

## SCIE H4122: Physico Chemical Science

Module Title:         Physice Chemical Science           Language of Instructive         English           Credits:         1           RPC Level:         8           Module Delivered In         1 programme(a)           Tacking & Learning Strategies:         This module will be taught as a A hour theory class for thirly weeks and practicals, guided reading, and writen assignments on selected topics. To develop independent and active learning, emphasis and clivered over threes. The module ontent will be delivered vale lettures may be rapicals. Outcoment. Any course related issue or questions that may arise will be discussed at lectures. Students can contact lecture outside of class hours to discuss feedback on reports, assignments and assessments.           Module Alm:         The aim of this module is to impart knowledge regaring the principles of the physical and contrent and practical applications in relation to the modules to impart knowledge regaring the principles of the physical and current legislation. This module will have visited of class hours to discuss feedback on reports, assignments and assessments.           Module Alm:         The aim of this module is to impart knowledge regaring the principles of the physical and current legislation. This module will have visited of class hours to discuss feedback on reports, assignments and assessments.           Module Alm:         The aim of this module he learner should be able to: Can contact lecturer outside of class hours to discuss feedback on reports, assignment and available and monitoring.           Discuss the method solid environment.         Explain the overeall interactive nature of the global environmen		~~~				
Credits:       10         Credits:       10         MPC Level:       8         Module Delivered In       1 programme(s)         Taesching & Learning       This module will be taught as a 3 hour theory class for thirty weeks and ten three hour practical sessions to reading, and written assignments on selected topics. To develop independent and active learning, emphasis and critique of class and practicals. Course lecture notes, additional metanias, learning written assignments on selected topics. To develop independent and active selected topics. To develop independent and active selected topics. To develop independent and active selected topics and practicals, sugged a develop in advance of class and practicals. Course lecture notes, additional metanias, learning written will be on the analysis and ortique of class and practical selected topics. To develop independent and active selected topics on reports, assignments and assessments.         Module Aim:       The aim of this module is to inpart knowledge regarding the principles of the physica and current learning written will be devined on the natural evinoment and to equipic the student with the selid set to monoment and anapte the evinonment and practical application. This module covers advanced theory of physicchemical principles in the global environment and practical selecter of the global environment.         LO1       Explain the overall interactive nature of the global environment.         LO2       Describe the environmental impacts of natural and anthropogenic pollutants.         LO3       Describe the environmental impacts of remote sensing.         LO4       Describe the environmental impacts of ra		-	Physico Chemical Science			
NFQ Level:         8           Module Delivered In         1_programme(s)           Tacking & Learning         This module will be taught as a 3 hour theory class for thirty weeks and ten three hour practical sessions to subject of points. To develop independent and acture learning, emphasis and critique of calcing materials. Source lecture notes, additional metrials.           Strategies:         This module will be taught as a 3 hour theory class for thirty weeks and ten three hour practical subject of points. To develop independent and acture learning the additional metrials.           Module Alm:         The aim of this module is to impart knowledge regarding the principles of the physical and chemical nature of the dynamics of the natural environment and to equip the student with the skill set to nomitor, analyse and practical splications in relation to the montoring and practical splications in relation to the montoring and practical splications in relation to the montoring and practical opplications in relation to the montoring and practical splications and available.           L01         Explain the overall interactive nature of the global environment.           L02         Describe the chemistry and processes of modem waste treatment methods.           L03         Describe the environmental impacts of natural environmental monitoring           L04         Describe the app	Language o	f Instruction:	English			
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Strategies:         be delivered over ten weeks. The module content will be delivered via lectures and practicals, guided reading, and writen assignments on selected topics. To develop independent and active learning, emphasis will be on the analysis and critique of reading materials. Students may be required to access material by guided reading in advance of class and practicals. Course lecture notes, additional materials. Students may be required to access materials by announcements and other course-related information will be available on Blassimments and assessments.           Module Aim:         The aim of this module is to impart knowledge regarding the principles of the physical and chemical nature of the dynamics of the natural and vanced to fast dynamed to equip the student with the skill set to monitor, analyse and manage the environment and avanced to fast dynamed to equip the student with the skill set to monitor, analyse and manage the environment assessitively and sustainably with regard to safety beat practice and current legislator. This module the learner should be available on Blassitian principles in the global environment and article applications in relation to the monitoring and protection of water quality and air quality.           Learning Ux=>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>	Module Deli	vered In	1 programme(s)			
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On successful completion of this module the learner should be able to:         LO1       Explain the overall interactive nature of the global environment.         LO2       Describe the environmental impacts of natural and anthropogenic pollutants.         LO3       Describe the chemistry and processes of modern waste treatment methods.         LO4       Describe modern analytical methods and technologies for environmental monitoring         LO5       Discuss the methodologies of emission monitoring.         LO6       Describe the applications and importance of remote sensing.         LO7       Discuss workplace pollutant monitoring including air quality and sound.         LO8       Understand and interpret official reports.         LO9       Perform analytical procedures and be able to collate data, interpret results and write environmental reports         LO1       Explain the environmental impacts of natural chemicals and anthropogenic pollutants.         Pre-requisite learning         Module Recommendations         This is prior learning outcomes that are too similar to the learning outcomes of this module.         No requisite modules listed         Co-requisite Modules         These are modules listed         Requirements         This is prior learning (or a practical skill) that is mendatory before enrolment in this module is allowe	Module Aim:		of the dynamics of the natural environment and to equip the student with the skill set to monitor, analyse ar manage the environment sensitively and sustainably with regard to safety best practice and current legislation. This module covers advanced theory of physicochemical principles in the global environment			
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LO4       Describe modern analytical methods and technologies for environmental monitoring         LO5       Discuss the methodologies of emission monitoring.         LO6       Describe the applications and importance of remote sensing.         LO7       Discuss workplace pollutant monitoring including air quality and sound.         LO8       Understand and interpret official reports.         LO9       Perform analytical procedures and be able to collate data, interpret results and write environmental reports         LO10       Explain the environmental impacts of natural chemicals and anthropogenic pollutants.         Pre-requisite learning         Module Recommendations       This is prior learning (or a practical skill) that is recommended before enrolment in this module.         No recommendations listed       Incompatible Modules         Incompatible Modules         Co-requisite modules listed         Co-requisite modules listed         Requirements         No Co-requisite modules listed         Requirements         This is prior learning (or a practical skill) that is mandatory before enrolment in this module is allowed.	LO2					
LO5       Discuss the methodologies of emission monitoring.         LO6       Describe the applications and importance of remote sensing.         LO7       Discuss workplace pollutant monitoring including air quality and sound.         LO8       Understand and interpret official reports.         LO9       Perform analytical procedures and be able to collate data, interpret results and write environmental reports         LO9       Explain the environmental impacts of natural chemicals and anthropogenic pollutants.         Pre-requisite learning         Module Recommendations         This is prior learning our a practical skill) that is recommended before enrolment in this module.         No recommendations         These are modules which have learning outcomes that are too similar to the learning outcomes of this module.         No Co-requisite modules listed         Co-requisite modules listed         Requirements         Requirements         This is prior learning (or a practical skill) that is mandatory before enrolment in this module is allowed.	LO3					
LO6       Describe the applications and importance of remote sensing.         LO7       Discuss workplace pollutant monitoring including air quality and sound.         LO8       Understand and interpret official reports.         LO9       Perform analytical procedures and be able to collate data, interpret results and write environmental reports         LO10       Explain the environmental impacts of natural chemicals and anthropogenic pollutants.         Pre-requisite learning         Module Recommendations This is prior learning (or a practical skill) that is recommended before enrolment in this module.         No recommendations listed       Incompatible Modules These are modules which have learning outcomes that are too similar to the learning outcomes of this module.         No incompatible modules listed       No Co-requisite modules listed         Requirements Requirements This is prior learning (or a practical skill) that is mandatory before enrolment in this module is allowed.	LO4	Describe mode	rn analytical methods and technologies for environmental monitoring			
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LO9       Perform analytical procedures and be able to collate data, interpret results and write environmental reports         LO10       Explain the environmental impacts of natural chemicals and anthropogenic pollutants.         Pre-requisite learning         Module Recommendations This is prior learning (or a practical skill) that is recommended before enrolment in this module.         No recommendations listed       Incompatible Modules These are modules which have learning outcomes that are too similar to the learning outcomes of this module.         No incompatible modules listed       Co-requisite Modules         No Co-requisite modules listed       No Co-requisite modules listed         Requirements This is prior learning (or a practical skill) that is mandatory before enrolment in this module is allowed.	LO7	Discuss workplace pollutant monitoring including air quality and sound.				
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Successful completion of year 3 or equivalent			ctical skill) that is mandatory before enrolment in this module is allowed.			
	Successful completion of year 3 or equivalent					



## SCIE H4122: Physico Chemical Science

## **Module Content & Assessment**

## Indicative Content

#### **Environmental pollutants**

Review of organic and physical chemistry to include kinetics and gas laws; Polluting chemicals: pesticides, herbicides, chlorinated hydrocarbons, PAH, heavy metals: chemistry and toxicities; Processing waste chemicals: landfill, incineration, SCWO, recycling; Chemicals in the workplace: radon, NOx, CO, ETS, asbestos; Outdoor pollutants, PM Index; Chemistry and reactivity of the hydroxyl radical (OH\*)

## Transport of pollutants

Transport mechanisms of chemical in the environment (LRTAP, Kow etc)

### Environmental analytical methods

Environmental applications of chromatography (HPLC, IC), solvent extraction, chelation.

#### Fluid dynamics

Point, line and continuous sources of pollution.

## Monitoring of air quality and emissions to air

Emissions monitoring: manual and continuous monitoring techniques for particulate and gaseous emissions from stacks and ducts; Ambient and outdoor air monitoring.

#### Remote sensing

Principles and applications of remote sensing. LIDAR and spectroscopic techniques

#### Sound

Noise monitoring, noise nuisance criteria and standards

#### **Biogeochemical cycles**

Atmosphere-earth-hydrosphere as dynamic system. Sources, sinks, reservoirs. Nitrogen, Phosphorus, Carbon and Sulphur cycles.

#### Hydrosphere.

Properties of water; Hydrological cycle; Lake stratification and effects; Eutrophication; Acidification, neutralisation and buffering. Drinking water sources and treatment; Waste-water treatment.

#### Water quality monitoring

Monitoring requirements under Water Framework Directive, Catchment monitoring, Priority substances. Sampling and laboratory methods; Portable devices and test kits. In situ monitoring technologies.

#### Chemistry of the earth (biosphere)

Mineral composition, groundwater protection; Physical/chemical interactions in soils; Speciation, N and P nutrients.

#### Chemistry of the atmosphere

Structure and composition of the atmosphere; Photochemistry; Chapman and catalytic reactions, halogenated gases, ozone depletion. Greenhouse effect, greenhouse gases, climate change.

#### Practicals

Practicals are designed to reinforce and amplify the theoretical content of the course and will be based on relevant applications of techniques such as ion exchange and ion chromatography, HPLC, solvent extraction/chelation of metals, ashing / dissolution techniques, graphite furnace and flame AAS, various parameters by titrimetry and spectroscopy, determination of chemical oxygen demand, FTIR spectroscopy of trace gases, jar tests / flocculation and residuals monitoring, conductivity / mass-charge balance evaluation.

Assessment Breakdown	%
Continuous Assessment	10.00%
Practical	20.00%
End of Module Formal Examination	70.00%

### 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	Two continuous assessment examinations of 1 hour duration	1,2,3,4,5,6,7,10	10.00	n/a	

## No Project

Practical					
Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date	
Practical/Skills Evaluation	Written reports/laboratory book and other appropriate assignments	3,4,8,9	20.00	n/a	

End of Module Formal Examination					
Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date	
Formal Exam	No Description	1,2,3,4,5,6,7,10	70.00	End-of-Semester	

SETU Carlow Campus reserves the right to alter the nature and timings of assessment



## SCIE H4122: Physico Chemical Science

# Module Workload

Workload: Full Time		
Workload Type	Frequency	Average Weekly Learner Workload
Lecture	30 Weeks per Stage	3.00
Laboratory	30 Weeks per Stage	1.00
Estimated Learner Hours	30 Weeks per Stage	3.00
	Total Hours	210.00

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