

Yarmouk University

Faculty of Science

Department of Earth and Environmental
Sciences



Proposed Degree Plan for the Master of Science Degree in Environmental Sciences (Non-thesis Track)

2021

Proposed Degree Plan for the Master of Science Degree in Environmental Sciences / Non-thesis Track

I. The applicant for this program should:

1. Hold a B.Sc. degree in Environmental Sciences or any other related fields approved by the department.
2. Fulfill the English Language requirement according to university regulations.
3. Satisfy any other conditions approved by related committees and councils.

II. Master of Science Degree in Environmental Sciences is awarded on the completion of the following requirements:

1. The fulfillment of the conditions stated in the regulations of awarding the master's degree at Yarmouk University No. (3) for the year 2011.
2. Completion of the remedial or/and additional courses recommended by the higher studies committee in the department.
3. Completion of (33) credit hours of 600-level courses (with a minimum GPA of 75%) distributed as follows:

a. Obligatory courses (24 credit hours)

| No. | Course No. | Course Name | Credit Hours |
|-----|------------|---|--------------|
| 1 | ENV 601 | Environmental Systems | 3 |
| 2 | ENV 603 | Environmental Management | 3 |
| 3 | ENV 608 | Application of Geographic Information Systems in Environmental Sciences | 3 |
| 4 | ENV 632 | Instrumental Techniques for Environmental Analysis | 3 |
| 5 | ENV 659 | Treatment of Water and Wastewater | 3 |
| 6 | ENV 682 | Environmental Pollution | 3 |
| 7 | ENV 688 | Solid Waste Management | 3 |
| 8 | ENV 690 | Research Project | 3 |

b. Elective courses (9 credit hours):

| No. | Course No. | Course Name | Credit Hours |
|-----|------------|---|--------------|
| 1 | ENV 607 | Fundamentals of Climatology | 3 |
| 2 | ENV 631 | Toxicology and Mutagenesis | 3 |
| 3 | ENV 637 | Environmental Health | 3 |
| 4 | ENV 640 | Environmental Physics | 3 |
| 5 | ENV 642 | Ecotourism | 3 |
| 6 | ENV 643 | Applied Remote Sensing | 3 |
| 7 | ENV 651 | Advanced Soil Science | 3 |
| 8 | ENV 652 | Oceanography | 3 |
| 9 | ENV 658 | Environmental Impact Assessment | 3 |
| 10 | ENV 692 | Special Topics in Environmental Science | 3 |
| 11 | ES 670 | Advanced Environmental Geology | 3 |
| 12 | CHEM 631 | Analytical Methods of Separation | 3 |
| 13 | CHEM 652 | Environmental Chemistry | 3 |
| 14 | ECO 631 | Environmental Economics | 3 |

Note: Course prerequisites depend on the student's bachelor's degree and the decision of the higher studies committee.

4. Successful passing the Comprehensive Exam (ENV 698) according to active rules. Zero credit hours is considered for the purposes of registration.

Description of the courses presented in the plan

ENV 601-Environmental Systems (3 Cr. Hrs.)

Course description

This course includes the following topics:

Introduction to environmental sciences; Matter and energy; Origin of life on earth and human evolution; Ecosystems (components, habitat and niche, interaction of species, energy flow, ecosystem characteristics, major types of ecosystems and environmental disturbance); Biogeochemical cycles; Negative human impacts and mitigation methods; Human and natural systems; Natural attenuation.

Course objectives

The course aims to introduce to the student the various environmental systems, their components, characteristics and their interaction with each other, the disruption of the ecosystem, types of ecological successions, the cycles of the elements, the human influence, and the mechanism for mitigating the environmental impact.

Learning outcomes

After studying this course, the student is supposed to be able to:

1. Know the basics of environmental sciences.
2. Identify the imbalance in the ecosystem and the mechanisms of environmental succession.
3. Understand the theories of the origin of life on earth and human developments
4. Understand the biogeochemical cycles, human impacts, and mitigation methods.
5. Distinguish the differences between human and natural systems to solve environmental problems.

ENV 603-Environmental Management (3 Cr. Hrs.)

Course description

This course includes the following topics:

Introduction to environmental management; Environmental management concepts; Benefits of applying environmental management; Environmental management principles, tools, and techniques; Environmental management and economics; Environmental hazards and risk management; Natural resource management.

Course objectives

The course aims to introduce the principles, mechanisms, and tools of environmental management.

Learning outcomes

After studying this course, the student is supposed to be able to:

1. Understand the principles and tools of environmental management.
2. Use environmental management concepts in environmental management.
3. Connect the principles of environmental management and economics to solve environmental issues.
4. Establish an outline for managing environmental risks.
5. Understand the mechanisms of natural resource management.

ENV 607-Fundamentals of Climatology (3 Cr. Hrs.)

Course description

The course includes the following topics: an introduction to the climate system, the physical geography of the earth's environment and global energy balance, climate

change and its impact on the environment, climate-environment relationships and its impacts on human activities the impacts of changing climates on the functioning and development of physical biological environments including glaciers, water resources, landforms, soils, vegetation and animals. climate solutions: local to a global perspective, and environmental planning and policies.

Course objectives

The course aims to introduce the principles of climatology, energy dynamics and balance, and the impact on global climate.

Learning outcomes

After studying this course, the student is supposed to be able to:

1. Explains the natural and physical phenomena that relate to the Earth's environments (such as global climate patterns and processes).
2. Describes scientific methods and processes related to the study of the world's environments, including the atmosphere,
3. lithosphere, hydrosphere, and biosphere.
4. Gather evidence on scientific problems, make scholarly claims based on gathered evidences, and reasonably defend these claims.
5. Determine the effects of climate on the function and development of physical biological environments.
6. Identifies key factors, patterns, and processes of the climate system, while understanding and summarizing the environmental impacts of regional and global climate.

ENV 608-Applications of GIS in the Environment

(3 Cr. Hrs.: 2+1)

Course description

The course includes the following topics: Basic concepts of using geographic information systems in environmental sciences, where students will be able to use GIS tools in studying real environmental problems, including issues and problems of air pollution, biodiversity, forest management, soil management, agriculture, risks, natural hazards, water resources, water basins and land surface analysis, impacts of climate changes, and optimum site modeling. The course includes training and practical exercises on different applications using appropriate GIS software.

Course objectives

The course aims to introduce students to the essential concepts of geographic information systems and its relationship with environmental sciences.

Learning outcomes

After studying this course, the student is supposed to be able to:

1. Build a solid background in GIS concepts of spatial analysis and modeling.
2. Apply the acquired skills to use geographic information systems techniques in solving environmental problems.
3. Employ the techniques of geographic information systems in the management of environmental resources.

ENV 631-Toxicology and Mutation

(3 Cr. Hrs.)

Course description

This course includes the following topics:

Basic principles of toxicology and mutation; Revision of the main current research in this field; Types of toxins and their metabolism; Reactive compounds and their

interaction with the nucleic acid; Mutagenesis and carcinogenesis; Mutation repair mechanisms with a focus on the recent trends in the field of toxicology and mutation.

Course objectives

The course aims to identify the types of toxins, their compounds, and the dynamics of the occurrence of mutations and cancer.

Learning outcomes

After studying this course, the student is supposed to be able to:

1. Familiar with basics and principles of toxicology.
2. Identify some toxic compounds.
3. Understand the mechanisms of gene mutations, their relationships with cancer, and pathways for repair.

ENV 632-Instrumental Techniques for Environmental Analysis (3 Cr. Hrs.)

Course description

The course includes the following topics: Review of chemical concepts, Stoichiometric calculations, Environmental Sampling Techniques, (Surface Water, Wastewater, Groundwater, Soil and Sediment, Hazardous Waste, Air and Stack Emission Sampling), Sample handling and preservation, Analysis of major constituents of water (TSS, DO, COD, BOD, TOC, ...), concentration units, Analysis of trace constituents, Molecular spectroscopy, Atomic absorption spectrometry, Atomic emission spectrometry (ICP-OES, ICP-MS), X-ray spectroscopy, Selection of the Proper Atomic Spectroscopic Techniques, Chromatographic Methods for Environmental Analysis, Gas Chromatography, High Performance Liquid Chromatography (HPLC), Ion Chromatography, Qualitative and Quantitative Analysis.

Course objectives

The course aims to understand the principles and methods of measurement and analysis used in environmental studies.

Learning outcomes

After studying this course, the student is supposed to be able to:

1. Express the levels of materials in the different samples in the appropriate units.
2. Test the appropriate method for collecting liquid, solid or gas samples.
3. Deal with the samples in the correct manner and does not expose them to contamination before analyzing them.
4. Choose the correct method of analysis

ENV 637-Environmental Health (3 Cr. Hrs.)

Course description

This course includes the following topics:

Introduction to the concepts and principles of environmental health including health matters etiology and reasoning; Control of health and environmental predicaments; Effects of the environment on human health; Physical, chemical and biological pollutants; Human body interaction with pollutants; Disease vectors (air, water and soil); Hazardous solid waste; Other issues including vital biological indicators and risk analysis.

Course objectives

The course aims to introduce the principles of environmental health and how the body reacts to various environmental pollutants.

Learning outcomes

After studying this course, the student is supposed to be able to:

1. Identify the main sources and types of environmental factors and the transfer and fate of these factors in the environment.
2. Identify the agents that promote the transfer of these factors from the environment to humans.
3. Describe how these factors interact with biological systems, and the mechanisms by which they exert adverse health effects.
4. Identify steps in risk assessment and risk management processes.

ENV 640-Environmental Physics

(3 Cr. Hrs.)

Course description

This course includes the following topics:

Definition of energy balance on Earth; Greenhouse effect; Man-made changes in the atmosphere; The physical basis and methods in energy and mass transfer that are needed to utilize both the unsustainable and renewable sources of energy; Unsustainable energy sources to be discussed include fossil and nuclear energy; The renewable sources to be discussed include solar, wind, biomass geothermal, tidal and ocean waves energy

Course objectives

The course aims to introduce the physical foundations for the exploitation of various energy sources.

Learning outcomes

After studying this course, the student is supposed to be able to:

1. Understand the physical basis for the exploitation of various energy sources.
2. Solve issues related to solar radiation, the earth's carbon cycle, and the greenhouse effect.
3. Discuss the composition of the atmosphere and the radiative balance of the biosphere.
4. Perform calculations on conventional carbon-based energy and nuclear power.
5. Explain and estimates renewable energy sources - solar, wind, water, and bioenergy.
6. Discuss the impacts on the environment, and the various sources of pollution.
7. Assess the various energy technologies (potential, pros and cons).

ENV 642-Ecotourism

(3 Cr. Hrs.)

Course description

This course includes the following topics:

Introduction to the fundamentals of the environment and environmental management as a foundation for understanding principles of ecotourism; The origin and development of ecotourism, its basic philosophy, the social and economic aspects of sustainable tourism; The promotion and marketing of site; The demographic aspects of ecotourism; The limitation to ecotourism and case studies

Course objectives

The course aims to identify the foundations and principles of ecotourism and how to create opportunities for ecotourism in natural sites.

Learning outcomes

After studying this course, the student is supposed to be able to:

1. Develop knowledge and understanding of the philosophy of ecotourism and its role in the maintenance of resources.
2. Differentiate between ecotourism and other forms of tourism that depend on nature.
3. Learn how ecotourism fits into sustainable development and natural resource planning and management.
4. Provide an overview of planning strategies and management forms for ecotourism.
5. Develop knowledge and understanding of resources, products, best management practices, and opportunities in the ecotourism sector.
6. Perform an outline of a visitor management process.
7. Understands the role of interpretation and selection of the best techniques.

ENV 643-Applied Remote Sensing (3 Cr. Hrs.)

Course description

This course includes the following topics:

This course develops the basic theoretical, technical and methodological skills to employ various types of remotely sensed data from airborne and spaceborne platforms as a source of qualitative and quantitative information in any of the landscape sciences e.g. forestry, urban planning, natural resource management, wildlife management, crop and soil science, geology, etc. Manual and computer-based laboratory exercises emphasize conventional analysis of aerial photographs and high-resolution satellite imagery. The second half of the course focuses on the application of remotely sensed data for watersheds, forest resources, wildlife habitat, point and non-point pollution, environmental monitoring, land use planning, etc. Applications will be discussed and illustrated using research examples throughout the course.

Course objectives

The course aims to learn the basics of remote sensing and how to use data from this technology as a source of information for the natural sciences.

Learning outcomes

After studying this course, the student is supposed to be able to:

1. Know the theoretical and practical aspects of remote sensing data and its interpretation.
2. Show excel in interpretation, measurement, and environmental monitoring skills, as well as mapping skills.
3. Use remote sensing techniques in managing and addressing environmental issues.

ENV 651-Advanced Soil Science (3 Cr. Hrs.)

Course description

The course includes: Definition of soil for engineering, agronomy and environmental science; Soil origin and compositions; Soil classification (7th Approximation USA); Chemical characteristics of soils (pH, colloids, Ion- exchange capacity, adsorption); Soil air, soil water (solution) and aeration; Movement of water in soils (saturated flow and unsaturated flow); Clay minerals, organic matter and their surface chemistry; Physical characteristics (texture, structure, permeability, porosity, bulk density, temperature and color); Plant nutrients and soil plant relation; Soil erosion, compaction, pollution (agro-chemicals) and remediation.

Course objectives

The course aims to introduce students to soil science in engineering, geology, agriculture, and environment.

Learning outcomes

After studying this course, the student is supposed to be able to:

1. Describe how soils form and classify their components.
2. Knowledge of soil structure and physical properties.
3. Describe soil water, aeration, and temperature and its effect on living organisms.
4. Describe how soil interacts with the environment, focusing on water and nutrient cycling.
5. Study the interaction of the soil with plants and organisms.
6. Describe the evolution of soil organic matter and how this affects soil properties.
7. Understand how soil properties limit nutrient availability to the roots.
8. Learn about global climate and soil interactions.

ENV 652-Oceanography

(3 Cr. Hrs.)

Course description

The course includes the following topics: An introduction to the basic principles of ocean science: the geology of the ocean basins and the mechanisms of their development, the topography of the ocean floor and the different environments of the ocean floor, the chemistry of sea water, how it develops and the factors affecting it, the distribution of salinity and temperature in ocean waters, the factors that affect them, and the role of the oceans in the cycles of elements In particular the carbon cycle, the physical dynamics of ocean currents, ocean waves and tidal waves. Coastal processes, ocean floor sediments; the impact of human activity on ocean environments (global warming, coastal development, fisheries, alien species, coral bleaching), and the diverse ecosystems of Earth's oceans such as deep-sea thermal water vents, coral reefs and estuaries (bays).

Course objectives

The course aims to learn about the different aspects of oceanography (geology, geomorphology, chemical, biophysical, and environmental) and human influences.

Learning outcomes

After studying this course, the student is supposed to be able to:

1. Understand the geology of the ocean floor and the mechanism of ocean floor formation.
2. Know the topography of the ocean floor and the knowledge of the different environments of the ocean floor and the characteristics of each.
3. Recognize the ocean water movement's surface and deep ocean circulation and triggering mechanisms.
4. Understand the chemistry of sea water, how it is formed, and the factors affecting it.
5. Grasp the most important chemical and physical properties of ocean water.
6. Perceive the human impacts on marine environments and resources.
7. Understand the role of the oceans in global change.

ENV 658-Environmental Impact Assessment (3 Cr. Hrs.)

Course description

This course includes the following topics:

Introduction to environmental impact assessment; Applying for a project approval; Screening; Scoping; Description of the environmental baseline; Term of reference; Impact identification; Tools of EIA used for scoping, prediction and evaluation; Methods and models for prediction; Evaluating impact significance; Mitigation; Reporting and reviewing the EIA; Decision-making; Monitoring and follow up; EIA examples.

Course objectives

The course aims to learn the foundations, principles, and tools of environmental impact assessment, anticipating and evaluating environmental impacts, mitigation methods and writing a report.

Learning outcomes

After studying this course, the student is supposed to be able to:

1. Deal with factory licensing applications and sorting them according to their needs for environmental impact assessment.
2. Define the scope the required study.
3. Anticipate potential impacts, evaluate, and suggest ways to mitigate environmental impacts.
4. Know how to report, review, make decisions, and methods for forecasting environmental risks.

ENV 659-Treatment of Water and Wastewater (3 Cr. Hrs.)

Course description

This course includes the following topics:

Introduction to drinking water purification; Water quality standards; Drinking water standards; Production steps of drinking water; Corrosion control; Introduction to wastewater; Sources of wastewater; Treatment of wastewater (Primary; Secondary and advanced treatments); Sewage sludge treatment and use.

Course objectives

The course aims to identify drinking water specifications, characteristics of wastewater, sources, technologies, and types of treatment.

Learning outcomes

After studying this course, the student is supposed to be able to:

1. Know the standards of water quality and the specifications of different drinking water.
2. Understand the methods of producing drinking water from ground and surface water.
3. Identify the sources and characteristics of wastewater
4. Understand the methods and techniques used in wastewater treatment.

ENV 682-Environmental Pollution (3 Cr. Hrs.)

Course description

This course includes the following topics:

Introduction to environmental pollution; Major types of environmental pollution and their sources; Mass transfer and partitioning; Mass balance analysis; Transport of pollutants in the environment; Fate of pollutants in the environment; Environmental modeling; Pollution prevention; Pollution control.

Course objectives

The course aims to identify the types of environmental pollution, the foundations, strategies, and the importance of protecting the environment and reducing pollution.

Learning outcomes

After studying this course, the student is supposed to be able to:

1. Differentiate between different types of environmental pollution in water, soil, air and food.
2. Know the sources of environmental pollution.
3. Understand the ways of pollutants transport in the environment.
4. Understand the methods of studying the fate of pollutants in the environment.
5. Understands pollution control methods.

ENV 688-Solid Waste Management (3 Cr. Hrs.)

Course description

This course includes the following topics:

Introduction to solid wastes; Sources of solid wastes (domestic, industrial, hazardous, agricultural, mining, constructions) ; Solid waste collection, transportation and transfer stations; Methods of treatment and disposal of solid wastes (On site treatment; Sea and ocean dumping; Landfilling; Composting, Incineration, Pyrolysis); Treatment of leachate; Methods of resource recovery from waste; Integrated solid waste management; Management of old landfills (In situ treatment; ex situ treatment (excavation and treatment of waste); Containment of old landfills on site.

Course objectives

The course aims to identify the types and sources of solid waste and integrated strategies for waste management.

Learning outcomes

After studying this course, the student is supposed to be able to:

1. Know the sources and types of waste (both hazardous and non-hazardous).
2. Understand the environmental problems resulting from waste.
3. Know the best methods for collecting, transporting, and storing waste.
4. Understand the principles of integrated waste management.

ENV 690-Research Project (3 Cr. Hrs.)

The course includes an introduction to the theory and practice of scientific research. Safety issues are discussed in laboratories, research in literature and search engines, experimental design, scientific research ethics, intellectual property, effective ways to obtain funding, learning to prepare a research project proposal (choosing a title, formulating objectives, reviewing literature and research methods, and other topics of relevance. Relationship), choosing a specialized topic to be approved by the Graduate Studies Committee after submitting a proposal clarifying the objectives, methodology and expected results, conducting a project through which the literature is reviewed, collecting data and samples, analyzing them and interpreting the results, then writing a report or a scientific publication (scientific paper, conference paper, poster, etc. Introducing the ethics of scientific research, presenting a paper (oral presentation).

Course objectives

The course aims to acquire the skills and methods of conducting scientific research.

Learning Outcomes

After studying this course, the student is supposed to be able to:

1. Understand scientific research methods in natural sciences.

2. Deal with various sources of knowledge and means of information technology such as libraries, global databases, search engines, and others
3. Adheres to scientific standards in terms of accuracy in using scientific references, sound scientific documentation and scientific publishing standards.
4. Take into account the ethics of scientific research and scientific honesty.
5. Know the methods of data collection and sampling
6. Know the methods of storing, analyzing and interpreting data.
7. Prepare a scientific publication.
8. Make an oral presentation and defend the results of the study

ENV 692-Special Topics in the Environment (3 Cr. Hrs.)

Course description

This course addresses environmental topics that are not included in the study plan. The instructor must determine the subject of the course and provide a comprehensive plan of the course content covering 3 credit hours per week.

Course objectives

The course aims to acquaint students with specific topics in environmental sciences that are not covered by the courses offered in the study plan.

Learning outcomes

After studying this course, the student is supposed to be able to:

1. Understand the different rationale for the topics at hand.
2. Identifying and describing environmental research problems and their scientific implications.
3. Write reports and scientific abstracts.
4. Deal with various sources of knowledge and means of information technology such as libraries, global databases, search engines, and others.
5. Understand the commitment to scientific standards in terms of accuracy, use of scientific references, accurate scientific documentation, citation, standards of scientific publication and scientific integrity.

ES 670-Advanced Environmental Geology (3 Cr. Hrs.)

Course description

The course includes: An advanced study of human interaction with different geological systems and studying the effects of natural geological hazards such as volcanic activities, earthquakes, landslides and floods, and methods of risk assessment and their implications, dealing and coexistence with them. The course includes topics related to the effects of human activity on natural systems such as groundwater quality and recharge, river systems, coastal hazards, natural sources, energy resources and pollution and includes (water sources and their pollution, mineral sources and their pollution, soil, the environment, energy sources and waste as a source and waste management). The concept of resource sustainability as a long-term concept. Environmental management from a global perspective. Climate change, geology and society. The course also includes some practical exercises to determine risks and methods of assessment, especially for some hazards, especially earthquakes, floods, and landslides.

Course objectives

The course aims to present an advanced presentation of environmental geology, studying natural hazards, and achieving the concept of sustainability.

Learning outcomes

After studying this course, the student is supposed to be able to:

1. Discuss the basic concepts of environmental geology and issues related to human population growth and its impact on the natural environment.
2. Understand the dynamics of the Earth as a complex system and the mechanism of occurrence of natural hazards.
3. Discuss the dangers arising from the basic natural hazards and the mechanism of dealing, coexistence and adapting to them.
4. Discuss methods and mechanisms to reduce natural hazards.
5. Determine the most important natural resources and methods of pollution and protection.
6. Understand the human relationship with the environment and discussing some global environmental issues such as climate change.

ES 690-Research Project

(3 Cr. Hrs.)

The course includes an introduction to the theory and practice of scientific research. Safety issues are discussed in laboratories, research in literature and search engines, experimental design, scientific research ethics, intellectual property, effective ways to obtain funding, learning to prepare a research project proposal (choosing a title, formulating objectives, reviewing literature and research methods, and other topics of relevance. Relationship), choosing a specialized topic in environmental sciences to be approved by the Graduate Studies Committee after submitting a proposal clarifying the objectives, methodology and expected results, conducting a project through which the literature is reviewed, collecting data and samples, analyzing them and interpreting the results, then writing a report or a scientific publication (scientific paper, conference paper, poster, etc. Introducing the ethics of scientific research, presenting a paper (oral presentation).

Course objectives

The course aims to acquire the skills and methods of conducting scientific research.

Learning Outcomes

After studying this course, the student is supposed to be able to:

1. Understand scientific research methods in natural sciences.
2. Deal with various sources of knowledge and means of information technology such as libraries, global databases, search engines, and others
3. Adheres to scientific standards in terms of accuracy in using scientific references, sound scientific documentation and scientific publishing standards.
4. Consider the ethics of scientific research and scientific honesty.
5. Know the methods of data collection and sampling
6. Know the methods of storing, analyzing and interpreting data.
7. Prepare a scientific publication.
8. Make an oral presentation and defend the results of the study.

CHEM 631-Analytical Methods of Separation

(3 Cr. Hrs.)

Course description

This course includes the following topics:

Classification of separation methods; Separation by extraction; Theories of chromatography; High performance liquid chromatography (HPLC); Steps for the

development of a separation method; Ion-exchange chromatography; Size exclusion chromatography; Thin-layer chromatography; Gas chromatography; Supercritical fluid chromatography; Electrophoresis; Chromatographic instruments and their fields of application.

Course objectives

The course aims to deepen the student's understanding of the topics of methods of separating chemical compounds, especially the different chromatography methods and the theories and techniques related to them.

Learning outcomes

After studying this course, the student is supposed to be able to:

1. Understand the principles and theories of chromatographic separation.
2. Classifies the different methods of chromatography and understand the mechanism of each method.
3. Know the components of chromatography devices, both liquid and gas.
4. Understand the principles of electrical separation and know their properties.
5. Understand the principle of the mass spectrometer device and learn about its different types.
6. Employ the different separation methods to solve the separation analytical problems and increase the efficiency of separation operations.

CHEM 652-Environmental Chemistry

(3 Cr. Hrs.)

Course description

The course includes the following topics:

An introduction to environmental chemistry, air pollution, environmental phenomena related to air pollution and their environmental impacts (ozone layer erosion, acid rain, global warming, smog, and airborne particles), the transmission and fate of organic and inorganic pollutants in the atmosphere. Air pollution, water pollution, sources of water pollution, organic and inorganic pollutants (such as: toxic metals, pesticides, phenols, industrial wastes ...), water pollution standards (BOD, COD), soil pollution, methods of sampling air, water and soil, methods Analysis of water, air and soil samples.

Course objectives

The course aims to introduce the student to contemporary environmental problems and the role of chemical analysis in environmental monitoring.

Learning outcomes

After studying this course, the student is supposed to be able to:

1. Know about contemporary environmental issues and explain how they occur.
2. Know the different sources of pollution and how gaseous, liquid, and solid pollutants are transported.
3. Know the negative effects caused by environmental pollution.
4. Know some methods of analysis and the foundations of choosing the appropriate method.

ECO 631-Environmental Economics

(3 Cr. Hrs.)

Course description

The course includes the following topics:

This course deals with the concept of environmental economics and economic well-being. Identify environmental and economic problems and discuss appropriate

political solutions. This course also deals with market failure, economic tools for sustainable development, and sheds light on some of the Jordanian environmental issues.

Course objectives

The course aims to identify the basics and principles of environmental economics, its components, indicators, and political solutions.

Learning outcomes

After studying this course, the student is supposed to be able to:

1. Know the environmental economy, and define its main components, indicators, and its relationship to our life.
2. Understand environmental problems and political solutions.
3. Know market failure: general defects and external factors.
4. Understand the process of regulating pollution.
5. Understand developing economies and the environment.
6. Know the water market mechanisms.

ENV 698 Comprehensive Exam (0 credit hours)