

FORMAN CHRISTIAN COLLEGE

(A Chartered university)

Spring Semester 2023

Department of Environmental Sciences

Course Information:

ENVR 413: Environmental Toxicology: 03 credits

Instructor Information:

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Class Day: Tuesday and Thursday

Objectives:

The course will introduce the concepts of adverse toxic effects of environmental chemicals, from natural and anthropogenic sources, on human and other living organisms. The course is focused on providing knowledge related to toxic chemicals in air, water and soil, dose response relationship in living organisms, short term (acute) and long-term (chronic) effects on organ system, their containment and control strategies.

Learning Outcomes:

At the end of course, students will be able to:

- Understand the fundamental concepts, methods, and approaches of environmental toxicology
- Describe the fate and transport of toxicants in the environment and how these processes affect their toxicity
- Demonstrate a fundamental knowledge of processes and endpoints in the human body associated with exposure to toxic agents and characterize the toxicological effects
- Acquire knowledge with the major issues, concepts, and subject areas in environmental toxicology
- Evaluate, discuss and explain the occurrence and significance of major environmental toxicants and be able to apply that knowledge for advanced analysis in the context of the environmental quality, public health and sustainability.

Text Books:

1. Environmental Toxicology, David A. Wright and Pamela Welbourn. 2002.
2. Essentials of Environmental Toxicology, Hughes, W. Williams, CRC Press Llc. 2003.

3. Casarrett & Doull's Toxicology- The basic Science of Poisons, Klassen, W.D., 7th Edition, McGrawhill, USA, 2005
4. Introduction to Environmental Toxicology, Landis, W. G., Yu, M-H., Lewis Publish. 1999.
5. Fundamentals of Toxicology, Pandey, K., Shukla, J. P., Trivedi, S. P., 2nd edition, New Central Book Agency (P) Ltd. 2006.

Course contents and weekly breakup:

Week	Contents
1	Introduction: definitions and concepts <input type="checkbox"/> History of toxicology <input type="checkbox"/> Concerns in Environmental Toxicology
2	Toxicological terminologies <input type="checkbox"/> Poisons, Toxins, Toxicants, Toxicity, Toxic symptoms and effects, selective toxicity, venom, Xenobiotics, Dose (administered dose, internal dose, target organ dose biologically effective dose), Dose-response relationships <input type="checkbox"/> Duration and frequency of exposure
3	<input type="checkbox"/> How is Dose Measured? <input type="checkbox"/> Threshold dose <input type="checkbox"/> Terms: NOEC, NOEL, NOAEC, NOAEL, LOEC, LOEL, MTC, and MATC <input type="checkbox"/> Individual susceptibility <input type="checkbox"/> Sensitive sub-population <input type="checkbox"/> LD50, LC50, EC50, and IC50
4	<input type="checkbox"/> Individual dose-response and Dose-Response Curves for Beneficial Substances <input type="checkbox"/> Evaluating Dose-Response Relationships <input type="checkbox"/> Comparing Toxicity of Compounds <input type="checkbox"/> Therapeutic Index (TI) and <input type="checkbox"/> Margin of Safety <input type="checkbox"/> Classification of toxic agents <input type="checkbox"/> Subcategories of Toxic Substances
5	<input type="checkbox"/> Ecological Concepts <input type="checkbox"/> The paths by which wastes, including toxicants, move into the biosphere where they produce morbidity <input type="checkbox"/> Levels of structural and functional organization. <input type="checkbox"/> Systems Biology: Framework for exposure at All Levels of Biological Organization <input type="checkbox"/> Interaction of chemicals with ecosystem and functions Quiz 1
6	Differences and similarities between Toxicology and Ecotoxicology Pollutant Toxicokinetics: Absorption, Distribution, Storage, Metabolism, Elimination
7	Pollutant behavior Bioaccumulation, biotransformation and bio magnification, biodegradation

8	Factors influencing toxicity or activity of toxicants: environmental factors, nutritional factors, biological factors, chemical and physiochemical properties
9	Interactions, synergism and potentiation Toxicant metabolism and accumulation in body organs and pathways
10	Natural & anthropogenic toxicological agents Biotransformation-metabolism of xenobiotics
11	Enzymes involved and factors affecting biotransformation Fate and transport of contaminants
12	Body system response and immunological considerations Toxicity of different pollutants Toxicology of metals and other inorganic pollutants
13	Pesticides, organic compounds, polychlorinated biphenyls QUIZ 2
14	Inorganic gaseous pollutants, petroleum hydrocarbons, ionizing radiation
15	Contaminants of emerging concerns Risk assessment and management
16	Review and Final Exams

Course Requirements:

Course content will be covered from the text however; the students will be encouraged and guided for securing additional information from other sources.

Course evaluation:

Weight-age and Grading:

ACTIVITY	WEIGHTAGE
Midterm exam	25%
Final exam	35%
Quizzes	15%
Presentation/activity/project	5%
Assignment	15%
Attendance	5%
Total	100%

The grading system for the course is as follows:

GRADES	QUALITY POINTS	NUMERICAL VALUE	MEANING
A	4.00	93-100%	Superior
A-	3.70	90-92%	
B+	3.30	87-89%	
B	3.00	83-86%	Good
B-	2.70	80-82%	

C+	2.30	77-79%	
C	2.00	73-76%	Satisfactory
C-	1.70	70-72%	
D+	1.30	67-69%	
D	1.00	60-66%	Passing

Course Policies:

Attendance: Students must attend all class meetings to assure the best possible grades; failure to do so will drastically affect the grade. If a student fails to attend 75% of the lectures, he/she will not be allowed to appear in the Final Examination. Excused absence on account of family emergency and/or participation in university activities will not count towards class attendance. The weightage of the attendance will be 5% of the grade.

Exams: Mid Term Exam will constitute 25% and the Final Exam will constitute 35% of the grade. The Mid Term Exam will include the topics covered during the first seven weeks whereas the Final exam will be based on 70% of the course covered after the seventh week and 30% will include review of the first seven weeks course. The format of the exams will be both objective and essay type.

Quizzes and Assignments: There will be two quizzes and two assignment apart from, midterm and final exams. The quizzes and assignments will carry 30% weightage of the grades.

Missed Exam: Students must take all the exams. If you do not appear in the exam you will be awarded zero point and your grade will be drastically affected. Make up-exam will not be given except on account of death of immediate family member.

Cheating and Plagiarism: There will be no tolerance for cheating/plagiarism. Any student caught cheating on the exam will be awarded zero point and may be dropped from the course. Detailed policy of classroom misconduct, cheating and plagiarism given in the Student Handbook will be strictly followed. Students are responsible for these directions given about dishonesty and plagiarism.

Mobile Phone: Use of mobile phone in the class is strictly prohibited. Students are advised to silence their mobiles before coming to class. Failure to do so will lead to disciplinary action.