

Semester	7		
Course Code	ENCM 41774		
Course Name	Environmental Toxicology and Risk Assessment		
Credit Value	4		
Status	Compulsory for BSc Honours in ENCM degree		
Pre-requisites	ENCM 21722		
Co-requisites	None		
Hourly Breakdown	Theory	Practical	Independent Learning
	48	36	116

Intended Learning Outcomes:

After completion of this course unit, the student will be able to;

1. critically discuss toxicological impacts of environmental contaminants on biota emphasizing health effects on humans,
2. demonstrate competencies in specific techniques/tools used for assessing toxic effects of environmental contaminants, preparation of laboratory reports based on critical analysis of toxicological data in a scientific manner, and
3. assess, evaluate and predict the human health risks and ecological health risks posed by environmental contaminants and hazardous situations for managing the environment.

Course Content:

Introduction to Environmental Toxicology: concepts and definitions. Routes and kinetics of toxicant uptake. Toxicokinetics vs toxicodynamics. Bioaccumulation and bioavailability. Metabolism of xenobiotics: phase 1 and phase 2 reactions; detoxification and bioactivation. Molecular mechanisms of toxic effects. Evaluation of acute and chronic toxicity (bioassays and biomarkers). Chronic effects: mutagenesis, carcinogenesis and teratogenesis, endocrine disruption. Environmental toxicology of selected groups of environmental contaminants: heavy metals, pesticides and herbicides, polychlorinated biphenyls, dioxins and furans, cyanobacteria and associated toxins, engineered nanomaterials and microplastics. Radiation and health risks. Occupational toxicology. Toxicity of animal venoms. Major elements of Risk assessment: hazard identification, exposure assessment, dose response assessment and risk characterization. Techniques and tools in human health risk assessment. Techniques and tools in ecological health risk assessment: probabilistic risk assessment methods, assessment factor methods, assessment of relative risks. Radiation risk assessment. Prospective and retrospective risk assessments. Formulation of environmental quality standards based on risk assessments. Risk management and risk communication.

Practical sessions on: Evaluation of toxic effects of selected environmental contaminants, Bioassays and estimation of toxicity thresholds, Applications of selected risk assessment methodologies for human health risk assessment and ecological risk assessment.

Teaching /Learning Methods:

A combination of lectures, laboratory sessions, computer based learning, self-studies, seminars and group discussions.

Assessment Strategy:

Continuous assessment and end of semester examination. Percentage given for each sub component indicates the percent contribution to the final marks

Continuous Assessment 40 %	Final Assessment 60 %		
Details: Assignments 10 Practical reports 20 Student seminars 10	Theory 60	Practical -	Other -

Recommended Readings:

1. Landis, W.G., R.M. Sofield & M.H. Yu (2018). Introduction to Environmental Toxicology: Molecular Substructures to Ecological Landscapes: 5th Edition. Taylor Francis/CRC Press.
2. Klaassen, C. D., L.J. Cassarett & J. Doull (2018). Toxicology – The Basic Science of Poisons. 9th Edition. McGraw Hill.
3. Newman, M.C. (2019) Fundamentals of Ecotoxicology. 5th Edition. CRC Press, New York.
4. Wright, D. A. & P. Welbourne (2002). Environmental Toxicology. Cambridge University Press