

COURSE CODE: ENS-313
COURSE NAME: Environmental Toxicology
CREDIT HOURS: Theory = 02 Practical = 01 Total = 03
CONTACT HOURS: Theory = 32 Practical = 48 Total = 80
PREREQUISITE: None
MODE OF TEACHING: Instruction: 2 hours of Lecture per week (67%)
 Lab Demonstration: 3 hours of Lab work per week (33%)

Course Description:

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.

TOPICS COVERED:

Week#	Topics
1	Introduction to Toxicology
2	Classification and properties of toxic substances: anthropogenic and natural poisons
3	Acute and chronic effects
4	Genotoxicity, mutagens, teratogens, carcinogens and sensitizers
5	Biological properties of organic and inorganic pollutants: essentiality and toxicity
6	Routes of absorption, Bioaccumulation and bio-magnification
7	Quantification of toxicity: dose-response relationships, synergism and antagonism
8	Quantification of toxicity: dose-response relationships, synergism and antagonism
9	Midterm Exam – MSE
10	LD50 and rating systems
11	Threshold Limit Values
12	Toxic impacts of atmospheric agents

13	Fate of absorbed toxins and xenobiotics
14	Detoxification and bio-activation
15	Natural detoxification processes
16	Risk management
17	Risk management
18	End Semester Exam

Lab Work:

Week#	Topics
1	Lab orientation
2	Intro to basic toxicology lab techniques
3	Analysis of toxins
4	Analysis of toxins
5	Dose-response relationship and D/R Curves
6	Dose-response relationship and D/R Curves
7	In vitro & In vivo techniques for toxicity testing
8	In vitro & In vivo techniques for toxicity testing
9	Midterm Exam – MSE
10	Ames test
11	Ames test
12	Comet assay
13	Comet assay
14	Immuno-fluorescent assay
15	Immuno-fluorescent assay
16	Microscopic observation of changes in plant cell morphology after exposure to toxic substances
17	Microscopic observation of changes in plant cell morphology after exposure to toxic substances
18	End Semester Exam

Text and Material:

1. Environmental Toxicology: Biological and health effects of pollutants. Yu M.H., Tsunoda H. and Tsunoda M. 3rd Edition. CRC Press, Taylor & Francis Group. 2011.
2. An Introduction to Environmental Toxicology, 4th Edition, by Michael H Dong, 2018.
3. Casarrett & Doull's Toxicology- The Basic Science of Poisons, Klassen, W.D., 9th Edition, McGraw-Hill, USA, 2018.

ASSESSMENT SYSTEM:

Theoretical/Instruction	100%
Assignments	10%
Quizzes	15%
Mid Semester Exam	25%
End Semester Exam	50%
Practical Work	100%
Lab Work	70%
Lab Exam/Projects	30%