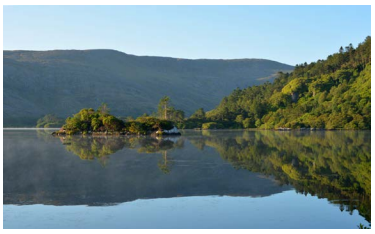
UN environment

GEMS Water

UCC University College Cork, Ireland Coláiste na hOllscoile Corcaigh

School of Biological, Earth and Environmental Sciences

Postgraduate Diploma FRESHWATER QUALITY MONITORING AND ASSESSMENT



Year 1 All three modules are compulsory

EV6001 Monitoring programme design for freshwater bodies (10 credits)

This module works through the step by step process of designing a monitoring programme for different levels of complexity and in relation to different monitoring objectives in different water bodies. An emphasis is placed on good practice in order to ensure reliable data are generated. Using examples and case studies, approaches to the selection of monitoring stations, monitoring methods and water quality parameters are considered. The need for a basic understanding of the hydrology of the water bodies is emphasised in order to optimise the frequency and location of sample collection. The role of additional information to support water quality assessment using monitoring data is also covered using examples.

EV6002 Quality assurance in freshwater quality monitoring programmes (10 credits)

All monitoring programmes should include an associated quality assurance programme that ensures monitoring data are reliable and comparable, not only from station to station but also from laboratory to laboratory, or programme to programme. This module works through the various quality assurance processes and options available from the point of sample collection in the field to eventual data submission to a database. Quality Assurance Plans and Standard Operating Procedures are introduced. Internationally available standards are compared and examples of best practice are presented for internal and external laboratory quality control. The process of preparing for an audit is introduced.

EV6003 Data handling and presentation for freshwater quality monitoring programmes (10 credits)

This module focuses on how to ensure that effective use is made of data from water quality monitoring programmes. Modern statistical techniques are demonstrated using freely available software. Geographical Information Systems (GIS) are introduced for data storage, analysis and presentation. Statistical analyses and the associated presentation of the results are illustrated with case studies and worked examples. Analysis and presentation of datasets from monitoring programmes are explored with individual projects.

Year 2 Two compulsory modules

EV6005 Monitoring and assessment of surface waters (10 credits)

This module describes the essential aspects of the physical, chemical and biological interactions in surface waters, that are necessary for designing an effective monitoring and assessment programme and for interpretation of the result. Examples of monitoring programmes with different objectives will be illustrated using case studies, and the key features of successful assessment programmes will be identified. Potential approaches to analysing and presenting surface water quality data will be evaluated.

EV6007 Monitoring and assessment of groundwater (10 credits)

This module describes the basic types of groundwater bodies and their important role as global water resources. Influences on the natural variation in groundwater quality are explored and their vulnerability to contamination is considered. Options for monitoring the quality of groundwaters are presented using case studies, and opportunities and constraints associated with designing an effective monitoring and assessment programme are explored. Examples of monitoring programmes with different objectives will be illustrated using case studies and approaches to analysing and presenting groundwater quality data will be evaluated.

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Year 2 Select two modules from the following

EV6004 Freshwater quality monitoring in the field (5 credits)

This module is a four-five day residential, field-based workshop. The workshop will take place in co-operation with a GEMS/Water partner country, normally in the African or Latin American and Caribbean regions and/or in Ireland. The workshop will comprise a series of practical exercises in the field covering monitoring site selection, sample collection, field-based measurements, field quality assurance, risk assessments and logistics. Water sampling for chemical, biological and particulate analysis will be carried out and data analysed and presented.

[Note The cost of attending this field module must be covered by the student, except for sponsored participants from the GEMS/Water programme]

EV6008 Freshwater quality monitoring using biological and ecological methods (5 credits)

Water quality has traditionally been assessed on the basis of physical and chemical measurements but numerous alternative approaches based on the flora and fauna of surface waters have also been proposed. Some of these approaches have been refined and developed at national and international levels for long-term, spatial and early-warning monitoring of water quality. The main approaches used in biological and ecological monitoring are described, with the aid of case studies. The scientific basis behind such methods is considered in order to identify the key criteria for their successful implementation in water quality monitoring programmes. The limitations and benefits of biological and ecological monitoring methods are evaluated.

EV6009 Freshwater quality monitoring with particulate material (5 credits)

Particulate matter in surface water bodies plays a key role in the storing and cycling of nutrients and contaminants. This module describes the key biogeochemical processes in rivers and lakes, emphasising the critical information required to interpret water quality monitoring data. Monitoring methods are presented with the aid of case studies. The potential benefits of monitoring using particulate matter, particularly with respect to contaminants are evaluated.