to music or using a laptop computer for matters unrelated to the course may be grounds for dismissal from class and/or other penalties. Students are not allowed to use image, video, nor audio recording devices of any kind during class time without prior consent of the instructor.

University Specific Procedures:

ADA Statement-Students with Disabilities:

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you have a disability requiring an accommodation, please contact:

Office of Student Disability Resources and Services Texas A&M-Commerce
Gee Library
Room 132
Phone (903) 886-5150 or (903) 886-5835
Fax (903) 468-8148
StudentDisabilityServices@tamuc.edu

Nondiscrimination Notice

Texas A&M University-Commerce will comply in the classroom, and in online courses, with all federal and state laws prohibiting discrimination and related retaliation on the basis of race, color, religion, sex, national origin, disability, age, genetic information or veteran status. Further, an environment free from discrimination on the basis of sexual orientation, gender identity, or gender expression will be maintained.

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Student Conduct
All students enrolled at the University shall follow the tenets of common decency and acceptable behavior conducive to a positive learning environment.

Campus Concealed Carry - Texas Senate Bill - 11 (Government Code 411.2031, et al.) authorizes the carrying of a concealed handgun in Texas A&M University-Commerce buildings only by persons who have been issued and are in possession of a Texas License to Carry a Handgun. Qualified law enforcement officers or those who are otherwise authorized to carry a concealed handgun in the State of Texas are also permitted to do so. Pursuant to Penal Code (PC) 46.035 and A&M-Commerce Rule 34.06.02.R1, license holders may not carry a concealed handgun in restricted locations. For a list of locations, please refer to ((http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/34SafetyOfEmployeesAndStudents/34.06.02.R1.pdf) and/or consult your event organizer). Pursuant to PC 46.035, the open carrying of handguns is prohibited on all A&M-Commerce campuses. Report violations to the University Police Department at 903-886-5868 or 9-1-1.