

FACULTY OF ENVIRONMENTAL STUDIES

Undergraduate Programmes Offered :

Bachelor Programme

- 1. Bachelor of Environmental Management*
- 2. Bachelor of Environmental Science and Technology*

STUDY SCHEME (BACHELOR OF ENVIRONMENTAL MANAGEMENT)

Notes : L = Lecture , L/T = Laboratory/Tutorial							
SEMESTER 1				SEMESTER 2			
1ST YEAR							
<i>CODE</i>	<i>COURSE NAME</i>	<i>L</i>	<i>L/T</i>	<i>CODE</i>	<i>COURSE NAME</i>	<i>L</i>	<i>L/T</i>
SKP2101	Malaysian Nationhood	3	0	BBI2423	Academic Interaction and Presentation	2	1
SKP2203	Islamic Civilization and Asian Civilization	2	0	PRT2008	Agriculture and Human	2	0
MGM3101	Principles Of Management	3	0	FCE3204	Thinking Skills	2	0
EMG3008	Introduction to Natural Systems	3	0	ECN3100	Principles Of Economics	3	0
QKXXX	Co-curriculum	0	1	EMG3009	Resource Management	2	0
	CEL2102 & LAX			EMG3203	Introduction to Environmental Planning	3	0
	TOTAL	11	1	EMG3801	Introduction to Fieldwork	0	2
				QKXXX	Co-curriculum	1	0
				TOTAL		15	3
2ND YEAR							
<i>CODE</i>	<i>COURSE NAME</i>	<i>L</i>	<i>L/T</i>	<i>CODE</i>	<i>COURSE NAME</i>	<i>L</i>	<i>L/T</i>
BBI2424	Academic Writing	2	1	SKP2204	Ethnic Relations	2	0
ACT2112	Introductory Accounting	3	1	EMG3303	Project Management and Operation	3	0
MGM3180	Basic Entrepreneurship	2	1	EMG3204	Environmental Planning Studio I	0	3
EMG3010	Environmental Quality Management	3	0	EMG4991	Environmental Management Seminar	1	1
EMG4802	Environmental Quality Management Fieldwork	0	2	EMG3302	Environmental Economics and Management	3	0
EMG3501	Principles of Environmental Law	3	0		Elective		
	TOTAL	13	5		LAX		
				TOTAL			
3RD YEAR							
<i>CODE</i>	<i>COURSE NAME</i>	<i>L</i>	<i>L/T</i>	<i>CODE</i>	<i>COURSE NAME</i>	<i>L</i>	<i>L/T</i>
EMG4206	Environmental Planning Studio II	0	3	EMG4803	Environmental Management Planning Fieldwork	0	2
EMG4902	Research Methodologies for Environmental Management	2	1	EMG4959A	Bachelor Dissertation	0	3
	Elective			EMG3401	Society, Ethics and the Environment	3	0
	LAX				CEL 2105/2106/2107		
	TOTAL				Elective		
				TOTAL			
4TH YEAR							
<i>CODE</i>	<i>COURSE NAME</i>	<i>L</i>	<i>L/T</i>	<i>CODE</i>	<i>COURSE NAME</i>	<i>L</i>	<i>L/T</i>
EMG4959B	Bachelor Dissertation	0	3	EMP4901	Industrial Training	0	12
EMG3202	Environmental Impact Assessment	2	0	TOTAL		0	12
EMG4102	Environmental Quality Management Systems	3	0				
	Elective	0	0				
	LAX						
	TOTAL						

STUDY SCHEME (BACHELOR OF ENVIRONMENTAL SCIENCE AND TECHNOLOGY)

Notes : L = Lecture, L/T = Laboratory/Tutorial							
SEMESTER 1				SEMESTER 2			
1ST YEAR							
CODE	COURSE NAME	L	L/T	CODE	COURSE NAME	L	L/T
SKP2203	Islamic Civilization and Asian Civilization	2	0	BBI2423	Academic Interaction and Presentation	2	1
PRT2008	Agriculture and Man	2	0	FCE3204	Thinking Skills	2	0
EMG3001	Man And Environment	3	0	ESC3009	Instrumentation and Environmental Analysis	2	1
ESC3013	Environmental Physics	2	1	ESC3508	Applied Mathematics for the Environment	2	1
ESC3014	Environmental Chemistry	2	1	ESC3509	Introduction to Environmetrics	2	1
ESC3015	Environmental Biology	2	1	ESC3101	Principles of Environmental Health	2	1
	Co-curriculum	0	1		Co-curriculum	0	1
	TOTAL	13	4		TOTAL	12	6
2ND YEAR							
CODE	COURSE NAME	L	L/T	CODE	COURSE NAME	L	L/T
SKP2101	Malaysian Nationhood	3	0	KOM3403	Public Oration	2	1
SKP2204	Ethnic Relations	2	0	MGM3180	Basic Entrepreneurship	2	1
BBI2424	Academic Writing	2	1	ESC3012	Solid Waste Treatment Technology	3	0
ESC3401	Environmental Geology	2	1		Elective	6	3
ESC3011	Introduction To Atmospheric Sciences	2	1		TOTAL	13	5
ESC3203	Environmental Hydrology	2	1				
	TOTAL	13	4				
3RD YEAR							
CODE	COURSE NAME	L	L/T	CODE	COURSE NAME	L	L/T
ESC4801	Integrated Environmental Field Study	0	2	ESC4959A	Bachelor Dissertation	0	2
ESC3204	Wastewater Treatment	2	1		Elective	9	3
	Elective	7	2		TOTAL	9	5
	TOTAL	9	5				
4TH YEAR							
CODE	COURSE NAME	L	L/T	CODE	COURSE NAME	L	L/T
ESC4959B	Bachelor Dissertation	0	4	ESC4901	Industrial Training	0	12
EMG3401	Society, Ethics and the Environment	3	0		TOTAL	0	12
EMG3202	Environmental Impact Assessment	2	0				
EMG3502	Law Of Environmental Pollution Control	3	0				
	TOTAL	8	4				

COURSE SYNOPSIS

Department of Environmental Management

EMG3001 Man And Environment 3(3+0)

Prerequisite : None

This course covers principles and concepts about the earth and the solar system, physical, chemical, and biological processes that shape the earth's life support system, ecology and ecosystems. Impacts of human activities on the environment, pollution and its management are discussed

EMG3003 Environmental Information Systems 3(2+1)

Prerequisite : None

This course covers identification of sources of environmental information, methods of collecting, abstracting and presenting information, and database management. Remote sensing techniques, social studies and monitoring networks are applied. Database management using computers and programs are also introduced.

EMG3007 Quantitative Methods for Environmental Management 3 (1+2)

Prerequisite : None

This course covers the quantitative methods used for data analysis in environmental management, with emphasis on the theories and practical of basic mathematics and statistics.

EMG3008 Introduction to Natural Systems 3 (3+0)

Prerequisite : None

This course covers the concept and basic principles of environmental science and management. It also focuses also on the biological and geographical approaches in biogeochemical cycles, which form the basic component of ecosystems and contribute towards biological diversity. The earth physical processes influencing the functional of natural resources are also discussed

EMG3009 Resource Management 2 (2+0)

Prerequisite : None

This course covers natural resource management. Land, water, minerals, energy and food production management are discussed as well. The impact of human consumption on these resources is considered. Management measures and conservation strategies for the principle components of natural resources are also discussed

EMG3010 Environmental Quality Management 3 (3+0)

Prerequisite : None

This course covers the management aspect of environmental quality and pollution control. Environmental health and risk elements are emphasised. Pollutant monitoring as well as control and treatment technology including global warming effects are also discussed

EMG3011 Sustainability and Society 2 (2+0)

Prerequisite : None

This course covers the concept and principles of sustainable development. Relationship between human and physical planning development are discussed from the socio-cultural, political and economic perspectives. The role of governance and education are also elaborated

EMG3103 Air and Water Quality Management 3 (3+0)

Prerequisite : None

This course covers the basic concepts of water and air pollution. Technologies and management systems used to control water and air pollution are emphasized.

EMG3104 Principles of Solid Waste Management 3 (3+0)

Prerequisite : None

This course covers functional elements in solid waste management systems in relation to its practices in Malaysia.

EMG3202 Environmental Impact Assessment 2(2+0)

Prerequisite : EMG3009

This course covers the use of the Environmental Impact Assessment (EIA) method in planning of developmental projects. EIA methodologies that are commonly used are discussed.

EMG3203 Introduction to Environmental Planning 3(3 + 0)

Prerequisite : None

This course covers the basic principles and theories of planning as well as various recent planning methods and techniques. Physical planning aspects such as structure plans, local plans, strategic plans and planning standards are introduced. The relationships between planning, management, environmental conservation, rehabilitation and Geographic Information Systems will be emphasized.

EMG3204 Environmental Planning Studio I 3 (0+3)

Prerequisite : None

This course covers the basic concept of environmental planning and the use of studio work in developing practical planning projects. Remote sensing methods and mapping software will be used to analyse planning and development issues as well as forming their solutions.

EMG3205 Physical Geography 3 (3+0)

Prerequisite : None

This course covers the fundamental issues in physical geography and analyses the implications of recent research. Global interactions involving the atmosphere, oceans, ecosystems, and geologic and earth surface processes will be emphasised. The influence of global processes and environmental changes on the nature of landforms and landscapes will be discussed.

EMG3302 Environmental Economics and Management 3 (3+0)

Prerequisite : ECN3100

This course covers the economic approach in assessing environmental problems and evaluating policy solutions. Emphasis will be given to market failure and externalities, conventional and economic solutions to environmental problems. Risk analysis approaches, benefit-cost analysis, case studies in environmental problems, and approaches to achieve sustainable development are covered.

EMG3303 Project Management and Operation 3 (3+0)

Prerequisite : ECN3100

This course covers the theories, techniques and process of project planning and management both at macro and micro levels, elements of management and the control of project management. Project analysis, techniques of project evaluation and contemporary issues on planning and project development will be discussed.

EMG3401 Society, Ethics and the Environment 3(3+0)

Prerequisite : EMG3001 / EMG3008

This course covers the relationship between the society and present environmental issues. The roles of economy, ethics, law and government in developing and solving environmental problems as well as the involvement of society in resource management and pollution control are emphasised.

EMG3402 Qualitative Research Methods for the Environment 4(3+1)

Orerequisite : None

This course covers qualitative research methods in the field of the environment including theoretical framework in qualitative research. Emphasis will be given towards training in common data collection methods such as interviewing, observations and document analysis.

EMG3501 Principles of Environmental Law 3 (3 + 0)

Prerequisite : None

This course covers introduction to the legal system in Malaysia including common law and statutory approaches in efforts to improve environmental quality. Agreements, conventions, and issues pertaining to environment at the international level and their legal implications are emphasised. Case laws on environmental issues are discussed.

EMG3801 Introduction to Fieldwork 2 (0 + 2)

Prerequisite : None

This course covers the introduction to research instruments, methods and techniques used in monitoring the environment. Environmental data will be analyzed with the right technique and summarized in a report

EMG4901 Industrial Training 12 (0+12)

Prerequisite : Final Year Student of Bachelor of Agricultural Management

This course covers the need for students to undergo practical training at public agencies or private companies for a period of 24 weeks. During the training period, the students will develop knowledge and practical experience on how public agencies or private companies deal with issues related to the environment from different aspects.

- EMG4959 Bachelor Dissertation** 6 (0+6)
 Prerequisite : None
 This course covers the preparation of proposal, implementation and scientific writing of research project. Scientific approach to generate data systematically through appropriate design, data collection and analysis are emphasized.)
- EMG4001 Statistics for Environmental Planning and Management** 3 (2+1)
 Prerequisite : None
 This course covers the application of statistical methods to the analysis and interpretation of information in environmental planning and management. Concepts and application of statistical methods are discussed. Laboratory activities emphasize data processing techniques, problem solving and interpretation of information related to environment.
- EMG4102 Environmental Quality Management Systems** 3 (3+0)
 Prerequisite : None
 This course covers the issues related to trade, environment and development and the roles of consumer, community, industry and government in enhancing the environment quality. The environmental management system standards, their application and impacts of international standards such as ISO 14000 series related to environmental management will be introduced.
- EMG4105 Management of Projects in Controlled Environments** 3 (2 + 1)
 Prerequisite : EMG3204 or EMG3303
 This course covers the use and application of the best practice and process-based approaches for the management of all types of projects related to the environment. The emphasis is on business case studies, project management team, controls, risk and quality.
- EMG4106 Environmental Change and Current Issues** 2 (2+0)
 Prerequisite : None
 This course covers the historical changes of the environment and current issues relating to environmental changes affecting mankind using the governance approach. The impact of mankind on the earth and the dynamic nature of the environmental system are also discussed.
- EMG4202 Transport Planning** 3(3+0)
 Prerequisite : None
 This course covers transport systems and its relationship to land use in urban and rural areas. Traffic flow theory and the implications of development and various land use activities on transport facilities are emphasised. Data collection, evaluation and project appraisal techniques for transport planning and its effects are discussed.
- EMG4203 Applied Environmental Planning and Management** 3(2+1)
 Prerequisite : EMG3204
 This course covers the concepts and methods practiced in environmental planning and management. Analytical skills in selecting appropriate alternative plans and mitigation measures to reduce environmental impacts will be developed through discussion of case studies.

EMG4205 Oil Spill Response Planning 2 (2+0)

Prerequisite : None

This course covers the strategies and issues involved in response to oil spills at sea. The factors which influence the behaviour and movement of oil, including the impact on different types of shores and ecosystems are explained. The components of an oil spill contingency plan are introduced. The steps which are involved in the management of oil spill response and past oil spill cases are discussed.

EMG4206 Environmental Planning Studio II 3 (0+3)

Prerequisite : EMG3203 and EMG3204

This course covers the strategic and multi-disciplinary nature of broad scale environmental planning including National Physical Plan (NPP) for shaping comprehensive urban and rural development or as a resource management study. Emphasis will be given to scientific inputs and research techniques, interaction of ecological, social, economic and cultural aspects. The application of CAD and GIS techniques will be an intergral component of the studio

EMG4401 Human Geography 3 (3+0)

Prerequisite : EMG3205

The course covers multiple approaches towards human geography from cultural, social, political and economic aspects. Challenges facing society in dealing with environmental problems are discussed.

EMG4402 Gender and Integrated Natural Resources Management 3 (2+1)

Prerequisite : EMG 3009

This course covers the issue of gender in integrated natural resource management. Consideration of gender aspects in the integrated natural resource management and weaknesses in projects which are insensitive to gender aspects are discussed through case studies. Indicators of impact methods are also discussed.

EMG4403 Research in Environmental Sociology 3 (2+1)

Prerequisite : EMG3011

This course covers the study of relations between environment and society and the differentiation between built and natural environments. Students will design and conduct sociological research focusing on environmental matters as an approach to sustainability

EMG4404 Ecotourism and Environment 3 (2+1)

Prerequisite : None

This course encompasses development of environmental and social initiatives in the tourism industry. It also includes the planning of sustainable strategies in ensuring the ecotourism business entity is managed professionally and successfully achieves the objectives of its existence

EMG4405 Life cycle thinking in sustainable development 3 (3+0)

Prerequisite : None

This course covers the life cycle approach, used to analyze a product. It consists of the three main pillars of sustainable development which are environment, social and economy. This course emphasises on the methods of conducting studies related to the product's life cycle through the perspective of sustainability.

Implementation of a comprehensive life cycle approach could provide a positive impact on the sustainability of a product under review

EMG4501 Policy and Environmental Administration 3(3+0)

Prerequisite : EMG3009

This course covers the process of formulating policies related to environmental matters. Administration and laws including 'Common Law' in Malaysia are emphasised. Systems of environmental administration as practiced by other countries are also discussed.

EMG4502 Environmental Law and Planning 3 (3 + 0)

Prerequisite : EMG3501

This course covers law related to the management, pollution control and planning of the environment. Enforcement, law of Torts, local and international legal regime are also emphasized.

EMG4504 Laws relating to Biodiversity Conservation and Climate Change 3 (3 + 0)

Prerequisite : None

This course covers law and policy as well as issues on biodiversity conservation and climate change at national and international level. The course also considers the interrelationship between biodiversity conservation and climate change from legal perspective including the court's roles and cases

EMG4802 Environmental Quality Management Fieldwork 2 (0+2)

Prerequisite : EMG3801

This course covers research methods related to the impact of development on the environment through fieldwork in selected locations. The result of this fieldwork will be summarized in the form of a report and presentation

EMG4803 Environmental Management Planning Fieldwork 2 (0+2)

Prerequisite : EMG3801

This course covers research methods on the impact of development on the environment through field studies. Field studies will be carried out in selected locations. The result of field studies will be summarized in the environmental impact assessment report

EMG4902 Research Methodologies for Environmental Management 3(2+1)

Prerequisite : None

This course covers the basic methods of qualitative and quantitative research for environmental management. Approaches in developing the problem statement, research objectives and proper literature reviews are explained. Emphasis will also be given towards to the application of research theory such as the establishment of the research objectives, the construction of the research instrument, collect and analyze data, and report the results

EMG4991 Environmental Management Seminar

2 (1+1)

Prerequisite : Second Year Student of Bachelor of Agricultural Management

This course trains students towards the proper use of seminar presentation techniques including presentation, content, preparation, audio visual equipment and seminar presentation software. Student will be evaluated through academic and technical seminars presentation.

EMG4992 Facilitation in Environmental Management

2 (1+1)

Prerequisite : None

This course will train students to adapt facilitation techniques for small and large groups. Students will design effective facilitation process and involve actively in group discussions

Department of Environmental Sciences

ESC3009 Instrumentation and Environmental Analysis 3 (2+1)

Prerequisite : None

This course covers chemical analysis in the environment that includes analysis of organic and inorganic pollutants and particle reactivity with pollutants. Preparation of standard chemical and column is detailed out. The most recent instrumentations employed in environmental studies are discussed.

ESC3010 Soil and Water Sciences 3 (2+1)

Prerequisite : None

This course covers the basic scientific and technological principles of soil and water studies which include the main aspects of geoscience, hydrologic cycle, flow through porous media, the role of water in soil-plant-atmosphere continuum, water quality and hydraulic.

ESC3011 Introduction to Atmospheric Sciences 3(2+1)

Prerequisite : None

This course covers composition and structure of atmosphere, cloud formation and weather phenomena, thermodynamic processes, solar and terrestrial radiation, air motions, and weather forecasts. Climate change including meteorological changes and global warming are also discussed.

ESC3012 Solid Waste Treatment Technology 3 (3+0)

Prerequisite : None

This course covers elements of solid waste management system which include generation, on-site handling and processing, collection, transportation, waste minimization and recycling, conversion technologies and final disposal. The relationship between economics, technologies, health, environment, law and planning in solid waste management and disposal are emphasized.

ESC3013 Environmental Physics 3 (2+1)

Prerequisite : None

This course covers physical phenomena and the laws that govern them. Topics discussed include the earth's heat engine process, green energy, electricity, wave motion and hydraulics, and radiation. The application of physical laws in solving environmental problems are introduced

ESC3014 Environmental Chemistry 3 (2+1)

Prerequisite : None

The course covers basic concepts of chemistry and its application in the environment. Topics discussed include water chemistry, physical chemistry processes in the environment, electrochemistry, geochemistry and biogeochemistry as well as organic chemistry. Sampling, preservation and storage of samples from environmental matrices are also discussed. Special topics on pollution chemistry, climate change chemistry and emerging pollutants are also emphasized

ESC3015 Environmental Biology 3 (2+1)

Prerequisite : None

This course covers basic principles of ecology such as ecosystem structure and function, autecology, population dynamics and communities interaction with the ecosystem. Biogeographic distribution, conservation biology, ecosystem services and biosphere management are also emphasized. Impacts of biological components on the environment will also be discussed

ESC3101 Principles of Environmental Health 3 (2+1)

Prerequisite : None

This course covers various environmental issues and problems that affect human health based on toxicology methods, epidemiology, microbiology and case studies. Pollution in different environmental media, chemicals and pesticides, epidemics, food and water borne diseases, the impact of climate on human health, and environmental health risk assessment are discussed.

ESC3203 Environmental Hydrology 3 (2+1)

Prerequisite : None

This course covers the role of hydrology in environmental planning and management as well as the eco-hydrological impacts on environmental management. Also discussed are problems of flood, landslide, erosion and sedimentation, non-point source of pollution, groundwater pollution and hydrologic modelling.

ESC3204 Wastewater Treatment 3 (2+1)

Prerequisite : None

This course discusses several different objectives of wastewater treatment, local regulatory requirements for wastewater discharges, wastewater sources and characteristics and the role of the wastewater treatment plant operator. Basic plant operational control parameters and process monitoring is emphasized. Principles of anaerobic sludge treatment, effluent and sludge reuse and health and safety issues are also explained.

ESC3205 Drinking Water Treatment 3 (3+0)

Prerequisite : None

This course covers issues on sources of water supply, impacts of water pollution and drinking water treatment processes. Important drinking water quality parameters and disinfection techniques as well as the impact of water quality on human health are also discussed.

ESC3401 Environmental Geology 3 (2+1)

Prerequisite : None

This course covers the basic environmental geology principles, earth internal and surface processes. Topics on mineral and energy resources, waste disposal and types of pollution related to environmental geology are also discussed. The current issues such as local and international geological adversities and mitigation measures will also be discussed

ESC3501 Environmental Geographic Information Systems 3 (2+1)

Prerequisite : None

This course covers the definition of GIS, geographic data, cartographic and data structure, input and output data as well as application of GIS in the field of environment.

ESC3507 Envirometrics 3 (2+1)

Prerequisite : None

This course covers methods in analysis and interpretation of environmental data in mitigating pollution sources. Case studies are used to validate prediction models based on real time analysis. Multivariate analysis and modelling methods to evaluate environmental quality are also discussed.

ESC3508 Applied Mathematics for the Environment 3 (2+1)

Prerequisite : None

This course covers the basic mathematics used in solving environmental issues. Environmental trends will be explained by using mathematical equations. Special topics in mathematical modeling will also be discussed

ESC3509 Introduction to Environmetrics 3 (2+1)

Prerequisite : None

This course covers elementary statistical topics for environmental data. Summary of the environmental conditions through exploratory data analysis and descriptive and inferential statistic are also introduced. Probability and estimation influence on sampling and the suitability of parametric and non-parametric test used are also discussed. Environmental metric applications will be given

ESC4002 Environmental Hydrochemistry and Geochemistry 3 (2+1)

Prerequisite : None

This course covers the basic scientific principles to the hydrochemistry and geochemistry of water and soil. Topics covered include mineral solubility, complexation, acids and bases, carbonate chemistry, rock weathering and clay formation, adsorption and ion exchange, redox reactions, microbial energetics and redox zonation as to describe the chemistry of pristine and polluted soil, surface, and ground water environments

ESC4101 Environmental Health Risk Assessment 3 (3+0)

Prerequisite : ESC3101

This course covers the health risk assessment process to measure the potential adverse effects and impacts on individual and population due to occupational and environmental pollutions.

ESC4102 Pollution Exposure Assessment 3 (2+1)

Prerequisite : ESC3101

This course covers anatomy and physiology of the human body, industrial toxicology, principles of evaluating the work environment, sampling methodology, noise exposure and control, and application of guidelines and standards. Emphasizes are given to the identification, evaluation and control of potential workplace hazards and the potential health threats to humans and the environment.

ESC4103 Environmental Microbiology 3 (3+0)

Prerequisite : None

This course covers the basic principles and methods used in environmental microbiology field. Students will also learn about microbial diversity, roles of microbes in different environments and their dynamic interactions within microbial communities, higher organisms and surroundings

ESC4201 River Water Quality Management 3 (3+0)

Prerequisite : None

This course covers water pollution sources, planning and management of water quality, water quality index determination and river classification for water resource management. Localized and regional watershed problems and solutions in relation to river water quality management are discussed.

ESC4202 Hydrogeology 3(2+1)

Prerequisite : None

This course covers importance issue of groundwater and the processes that were used to manage it. In addition topics related to groundwater development, flow through porous media, water movement and distribution towards groundwater wells, drainage, reclamation procedures, groundwater pollution and ground water modeling will also be discussed.

ESC4204 Watershed Analysis 3 (3+0)

Prerequisite : ESC3203

This course covers hydrologic and geomorphic basis of environmental management problems concerning drainage basins. Essential tools and techniques to conduct watershed evaluation using Geographic Information Systems (GIS) and watershed modelling to evaluate the health status of a watershed that will include diagnosing the causes, suggestion on options, and policies on how to improve the watershed system.

ESC4205 Marine Chemistry 3 (2+1)

Prerequisite : ESC3014

This course covers the chemical processes of marine environments which include basic biogeochemistry of oxygen, salt composition, dissolved chemical species, radioisotopes, trace and major elements, heavy metals in the coastal and deepocean. One fieldwork activity is held during this course to expose students to the correct seawater, sediments and total suspended solid sampling, include current method on samples treatment. An advance analysis on the samples is also discussed.

ESC4301 Carbon Sequestration And Climate Changes 3 (2+1)

Prerequisite : ESC3015

This course covers sources, changes and impacts of greenhouse gases, principles and United Nations Framework Convention on Climate Change. The focus is on temperature change, sea level rise, change in precipitation, and impact of climate change on biodiversity and sustainability of life support systems. Concept of carbon sequestration in ecosystem and carbon trading are discussed.

ESC4303 Air Pollution Control Technology 3 (3+0)

Prerequisite : ESC3013

This course covers various aspects of air pollution control technologies including measurement and monitoring, meteorology, regulatory and engineering control of air pollution.

ESC4401 Subsurface Investigation Technique 3 (2+1)

Prerequisite : ESC3013

This course covers methods to investigate and identify structures, physical parameters and the constituents of the

earth subsurface including geophysical methods for surveying and exploration purposes. Application of various aquifer evaluation methods and computer programs are also adopted.

ESC4404 Hazardous Waste Treatment Technology 3 (3+0)

Prerequisite : ESC3014

This course covers the physical, chemical and toxic properties of hazardous wastes that form the basis for hazard classification and determination of their movement, distribution as well as their impacts on human health and the environment. Treatment and disposal technologies including handling, storage and transportation based on the Environmental Quality Act 1974 and international regulations are discussed.

ESC4406 Environmental Geophysics 3 (2+1)

Prerequisite : ESC3013

This course covers the study of earth's internal structures and content through geophysical methods such as surveying, exploration and pollution assessment. Anthropogenic activities and natural processes contributing to environmental pollution are also discussed.

ESC4502 Environmental Emergency Response 3 (3+0)

Prerequisite : ESC3014

This course covers management of water, food, liquid waste, solid waste, medical waste, housing and mass care shelters, disease vectors, hazardous and toxic materials, radiation, and biological infection wastes after a disaster including nature of emergencies and disasters and emergency response. Material Safety Data Sheet (MSDS), Chemical Safety Data Sheet (CSDS) documents and incident command procedures are discussed.

ESC4503 Pollution Biology 3(2+1)

Prerequisite : None

This course covers discussion on the natural environment and sources of air, water and soil pollution. The physiological and biochemical responses of plants and animals and other organisms including defense mechanisms, avoidance and resistance, monitoring, biological indicators and their applications, evolution, pollution, practical uses of tolerance and resistance will also be discussed.

ESC4504 Environmental Modeling 3(2+1)

Prerequisite : ESC3508

This course covers the basic principles and methods used in physical and social parameter measurements in environmental studies. Techniques of environmental measurement, sampling, data analysis and interpretation will be discussed and implemented in the field.

ESC4505 Industrial Ecology 3 (3+0)

Prerequisite : EMG3001

This course covers the significance of physical, biological, chemical and societal frameworks in the use of ecological concepts to manage resource in a built up area using tools such as design and development, process design, life cycle assessment, impact assessment and interpretation.

ESC4506 Intelligent Technology for Environment 3 (3+0)

Prerequisite : None

This course covers concepts and methods in the development of an artificial intelligence system. Benefits and limitations of artificial intelligence versus conventional methods in solving environmental problems are emphasized through discussions of artificial intelligence architecture, knowledge acquisition process, knowledge engineering, knowledge representation and development tools.

ESC4507 Environmental Forensics 3 (2+1)

Prerequisite : None

This course covers distribution, sources and transport pathways of pollutants in the environment and their application in environmental forensics. Unique molecular marker compounds, weathering effects on molecular marker distribution, diagnostic indices, biodegradation and application of molecular markers for leachate and chemical spill source identification are discussed.

ESC4508 Biodiversity and Conservation 3 (3+0)

Prerequisite : ESC3015

This course covers concepts in biodiversity and conservation. Emphasis is placed on ethics, laws and economics that influence attitudes towards management of biodiversity through discussions on drivers of biodiversity loss and strategies in conservation to guarantee biodiversity sustainability, methods to protect ecosystem and restoration strategies as conservation tools.

ESC4509 Ecology of Natural Resources 3 (3+0)

Prerequisite : ESC3015

This course covers biophysical and socioeconomic concepts of managing natural resources and ecological principles in the preservation, conservation and restoration of resources. The ecology and natural history of diverse natural resources ranging from individual organisms to landscapes, natural to managed ecosystems, wilderness to agricultural and urban systems, and local to international environment are discussed.

ESC4510 Environmental Biophysics 3 (2+1)

Prerequisite : ESC3013

This course covers principles for analyzing energy and mass changes between living organisms and their environment. Discussions include microclimate parameters and its interaction with vegetation as well as impacts on environment. Application of models to calculate energy and mass transfer rates, and impact of micro climatic changes on agriculture yield are also discussed.

ESC4511 Environmental Remote Sensing 3 (2+1)

Prerequisite : None

This course covers concepts of remote sensing and its application in environmental management including the principles of remote sensing, radiation theory, sensor systems, data acquisition, correction and storage, data analysis, and spectral signatures of natural and man-made materials.

- ESC4512 Advance Environmental Chemistry** 3 (2+1)
 Prerequisite : ESC3014
 This course covers concepts of chemistry concerning the behavior of particles in the environment, partitioning of solids and colloids, and chemistry of natural and polluted water, soil and air. Lateral and vertical transport of organic pollutants are emphasized. Biomonitoring of organic and inorganic chemicals such as heavy metals, nutrients, pesticides and hydrocarbons are discussed.
- ESC4513 Environmental Bioremediation** 3 (2+1)
 Prerequisite : None
 This course covers various aspects of soil remediation using biological methods to degrade toxic compounds. The bioremediation process, biochemical reactions and metabolic pathways are emphasized. In-situ and reactor treatment processes are discussed.
- ESC4515 Industrial Health and Safety System** 2(2+0)
 Prerequisite : None
 This course discusses the concepts and approaches in industrial, health and safety management systems. Emphasis is given to the planning, monitoring and actions to manage industrial hazards, risks, accidents and emergencies. The responsibilities and participation of all parties are also discussed. The role of policies, laws, standards, Best Available Technology (BAT), and Best Management Practices (BMP) are also emphasized
- ESC4516 Application of Environmental Computer Modeling** 3 (2+1)
 Prerequisite : ESC3508
 This course covers mathematical models related to environment. Methods to execute mathematical models by utilizing computer software and manipulate codings in order to solve environment related problems will be performed
- ESC4603 Energy System and Environment** 3 (3+0)
 Prerequisite : ESC3013
 This course covers energy sources, energy generation its impacts on the environment, energy conservation, and socioeconomic implications. The utilization of clean energy technology is discussed in light of government policies and strategies on energy.
- ESC4801 Integrated Environmental Field Study** 2 (0+2)
 Prerequisite : None
 This course covers integrated research projects by applying various measurement techniques, field data collection and analysis method. Emphasis is given to investigative studies in groups on environmental issues for the benefit of industries and communities
- ESC4901 Industrial Training** 12 (0+12)
 Prerequisite : Have pass 7 semesters in Bachelor of Science and Environmental Technology
 This course covers industrial training for a period of 24 weeks at a government or private agency in the field of environmental science and technology. The student is responsible in conducting a mini project which will be carried out under the supervision of the industrial supervisor, including preparing a written report and oral presentation.

ESC4959 Bachelor Dissertation

6 (0+6)

Prerequisite : None

This course covers the preparation of proposal, implementation and scientific writing of research project. Scientific approach to generate data systematically through appropriate design, data collection and analysis are emphasized