University of Derna
Faculty of Natural Resources and Environmental Sciences
Department of General Orientation
Study Plan

The Courses for the Department of Environmental Sciences
First Year

Autumn Semester

No	Course Title	Units
AR 103	Arabic Language	2(0-2)
ZO 021	General Zoology	3(3-2)
CH 011	General Chemistry	3(3-2)
MA 011	General Mathematics	3(3-2)
EL 011	English Language 1	2(0-2)
64105	Introduction To Natural Resources	3(3-2)
EC 110	Principles of Economics	3(0-3)
Total Units		19

Spring Semester

No	Course Title	Units
PH 011	General Physics	3(3-2)
CH 351	Analytical Chemistry	3(3-2)
BO 021	General Botany	3(3-2)
62152	General Ecology	3(3-2)
ET 011	Environmental terms	2(0-2)
ST 011	Principles Statistics	3(3-2)
CS 011	Computer Science	2(0-2)
Total Units		19

Syllabus of General Orientation Department Courses

Arabic Language	2 (0-2)- AR103

Arabic Grammar and Morphology. Rhetorical Styles. Written Expression Skills. Analytical Reading of Literary Texts. Linguistic Applications in Scientific Writing

General Zoology	3 (3-2) ZO 021

Classification of the Animal Kingdom. Internal and External Anatomy. Major Body Systems. Reproduction. Animal Diversity. Ecological and Economic Significance

General Chemistry	3 (3-2) - CH 011

Atoms and Elements. Chemical Bonds. Reactions and Equations. Solutions. Acids and Bases. Thermodynamics. Introduction to Organic Chemistry

General Mathematics	3 (3-2) - MA 011

Algebra. Equations. Functions. Differential and Integral Calculus. Matrices. Basic Statistics. Mathematical Applications in Environmental Sciences

English Language 1	2(0-2) 1 - EL 011

Basic Scientific Vocabulary. Reading and Comprehension. Grammar. Academic Writing Skills. Conversation and Listening within Scientific Contexts

Introduction To Natural Resources	3(3-2) -64105

Introduction. General concepts and definitions. Classification of natural resources. Importance and future of resources. Water and its sources. Marine resources, wildlife, and overfishing. Forests. Rangelands. Agricultural lands. Soil, its importance, and classifications. Study of oil and natural gas. Study of coal. Study of important mineral ores. The importance of oil, natural gas, coal, and mineral ores in the economy. Natural resources and the environment.

Principles of Economics	3 (0-3) - EC 110

General Economic Concepts. Supply and Demand. Production. Consumption. Market and Prices. Economic Policies and Their Relationship to the Environment

General Physics	3 (3-2) - PH 011

Mechanics. Energy. Heat. Electricity and Magnetism. Light. Sound. Applications in Resources and the Environment

Analytical Chemistry	3 (3-2) - CH 351

Gravimetric and Volumetric Analysis. Qualitative and Descriptive Analysis. Titration Techniques. Use of Analytical Instruments in the Laboratory

General Botany	3 (3-2) - BO 021

Plant Anatomy. Plant Physiology. Classification. Reproduction. Relationship with the Environment. Importance of Plants in the Ecosystem

General Ecology	3 (3-2) -62152

General Concepts. Ecology and ecosystem models. Energy flow. Various cycles and their impact. Effects of the surrounding environment. Formation of ecosystems. Characteristics, growth, and composition of populations and the relationships between them. Different terrestrial and aquatic ecosystems. Individual behavior and the organization of ecosystems. Population dynamics and the organization of biological communities. General concepts on surveying and measuring different ecosystems. Ecosystems in Libya and the Green Mountain (Al Jabal al Akhdar).

Environmental terms	2 (0-2) - ET 011

Scientific Terminology in Arabic and English related to the Environment. Using Scientific Dictionaries. Translation of Scientific Terms. Environmental Translation Skills

Principles Statistics	3 (3-2) - ST 011

Data and its Types. Measures of Central Tendency. Dispersion. Probability Distributions. Correlation and Regression. Statistical Applications in Environmental Sciences

Computer Science	2 (0-2) - CS 011

Computer Components. Operating Systems. Word Processing and Spreadsheet Software. Internet and Scientific Research. Introduction to Programming

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Faculty of Natural Resources and Environmental Sciences
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The Courses for the Department of Environmental Sciences

Second year

Autumn Semester

No	Course Title	Units
64242	Principles of Soil	3(3-2)
64108	General Geology	3(0-3)
61201	Principles of Forest & Range Sciences	3(0-3)
62251	Introduction to Climatology	3(0-3)
62292	Environmental Pollution	3(0-3)
64205	Hydrology	3(3-2)
61342	Nat. Res. Measurements	3(0-3)
Total Units		21

Spring Semester

No	Course Title	Units
64210	Ground Survey	3(3-2)
64261	Conservation of Natural Resources	3(0-3)
64282	Maps and Photogrammetry	3(3-2)
64236	Forest and Range Resources	3(0-3)
64252	Introductory Petrology	3(3-2)
62240	Ecotourism	3(0-3)
64212	Principles of Soil Science	3(3-2)
Total Units		21

Third Year

Autumn Semester

No	Course Title	Units
64352	Research Methods	3(0-3)
62344	Principles of Sustainable Development	3(0-3)
EC 217	Research Methodology	3(0-3)
64368	Human Resources Economics	3(0-3)
64327	Economic Geology	3(0-3)
64329	Energy Resources	3(0-3)
64345	Ground Survey and Photogrammetry	3(3-2)
Total Units		21

Spring Semester

No	Course Title	Units
61352	Parks and Recreation	3(0-3)
AG 205	Experimental Design	3(3-2)
64377	Soil Conservation	3(0-3)
64384	Rangeland Ecology and Management	3(3-2)
64387	Petroleum Geology	3(0-3)
64391	Principles of Remote Sensing	3(3-2)
64321	Geographical Information System	3(3-2)
Total Units		21

Forth Year

Autumn Semester

No	Course Title	Units
61411	Waters Resources Management	3(3-2)
64410	Natural Resources Subjects	3(0-3)
64437	Land Use and Resources Assessment	3(3-2)
64440	Application of Remote Sensing	3(0-3)
64421	Management of Natural Resources	3(0-3)
NL100	National Culture	2(0-2)
64445	Seminar	1(4-0)
Total Units		18

Spring Semester

No	Course Title	Units
EC 303	Environmental Economics	3(0-3)
64450	Petroleum and Gas Resources in Libya	3(0-3)
64458	Natural Resources and Modern Society	3(0-3)
64486	Natural Resources Economics	3(0-3)
61408	Wildlife Ecology Management	3(3-2)
64438	Water Resources In Libya	3(3-2)
64492	Independent Study	2(0-2)
Total Units		20

Syllabus of Natural Resources Department Courses

Natural to Introduction Resources	3 (3-2)- 64105

Prerequisites: General Environment.

Introduction. General concepts and definitions. Classification of natural resources. Importance and future of resources. Water and its sources. Marine resources, wildlife, and overfishing. Forests. Rangelands. Agricultural lands. Soil, its importance, and classifications. Study of oil and natural gas. Study of coal. Study of important mineral ores. The importance of oil, natural gas, coal, and mineral ores in the economy. Natural resources and the environment.

General Geology	3 (3-2) - 64108

Prerequisites: General Environment.

General Introduction. Importance of geology and various geological sciences. The Earth's main spheres and the solar system. Plate tectonics theory. The origin of continents and oceans. Introduction to minerals, crystals, and the physical properties of minerals. Volcanoes and earthquakes. Study of different rock types (igneous, sedimentary, and metamorphic). Evolution of life. Study of fossils. The geological timescale (geologic column).

Practical Component: Includes the identification of minerals and different types of rocks

Land Surveying	3 (3-2) - 64210

Prerequisites: General Mathematics.

General Introduction. Plane Surveying. Measurement of distances, directions, and bearings. Measurement of vertical distance. Area calculation, theory of instruments used, and their applications. Applications of surveying instruments and methods of preparing topographic maps. General concepts of satellite imagery and Geographic Information Systems (GIS) as a tool and its importance for natural resources.

Principles of Soil Science	3 (3-2) - 64212

Prerequisites: General Chemistry, General Geology.

General Introduction. Various soil sciences. mportance of soil as a natural resource. Definition of soil. Physical properties of soil. Mineralogical and chemical properties. Fundamentals of different soil measurements. The role of soil in plant nutrition. Soil microorganisms and their importance. Soil division and classification. The relationship between human activities and soil.

Practical Component: Includes various soil measurements such as soil water content, air content, and organic matter. It also includes the instruments used to measure soil water content.

Petrology Introductory — 3 (3-2) 64225

Prerequisites: General Geology.

General Introduction. Study of different rock types and their formation. Forms and structures in igneous rocks. Study of magma and its types. Classification of igneous rocks. Study of sedimentary rocks in terms of origin, textures, structures, and their classification. Study of metamorphic rocks. Types of metamorphism and the causative factors.

Principles of Mineralogy — 3 (3-2)- 64242

Prerequisites: General Geology.

Introduction to Mineralogy. Principles of Crystallography. Physics and chemistry of crystals. Study of different compounds. Principles of identifying crystal structures and methods of identification. Crystals and the crystalline properties of minerals. Physical properties of minerals. Classification of minerals. Origin of minerals. Occurrence of minerals in nature. Some industrial uses of minerals.

Forest and Range Resources — 3 (3-2) -64248

Prerequisites: General Botany.

General Introduction. Forests as a natural resource. General benefits of forests and rangelands. Distribution of forests worldwide, their types, and economic and environmental significance. Mediterranean forests. Forests of the Arab world. Forests in Libya. The current status of forests. Natural grazing land areas in the Arab world and Libya, and their productivity. Conservation and maintenance of natural grazing lands. Economics of forests and rangelands. The role of forests and rangelands in sustainable development. The role of these resources in enhancing national income.

Conservation of Natural Resources — 3 (0-3) - 64261

Prerequisites: Introduction to Natural Resources.

The concept of natural resources. Water, land, forests, wildlife, minerals, and air. Human use and exploitation of the natural environment (with a focus on the ecological aspect). Limiting resource degradation. Functions and objectives of resource conservation. Natural balance. The positive reflections of resource conservation on biodiversity. Humans and renewable natural resources. Protected and conserved forests. Nature reserves: their concept and reasons for establishment. Theory of their design and maintenance. Laws and organizations related to the

conservation of natural resources. Mineral and petroleum resources. Problems of natural resource exploitation and their impact on environmental pollution.

Maps and Photogrammetry — 3 (3-2) - 64282

Prerequisites: Land Surveying.

Nature of Maps: Practical and Theoretical. Basic map operations. Map scales. Aerial photography and the production of aerial images. Classification of aerial photographs and their geometric characteristics. Plotting of spatial information and map representation and handling. General concepts of Geographic Information Systems (GIS) and Remote Sensing. Offered to other departments.

Geographical Information System — 3 (3-2) 64321

Prerequisites: Maps and Aerial Photographs.

General Introduction. Fundamentals, uses, and importance of Geographic Information Systems (GIS). Analysis techniques. Methods of using GIS via computers for the purpose of displaying and analyzing natural resource data. Sources of spatial information and how it is captured. Data structure, analysis, and patterns. Applications in natural resource management and environmental issues.

Economic Geology — 3 (3-2) - 64327

Prerequisites: General Geology.

General Introduction. Economic importance of minerals. Theories of ore deposition. Classification of ores. Mineral markets. Mineral supply. Mineral demand. Factors influencing mineral pricing. Cost and return in mining operations. The role of scarcity in mining economics. Geological ages of mineral formation. Economic importance of mining in Libya.

Industrial Geology — 3 (3-2) -64431

Prerequisites: Introduction to Mineralogy. Fundamentals of Petrology.

The main properties of industrial minerals and rocks. Their classification based on origin and economic feasibility, including igneous, sedimentary, and metamorphic rocks and minerals. Modes of occurrence of industrial minerals and rocks in different geological environments and their mineralogical composition. Processing of various industrial minerals and rocks and determining their suitability for different uses. Economic considerations in ore processing. Case studies of common industrial mineral and rock sites and their occurrences in Libya and worldwide.

Practical Component: Identification of hand specimens of important industrial minerals and rocks.

Economics Human Resources	3 (3-2) -64368

Prerequisites: Principles of Economics.

Population size. Age and gender structure. Size of the labor force. Economic structure. Population density and growth. Economic relationships between human and natural resources. Optimum population size. Labor market and human resource supply. Population as a productive factor. The impact of migration and displacement on the use of natural resources. Population, environment, and food. Human resource development in the context of globalization.

Water Resources	3 (3-2) -64372

Prerequisites: Introduction to Natural Resources.

General Introduction. Supply of water resources. Demand for water resources. Water and various consumptions. Population growth and water resources. Classification of water resources. Conservation and management of water resources. Collection of water data, information, and studies. The impact of forests and vegetation cover on water catchments. The impact of grazing animals and various agricultural activities on water harvesting. Water resources in the Arab world. Water balance in Libya. Examples of water resources in Libya and how to conserve and develop them.

Soil Conservation	3 (3-2) 64377

Prerequisites: Introduction to Natural Resources. Fundamentals of Forestry and Rangeland Science.

General Introduction. Importance of soil as a natural resource. Human activity and soil erosion. Physics of rainfall erosion. Estimation of surface runoff. Estimation of soil loss. Methods of research in erosion. Land use and soil conservation. Resistance to natural erosion. Resistance to erosion during land exploitation. Resistance to erosion in unexploited lands. Forest and rangeland lands and their conservation. Examples and exercises.

Land Survey and Photogrammetry	3 (3-2) - 64381

Prerequisites: Geographic Information Systems (GIS).

General Introduction. Plane Surveying. Measurements of distances, directions, and bearings. Measurement of vertical distance. Instruments used and their applications. Aerial photography and the production of aerial images. Classification of aerial photographs and their geometric characteristics. Plotting of spatial information, map representation, and handling. Applications of surveying instruments. Satellite imagery

and Geographic Information Systems (GIS) and their importance for the study of natural resources (primarily offered to other departments).

Rangeland Ecology and Management	3 (3-2) - 64384

Prerequisites: Fundamentals of Rangeland and Forest Science.

General Concepts. Rangelands as renewable natural resources. Rangelands in Libya and their characteristics. Methods of rangeland assessment. Grazing animals, wildlife, and water resources in natural rangelands. Vegetation cover. Problems of rangelands. Sustainable development and multi-purpose management of natural rangelands.

Petroleum Geology	3 (3-2) -64387

Prerequisites: Introduction to Mineralogy. Fundamentals of Petrology.

General Introduction. Origin of oil and natural gas. Occurrence and deposits of oil in different rocks. Reservoir rocks and source rocks. Oil traps. Types of oil traps. Methods of oil exploration and prospecting. Uses of natural gas and oil. Oil basins. Occurrence of oil and gas in the Arab world and in Libya.

Management of Natural Resources	3 (0-3) -64421

Prerequisites: Introduction to Natural Resources. Geographic Information Systems (GIS).

General Introduction. The relationship of resources to applied and human sciences. Diversity of resources: forests, soil, agricultural resources, rangelands, water resources, fish, wildlife, recreation. Market and non-market values of resources and their relationship to resource management decisions. Application of Geographic Information Systems (GIS) and Remote Sensing techniques in vegetation cover analysis, soil analysis, and the management of rangelands and other natural resources. The use of technology in the management of these resources. Conceptualization of resource management plans.

Land Use and Resources Assessment	3 (3-2) 64437

Prerequisites: Introduction to Natural Resources. General Environment. Maps and Aerial Photographs.

General Introduction. Location theory. Objectives of land use. Principles and classification of land uses and their importance. The administrative map and how to prepare it. Vegetation cover and lands: diagnosis, analysis, and organization. Ecosystems and how to conserve them. The use of aerial photographs and other maps in surveying and classifying natural resources. Applications of legal land description. Preparation of administrative maps. Methods and techniques of natural resources and their role in development planning. Laboratory and field applications.

Applications in Remote Sensing	3 (0-3)- 64440

Prerequisites: Fundamentals of Remote Sensing.

General Introduction. Analysis of Earth surface features and various geological phenomena. Vegetation cover analysis. Application of this technology in various natural resources. Preparation of maps and identification of mineral resources, water systems, geological phenomena, vegetation cover, etc., using remote sensing imagery.

Gas Resources in Libya and Petroleum	3 (0-3)- 6445

Prerequisites: Introduction to Natural Resources.

Historical Introduction. The role of oil and gas in development. Environmental consequences of these resources. Global oil and gas production. Oil and gas production in Arab countries. Oil and gas in Libya. Oil fields and their production. The role of oil in human development and the national economy. Conservation and rationalization of oil and gas resources. Oil-based industries. The future of oil and gas in the world and in Libya.

Mining Geology	3 (0-3) -64452

Prerequisites: Introduction to Mineralogy.

General Introduction. General definitions in economic geology. The nature of the occurrence of ores and minerals in the Earth. Genesis of mineral deposits. Types of ores. Methods of separating and extracting metals from their ores. Importance of minerals and ores in industry. Study of some examples of important ores (iron, coal, gemstones, radioactive ores, and some building and ornamental rocks).

Mining and Sustainable Development	3 (3-2) - 64454

Prerequisites: General Geology. Maps and Aerial Photographs.

Introduction to various mining operations. Technologies used. The concept of sustainable development. The relationship between sustainable development and mining. The impact of mines on land use and development programs. Fundamentals of surface and subsurface land surveying. Various measurements. Data collection and map preparation. Methods of surveying the surface and subsurface of the Earth. Selection of appropriate machinery. The impact of drilling, mining, and quarrying operations on sustainable development in Libya.

Natural Resources and Modern Society	3 (0-3)- 64458

Prerequisites: Principles of Economics.

Introduction and general definitions. Consumption of natural resources. Resource issues. Resources as commodities and stocks. The impact of resource availability on economic growth. Optimal exploitation and market behavior. Economic analysis of resources. Factors mitigating resource scarcity. Energy resource management. Availability of mineral resources. Economics of forest management. Management of marine resources. Water resource systems. Natural areas and ecosystems as a natural resource.

Fisheries Management	3 (3-2) - 64462

Prerequisites: Introduction to Natural Resources.

General Introduction. Concepts of territorial and international waters, and the continental shelf. Methods of quantitative stock assessment. Regulation of fishing. Conservation of fish habitats. Restoration of fish habitat. Fish stocks and harvest regulations. Evaluation of production and different fish categories. Global fisheries.

Natural Resources Economics	3 (0-3)- 64486

Prerequisites: Introduction to Natural Resources. Principles of Economics.

General Introduction. Concept and importance of natural resources. Different classifications of natural resources. The dynamic relationship between the economy and natural resources. Economic analysis of natural resources. The resource market. Cost and return in the supply and demand of resources. Economics of renewable natural resources. Economics of non-renewable natural resources. The impact of

profits on the environment and humans. The economic importance of natural resources in Libya.

Seminar	1 (4-0) - 64445

The student undertakes the preparation of a topic they wish to study under the supervision of a faculty member. This can be designated as a Special Study course. The objective of this course is to train students in the preparation and delivery of presentations.

Hydrology	3 (0-3) - 64205

General definition of hydrology. The hydrological cycle, precipitation, precipitation measurement, evapotranspiration, surface runoff, surface runoff measurements, the stage-discharge relationship, groundwater movement, confined and unconfined aquifers, groundwater in Libya.

Energy Resources	3 (0-3) - 64329

Introduction to depletable and renewable energy sources, solar energy, solar radiation, hydropower, ocean waves and their power output, hydropower systems, small hydropower plant capacity, flow measurement in water turbines, wind energy, and biogas fuel production.