

Module Title:	Freshwater Ecology
Language of Instruction:	English
Credits:	5
NFQ Level:	8
Module Delivered In	1 programme(s)
Teaching & Learning Strategies:	This module will be delivered via two one-hour lectures and a two-hour practical per week, for fifteen weeks. Students may be required to access teaching material via Blackboard or the student accessible Institute's course specific network folder, in advance of lectures and practicals to encourage active learning. To consolidate lectures and practicals, students will normally be required to carry out assignments, critique and present peer reviewed published case studies, conduct debates on module relevant environmental issues, and take multiple choice question assessments. Group and peer learning will be facilitated during the preparation of assignments, presentations and practicals. Any course-related issue or questions that may arise will be discussed at lectures. Course lecture summaries, course calendar, announcements and other course-related material will be available on Blackboard, a virtual learning environment, or in the student accessible Institute's course specific network folder. Students may then contact the lecturer to discuss formative feedback given on written reports and group project work. On-line demonstrations will illustrate the key concepts of the module and will be available throughout the year. The practical component will • allow students to develop the required technical competencies, attitudes and behaviours • develop problem solving abilities and group skills • promote deep learning via investigation of a problem, application of prior knowledge and analysis of results, thus generating new knowledge • promote timely submission of reports written in the standard format
Module Aim:	To provide a theoretical and practical introduction to freshwater and estuarine ecology, and the associated anthropogenic impacts, and to introduce fundamental concepts of ecotoxicology, both theoretical and applied.
Learning Outcomes	
<i>On successful completion of this module the learner should be able to:</i>	
LO1	Define and describe the fundamental principles of freshwater and estuarine ecology.
LO2	Discuss and evaluate the causes and effects of freshwater and estuarine pollution in the global and Irish contexts.
LO3	Employ freshwater quality monitoring and analyse the data.
LO4	Apply and evaluate basic toxicological test procedures and discuss the principles of toxicology and ecotoxicology
Pre-requisite learning	
Module Recommendations <i>This is prior learning (or a practical skill) that is recommended before enrolment in this module.</i>	
No recommendations listed	
Incompatible Modules <i>These are modules which have learning outcomes that are too similar to the learning outcomes of this module.</i>	
No incompatible modules listed	
Co-requisite Modules	
No Co-requisite modules listed	
Requirements <i>This is prior learning (or a practical skill) that is mandatory before enrolment in this module is allowed.</i>	
No requirements listed	

Module Content & Assessment

Indicative Content

Freshwater Ecology

Basic concepts of ecology and limnology: the ecosystem, populations and communities, ecological niches, energetics and food webs, the role of micro-organisms in the carbon and nitrogen cycles. Properties of water. The hydrological cycle and classification of natural waters. Ecological characterisation of rivers and lakes. Biochemical and physico-chemical aspects of water pollution. Plant and animal communities of lotic and lentic waters. Macroinvertebrates as biotic indices of eutrophication. Contemporary aquatic pollution in Ireland. Review of marine and brackish water flora and fauna. Classification of estuaries. Physicochemical characteristics of estuaries incorporating salinity, temperature, dissolved oxygen, wave action, currents, turbidity, substratum. Adaptations of estuarine organisms: morphological, physiological and behavioural. Ecology and effects of pollution on estuaries. Ecotoxicology: general principles of toxicology and ecotoxicology. Assessment parameters: LD50, EC50, NOEC, LOEC, etc. Toxicity tests: freshwater invertebrates, *Eisenia fetida*, algae, salmonids, collembola, oribatid mites, nematodes and other test models. Multispecies test systems. Sublethal toxicity tests. Heavy Metals. Pesticides. Oil pollution. Bioaccumulation. Bioprobes and Biosensors. The Microtox system.

Practical Work

Practicals will take the form of mini projects where appropriate. Health and safety will be an integral part of all practicals. Identification of macroinvertebrates by F.B.A. keys. A field trip will take place for quantitative sampling of the aquatic flora and fauna at different stations in a river. Field measurement of temperature, pH, dissolved oxygen, turbidity, conductivity, flow rate, biochemical oxidation demand. Analysis, interpretation and presentation of data. Examination and identification of selected marine/estuarine flora and fauna. Toxicology tests with *Daphnia magna*, *Eisenia fetida*, and *Steinernema feltiae*, as appropriate.

Assessment Breakdown	%
Continuous Assessment	10.00%
Practical	30.00%
End of Module Formal Examination	60.00%

Special Regulation

Students must achieve a minimum grade (35%) in both the practical/CA and final examination

Continuous Assessment

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Other	May include MCQ, assignments and practical work	1	10.00	n/a

No Project

Practical

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Practical/Skills Evaluation	Practical reports, and specific assignments	3,4	30.00	End-of-Semester

End of Module Formal Examination

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Formal Exam	A two hour terminal exam will be held at the end of the year.	1,2,4	60.00	End-of-Semester

ITCarlow reserves the right to alter the nature and timings of assessment

Module Workload

Workload: Full Time		
<i>Workload Type</i>	<i>Frequency</i>	<i>Average Weekly Learner Workload</i>
Lecture	30 Weeks per Stage	1.00
Laboratory	30 Weeks per Stage	1.00
Estimated Learner Hours	30 Weeks per Stage	1.00
Total Hours		90.00

Module Delivered In

Programme Code	Programme	Semester	Delivery
CW_SASES_B	Bachelor of Science (Honours) in Environmental Science	4	Mandatory