Provision of income generating activities for men and women for better sustainable livelihood

Within the activities of SUMAMAD project held at the department of Environmental sciences, Faculty of science, The income generating activities for the local community of Omayed Biopshere Reserve was implemented.

The activities started for women with provision of material and dies for producing handicrafts. This work has been extended to include the production of small carpets, hand bags, small carries bags. The quality of the products were checked and sold in the local market to tourists, visitors and local people. The revenues produced were used by the handicraft project members to buy more material. This activity has been so far successful, however more support is needed to produce new attractive products, to meet the market needs. This activity will be followed up in the activities of the next year. The following are some photos of the products produced and some members of the NGO giving advices.

Regarding the income generating activities for men, multipurpose olive propagates has been purchased and distributed to selected members form the four villages. These propagules are still in plastic growing on bags as they were purchased, and is expected to be transplanted to the appropriate fields at the appropriate time around the houses of the members of this practice. This activity will be continued in the next year of the project.

The Botanic Garden of Alexandria University

Established in 1965, at the faculty of Science – Alexandria University. It contains a collection of rare terrestrial and limnetic species, and street trees that exist in Alexandria city and nearby towns with an identification label of each species .

The main purpose of this Botanic Garden is education training of students on species classification, and research. The garden is serving all faculties of Alexandria University.

One important mission of the Botanic Garden is conservation of all species planted, and propagation of endemic and endangered ones.

The Botanic garden contain 4 green houses for propagation of rare species from Gymnosperms and Pteridophytes as well as shade plants.

A special area in the garden is dedicated for experiments, with equipment for aquaponics and hydroponics techniques as sustainable development techniques used for training if Master students of the Environmental Science department.

There are 5 gardeners appointed for maintaining the garden. They are trained to do composting of green plant remains and reuse them for fertilization processes. These gardeners are supervised by 2 professors form the Botany Department for follow up of the garden activities and experiments.


الحديقة النباتية
Botanic Garden

Education programs of Ecosystems

Bachelor Program
Department Of Environmental Sciences
Faculty Of Science - Alexandria University

Envt 101 Introduction of Environmental Sciences

Lec. 2 hrs

This survey course is designed to provide students with a sound foundation in basic principles and unifying concepts of Environmental Sciences, Topic selection is based on major themes of modern environmental sciences: Humans and sustainability, Science and ecological principles, Sustaining biodiversity and natural resources and sustaining environmental quality and human societies, Students will gain an awareness of the importance of earth's systems in sustaining our daily lives, Plus the scientific foundation and tools needed to apply critical thought to contemporary environmental issues.

Envt 102 Practical Concepts in Environmental Sciences

Lec. 2 hrs + Tut. 1 hr + Lab. 3hrs

Practical concepts and problem solving in environmental sciences through demonstrations, Hands-on activities, Structured discussions and problem sets beyond those of traditional lecture and discussion components offered in ENVT-101, Emphasizes experience and critical thinking in the four core areas: Geology, Hydrology, Atmospheric sciences and ecology.

Envt 150 Landscape Ecology

Lec. 1 hr + Lab. 3hrs

History and definition of landscape ecology, Its relationship to other subfields of ecology, Causes of landscape pattern (abiotic, biotic, human land use and disturbance), Data for studying landscapes (GIS, remote sensing), Measuring landscape pattern (spatial statistics, landscape pattern analysis), Landscape disturbance dynamics, Effects of landscape pattern on organisms, Populations, Communities and ecosystem processes; Conservation ecology at the landscape scale.

Envt 201 Environmental Earth Sciences and Energy Resources

Lec. 2 hrs + Lab. 3 hrs

Geologic framework that provides a brief background in Earth system science (an overview of our planetary environment, internal processes, rock deformation, plate tectonics, weathering, streams and flooding, Earth materials (such as minerals, rocks and soils) to determine their potential use as resources or waste disposal sites and their effects on human health, Hazardous geologic processes that covers the broad range of geologic events which are damaging to human interests, Including earthquakes, Volcanic eruptions, Landslides and floods, Using and caring for earth resources, Human impacts on the environment (hydrologic processes of groundwater and surface water to evaluate water resources and

water pollution problems), Landscapes for site selection, Land-use planning and environmental impact analysis, Medical geology (effects of chemical elements in the environment, especially trace elements, on the health of humans and animals), This involves the understanding of biologic effects of exposure to these elements, As well as knowledge of their distribution in the geologic environment, Energy utilization, Energy resources development, Availability of alternatives and energy resources management, Conservation and policy are presented. Applicable physical principles related to the economics, Conservation and technology of energy are covered.

Envt 202 Environmental Biology

Lec. 2 hrs + Tut. 1 hr+Lab. 3hrs

This course introduces students to principles and concepts of biology and ecology, It provides a broad understanding of the biology of groups or organisms, Ecological relations and processes on the lands, In the oceans and fresh waters and the air, The impacts of global and local environmental changes, human intervention and effects of pollutants on various ecological units are examined, Students also are introduced to molecular biology, The nature of the genetic code, Metagenesis and carcinogenesis.

Envt 203 Ecosystems

Lec. 1 hr + Tut. 1 hr + Lab. 3hrs

An overview of the general principles of ecosystem, Types, Survey of the different ecosystems, Desert ecosystems, Grassland ecosystems, Freshwater ecosystems, Ocean and coastal ecosystems, Fragile ecosystems and human-dominated ecosystems, Egyptian ecosystems, Nile Delta, Western Desert, Eastern Desert, Dunes, Coastal and marine areas, Coral reefs, Fresh water marches, Salt water marches, Fresh water swamps, Fresh water lakes and mangroves.

Envt 204 Environmental Hydrology

Lec. 1 hr + Lab. 3hrs

A comprehensive survey of water resources considering both quantity and quality, Emphasis is on the standard techniques of sampling and monitoring especially for ground water, The hydraulic characteristics of water-bearing formations are also discussed, Analytical procedures used in field investigations and modeling studies are covered, Hydrology and water resources management The hydrological cycle, Precipitation, Evaporation and evapotranspiration, Infiltration, Storage, Run-off, Ground water, Sediment transport, Water-use (irrigation, industry, domestic, navigation, fisheries, recreation), Sources of water (precipitation, lakes, rivers, groundwater, swamps, re-use, desalination), Conservation of water quality (in irrigation, industry and domestic use), Introduction to optimization and water resources management.

Envt 205 Aquatic Sciences

Lec. 1 hr + Tut. 1 hr + Lab. 3hrs

The physical, Chemical, Geological and biological aspects of sea, Lake and stream environments, The aquatic environments, General characteristics, Ecological subdivisions of aquatic ecosystems, pelagic and benthic communities, Composition, Biology and ecology of important groups, Biological processes, Primary and secondary productivity, Food webs, Ecological factors, Coastal communities, Benthic and pelagic characteristics, Biodiversity, Susceptibility to varying environmental conditions, Bioaccumulation, Economic importance and management of coastal zone communities, Development of aquatic ecosystems.

Envt 250 Environmental Physics

Lec. 2 hrs

This course is being offered to respond to the growing need for knowledge about the physics behind contemporary environmental problems, The lectures and discussions will concentrate on one of the most pressing global environmental problems of the day, The threat of global warming due to increased greenhouse gases in the earth's atmosphere, We will also examine the problem of ozone depletion in the stratosphere (the ozone hole), Alternative energy sources, Such as solar and wind power and environmental problems associated with nuclear power.

Envt 251 Coastal Zone Management

Lec. 1 hr + Lab. 2 hrs

Challenges in the coastal regime, Special nature of the coast, Pressure and effects by human, Rational for government intervention, Understanding the coastal environment, Definition of the coastal zone, Coastal morphology and landforms, Costal ecosystems and classification of coastal areas, Environmental parameters of the coast, Barrier islands, Estuaries, Coastal marshes, Coral reefs, Rocky shores and bluffs, Coastal processes, Wind, waves, Currents and tides, Hurricanes and extra-tropical storms, Sea level rise, Erosion and accretion, Climate change, Monitoring tools for coastal inventories, Conventional methods, Remote sensing, Aerial photography and satellite monitoring, Pollution issues and toxic contaminants, Oil pollution heavy metals and organic toxants, Coastal development and management issues, Land use pattern and sustainable development, Protection of coastal waters and wetlands, Coastal resources and habitat conversation, Management of coastal regimes, International guidelines law of the sea, Egyptian ccoastal policy, Coastal management programs, Managing constructions, Urban waterfront development, Beach access and land acquisition.

Envt 252 Climate and Meteorology

Lec. 2 hrs + Lab. 1hr

The atmospheric physical processes important to understanding climate, Weather and forecasting for the earth’s surface at a range of spatial and temporal scales, Students will observe, Record, Analyze and discuss meteorological phenomena in terms of fundamental physical theories and natural laws, Such as energy relations, Fluid dynamics, Pptics and feedback loops.

Envt 253 Wetland and Aquatic Ecology

Lec. 1 hr + Lab. 3 hrs

A study of the interaction of physical, Geochemical and biological components of wetland ecosystems, Adaptations of organisms in wetland ecosystems and community interactions are emphasized, Field and laboratory study give students experience in inquiry-based activities involving data collection and analyses used in wetland ecology, Techniques in wetland characterization and delineation are covered.

The physical, Chemical, Geological and biological aspects of sea, Lake and stream environments, The aquatic environments, General characteristics, Ecological subdivisions of aquatic ecosystems, Pelagic and benthic communities, Composition, Biology and ecology of important groups, Biological processes, Primary and secondary productivity, Food webs, Ecological factors, Coastal communities, Benthic and pelagic characteristics, Biodiversity, Susceptibility to varying environmental conditions, Bioaccumulation, Economic importance and management of coastal zone communities, Development of aquatic ecosystems.

Envt 254 Behavioral Ecology

Lec. 2 hrs

Behavioral ecology investigates the actions of animals in reference to their evolution, environment and interactions with other organisms. Behavioral patterns are determined by natural selection acting on genomes functioning under particular ecological conditions. Hence, this course will focus on the animal

behavior that is related most directly to survival and reproduction in a natural ecological context. Major topics will include: optimality models, predator-prey interactions, distribution of organisms in space, dominance and aggression, mating systems, sexual selection, communication, and helping behavior. An emphasis is placed on students conducting their own research and learning all aspects of the scientific process through the field of behavioral ecology.

Envt 257 Introduction to Environmental Ethics and Politics

Lec. 2 hrs .

History of ideas on man's place in nature, Evolution of environmentalist movement's ethics in 19th-20th centuries, Contemporary ideas on environment, Technology and economic growth relationships, Sustainable development, This course will review how the major components of the Egyptian political system, Including institutions, Processes and political values, Relate to environmental policy, The course will also provide an update on environmental policies currently active on the national agenda.

Envt 301 Remote Sensing

Lec. 1 hr + Lab. 3hrs

Theory and application of remote sensing, The electromagnetic spectrum, Earth-energy interactions, Photographic and photogrammetic principles and operation of multispectral sensors, Applications include basic photo interpretation and satellite image analysis for agriculture, Environmental assessment, Forestry, Geology, Rangeland, Urban, Wildlife and others, Advanced principles and applications in remote sensing, Emphasizing digital image processing techniques, Spectral and spatial image enhancement, Advance transformations, Image classification and change detection, Course emphasizes hands-on lab and project work, Interpretation of remotely sensed environmental data such as aerial and satellite photo imagery, Topics include photogrammetric correction, Photo interpretation, Classification of land use cover and features and the use of image analysis software and heads-up digitization.

Envt 302 Geographic Information Systems

Lec. 1 hr + Lab. 3hrs

This course is designed to acquaint students with the history, Operation and applications of geographic information systems (GIS), This course will cover all aspects of GIS including data collection, Preprocessing, Data management and data analysis as well as the application of these systems.

Envt 303 Environmental Microbiology

Lec. 1 hr + Lab. 3hrs

To provide a basic understanding of environmental microbiology primarily from two aspects: Microbial interactions with chemical pollutants in the environment and the fate of microbial pathogens in the environment, Topics covered include microbial environments, Detection of bacteria and their activities in the environment, Microbial biogeochemistry, Bioremediation and water quality.

Envt 304 Conservation and Natural Resources

Lec. 2 hrs + Tut. 2 hrs

Conservation of natural resources including history, Ecological and social foundations, Examines principles of sustained yield, Carrying capacity, Supply and demand and world population growth as applied to agriculture, Range, Forest, Wildlife, Fisheries, Recreation, Minerals and energy management, The role of genetics and behavior in shaping the patterns and processes of nature, With an emphasis on the critical process of natural selection and general ecology, Including habitat types, Communities, Ecosystems, Population dynamics and trophic interactions, Each topical area will be examined in the

context of natural resource applications, Managing protected areas, Conservation and sustainable development at the local and national levels.

Envt 305 Desert and Desertification

Lec. 1 hr + Tut. 2 hrs

Study of desert's types, Features, Biomes and distribution, This course concentrates on improving the understanding of desertification and desert development through studying causes, Impacts, Prehistoric patterns, Historical and current desertification and its mitigation.

Envt 306 Environmental Chemistry

Lec. 3 hrs

Topics related to the sources, Reactions, Transport, Effects and fates of chemical species in water, Soil and air environments, Properties of water and bodies of water in relation to the basic principles of chemistry, Aquatic microbial biochemistry principles, Composition and chemistry of the atmosphere, Particles in the atmosphere and air pollution, Composition and properties of soil in relation to soil pollution, An introduction to "green" chemistry.

Envt 308 Environmental Chemistry (Lab)

Lab. 3 hrs

This course is aimed to provide a general overview for the wastes and pollutants in soil, Nature and sources of hazardous wastes, Environmental chemistry of hazardous wastes, Mass transport in saturated media, Reduction, Treatment and disposal of hazardous wastes.

Physical basis of atmospheric phenomena on small, Medium and large scales, Introduction to atmospheric dynamics, Examination of atmospheric circulation systems, Introduction to atmospheric physics and chemistry, Particles in the atmosphere, Gaseous inorganic air pollutants, Organic air pollutants, The photochemical smog, The endangered global atmosphere, Sources, Fate and effects of air pollution, Air quality, Air quality monitoring, Gas and vapour sampling, Particulate matter sampling, Emission measurements, Air quality monitoring system, Case studies of air quality management, Indoor air pollution, Public and occupational health: Introduction to toxicology as it relates to environmental and health effects of hazardous materials, Toxicological methodology, Risk management factors including microbiological and socio-legal aspects, Risk assessment.

Envt 350 Natural Hazards

Lec. 2 hrs + Tut. 1 hr

This course will introduce the earth system as a basis for characterising and understanding natural hazards, Their causes and consequences, The major types of natural hazard will be described, Analysed and assessed in terms of their underlying causes as well as their socio-economic and environmental impacts, This Course capitalises on natural synergies between subsurface, Surface and human dimensions of the Earth System, Hazards to be considered will include earthquakes and tsunamis, Volcanic hazards (local, regional and global scale), Meteorological hazards (hurricanes, tornados, dust storms, el nino, flooding and coastal erosion), Topographic hazards such as collapse of unstable slopes, Hazards arising from climate change and hazards associated with bolide impacts, The evidence for past natural catastrophes and hazards, Recorded in natural archives, Will be described along with remote sensing methods for documenting current hazards and hazard risk, The principles and application of risk assessment and analysis will be considered with respect to case studies, The course will conclude with an overview of human settlement, Planning and policy in relation to natural hazards in the light of their socio-economic impacts.

Envt 351 Environmental Hydrogeology

Lec. 1 hr + Lab. 3 hrs

Environmental hydrogeology (the geologic and hydrologic factors controlling the occurrence, movement and chemical quality of groundwater), Topics covered include: Water, Hydrological cycle, Evaporation, Transpiration, Infiltration, Surface water / Groundwater interaction, Stream discharge, Porosity, Specific yield, Specific retention, Darcy's Law, Measuring permeability, Aquifer properties, Storativity, Homogeneity and isotropy, Fresh water head, Equations of groundwater flow, Flow lines, Steady-flow equations, Vadose zone, Unsaturated flow theory, Groundwater flow to wells, Theim equation, Thies method, Jacob method, Hantush method, Neuman method, Theoretical time-drawdown relationship, Slug tests, Hvorslev slug test method, Bouwer and rice method, Specific capacity, Case studies, Regional groundwater flow, High Plains aquifer, Groundwater interaction with regional aquifers lakes and wetlands, Inorganic chemicals in groundwater, Chemical reactions, Isotope hydrology, Sources of groundwater contamination, Sampling in the saturated and vadose zones, Groundwater management, Surficial geophysical methods.

Envt 353 Plant Tissue Culture

Lec. 1 hr

Plant Tissue Culture will cover the essential in vitro methods and strategies currently available in research and commercial production, We will systematically explore each of the technologies in classic plant tissue culture from the basics to high tech applications and combine the lectures with practical laboratory experience whenever possible.

Envt 355 Atmospheric Chemistry

Lec. 1 hr + Lab. 3 hrs

This course treats the earth's atmosphere as a biogeochemical system now significantly perturbed by human activity, After a brief review of needed chemical fundamentals, The course treats the following topics: The structure and general circulation of the atmosphere, Energy balance and the transfer of radiation, With major emphasis on the natural and perturbed photochemistry of the stratosphere and troposphere, Current atmospheric environmental issues (stratospheric ozone loss, greenhouse warming, urban/regional smog) are treated as perturbations of natural biogeochemical cycles (C,N,Cl….), Course concludes with possible policy implications of these atmospheric chemistry problems (e.g. proposed 'geo-engineering' solutions to global climate change).

Envt 356 Environmental Phytoremediation

Lec. 2 hrs

The study of environmental pollution effects on physiological and ecological processes of plants, In both managed and unmanaged ecosystems, Pollutants under study include contaminants of air (such as ozone, Sulphur dioxide and UV-B radiation) and soil (such as metals and organic xenobiotics), Topics include principles, Protocols and applications of molecular biology and biotechnology for genetic improvement of microbes / plants for environmental remediation.

Envt 357 Geomorphology

Lec. 2 hrs .

The course includes discussion of earth-surface processes, analysis of landforms, and quantification of geomorphic data.

Envt 358 Environmental Health and Monitoring

Lec 2 hrs + Tut. 1 hr

This course covers the influence of environmental conditions on human health, Emphasis is placed on environmental contaminants and the major exposure routes of the human body, Upon completion, Students should be able to examine segments of the environment, Including air, Water and food and determine how the conditions of these influence human health.

Envt 359 Land Degradation

Lec. 2 hrs + Tut. 1 hr

The types and causes of land degradation in dryland areas, First-hand experience of field techniques for land degradation assessment, Land degradation within the context of global environmental change issues and major developmental problems, To relate land degradation, Its impact and conservation measures to the Sustainable drylands Livelihoods framework.

Envt 360 Environmental Micropaleontology

Lec. 1 hr + Lab. 3 hrs

Environmental Micropaleontology deals with the use of microfossils in dated sediment cores to interpret environmental change, Whether naturally or human induced, Examples from marine and freshwater systems illustrate how quantitative relationships between microfossil and geochemical data can provide information about biological reference conditions, Even in previously non-monitored areas, The complementary nature of the methods used allows a broad understanding of environmental changes in aquatic environments (e.g., pollution, eutrophication, climatic change).

Envt 361 Marine Geology

Lec. 2 hrs + Tut. 1 hr

The focus of this course will be a survey physical makeup of the ocean floor and processes that control its evolution, Included will be discussions global tectonics, Earth history as revealed by the sea floor sediment record (e.g., paleooceanography) and a survey of environments from the abyssal plain to coastal areas of the ocean.

Envt 362 Environmental Modeling

Lec. 1 hr + Lab. 3 hr

This course will introduce users to many new or advanced modeling techniques for 3D site modeling, A series of lectures and hands-on tutorials will be presented covering the following topics in a progressive fashion: Learn about the new options available in MODFLOW2000, Including the new layer property flow (LPF) and hydrogeologic unit flow (HUF) packages, Learn to import and manage data for transient simulations, Learn how to use the new stochastic modeling module in GMS, Including monte carlo, Latin hypercube and indicator simulation methods, Use the new risk analysis wizard to perform probabilistic threshold concentration and probabilistic capture zone analyses, Use the new transition probability geostatistics model (T-PROGS) now available in GMS, Learn how to generate a FEMWATER simulation, Including a discussion of advanced 3D finite element mesh generation techniques.

Envt 401 Environmental Pollution and Public Health

Lec. 2 hrs

Wastes and pollutants in soil, Nature and sources of hazardous wastes, Environmental chemistry of hazardous wastes, Reduction, Treatment and disposal of hazardous wastes.

Public and occupational health: Introduction to toxicology as it relates to environmental and health effects of hazardous materials, Toxicological methodology, Risk management factors including microbiological and socio-legal aspects, Risk assessment.

Envt 402 Global Environmental Issues and Hazards in Egypt

Lec. 2 hrs + Tut. 2 hrs

This course explores ethical, Ecological and policy dimensions of international environmental issues as atmospheric and water pollution, Global climate change, Care of agricultural lands, Water scarcity, Overharvest of renewable resources, Loss of biodiversity and world population growth, Environmental problems will be related to other social and ethical concerns, Topics may include: Land use practices and reform, Farmland and open space preservation, Soil and water conservation, Reversing land degradation, Rangeland management, Wetlands protection and rehabilitation, Waste management and reduction, Recycling and composting, Air pollution, Global warming and sea level rise and marine wilderness areas.

Envt 403 Environmental Pollution (Lab)

Lab. 3 hrs

Envt 404 Student Colloquium Series **Lec. 1 hr**

Annual series of colloquia exploring a broad environmental related topic from a variety of viewpoints.

Envt 405 Environmental Impact Assessment

Lec, 2 hrs

Definition, Scope and field of application of environmental impact assessment (EIA), Methodologies of EIA, Assessment of impacts, National and international legislation of EIA, Discussion of case studies.

Envt 407 Environmental Management and Legislation

Lec. 2 hrs

This course addresses environmental issues faced by industry, Including such topics as waste management, Chemical inventories, Pollution prevention and discharge permitting, Industrial ecology is introduced as an approach to the development of a sustainable industrial society, Including treatment of Life cycle analysis, Design for environment, Environmentally conscious manufacturing and Environmental management system (EMS), Understanding ISO 14000 scope and definitions, EMS requirements and environmental policy, Cost benefit, EMS in Egypt, Regulation and regulatory framework of the environmental and hazardous waste law, Definitions, Policy guidance vs regulations, Role of the states, Municipalities and the EEAA, Compliance issues, Case studies.

Introduction to basic legal concepts: Sources of law, Legal remedies, Common law, Administrative law, Planning acts, Environmental protection acts and environmental assessment acts, Critical review of environmental legal concepts and their social, Economic and environmental effects, Understanding of the legal structures within which Egyptian environmental regulations are applied, Legal obligations, The latest trends in developing environmental legislation, International environmental legislation, Treaties and policies, Philosophy of environmental controls.

Envt 450 Environmental Biotechnology

Lec. 1 hr + Lab. 3 hrs

Biological systems for the production of commercial goods and services: Foods, Drugs, Chemicals, Fuels, Equipment, Diagnostics, Waste treatment, Properties of microbial, Plant and animal cells and of enzymes used in bioprocess applications, Classification and characterization of biological agents and materials, Quantification of metabolism, Biokinetics, Bioenergetics, Elementary aspects of molecular biology, Genetic engineering, Biochemistry, Microbiology, Stoichiometry, Knetics and thermodynamics of microbial processes for the transformation of environmental contaminants, Design of

dispersed growth and biofilm based processes, Applications include treatment of municipal and industrial waste waters, Detoxification of hazardous chemicals and groundwater remediation.

Envt 451 Natural Protected Areas and Wildlife

Lec. 2 hrs + Tut. 1 hr

Almost 75% of the training program is conducted in the field, It provides practical examples of management of the great variety of protected areas and an ample range of exercises to provide participants with the practical concepts, Methods and techniques required to improve management of wildlife and protected areas, The course includes, Types of protected area, Social and environmental benefits of protected areas, Protected area systems, Working with user groups, Managing natural resources, The planning process: Achieving desired resource and social conditions and fostering effective management, Basic concepts of biodiversity conservation and wildlife management: categories of wildlife, Understanding and defending wildlife values, Management by objectives, Planning for national protected area systems and individual wildlife areas and integrated natural resource planning, Conflict resolution and consensus building among all the stakeholders involved in protected areas and their surrounding regions, Management of impacts to soil, Vegetation, Water quality and wildlife, Managing visitors, Developing facilities and infrastructure, Conflict resolution and consensus building among all the stakeholders involved in protected areas and their surrounding regions, Case studies on protected areas network in Egypt.

Envt 452 Remote Sensing and Geographic Information Systems Applications

Lec. 1 hr + Lab. 3 hrs

The course offers practical applications to develop hands-on skills in the use of relevant tools and techniques, The applications are mostly in the fields of: Natural resources, Water resources, Earth resources and urban planning.

Envt 453 Water Resources Management

Lec. 1 hr + Lab. 3 hrs

The course is designed to acquaint students with the history and practice of water resources planning and management, Provide examples of water resources planning protocols employed by various agencies and levels of government, Addresses the role of analytic methods in water resources planning processes, Illustrates the roles of interdisciplinary teamwork, Partnerships and public involvement in planning and management processes, Differentiates the roles of planners and decision makers and presents the elements of integrated water resources planning and management.

Envt 454 Environmental Remediation

Lec. 2 hrs + Tut. 1 hr

The course will focus on the principal remediation legislation In the world and in Egypt and will provide an understanding of all laws governing conduct of remediation including the national requirements under the environment protection laws and acts, and legislation. It will also cover how to select remediation contractors and contractor liability will also be addressed. This course will examine the principles of environmental chemistry which apply to the remediation of contaminated soil and water, Including the properties of soils systems and the factors controlling mass transport, Partitioning, and chemical fate, ENVT, Current and emerging remediation technologies and their limitations in soil and groundwater restoration are reviewed.

Envt 456 Waste Management

Lec. 2 hrs + Tut. 1 hr

Integrated strategies for waste control for both industrial and municipal solid waste to include hazardous and non-hazardous streams, Introduction to both hazardous and non-hazardous waste definitions and an overview of environmental legislation regulating these wastes, A broad range of waste management is discussed and successful case studies analyzed, Primary focus is on waste minimization techniques of source reduction and recycling, A thorough review of waste disposal options such as chemical, Physical and biological treatment, Thermal processes and land disposal round out the waste management strategies discussed, Economic and political considerations influencing integrated waste management, Global waste.

Envt 457 Restoration Ecology

Lec. 2 hrs + Tut. 1 hr

Review and discuss fundamental concepts, Current literature and contemporary topics relating to ecological restoration in natural ecosystems, This includes the theoretical development of restoration ecology and its application, Ecological restoration, The relationship with conservation biology will be explored, The goal is to inform, Exchange views and develop critical thinking skills, Case studies will be developed and examined as a means of exploring alternative objectives, Problems, Limitations, Ecological potentials and restoration strategies.

Envt 458 Contaminant Fate and Transport

Lec. 2 hrs

This course exposes the student to pollution fate and transport mechanisms and theory so that they can better probe, Analyze and solve water resources pollution problems, The course tracks pollutant movement through the vadose zone, Groundwater, Rivers, Lakes, Estuaries, Oceans and the atmosphere to characterize the quality of our water resources. Dissolved and particulate pollutants and exchanges between media, Are considered, Describes the physical controls on chemical advection and diffusion based on a theoretical understanding of pollutant fate and transport. The course considers how the biological and physical properties of the soil, Water and atmospheric media affect pollutant fate, Transport and environmental impact.

Envt 459 Contaminant Hyrogeology

Lec. 1 hr + Lab. 3 hrs

Introduction to contaminant hydrogeology, Including properties of organic and inorganic contaminants, Chemical and physical processes affecting concentration of solutes in the subsurface, Mass transport, Multiphase flow, Contaminant monitoring and site remediation.

Envt 460 Ecological Risk Assessment

Lec. 1 hr

Ecological risk assessment is a process for collecting, Organizing, and analyzing information to estimate the likelihood of undesired effects on nonhuman organisms, Populations, or ecosystems, The primary purpose for conducting such assessments is to provide information needed to make decisions concerning site remediation, The course presents a conceptual approach and specific methods for assessing the ecological risks posed by contaminated sites, We will work through the individual steps for understanding and then apply the concepts to real ecological risk assessment case studies.

Envt 461 Biodiversity

Lec. 2 hrs

This course is an integrated survey of the plant and animal kingdoms which stresses general concepts and economically important species, Particular attention will be paid to special structures and mechanisms evolved by selected representatives of major phyla of plants and animals for solving problems

of life in various environments, Ecosystem function of biodiversity in Arid Ecosystems, Biodiversity loss, Causes and consequences, Biodiversity conservation.

Envt 490 Research Project

Lec. 2 hrs

جامعة الإسكندرية
ALEXANDRIA UNIVERSITY
Faculty of Science

M.Sc. in
Natural Resources Sustainability for Land Development (NRSLD)

Under the framework of the SuReMap Erasmus+ project

SureMap

Co-funded by the Erasmus+ Programme of the European Union

SuReMap

(Sustainable Resource Management Programme to solve Deserted Challenges)

Aims to establish interdisciplinary programs that train students to address water, energy & food-related challenges in "Egypt's 2030 strategy".

SureMap

Co-funded by the Erasmus+ Programme of the European Union

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Department of Environmental Science
Faculty of Science - Alexandria University

SEKEM ENERGY

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جامعة الإسكندرية
ALEXANDRIA UNIVERSITY
Faculty of Science

NRSLD PROGRAM

Vision

NRSLD program aims to prepare students with the knowledge and experience for the management and sustainable development of drylands' natural resources in the local, regional, and international related sectors.

Mission

The Faculty of Science through NRSLD program seeks to qualify the graduates to be competitive at local, regional, and international levels, by creating an appropriate educational environment and fostering ethically, scientifically and professionally sound approaches that enable graduates to serve the community and the institutions closely related to sustainable development plans.

SuReMap Consortium

NRSLD is an outcome of the SureMap Erasmus+ project that includes a consortium of 8 Egyptian and European universities. The program is cooperatively designed by the consortium, therefore; it has the advantage of the international and interdisciplinary perspective, European framework of recognition, and benefits from a wide network of participating professors from the following universities:

- RWTH Aachen
- Heliopolis University
- Alexandria University
- CITY College – Sheffield University
- The American University in Cairo
- University of Palermo
- Aswan University
- Technical University of Madrid

Program Structure

2 YEARS (4 SEMESTERS)

The student completes 60 ECTS of core courses, 30 ECTs of elective courses, and 30 ECTS for M.Sc. thesis.

SEMESTER 1 & 2: 60 ECTS CORE COURSES

- Introduction to Sustainability Management
- Sustainable Development
- Sustainable Water Resources Management
- Sustainable Energy Resources and Management
- Sustainable Management of Marginal Drylands
- Sustainable Farming Systems: Hydro and Aquaponics
- Green Entrepreneurship and Agribusiness
- Environmental Hydrology
- Projects Management
- Scientific Methodologies and Research Ethics

Semester 3: Select 30 ECTS of Elective Courses

- Hydrogeology
- Climate Smart Agriculture and Crop Adaptation
- Solar Energy Systems
- Environmental and Resource Economies
- Integrated Cropping Systems in Drylands Farming
- RS & GIS for Natural Resources Management
- Environmental Management and Legislations
- Sustainability Issues and Challenges
- Sustainable Community-based Natural Resources Management
- Toward a Sustainable Global Food system
- Irrigation and Drainage Engineering: Sustainable Strategies and Systems
- Recycling of Wastes
- Land Degradation and Sustainable Agriculture
- Land suitability & Land Use Planning
- Desert Land Reclamation

SEMESTER 4: 30 ECTS FOR M.SC. THESIS

SureMap

Co-funded by the Erasmus+ Programme of the European Union

NRSLD is designed to comply with the Bologna Declaration and according to the demands of the Strategic Frameworks for European Cooperation in Education and Training (ET 2020).

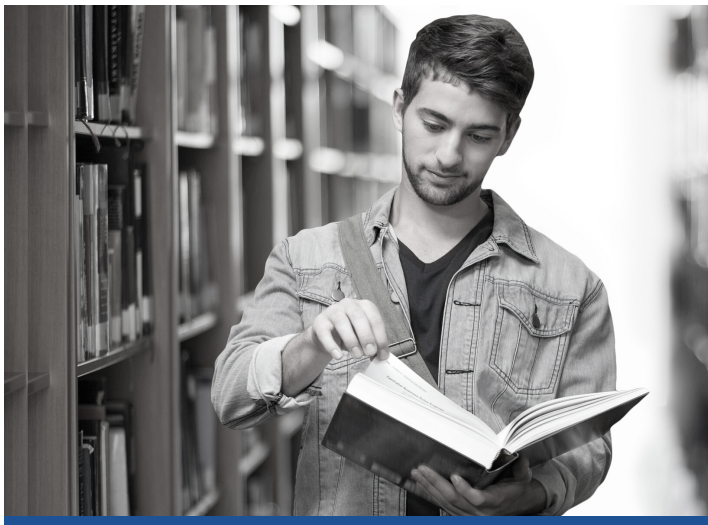
NEXUS

Language

English is the medium of instruction. Students are expected to demonstrate an acceptable level of English proficiency.

Admission Requirements:

Holds a B.Sc. in science, agriculture, or engineering with a minimum CGPA of 2.33 (Good) from an Egyptian, Arab, or Foreign Higher Education Institution.



Sustainable Land Management – SLM
Master Program Bylaws

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25th April, 2017

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Preface

The sustainable land management master degree aims at establishing the concept of holistic management of agricultural production elements. The idea of the master came after carrying out a thorough study of the needs assessment on the local and regional level in order to put the idea into action. This concept will empower lay-down and establish the concept of sustainable management of land resources in its comprehensive and integrated various fields, which ensures the sustainability of resources to meet the needs of current and future generations of food. An initiative of representatives of some European bodies (Desertification Research Center - University of Sassari - Italy, University of Leeds - United Kingdom, University of Aristotle - Greece, Union of Mediterranean Universities UNIMED, and Advanced Computer Systems Company ACS, Italy, as well as four Egyptian Universities, namely, Cairo, Alexandria, Zagazig, Damanhour to prepare a collaborative research project entitled "Interuniversity Learning in Higher Education on Advanced land Management - Egyptian Country/ ILHAM-EC" was funded by Erasmus+ KA2 program, to establish a joint Master's degree in sustainable land management (SLM).

The SLM Master is characterized by:

1- It is shared by the 4 Egyptian universities
2- Exchange of scientific expertise between faculties and students in the 4 Egyptian universities and their counterparts in EU
3- The master is prepared in both European Credit Transfer System (ECTS) and Egyptian Credit Hour System (ECH)
4- The possibilities of attracting students from different disciplines other than agriculture from the Arab world and African countries
5- Increase the awareness about the importance of SLM
6- Application of up-to-date technologies in SLM with the help of local and European experts
7- The SLM graduate will have a prominent role in:
    a. Presence of systems and policies that protect the land users from deteriorating their lands
    b. Creation of SLM system in new lands that guarantees and maintains the quality of land
    c. Land use planning of non-agricultural lands in the new urban areas, and the assurance of the presence of a green belt around the city that maintain quality of life in these cities.

1- Background

Productive agricultural land resources in Egypt suffer pressures from multiple physical and human factors that lead to soil degradation and desertification. Irrigated lands are deteriorated, as the main source of irrigation water that comes from the Nile contains high concentrations of pollutants, as well as the re-used drainage water contains residues of fertilizers and pesticides. Sea level rise represents a threat to agricultural land especially in the Northern Delta, where saltwater intrusion from the sea into the groundwater, leads to decline of agricultural productivity. Moreover, rapid population growth leads to urban encroachment on fertile agricultural land. Therefore urban growth is considered one of the important reasons of land degradation in Egypt.

The Egyptian authorities, in their efforts to enhance agricultural development, are faced with many constraints and determinants. These are: the implementation of land use policies that might be inappropriate; lack of realistic planning; lack of adequate scientific knowledge; not enough technical expertise capable of dealing with complex problems; many institutions are not capable to conduct integrated and multi-disciplinary studies and not enough follow-up actions on issues of land degradation and their impact on productivity and desertification; Lack of advanced educational and training programs that are designed for the sustainable management and conservation land resources; lack of effective communication at national, regional and international levels; lack of effective mechanisms for technology transfer and exchange of expertise and cooperation at various levels; and finally the absence of mechanisms to promote community participation in the decision-making process.

For the above mentioned reasons, and for the development and modernization of institutional and individual capacities, the project aims to develop a new Master degree in the field of sustainable land resources management; organize training courses for faculty members to enhance knowledge-sharing; updating the technical skills and teaching methods on the issues of sustainable land management to solve developmental problems.

From the needs assessment survey that was carried out by the Egyptian partners, it was clear the importance to develop a new Master degree based on innovative learning methods aiming at improving the quality of teaching and learning while ensuring high quality educational curricula. This approach is considered the most appropriate to meet the professional, employer and socio-economic needs of Egypt. Furthermore, as follow up of the survey, significant new initiatives were

suggested to be implemented, such as cross-disciplinary courses, students and teachers' mobility, seminars, courses and traineeships organized by international Institutions working in SLM.

2- Sustainable Land Resources Management (SLM)

Sustainable land management combines technologies, policies and activities aimed at integrating socio-economic principles with environmental concerns so as to simultaneously FAO:

- Maintain or enhance production/services (**productivity**).
- Reduce the level of production risk (***stability***).
- Protect the potential of natural resources and prevent degradation of soil and water quality (***protection****)*
- Be economically viable (***viability***) and
- Be socially acceptable (***acceptability****).*

3- Program Rationale

Sustainable land management is a challenging multi-disciplinary field. In order for Egyptian universities to train effective SLM managers, a new inter-university Master degree in SLM will be developed through this project.

4- Vision

To utilize and preserve environmental resources

5- Mission

Promotion of specialized personnel and updating the scientific and technical skills in the field of integrated management of land resources in order to gain the ability to confront problems and keep up-to-date of global developments

6- Objectives

- The new Master is to provide graduates with the required knowledge and understanding of the scientific, policy and legislative frameworks as well as sound and holistic management skills for sustainable land management through.
- Providing the scientific basis for implementing the sustainable land resources management in a comprehensive and integrated ecosystem.

- Educating the students on how to critically understand and evaluate the complex issues involved in sustainable land management.
- Allowing students to deepen and focus on some selected national development issues such as food security and sustainable agriculture.
- Responding to the requirements of the national and private companies needs of specialized and trained personnel who are able to implement sustainable land management and water resources strategies.
- Allowing the graduates to focus on the analysis of the real resources problems, in addition to field work to enhance learning.
- Adopting the multidisciplinary and interdisciplinary approaches to solve environmental problems locally and regionally, and develop realistic solutions through a comprehensive integrated outlook, which is based on a broad base of pure and applied sciences as well as agricultural and engineering sciences; and, social, legal and economic sciences scientific fields.
- Confirming the importance of land resources management for Egypt and the Arab and African region that suffer from problems of land degradation and loss of cultivated areas due to desertification and urban sprawl and declining land productivity which complicates the issue of food security and hinders achievement of sustainable development.
- Satisfying the needs of land resources sector by providing personnel and leaders capable of sound management of land resource.
- Capacity building and improving teaching methods so as to keep pace with national needs and international references
- Creating a network to support effective partnership and cooperation with various stakeholders both locally and internationally in the field of sustainable land resources management.

7- E-learning approach

New learning materials will be developed by partners on use of multidisciplinary approaches and advanced technologies in the management of land resources. All material will be implemented in an E-learning System and used to update specific technical skills of Egyptian professors. The E-learning material will be used in the Master.

8- Career Prospects & Opportunities:

Graduates of the SLM Master will be qualified to go into positions such as:

- Land Resources Management and Planning Officer
- Land Resources Development Project Officer
- Environmental Impact Assessment Specialist
- Agricultural Land Use Policy and Food Security Officer
- Land Reclamation and Agricultural Development Project Specialist
- Soil Fertility Management Specialist
- Natural Reserves (protected areas) officer
- Natural Reserves (protected areas) officer

- Graduates are well trained to be resource managers capable of providing information for sound management and planning of land resources.
- Employment with Agricultural Land Management agencies such as Ministry of Agriculture; local and regional planning organizations such as Ministry of Housing & Reconstruction; private organizations which own and manage land; and consulting firms.
- Graduate academic training could lead them to be involved in research and pursue higher degree (Ph.D.) in soil and water sciences.
- Careers in precision agriculture requiring professionals who can work outdoors on the land and indoors with data and computer applications dealing with geographic information systems GIS and remote sensing could be available.

Chapter 2: General Rules

Article 1: Scientific Department / Scientific Committee

Article 2: Coordinating Committee

Article 1: The Scientific Department / Scientific Committee

The soil and water science department will coordinate and be responsible for all the matters related to the management of the SLM program. In case there was no scientific department assigned, a scientific committee will be formed at the faculty level.

1. The scientific committee (SC) will be headed by the vice Dean of graduate studies and 7 members from the departments teaching the SLM courses.
2. The committee's term is 3 consecutive academic years.
3. Committee will meet at a location determined by the Dean and submits its recommendations to the Faculty Council for approval.
4. The committee will perform the following duties:
    a. Assign prospective students to academic advisors
    b. Review students' research protocols to ensure compatibility with the Faculty research plan and the SLM stated objectives.
    c. Review students' progress reports.
    d. Recommend and assign teaching staff for the SLM courses.
    e. Review students' grades and courses completed in a guest University.
    f. Investigate any requests / complaints of students and sending its recommendations to Faculty Council for approval.
    g. Answer inquiries of prospective students wishing to register for SLM master degree.
    h. Monitor the performance of the teachers and students,
    i. Prepare an annual report on the progress of the Master Program and suggest corrective actions
    j. Promote and publicize the SLM program at the faculty / university level.

Article 2: Program Coordinating Committee (PCC)

The PCC will be formed at the four participating universities level as follows:

1. Committee will be formed from 8 members, two members from each participating university. Each university will be represented by the SLM project coordinator, in addition to another member from the departments that are involved in the teaching of program courses.
2. Committee term is 4 consecutive academic years
3. Committee will be headed by one of the SLM project coordinators in a rotational manner.
4. The committee will perform the following tasks:
    a. Decide all matters related to the exchange of teachers and students among the four participating universities
    b. Approve any requests from other Egyptian or foreign universities who wish to join the program.
    c. Suggest ways for the development and enhancement of Program quality.
    d. Promote SLM Master at all levels
    e. Investigate complaints and potential problems among the four participating universities and propose solutions for consideration by the scientific department / scientific committee.
5. Committee will meet once a semester at one of the locations of the scientific department / scientific committee, and submit its resolutions to the Faculty Council for approval and implementation.

Chapter 3: Specific Rules
(According to each college)

Article 3: Human Resources

Article 4: Pedagogic Resources

Article 5: Internal Regulations - e.g. Alexandria Bylaws

Article 3: Availability of Human Resources

The soil and water sciences department has 34 staff members in different specialties, who will teach the new Master courses. Moreover, faculty members from other departments will be available to teach the courses in an interdisciplinary manner.

Article 4: Availability of Infrastructure and facilities

The soil and water sciences department has adequate lecture rooms, research labs, and computer labs equipped with the necessary pedagogic materials needed for teaching and learning. Specialized licensed GIS and RS software are also available

Article 5: Internal Regulations – Alexandria University

The SLM Master Program will comply with the Bylaws of the graduate school of the Faculty of Agriculture, Alexandria University.

Article 5-1: Nature of study

The study in this program includes high quality courses and training in scientific research methods and results interpretations, and ends by preparing a master thesis that meet the approval of the examiners' committee.

Article 5-2: Date of Admission

Students will submit their application to the college within the first 2 weeks of the month of August every year.

Article 5-3: Admission Requirements

1. Applicants must have a BSc degree, and must have a good grade of at least C+ or its equivalent.
2. The College Board might accept the registration of a student having a BSc degree from other colleges based on the recommendation of the department, on the condition that the student would study a number of complementary courses as determined by the department and pass them with an average grade of at least C+, and these courses will not appear in his SLM Master transcript.

3. Students having BSc from the high agricultural institutes might be accepted in the SLM program and complying with the Supreme Council of Universities rules regarding the equivalency of this BSc.
4. The academic advisor may help the student formulate his research protocol and form a supervising Master committee for the student after passing at least 30% of the credit hours with a cumulative CGPA of at least C+.
5. The student will present the research protocol in a seminar of the Department, and the research topic should be within the departments' research plan.
6. The student should obtain English language proficiency certificate before obtaining the SLM Master degree.
7. Validation report should be submitted and accepted by the department council, and the student must obtain a CGPA of at least C+ before forming the examination committee.
8. Master's degree is awarded to students who pass their master defense

Article 5-4: System of study and exams:

1. In order for the student to get the a Master degree in SLM, he/she should study 90 ECTS (equivalent to 30 credit hours) consisting of 14 courses, 11 of them are mandatory (72 ECTS equivalent to 24 credit hours), and 3 courses are elective courses (18ECTS equivalent to 6 credit hours) in addition to thesis research (30 ECTS equivalent to 8 credit hour). The courses load should not exceed 30 ECTS (equivalent to 10 credit hours) per semester.
2. The exam of each course should be written and oral according to the regulation of the college council, and the final written exam will be held at the end of the semester, and grading should be done according to Table (1).

Table 1: Students' Grading System

Marks	Points	Grade	
>- 90	4.000	A	Very high graduate caliber
85 < 90	3.666	A-	
80 < 85	3.333	B+	
75 < 80	3.000	B	Satisfactory Performance
70 < 75	2.666	B-	
65 < 70	2.333	C+	
60 < 65	2.000	C	
55 < 60	1.666	C-	The Performance of the student is less than exp
50 < 55	1.333	D+	
45 < 50	1.000	D	Unsatisfactory Performance
< 45	0.000	F	Fail
	---	W	Withdrawal
	---	FW	Forced Withdrawal
	---	I	Incomplete
	---	MW	Military Withdrawal
	---	L	Listener
	---	IP	In Progress
	---	S	Satisfactory
	---	U	Unsatisfactory

Calculation of Cumulative Grade Point Average (GPA):

a- Course grade = course credit hours x points
b- Average GPA per semester = (course 1 grade + course 2 grade + ……..) / summation of credit hours per semester
c- CGPA = summation of all courses grades / summation of all credit hours

Chapter 4: Transitional Rules

Article 6: Two-location Venue

Article 7: Comparative Course Code

Article 6: The Two-location Master Venue

1- The student will register for SLM master degree at one of the four participating universities Cairo – Alexandria – Zagazig – Damanhour (Home University)

2- Students will study their mandatory (Foundation) courses in the first academic year at one of the following two-locations, namely; Cairo University or Alexandria University (Guest University).

3- The scientific department / scientific committee will select the professors from the home and/or guest universities, who will teach the courses in the two-locations

4- The student will pay the Master registration fees to his home university, and will pay the fees for the courses credit hours at his guest university according to the distribution of courses per semester (Table 4).

5- The scientific department / scientific committee will assign an academic advisor (based on the student merit), then will approve it from the faculty council in the student's home university.

6- After completing 30% of the courses credit hours - and in the second semester – the student shall prepare a research protocol with the assistance of the academic advisor, and present it to the scientific department / scientific committee seminar. Based upon the approved research protocol, a specialization module will be determined and a supervising committee will be formed and approved by the department council / scientific council, then Faculty Council.

7- Courses completed at the guest university will be transferred to the home university and will appear in the student's transcript according to the courses codes (table 2)

8- The student will study the specialization courses and carry out his thesis research at his home university starting in the second academic year

9- Theses transitional rules could be repeated for another period upon an agreement and mutual interest between the respective faculties of the study venue.

Article 7: Courses coding system

Course coding from the four participating universities is shown in table 2.

Table 2: Comparative Course Codes

Course Name	DU Code	ZU Code	AU Code	CU Code
Agroecosystems *	SLM 27805	SLM 701	SLM 14632	SLM 805
Biodiversity and Ecosystem Services *	SLM 27806	SLM 702	SLM 14633	SLM 806
Advanced Land Degradation*	SLM 27807	SLM 703	SLM 14634	SLM 807
GIS and Spatial Analysis *	SLM 27809	SLM 704	SLM 14630	SLM 809
Introduction to Spectroscopy*	SLM 27808	SLM 705	SLM 18651	SLM 808
Economics of Land Degradation*	SLM 27810	SLM 707	SLM 03542	SLM 810
Biostatistical Analysis*	SLM 27803	SLM 724	SLM 19641	SLM 803
English for Scientists and Proposal Writing*	SLM 27801	SLM 790	SLM 30666	SLM 801
Research Methods and Sci Communications*	SLM 27804	SLM 794	SLM 30668	SLM 804
Training*	SLM 27799	SLM 791	SLM 14699	SLM 899
Thesis research*	SLM 27700	SLM 793	SLM 14600	SLM 850
Students seminars in SLM*	SLM 27701	SLM 792	SLM 14601	SLM 800
Land Use Planning for Sustainable Development**	SLM 27851	SLM 708	SLM 14635	SLM 851
Advanced Land Evaluation**	SLM 27853	SLM 709	SLM 14636	SLM 853
Climate Change and Food Security**	SLM 27855	SLM 710	SLM 14637	SLM 855
Modelling of Land Use Changes**	SLM 27857	SLM 711	SLM 14638	SLM 857
Land Use Policies and Legislations**	SLM 27859	SLM 712	SLM 14639	SLM 859
Advanced Soil and Water Pollution and Remediation**	SLM 27861	SLM 713	SLM 14640	SLM 861
Systems Approach to Water Management**	SLM 27863	SLM 714	SLM 14641	SLM 863
Socioeconomic Aspects of Water Management**	SLM 27865	SLM 715	SLM 14642	SLM 865
Sustainable Soil Fertility Management**	SLM 27867	SLM 716	SLM 14643	SLM 867
Alternative Agricultural Systems**	SLM 27869	SLM 717	SLM 14644	SLM 869
Plant System Modelling in Land Management**	SLM 27871	SLM 718	SLM 14603	SLM 871
Animal System Modelling in Land Management**	SLM 27873	SLM 719	SLM 08643	SLM 873
Integrated Pest Management (IPM)**	SLM 27875	SLM 720	SLM 18308	SLM 875
Applied Bioeconomics**	SLM 27877	SLM 721	SLM 03551	SLM 877
Advanced Agricultural Waste Management**	SLM 27879	SLM 722	SLM 14654	SLM 879

* Mandatory Courses ** Elective Courses

Chapter 5: Modules and Courses

Article 8: Program Intended Learning Outcomes (ILO's)

Article 9: Structure of the SLM Master

Article 10: Foundation & Specialization Modules & Courses

Article 11: Course distribution per semester

Article 8: Program Intended Learning Outcomes

After completion of the Master program graduates will gain the following skills in addition to the skills of the NARS master program:

Knowledge and understanding outcomes

- Understand issues related to land and water management and their sustainable development, which underlie the strictly scientific and technical processes;
- Evaluate relevant sources in a critical manner, generate independent assessments and develop projects;
- Analyze the complexity of a situation through a cross-disciplinary perspective, and translate it into a solvable problem.

Intellectual skill outcomes

- Use critical thinking skills and problem solving attitude;
- Create and set up tools allowing for a sustainable protection and management of the land.

Professional and practical skill outcomes

- Define an objective diagnosis contributing to the decision-making process;
- Communicate scientific information and use it to help determine operational responses;
- Develop policies and identify their role within the institutional, economic and social framework.

General and transferable skill outcomes

- Negotiation and communication skills in interdisciplinary teams;
- Manage an intervention or research project in the field of land and water management;
- Apply Geospatial analysis for assessing the physical impact of land management practices;
- Assess physical and socioeconomic impact of land degradation and land management practices;
- Apply spectroscopy for the management of soils, crops, agricultural inputs and products and water quality.

Article 9: Structure of the SLM Master Program

In order to get the Master degree in sustainable land management (SLM), the student should successfully complete the required course work according to the European Credit Transfer System (ECTS) in accordance with Bologna accord, as well as the Egyptian Credit Hour System (ECH) as follows:

a- The program includes studying 120 ECTS (equivalent to 38 Egyptian credit hours) over 2 academic years, in order to earn the SLM master degree.
b- The 120 ECTS are divided into 90 ECTS courses (equivalent to 30 ECH) and 30 ECTS (equivalent to 8 ECH) thesis research as shown in (Table 2 and Figure 1)
c- The 90 ECTS are distributed as 72 ECTS (equivalent to 24 ECH) mandatory courses and 18 ECTS (equivalent to 6 ECH) elective courses (Table 2 and Figure 1).
d- The 72 ECTS (equivalent to 24 ECH) are distributed over 6 foundation modules as follows (Figure 1):
    i. 45 ECTS (equivalent to 15 ECH) distributed in 3 modules namely; Sustainable agroecosystem management; Geomatics and Spectroscopy; and Bioeconomics of land management.
    ii. 9 ECTS (equivalent to 3 ECH) represent 3 seminars in 1 module, namely SLM Seminar
    iii. 6 ECTS (equivalent to 2 ECH) represent 2 English language courses in 1 module, namely Scientific English and project proposal Writing
    iv. 12 ECTS (equivalent to 4 ECH) as training in 1 module, namely, mobility strand
e- The 18 ECTS (equivalent to 6 ECH) are elective and represent 3 courses chosen from 1 specialization module out of three, namely, land use planning and assessment; environmental soil and water resources management; and farming system modelling in land management. (Table 2 and Figure 1). Each specialization module contains 5 courses, in which the student will select 3 to be included in his study.
f- The student will study 30 ECTS (equivalent to 8 ECH) thesis research over at least 2 semesters
g- The mandatory and elective courses as well as the research are distributed over 2 academic years (Table 3)

h- After the completion of the program requirements and the successful passing of the 120 (equivalent to 38 ECH) ECTS, the student will obtain a master degree in sustainable land resources management (SLM).
i- The first year will be devoted to the study of the foundation modules, and the specialization modules will be studied in the second year.

Article 10: Foundation & Specialization Courses & Modules

The SLM Master program is divided in two main types of modules and courses. The first one is the foundation module, which is comprised by 6 core modules. These 6 core modules are all mandatory and have 9courses in addition to field training and 3 SLM seminars (Table 3 and figure 1).
The second module is the specialization one, which is comprised of 3 core modules each of which contains 5 elective courses, from which the student will select one module, and from that module the student will select 3 elective courses (table 3 and figure 1).

Table 3: SLM Master Modules and Courses

A- Foundation (Mandatory) Modules and Courses				
Core Module	**Specific Courses**	**Suggested Code**	**ECTS#**	**ECH##**
Sustainable agro-ecosystem management	• Agroecosystems • Biodiversity and Ecosystem Services • Advanced Land Degradation	SLM 14632 SLM 14633 SLM 14634	6 6 6	2 2 2
Geomatics and Spectroscopy	• GIS and Spatial Analysis • Introduction to Spectroscopy	SLM 14630 SLM 17651	9 6	3 2
Bioeconomics of land management	• Economics of Land Degradation • Biostatistical Analysis	SLM 03542 SLM 19641	6 6	2 2
Scientific English and project proposal Writing	• English for Scientists and Proposal Writing • Research Methods and Scientific Communications	SLM 30666 SLM 30667	3 3	1 1
Mobility Strand	• Training	SLM 14699	12	4
Seminar in SLM	Students seminars in SLM	SLM 14601	**9**	**3**
	Subtotal Foundation Credits		**72**	**24**

Master Thesis	Thesis research	SLM 14600	**30**	**8**

Table 3: Cont'd

B- Specialization Modules and Courses (Select 3 courses)				
Core Module	**Specific Course**	**Suggested Code**	**ECTS[#]**	**ECH[##]**
Land Use Planning and Assessment	• Land Use Planning for Sustainable Development	SLM 14635	6	2
	• Advanced Land Evaluation	SLM 14636	6	2
	• Climate Change and Food Security	SLM 14637	6	2
	• Modelling of Land Use Changes	SLM 14638	6	2
	• Land Use Policies and Legislations	SLM 14639	6	2
Environmental Soil and Water Resources Management	• Advanced Soil and Water Pollution and Remediation	SLM 14640	6	2
	• Systems Approach to Water Management	SLM 14641	6	2
	• Socioeconomic Aspects of Water Resource Management	SLM 14642	6	2
	• Sustainable Soil Fertility Management	SLM 14643	6	2
	• Alternative Agricultural Systems	SLM 14644	6	2
Farming System Modelling in Land Management	• Plant System Modelling in Land Management	SLM 14603	6	2
	• Animal System Modelling in Land Management	SLM 08643	6	2
	• Integrated Pest Management (IPM)	SLM 17307	6	2
	• Applied Bioeconomics	SLM 03551	6	2
	• Advanced Agricultural Waste Management	SLM 14654	6	2
Subtotal Specializations Credits			**18**	**6**

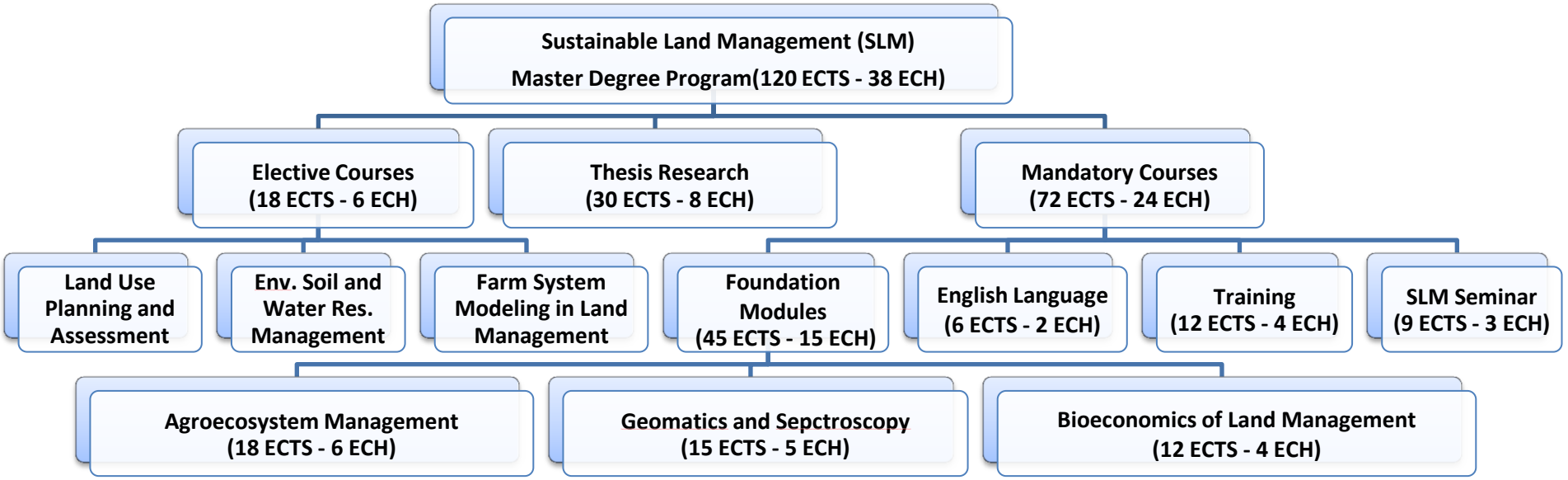

Figure 1: Distribution of the ECTS* and ECH# for the Sustainable Land Management (SLM) Master Degree.

***ECTS : European Credit Transfer System # ECH : Egyptian Credit Hour**

Article 11: Course distribution by semester

The SLM courses are distributed over the period of 2 academic years (Table 4).

Table 4: Course Distribution by Semester for SLM Master

First Year, 1st Semester (fall)

Course Code (UNIAL system)	Courses	Lecture	Practical	ECH	ECTS
SLM 19641	Biostatistical analysis	1	2	2	6
SLM 14634	Advanced Land Degradation	1	2	2	6
SLM 30666	English for Scientists and Proposal Writing	1	-	1	3
SLM 14630	GIS and Spatial Analysis	2	2	3	9
SLM 14632	Agroecosystems	1	2	2	6
			Semester Total	10	30

First Year, 2nd Semester (Spring)

Course Code	Courses	Lecture	Practical	ECH	ECTS
SLM 17561	Advance Spectroscopy	1	2	2	6
SLM 14633	Biodiversity and Ecosystem Services	2	-	2	6
SLM 03542	Economics of Land Degradation	2	-	2	6
SLM 14699	Mobility Strand (Training)	-	8	4	12
			Semester Total	10	30

Second Year, 1st Semester (Fall)

Course Code	Courses	Lecture	Practical	ECH	ECTS
SLM 14601	SLM Seminar	1	-	1	3
Elective	From Specialization Modules	1	2	2	6
Elective	From Specialization Modules	1	2	2	6
SLM 14600	Thesis Research	-	4	2	5
			Semester Total	7	20

Second Year, 2nd Semester (Spring)

Course Code	Courses	Lecture	Practical	ECH	ECTS
SLM 14601	SLM Seminar	1	-	1	3
SLM 30667	Research Methods and Scientific Communications	1	-	1	3
Elective	From Specialization Modules	1	2	2	6
SLM 14600	Thesis Research	-	4	2	8
			Semester Total	6	20

Second Year, 3rd Semester (Summer)

Course Code	Courses	Lecture	Practical	ECH	ECTS
SLM 14600	Thesis Research	-	4	4	17
SLM 13601	SLM Seminar	1	-	1	3
			Semester Total	5	20

Chapter 6: Short Course Description
SLM Master Degree

Foundation Module: Sustainable agro-ecosystem management

Agro-ecosystems (SLM 14632)
(1 hr. Lecture + 2 hrs. Practical = 2 Credit Hours)
Ecosystems: concepts and definitions - Nutrient Dynamics of Agroecosystems - Factors Influences Nutrient Dynamics in Agroecosystems - Soil Organic Matter - Weeds in Agroecosystems - role of Soil Microorganisms in agroecosystems - Animal husbandry system - Influence of Irrigation Systems - Cropping Systems - Agroecosystem Quality - Policy and Management Challenges

Biodiversity and Ecosystem Services (SLM 14633)
(1 hr. Lecture + 2 hr. Practical = 2 Credit Hours)
Components & functions of natural ecosystems - Ecosystem services - Biodiversity levels and values - Biodiversity in agro-ecosystems & it's importance - Current pressures on biodiversity and responses - Biodiversity hot spots - Sustaining biodiversity: species approach - Biodiversity and ecosystem function - How can biodiversity affect C sequestration - Biodiversity conventions - Biodiversity futures for the 21st Century

Advanced Land Degradation (SLM 14634)
(1 hr Lecture + 2 hrs. Practical = 2 Credit Hours)
Concepts of desertification, aridification, remediation, conservation - Water Erosion - Wind Erosion – Desertification - Chemical deterioration - Saline and alkali soils - Soil compaction and crusting - Soil and climate change - Modeling land degradation - GIS and RS for determining land degradation - MEADULS concept for assessing land degradation

Foundation Module: Geomatics and Spectroscopy

GIS and Spatial Analysis (SLM 14630)
(2 hr. Lecture + 2 hrs. Practical = 3 Credit Hours)
Key concepts of GIS - Global Positioning Systems (GPS) - Digital image processing techniques in agriculture resource management - Basics of Geostatistics - Spatial Analysis - Variogram modeling - Estimation (Kriging) - GIS and RS in soil management - Precision farming using GIS and RS for crop management - GIS and RS for water management in agriculture - GIS AND RS disease/pest management - Participatory GIS

Introduction to Spectroscopy (SLM 17651)
(1 hr. Lecture + 2 hrs. Practical = 2 Credit Hours)
Introduction to Spectroscopy - Mass Spectrometry - Ultraviolet-Visible Spectroscopy - Infrared Spectroscopy - Optical Spectroscopy - FTIR (Fourier transform infrared spectroscopy - Raman Spectroscopy - Flame Spectroscopy - Fluorescence Spectroscopy - Emission Spectroscopy - Nuclear Magnetic Resonance Spectroscopy

Foundation Module: Bioeconomics of land management

Economics of Land Degradation (SLM 03542)
(1 hr. Lecture + 2 hrs. Practical = 2 Credit Hours)
Introduction to resource and environmental economics - Scrutinizing efficiency and its types - Supply and demand in environmental economics - Expected value calculations - Market failure, externalities, and public goods - Government solutions to market failure - Trade-offs between growth and the environment - Biodiversity and valuation - Value of Land - Land degradation economic assessment

Biostatistical analysis (SLM 19641)
(1 hr. Lecture + 2 hrs. Practical = 2 Credit Hours)
Concepts of biostatistics - Descriptive measures - Probability theory - T-test and comparison of means - ANOVA and experimental designs: CRD - ANOVA and experimental designs: Latin square - ANOVA and experimental designs: factorial and nested – LSD - Regression and correlation - Multivariate analysis of variance (MANOVA) - Principal component analysis (PCA) – Discriminant analysis – Clustering

Foundation Module: Scientific English and project proposal Writing

English for Scientists and Proposal Writing (SLM 30666)
(1 hr. Lecture + (-) hrs. Practical = 1 Credit Hours)
Introduction and Expectations - Research proposal writing - Research proposal Communication in science - Build a proposal writing team - Explaining the different components of a proposal - Project implementation - monitoring - evaluation - and follow up - Project risk management and SWOT analysis -

Logical framework matrix and Gantt chart - Presenting research results - Discussion of projects designed by the students' groups

Research Methods and Scientific Communications (SLM 30667)
(1 hr. Lecture + (-) hr. Practical = 1 Credit Hours)
Formulating a research problem - Conceptualizing a research design - Constructing and instrument for data collection - Selecting a sample - Writing a research proposal - Collecting data - Processing and displaying data - Writing a research report

Specialization Module: Land Use Planning and Assessment

Land Use Planning for Sustainable Development (SLM 14635)
(1 hr. Lecture + 2 hrs. Practical = 2 Credit Hours)
Nature and scope of land use planning - Overview of planning process - Steps in land use planning - Sustainable Development Goals - Sustainable development indicators - Student case study

Advanced Land Evaluation (SLM 14636)
(1 hr. Lecture + 2 hrs. Practical = 2 Credit Hours)
Aims and the types of land evaluation - Land characteristics and land qualities - Methods of land capability evaluation - Methods of land suitability for different crops - Computer models for land evaluation - Land evaluation of different agro-ecosystems (irrigated land - dry land and rain-fed agriculture - extensive grazing) - GIS and RS for mapping land evaluation

Climate Change and Food Security (SLM 14637)
(1 hr. Lecture + 2 hrs. Practical = 2 Credit Hours)

Introduction to climate: How Does Climate Work? - History of Earth's climate - What Causes Climate to Change? - GCMs & predictions - How Does the Climate System Respond to Input? - Climate change impact on agriculture - Constraints on Food and Farming from Climate Change - Risk assessment & management of CC impacts - Challenges for food systems: Biofuels & GM crops - Reducing risks to food security from climate change

Modeling Land Use Changes (SLM 14638)
(1 hr. Lecture + 2 hrs. Practical = 2 Credit Hours)

Overview of general terms - Land use and land cover classification systems - Data collection tools - Data handling and manipulation - Multiple impacts of land use and land cover changes - Models and assumptions of land use change - Vegetation spectral indices - Urban (non-vegetation) spectral indices - Land use models and how to select suitable one - Modeling land use change - Prospects of the future - Case Studies

Land Use Policies and Legislation (SLM 14639)
(1 hr. Lecture + 2 hrs. Practical = 2 Credit Hours)

introductory note about agricultural policies - Egypt Sustainable development strategy until 2030 - Egypt sustainable agricultural development strategy until 2030 - Egypt environment - law 4 – 1994 and its amendments - Egypt land reclamation strategy - Egypt water resource management strategy - Agricultural reform in Egypt - Pesticides use and regulation laws - Farming and nursery laws - Case Studies

Specialization Module: Environmental Soil & Water Resources Management

Advanced Soil and Water Pollution and Remediation (SLM 14640)
(1 hr. Lecture + 2 hrs. Practical = 2 Credit Hours)

Review: Major types of soil pollutants - Heavy metals and the soil system - Pollution mechanisms and soil-pollutants interaction: Physical processes - Pollutants' alteration - transformation - and initiation of chemical changes within the soil - Monitoring of soil pollution - Planning and realization of soil remediation - Review of groundwater systems - The concept of groundwater quality - Pollutants in groundwater environments - Evaluation of groundwater vulnerability to pollution using modeling and GIS - Risk assessment of groundwater pollution - Groundwater remediation using active and passive processes - Students' presentations of selected study cases and practical results

Systems Approach to Water Management (SLM 14641)
(1 hr. Lecture + 2 hrs. Practical = 2 Credit Hours)

Introduction in water resources management - An overview of water management issues - Surface water - Ground water - Precipitation and conveying

system - Virtual and sweet water - Hydrological structures - Applied system analysis- Methods of water resources system management (Simulation-optimization- multi-objective analysis) - Water management under uncertainty approach (Fuzzy models) - Water resource system management for sustainable development - Implementation of water resource management tools using simulation - optimization and multi-objective - Case study 1. rain water harvesting in North West Coast: Open discussions and conclusion - Case study 2. Irrigation water management in the Nile Delta: Open discussions and conclusion

Socioeconomic Aspects of Water Resource Management (SLM 14642)
(1 hr. Lecture + 2 hrs. Practical = 2 Credit Hours)
Introduction to water resources economics and law - Review of basic microeconomics applied to water resources - Part 1 - Review of basic microeconomics applied to water resources - Part 2 - Water quality issues - Water prices and rates for residential use - Water and agriculture - Uncertainty and risk in supply and demand of water resources - Groundwater - In situ uses of water: Environmental and recreational use - Floods and droughts and the role of dams - Water issues in the developing countries - Summary - suggestions for future work - and conclusions

Sustainable Soil Fertility Management (SLM 14643)
(1 hr. Lecture + 2 hrs. Practical = 2 Credit Hours)
Introduction to soil fertility - Essential nutrients - Plant-soil-nutrients interrelationship; - Diagnostic techniques for nutritional disorders (soil fertility evaluation) - Case study II. Field trip - soil and plant sampling - Scientifically based fertilizers recommendation - High vs. low agriculture inputs - Integrated Nutrient Management (INM) and Best Management Practices (BMP) - Site specific soil fertility management. Mineral nutrition (MN) vs. human health and environmental risks - Modelling yield response to added nutrients - Computer Based Diagnostic soil fertility Tools

Alternative Agricultural Systems (SLM 14644)
(1 hr. Lecture + 2 hrs. Practical = 2 Credit Hours)
The concept / the origin and development of world agriculture - Patterns and the foundations of conventional agriculture - Development of sustainable agricultural systems - Conventional / Standard Agriculture vs. Conservation Farming - Organic Agriculture - Bio-Dynamic agriculture - Agroforestry - Biosaline

Agriculture - Permaculture – Rhodale - Urban agriculture systems - Precision agriculture - Climate Smart Agriculture - Physical, chemical, and biological qualities - Management systems for the sustainable agriculture - Managing Water and Fertilizer for Sustainable Agricultural Intensification

Specialization Module: Farming system modeling in land management

Plant System Modeling in Land Management (SLM 14603)
(1 hr. Lecture + 2 hrs. Practical = 2 Credit Hours)
Introduction to plant growth and development - Factors affecting plant growth: I. Climatic factors - Factors affecting plant growth: II. Soil factors - Biotic and Abiotic stresses - Principles - methods - and scaling of mathematical modeling - Model approximation - validation and fitting - Model equation types and decision making - Classification of mathematical models and numerical solutions - Crop Growth Modeling - Photosynthesis and Carbon Assimilation - Root growth and activity and soil-plant-water relationships - Plant growth stress - Concepts of system dynamics modeling - Types of plant modeling system - Application of plant modeling in crop production

Animal System Modeling in Land Management (SLM 08643)
(1 hr. Lecture + 2 hrs. Practical = 2 Credit Hours)
Introduction to Animal Livestock Productive Systems - Introduction to Plant Productive Systems - Agricultural productive system vs. Agricultural systems modeling - Requirements to build a systems modeling (integrated - organic - ecological - economical - and productive model) - Examples for integrated systems modeling - Evaluation criteria for an integrated model - Logical Framework Matrix (LFM) components - Risk assessment - Traceability coding and certification

Integrated Pest Management (SLM 17307)
(1 hr. Lecture + 2 hrs. Practical = 2 Credit Hours)
History of Integrated Pest Management and appropriate definitions - Host plant resistance - crop rotation and cultural practices - Principles of weed - insect - disease and nematode management - Environmental fate of pesticides - Managing pests in organic systems - Using peanut to demonstrate IPM principles - Examples of large-scale management programs - Turf grass and nursery crops (aesthetics - propagation) - Livestock and pastures (grazing - feedlots) - Urban

IPM (insects and rodents) - Post-harvest handling of vegetables - commodities - etc. - Consultant and Extension roundtable

Applied Bioeconomics (SLM 03551)
(1 hr. Lecture + 2 hrs. Practical = 2 Credit Hours)
Introduction - Consumer behavior and Demand - Producer decision making: single variable input and two variable inputs and enterprise selection - Production costs - supply - and price determination - Production costs - supply - and price determination under uncertainty - Competition - monopolies - natural monopolies - and the market - Imperfect competition - role of governments - and market regulations pertaining to land resources. - Natural Resources and Welfare Analysis

Advanced Agricultural Waste Management (SLM 14654)
(1 hr. Lecture + 2 hrs. Practical = 2 Credit Hours)
Agricultural Wastes and Water - Air - and Animal Resources - Agricultural Waste Characteristics - Role of Soils in Waste Management - Role of Plants in Waste Management - Application of agricultural waste - Agricultural Waste Management Systems - Planning an agricultural waste management system - Waste Utilization - Waste Management Equipment

Appendix 1: Course Specifications

Mandatory Module: Sustainable agro-ecosystem management

Mandatory Course: Agroecosystems

University: Alexandria **Faculty**

Program on which the course is given: Sustainable Land Management (SLM)

Major or minor element of program: Sustainable Agroecosystem Management

Department offering the program: Soil and Water Sciences

Department offering the course: Environmental Science (Faculty of Science)

Academic year / Level: Master

Date of specification approval:

A- Basic Information

Title: Agroecosystems **Code:**

Credit Hours/ECTS: 2/6

Lecture: 2 **Tutorial/Practical:** **Total:** 2

B- Professional Information

1 – Overall aims of course

Agroecosystems that we have inherited and as we perceive them today are actually marvels created on earth's surface through human endeavor over a few millenniums. We have understood and accrued a large body of knowledge about them. Yet, we have too many things to investigate and perhaps control to our own advantage, of course, without deteriorating natural resources and our environment. Today, an entire posse of agroecosystems on the globe feeds over 7 billion human species and innumerable farm animals. We have to strive to manage these agroecosystems to feed a larger populace in the future.
This course aims at providing advanced information on:

- **a.** The ingredients, nutrient dynamics, and factors that affect productivity and ecosystematic functions in different agroecosystems,
- **b.** Agroecosystem Quality: Policy and Management Challenges
- **c.** Policy and strategies for designing sustainable farming systems

.**2 – Intended learning outcomes of course (ILOs)**

a- Knowledge and understanding:

a1- Identifying Ingredients of Agroecosystems
a2- Understanding Nutrient Dynamics of Agroecosystems
a3- Understand livestock system components
a4- Exploring the role of soil microorganisms in agroecosystems.

b. Intellectual skills:

b1- Infers Factors Influences Nutrient Dynamics in Agroecosystems.

b2. Relates soil microorganisms and nutrient dynamics.
B3- Explore the difference between different trends in nutrient supply and soil fertility management practices in Agroecosystems.
b4- Classifying cropping systems
b5- Designs methods to control weeds in different cropping zones

c. Professional and practical skills:

c1- Interpret data to draw conclusions about types of cropping systems and nutrient dynamics.
c2- Judges the Influence of irrigation systems on nutrient dynamic.
c3- Justifies policy and strategies for designing sustainable farming systems
c4-Verifies quality indicators of agroecosystems

d- General and transferable skills:

d1- Communication skills, covering both written and oral communication
d2- Prepare reports for evaluating influence of irrigation systems on nutrient dynamic
d3- Practice the acquired skills for problem-solving.
d4- Work effectively both in a team and independently .

3- Contents

Topic
Week 1: Ecosystems: concepts and definitions • Ecosystems and agroecosystems • Definition and Ingredients of Agroecosystems • Recognizing agroecosystems services
Week 2: Nutrient Dynamics of Agroecosystems • Nutrient Inputs to Agroecosystems • Trends in Nutrient Supply and Soil Fertility Management Practices o Nutrient Supply Through Natural Factors o Nitrogen Supplied Through Chemical Fertilizers o Nitrogen Supply to a Legume Agroecosystem o Nitrogen Supplied Through Crop Residue and Green Manures
Week 3: Factors Influences Nutrient Dynamics in Agroecosystems • Tillage and Soil Organic Carbon • Organic Mulches and Nutrient Dynamics
Week 4: Soil Organic Matter • Crop Residue Recycling • Green Manures and Nutrient Dynamics in Agroecosystems • Organic Manures • Industrial By-Products
Week 5: Weeds in Agroecosystems

• Methods to Control Weeds in Different Cropping Zones Pest management • Chemical pest control • non-traditional pest control
Week 6: Midterm Exam
Week 7: Exploring the role of Soil Microorganisms in agroecosystems. • Biological Nitrogen Fixation • Mycorrhizas • Plant Growth Promoting Rhizobacteria • Azolla and Blue Green Algae
Week 8: Site visit to the experimental farm
Week 9: Animal husbandry system • Cattle, sheep/ goat systems management • Animal nutrition
Week 10: Influence of Irrigation Systems • Precipitation Pattern • Methods of Irrigation Adopted in Various agroecosystems • Water Resource and Mode of Irrigation • Water Requirements of Crops • Irrigation And Cropping Zones in Different Continents.
Week 11: Cropping Systems • Mono-cropping • Crop Rotations ,Inter-Cropping and Mixed Crops • Strip Cropping, Fallows and Cover Crops
Week 12: Group Discussion Examples of agroecosystems::arid agroecosystems, wetlands, dry rangeland, aquatic ecosystems, and tree ecosystems.
Week 13: Group Discussion Agroecosystem Quality: Policy and Management Challenges for New Technologies and Diversity • Challenges to agroecosystems management • Quality Indicators • Biodiversity of agroecosystems • Strategies for designing sustainable farming systems.

4– Teaching and learning methods

4.1 Lectures
4.2- Group Discussion & Field Trips
4.3- Assignments & Reports

5- Student assessment methods

5.1 Group discussion and oral exam to assess Communication skills and Working effectively both in a team and independently
5.2- Written Exams to assess the understanding and scientific background
5.3- Field visits report to assess the intellectual & professional skills

Assessment schedule

Assessment 1:	Assignments – Week: 2-5
Assessment 2:	Mid-term written exam – week: 6
Assessment 3:	Reports discussion: 12-13
Assessment 4:	Oral exam – Week: 14
Assessment 5:	Final written exam – Week: 15

Weighing of assessments

Mid-term examination:	10%
Final-term examination:	40%
Oral examination:	20%
Assignments:	15%
Reports:	15%
Total =	100%

Additional Information (Assessment)

Report (15% of total mark) on a topic chosen by the student, but which is of relevance to the course and agreed in discussion with the teaching staff.
Beside frontal lectures, work in small groups is intended. Groups will be field handled with various causes related to biodiversity themes. Case studies will be discussed during the course, using a multistakeholders processes approach.
Results of field observations and analysis will be presented in the form of seminar papers. Visit to field sites will be also organized during the course

6- List of references

1- AGROECOSYSTEMS

1- KrishnaK. R. (2014) Soils, Climate, Crops, Nutrient Dynamics, and Productivity. Apple Academic Press , Toronto, New York.
2- Vandermeer, J. H. (2011)The Ecology of Agroecosystems. Jones and Bartlett Publishers, LLC
3- Collins, W. W. and Qualset, C. O. (1998) Biodiversity in Agroecosystems. Lewis. Poka Raton, New York.

7- Facilities required for teaching and learning

1. Computer
2. Data Show
3. White board and white board markers

Course coordinator: Prof. Fawzy Kisk & Prof. Manal Fawzy

Head of Department:

Date: / /

Mandatory Module: Sustainable agro-ecosystem management

Mandatory Course: Biodiversity and Ecosystem Services

University: Alexandria **Faculty:**

Program on which the course is given: Sustainable Land Management (SLM)

Major or minor element of program: : Sustainable Agroecosystem Management

Department offering the program: Soil and Water Sciences

Department offering the course: Environmental Science (Faculty of Science)

Academic year / Level: Master

Date of specification approval:

A- Basic Information

Title: Biodiversity and Ecosystem services **Code:**

Credit Hours / ECTS: 2 / 6

Lecture: 2 **Tutorial/Practical:** **Total:** 2

B- Professional Information

1 – Overall aims of course

Ecosystem services are the benefits humankind derives from the workings of the natural world. The delivery of ecosystem services depends in many cases on the maintenance of biodiversity. However, in many instances we do not well understand the mechanism by which biodiversity enhances the delivery of ecosystem services.

One of the key insights from this course is to explore current understanding of the relationships between biodiversity, the structure and functioning of ecosystems, and the provision of ecosystem services.

It aims specifically at providing advanced information on:

a- Giving an insight on ecosystem types, functions, components and services.

b- Providing comprehensive information about biodiversity and its critical importance to ecosystem functioning and human wellbeing.

2 – Intended learning outcomes of course (ILOs)

a- Knowledge and understanding:

On the completion of this course the student will be able to:

a.1 - Identify biodiversity and major components of our global ecosystem

a.2 - Define different components, functions and services of different ecosystems.

a.3- Understand the relationship between biodiversity and ecosystems services.

a.4- Recognize levels and role of biodiversity in ecosystem functioning

a.5- Summarize types and categories of ecosystems services.

a.6- Describe human impacts on the biodiversity and biodiversity hotspots

b- Intellectual skills:

b.1- Differentiate between different levels of biodiversity.

b.2- Evaluate the causes of biodiversity loss and human activities causing this loss
b.3- Explore how can we place value on ecosystem services.
b.4- Design Methods to control biodiversity loss.
b.5- Estimate sensitivity of different services to variation in biodiversity.

c- Professional and practical skills:

c.1- Interpret data to draw conclusions about management of ecosystem services
c.2- Criticize the on-going measures of dealing with biodiversity impoverishment
c.3- Justifies the link between biodiversity, ecosystem services and human well-being
c.4- Infer solutions to solve biodiversity problems and achieve sustainability

d- General and transferable skills:

d.1- Communication skills, covering both written and oral communication
d.2- Prepare reports for evaluating human impacts on biodiversity and ecosystem services.
d.3- Practice the acquired skills for problem-solving.
d.4- Work effectively both in a team and independently .

3- Contents

Topic

Week 1: Biodiversity and Ecosystems :
• Theory & definitions
• Role of biodiversity in ecosystem functioning
  ○ Terrestrial systems
  ○ Marine systems
• Finding quantitative links between biodiversity and ecosystem services

Week 2: The links between biodiversity, ecosystem functions and ecosystem services. • Provisioning services
Week 3: The links between biodiversity, ecosystem functions and ecosystem services. • Regulating services
Week 4: The links between biodiversity, ecosystem functions and ecosystem services • Supporting • Cultural services
Week 5: Current pressures on biodiversity and responses • Direct & indirect causes of biodiversity loss • Biodiversity hot spots.

Week 6: Midterm Exam
Week 7: Sustaining biodiversity : species approach Biodiversity conventions • The Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES) • The RAMSAR Convention • Convention on Migratory Species (Bonn Convention) • Convention on Biological Diversity(CBD)
Week 8: Site visit to protected area
Week 9: Open discussion & brain storming • Judging the on-going measures of dealing with biodiversity impoverishment • Infer solutions to solve biodiversity problems and achieve sustainability
Week 10: Management of ecosystem services • Ecosystem services and resilience • Resilience thinking in policy and practice
Week 11: biodiversity, ecosystem services and human well- being
Week 12: Reports discussion on: • Biodiversity futures for the 21st century. • Towards a strategy for reducing biodiversity loss
Week 13: Reports discussion on: • Biodiversity Futures for the 21st Century. • Towards a Strategy for Reducing Biodiversity Loss

4– Teaching and learning methods

4.1 Lectures
4.2- Group Discussion & Field Trips
4.3- Assignments & Reports

5- Student assessment methods

5.1 Group discussion and oral exam to assess Communication skills
And Working effectively both in a team and independently
5.2- Written Exams to assess the understanding and scientific background
5.3- Field visits report to assess the intellectual & professional skills

Assessment schedule

Assessment 1:	Assignments – Week: 5
Assessment 2:	Mid-term written exam – week: 6
Assessment 3:	Reports discussion: 12-13

Assessment 4:	Oral exam – Week: 14
Assessment 5:	Final written exam – Week: 15

Weighing of assessments

Mid-term examination:	15%
Final-term examination:	40%
Oral examination:	15%
Reports, assignments and semester work:	30%
Total	100%

Additional Information (Assessment)

Report (15% of total mark) on a topic chosen by the student, but which is of relevance to the course and agreed in discussion with the teaching staff.
Beside frontal lectures, work in small groups is intended. Groups will be field handled with various causes related to biodiversity themes. Case studies will be discussed during the course, using a multistakeholders processes approach.
Results of field observations and analysis will be presented in the form of seminar papers. With regard to selected topics of seminars additional lectures are provided by visiting academic staff or researchers. Visit to field sites will be also organized during the course

6- List of references

1- Robert Kaufman: Global Biodiversity 1st ed ; (2007) McGraw-Hill.
2- Shahid Naeem,Daniel E. Bunker, Andy Hector, Michel Loreau& Charles Perrings: Biodiversity, Ecosystem Functioning, and Human Wellbeing ; (2009) Oxford University Press.
3- Pushpam Kumar: The Economics of Ecosystems and Biodiversity (TEEB) Ecological and Economic Foundations (2010) Earthscan, London and Washington.

Periodicals, Web Sites, ..., etc.

WWW. CBD. Org WWW. UNESCO/mab.org WWW. IUCN.org

7- Facilities required for teaching and learning

Computer Data Show White board and white board markers

Course coordinator: Prof. Manal Fawzy

Head of Department:

Date: / /

Mandatory Module: Sustainable agro-ecosystem management

Mandatory Course: Advanced Land Degradation

University: Alexandria **Faculty:**

Program on which the course is given: Sustainable Land Management (SLM)

Major or minor element of program: Sustainable Agroecosystem Management

Department offering the program: Soil and Water Sciences

Department offering the course: Soil and Water Sciences

Academic year / Level: Master

Date of specification approval:

A- Basic Information

Title: Advanced Land Degradation **Code:**

Credit Hours / ECTS: 2 / 6

Lecture: 2 **Tutorial/Practical:** Total: 2

B- Professional Information

1 – Overall aims of course

The course is aimed to shed the light on the problem of land degradation, and determine the different types of land degradation and how to prevent, overcome and solve the problems associated with such degradation.

2 – Intended learning outcomes of course (ILOs)

a- Knowledge and understanding:

a1- Define land degradation and its causes and effects
a2- Describe and distinguish the different types of land degradation
a3- Identify different indicators used to quantify land degradation
a4- Identify the management practices used to overcome the different types of land degradation
a5- Explain how land degradation would impact conservation practices

b- Intellectual skills:

b1- Determine the different types of land degradation
b2- Detect causes and effects of land degradation
b3- Calculate the land degradation indicators
b4- Select the appropriate indicators for local, national, and regional scales
b5- Determine the proper management practices to overcome different land degradations
b6- Report the important conservation practices relevant to each type of land degradation

c- Professional and practical skills:

c1- Distinguish different types of land degradation
c2- Explain the harmful effects of land degradation
c3- Compare the different management practices to overcome land degradation

d- General and transferable skills:

d1- Use the modern technology in land degradation.
d2- Develop the team work concept in land degradation.
d3- Improve the creative thinking and communication skills in land degradation issues.
d4 - Develop the holistic approach in land degradation studies.

3- Contents

Topic
Week 1: Definitions : desertification, aridification ,remediation, conservation,
Week 2: Global land resources - Extent of land degradation - Causes of land degradation
Week 3: Erosion: Erosion hazards - Mechanism of erosion-
Week 4: Water Erosion- Methods of quantifying soil losses by water erosion –
Week 5: Conservation and management of water eroded soils by 1- crop management 2 - agriculture practices
Week 5: Wind Erosion - Estimating soil loss by wind
Week 6: Desertification: causes of desertification - Desert conservation and reclamation
Week 7-8: Land degradation due chemical deterioration
1 - Salt-affected soils: Characterization, hazard effects, managing and reclaiming
2 – Alkalinity: Causes - characterization, hazard effects, managing and reclaiming
Week 9: Land degradation due physical deterioration: Soil compaction and crusting: Causes of compaction- Effects of compaction- Management of soil crusting and compaction
Week 10: Land degradation due biological deterioration: soil organic matter – loss of microorganism
Week 11: Soil and climatic change: EFFECTS OF GLOBAL WARMING ON SOILS - Plant

growth and carbon sequestration in soils Week 12: Modern techniques for assessing land degradation

4– Teaching and learning methods

4.1- Lectures
4.2- Seminars
4.3- Case studies and problems
4.4- Internet search

5- Student assessment methods

5.1 Quizzes
5.2 Mid-term Exam
5.3 Oral Examination
5.4 Final-term theoretical Examination

Assessment schedule

Assessment 1: Quizzes	Weeks: 3 - 10
Assessment 2: Mid-term Exam	Week: 8
Assessment 3: Oral Examination	Week: 12
Assessment 4: Final-term theoretical Examinatio	Week: 13

Weighing of assessments

Mid-term examination	10%
Final-term examination	70%
Oral examination	10%
Quizzes	10%
Total	100%

Any formative only assessments

6- List of references

6.1- Course notes

Power point presentation

6.2- Essential books (text books)

Lal, R. , Blum, W.H., Valentine, C. and B.A. Stewart.(1998). Methods for assessment of soil degradation. CRC Press. New York.
Fullen, M.A. and Catt, J.A. (2004). Soil Management: Problems and Solutions . Arnold Pub.

6.3- Recommended books

Lal, R., Sobecki, T. M., Livari, T., and J. M. Kimble. 2004. Soil degradation in the United States: Extent, Severity, and Trends. Lewis Publishers. NY, London, Boca Raton.
Pimentl,D. (Ed.) (1993) . World Soil Erosion and Conservation .Cambridge Univ. Press .
Hudson, N. (1971) . Soil Conservation. B T Batsford Limited .
R.P.C. Morgan, 2005, Soil Erosion and Conservation, 3rd edition. Blackwell Publishing Ltd. Oxford
FAO 2015. Status of the World's Soil Resources, FAO.
Liniger, H.P., R. Mekdaschi Studer, C. Hauert and M. Gurtner. 2011. Sustainable Land Management in Practice – Guidelines and Best Practices for Sub-Saharan Africa. TerrAfrica, World Overview of Conservation Approaches and Technologies (WOCAT) and Food and Agriculture Organization of the United Nations (FAO)
Liniger, H.P. and W. Critchly. 2011. WOCAT 2007: where the land is greener. Casestudies and analysis of soil and water conservation initiatives worldwide. CTA, FAO,UNEP, CDE.

6.4- Periodicals, Web sites, … etc

Soil Sci. Soc. Amer. J.
Geoderma
J.Soil and Water Conservation
J. Soil Sci.
J. Env. Quality
www. FAO.org

GLASOD (Global Assessment of Soil Degradation) publications (ISRIC, Wageningen):
http://www.isric.org/projects/global-assessment-human-induced-soil-degradation-glasod

(G)LADA (Land Degradation Assessment in Drylands) publications, FAO & ISRIC:
http://www.isric.org/projects/land-degradation-assessment-drylands-glada

7- Facilities required for teaching and learning

Computer, Data show, Field trips

Course coordinator:

Head of Department:

Date: / /

Mandatory Module: Geomatics and Spectroscopy

Mandatory Course: GIS and Spatial Analysis

University: Alexandria **Faculty:**

Program on which the course is given: Sustainable Land Management (SLM)

Major or minor element of program: Geomatics and Spectroscopy

Department offering the program: Soil and Water Sciences

Department offering the course: Soil and Water Sciences

Academic year / Level: Master

Date of specification approval:

A- Basic Information

Title: GIS and Spatial Analysis **Code:**

Credit Hours / ECTS: 3 / 9

Lecture: 2 **Tutorial/Practical:** 2 **Total:** 3

B- Professional Information

1 – Overall aims of course

For optimum utilization of available agricultural land resources on a sustainable basis, timely and reliable information regarding their nature, extent and spatial distribution along with their potential and limitations is very important.

The efficiency and accuracy of data are improved when remote sensing data products and GIS are used. Spatial tools such as the Global Positioning System (GPS), Geographic Information Systems (GIS) and Remote Sensing (RS) for storing and analyzing spatial data can help us make better decisions in agriculture, land development, environmental protection and restoration. Specifically this decision making tools can be used in the context of agriculture in assessment of crop area extent, management of water resources, identification of pest attacks and diseases, yield assessment studies, land suitability assessment for agriculture disaster management and precision agriculture.

Geostatistical analysis is vital in creating maps of different soil characteristics, taking into account the spatial as well as directional variability of soil properties. The semivariogram and kriging are the heart of geostatistics and will be introduced to the students with their different types of estimation.

Students will apply their new skills to one of several case studies in topics on agriculture, pest management, crop monitoring, water and land resource management and risk assessment among others. This course will offer a mixture of lectures, demonstrations and hands-on exercises using open source GIS and RS software.

2 – Intended learning outcomes of course (ILOs)

a- Knowledge and understanding:

- Understand the basic concepts of geographic information systems
- Understand the principles of remote sensing
- Know the various sources and types of remote sensing and GIS data
- Understand spatial variability of the biophysical environment and how it affects the sustainable use of land resources.
- Understand the role and scope of GIS/RS in environmental analysis

b- Intellectual skills:

- Make rational, scientific judgments on the validity and use of particular datasets for a range of environmental problems;
- Make informed and critical judgments when faced with an issue concerning geographic information management
- Analyse, synthesis and summarise geographic information requirement for a project;
- Apply knowledge and understanding to address a wide range of spatial issues
- Recognise the moral and ethical, as well as scientific issues that relate to geographic information and address these issues in context with current spatial data policies and strategies.
- Develop the students' capacity to make informed and critical judgments between alternative solutions to specific problems using GIS/RS
- Demonstrated ability to conceptualize, plan and conduct project in the area of land resource management.

c- Professional and practical skills:

- Synthesise information from a variety of sources
- Gain experience in the applications of remote sensing and GIS to solving problems related to natural resources management
- Knowledge of the GIS and RS tools that are available for natural resources management.
- Skill to use GIS/RS software for spatial data preparation, interpretation, analysis and visualization.
- In-depth skills of vector and raster processing.
- Show proficiency in integrating GIS data analysis with simple statistical analysis.
- Provide a critical evaluation of new and existing approaches to the remote sensing of the environment and the role of GIS
- Develop students' abilities in the practical procedures of GIS/RS from data acquisition and processing through to effective display of results
- Understand the complexity of spatial data and their relationships with non-spatial information
- Perform spatial analysis on a varied range of spatial data
- Gain complete understanding of spatial data acquisition procedures
- Assess the quality of acquired spatial data

- Design, develop and evaluate methodologies and develop critics of them, and where appropriate, propose new techniques for research.

d- General and transferable skills:

- The ability to reflect on the significance and inter-relationships of knowledge acquired both by study and from the professional experience of the student
- The ability, on the basis of such reflection, to formulate original ideas and innovative proposals
- The ability to initiate change on the basis of informed ideas and proposals, within the context of the student's personal professional activity

3- Contents

Topic
<u>Week 1: Introduction and key concepts of GIS.</u> • Introduction concepts of GIS and remotesensing in agricultural resource management • Planning for a GIS system installation • Introduction GIS data collection using GPS • Gathering data using mobile phones using (ODK) • Integrating GPS data into GIS • GIS Data sources and types for agriculture • Working with data from different sources • Geo database creation and maintenance for agricultural resources • Attributes manipulation in GIS • Facilitated practical exercises in working with tabular data in excel format <u>Week 2: Global Positioning Systems (GPS).</u> • What is GPS • How GPS works • Types of GPS • GPS data accuracy • GPS signal errors • What's WAAS • Limitations to GPS <u>Week 3: Digital image processing techniques in agriculture resource management.</u> • Obtaining satellite imagery for agriculture resource management • Satellite Image processing and calibration for agricultural resources • Land use classification using supervised classification • Land use classification using unsupervised classification • Accuracy assessment and ground truthing technique

- Agricultural resource planning and monitoring
- Agro-Ecological zone mapping
- Agricultural resource mapping and updating
- Mapping crop
- Mapping soil variability
- Mapping condition that affects plant health, yield, or quality of a crop e.g. weed infestation
- Land suitability assessment for agriculture

Week 4: Basics of Geostatistics
- Overview of Geostatistics - stationarity – anisotropy - directionality
- Geostatistics versus normal interpolation

Week 5: Spatial Analysis
- Spatial analysis (non-geostatistical)
- Spatial continuity analysis (geostatistical)

Week 6: Variogram modeling
- Basic models
- Model fitting

Week 7: Estimation
- Deterministic estimation
- Estimation criteria
- Probabilistic (Geostatistical) estimation and Types of Kriging

Week 8: GIS and RS in soil management.
- Characterizing soil spatial variability
- Site-specific soil management prescription maps
- Soil Mapping and Capability Assessment
- Mapping Soil Erosion Risk Using RUSLE
- Case study: GIS and Remote Sensing in Drought Monitoring

Week 9: Precision farming using GIS and RS for crop management.
- Yield monitoring and mapping
- Grid sampling, management zones
- Crop health analysis using NDVI
- Remote sensing (RS) for precision agriculture
- Crop stress detection
- Crop modeling for yield estimation and production

Week 10: GIS and RS for water management in agriculture:
- Multi criteria analysis in determining potential ground water zones
- Mapping and monitoring irrigated land.

- Flood monitoring;
- Hydrological modeling and its application in agriculture
- Statistical analysis procedures on historical series of rainfall data to produce agro climatic classification
- Land suitability assessment for agriculture

Week 11: GIS AND RS disease/pest management.

- Using remote sensing and GIS to identify breeding areas
- Determining spatial patterns of the disease and pathway
- Crop damage assessment using change detection
- Determine the spatial extent of a disease
- Monitoring weather and ecological conditions favorable for crop pests and disease
- Case study: Remote Sensing for grazing management

Week 12: Participatory GIS.

- Public participation in agricultural resource management
- Using Google earth in agricultural resource management

Web based Publishing for interactive and dynamic agricultural maps

4– Teaching and learning methods

Lecture
Directed Learning
Independent Learning
Exam preparation
Exam taking

5- Student assessment methods

Weighing of assessments

Mid-term examination	10%
Final-term examination	40%
Oral examination	10 %
Practical examination	20%
Semester work	20%
Total	100%

Any formative only assessments

- Essay (75% of continuous assessment mark) on a topic chosen by the student, but which is of relevance to the course and agreed in discussion with the teaching staff.

- Beside frontal lectures, work in small groups is intended. Groups will be field handled with various applied examples, case studies, and hand-on exercises.
- Results of field observations and analysis will be presented in the form of seminar papers. With regard to selected topics of seminars additional lectures are provided by visiting academic staff or researchers.

6- List of references

1- Wilson, J. P. and A. S. Fotheringham. 2008. The handbook of geographic information science. Blackwell Publishing Ltd. USA.
2- Longley, P.A, Goodchild, M.F., Maguire, D.J, and D.W. Rhind. 2005. Geographical Information systems and Science, 2nd edition. John Wiley and Sons. London.
3- Burrough, P.A., and R.A. McDonnell. 1998. Principles of Geographic Information Systems. OxfordUniversity Press.
4- Star, J., and J. Estes. 1990. Geographic Information Systems: An Introduction. Prentice Hall.
5- Aronoff, S. 1989. Geographic Information Systems: A management perspective. WDL Publications, Ottawa, Canada.
6- Sabins, F. 1997.Remote Sensing: Principles and Interpretations. 3rd edition. W.H. Freeman and Company, New York. (This is the main textbook)
7- Lillesand, T. and R.W. Kiefer. 1987. Remote Sensing and Image Interpretation. John Wiley and Sons.
8- Jensen, J.R. (2005). Introductory Digital Image Processing: A Remote Sensing Perspective. 3rd Edition. Prentice-Hall, Upper Saddle River, NJ.
9- Isaaks, E.H. and R. M.Srivastava. 1989. Applied Geostatistics. Oxford University Press,
10- Chandra, A.M., and Ghosh, S.K., (2006). Remote sensing and geographical information system. Alpha Science International Ltd, Oxford, U.K.

6.1- Periodicals, Web sites, … etc

The GIS Primer: http://www.innovativegis.com/basis/primer/primer.html An Introduction to Geographic Information Systems. David J. Buckley, Pacific Meridian Resources, Inc. accessed December 2016.

GIS.Com 'What is a GIS?' http://www.gis.com/whatisgis/index.html accessed December 2016.
About GIS (GIS Lounge) http://gislounge.com/library/what-is-gis/ accessed December 2016.
Natural Resources Canada: Fundamentals of Remote Sensing. accessed December 2016.
http://www.nrcan.gc.ca/node/9309

7- Facilities required for teaching and learning

Computer lab equipped with suitable GIS / RS / Geostatistics software, printers, scanners, plotters, …. etc

Course coordinator: Prof. Dr. Mohamed Bahnassy

Head of Department:

Date: / /

Mandatory Module: Geomatics and Spectroscopy

Mandatory Course: Advanced Sepctroscopy

University: Zagazig **Faculty:**

Program on which the course is given: Sustainable Land Management (SLM)

Major or minor element of program: Geomatics and Spectroscopy

Department offering the program: Soil and Water Sciences

Department offering the course: Soil and Water Sciences – Pesticides Chemistry

Academic year / Level: Master

Date of specification approval:

A- Basic Information

Title: Advanced Spectroscopy **Code:**

Credit Hours / ECTS: 2 / 6

Lecture: 1 **Tutorial/Practical:** 2 Total: 2

B- Professional Information

1 – Overall aims of course

The aim of this course is to provide the students with the principles of spectral methods of analysis (Uv-Vis, Ir, Raman, emission, flame photometry, atomic, fluorescence spectroscopy) of chemical substances through spectroscopy education that would enable the student to work in the different related fields of analysis and research (water analysis, environmental analysis for detection of pollutants,…..etc) in a communicative team work. After successful completion of this course, students should be able to understand the techniques of separation and the concepts of spectroscopy analytical methods, identify and treat analytical data for quantitative and qualitative characterizations and apply the techniques to analysis of compounds

2 – Intended learning outcomes of course (ILOs)

e- Knowledge and understanding:

1. Define the theories of instrumental methods of spectroscopic analysis
2. Identify the theories of instrumental methods of spectroscopic analysis
3. Discuss the theories of instrumental methods of spectroscopic analysis
4. Recognize the theories of instrumental methods of spectroscopic analysis
5. List the principles of spectroscopy.
6. Write the different methods of spectroscopic analysis
7. Mention methods of spectroscopic analysis depending on the type of the samples

f- Intellectual skills:

1. Choose suitable spectroscopy methods of analysis of the substance to be analyzed

2. Have analytical thinking
3. Distinguishes between different techniques of spectral analysis.
4. Conclude the theory of every technique of spectral analysis Professional and

g- Practical skills
1. Use instruments in analytical laboratories.
2. Use the sheets of spectroscopic analysis.
3. Detect the quality of analyzed sample.
4. Write full report justifying his judgment.
5. Apply FTIR spectroscopy to obtain structural information
6. Apply safety measures in practice

h- General and transferable skills:
1. Interact efficiently with others.
2. Work effectively in a team.
3. Manage time effectively.
4. Make appropriate decisions depending on studying situations.
5. Collect the gained experiences in certain spectroscopy activities.
6. Write effectively a scientific report in English.

3- Contents

Topic	Lecture	Tutorial/Practical
1	Introduction to Spectroscopy	Introduction to Spectroscopy
2	Mass Spectrometry	Determination of Iron in water by Spectrophotometric method
3	Ultraviolet-Visible Spectroscopy	UV/VIS Spectroscopy and Spectrophotometry: Spectrophotometric Analysis of Potassium Permanganate Solutions
4	Infrared Spectroscopy	Determination of chromium and manganese in a mixture I
5	Optical Spectroscopy	Determination of chromium and manganese in a mixture II
6	Midterm Exam	
7	FTIR (Fourier transform infrared spectroscopy)	FTIR: Comparison of Sample Preparation Techniques and Interpretation of Spectra of an Unknown
8	Raman Spectroscopy	FTIR: Comparison of Sample Preparation Techniques and Interpretation of Spectra of an Unknown
9	Flame Spectroscopy	Quantitative Analysis of Aspirin Tablets by an Absorption Spectrophotometry
10	Fluorescence Spectroscopy	Determination of conc of Potassium Permenganate (KMNO4) sample .
11	Emission Spectroscopy	Effect of PH on the absorption Spectrum of Methyl

		Red (MR)
12	Nuclear Magnetic Resonance Spectroscopy	Revision
13	Final Exam	

4– Teaching and learning methods

4.1. Lectures.
4.2. Practical sessions.
4.3. Group discussions.
4.4. Data analysis.
4.5. Problem solving.
4.6. Seminars.
4.7. Reports
4.8. self-study

5- Student assessment methods

5.1. Mid-term exam
5.2. Oral exam
5.3. Practical exam
5.4. Final written exam
5.5. Writing on a subject related to the **course**

Assessment schedule

Assessment 1: Mid-term exam	Week 6
Assessment 2: Practical exam	Week 13
Assessment 3: Oral exam	Week 13
Assessment 4: Final written exam	Week 14
Assessment 5: report	Week 11, 12

Weighing of assessments

Mid-Term Examination	5%
Oral exam	5%
Practical exam	20%
Final report	10%
Final-Term Examination	60%
Total	100%

6- List of References

6.1- Course notes

6.2- Essential books (text books)

- J. Mendham, R.C. Denney, J. D. Barnes & M.J.K. Thomas, Vogel's Quantitative Chemical Analysis (6th Edition), Prentice Hall, Upper Saddle
- Douglas A. Skoog, F. James Holler, Stanley R. Crouch, Principles of Instrumental Analysis, (6th Edition) ,Stanford University, University of Kentucky, Stanley R. Crouch, (2007)
- Daniel C. Harris, Quantitative Chemical Analysis, 8th Edition, W.H. Freeman and Company,W. H., New York, 2010

7- Facilities Required for Teaching and Learning

Personal Computer, Data Show Projector

Course coordinator: Hend El-akkad / M. Abohashem/ Sameh Shaddad

Head of Department:

Date: / /

Mandatory Module: Bioeconomics of land management

Mandatory Course: Economics of Land Degradation

University: Alexandria **Faculty:**

Program on which the course is given: Sustainable Land Management (SLM)

Major or minor element of program: Bioeconomics of land management

Department offering the program: Soil and Water Sciences

Department offering the course: Agricultural Economics

Academic year / Level: Master

Date of specification approval:

A- Basic Information

Title: Economics of Land Degradation **Code:**

Credit Hours / ECTS: 2 / 6

Lecture: 2 **Tutorial/Practical:** **Total:** 2

B- Professional Information

1 – Overall aims of course

This course provides students with the economic background needed in understanding the true meaning of land resources, an assessment of the economic benefits and costs of land degradation, determination of optimal pollution rates, the obstacles encountered in land resources preservation, externalities and public goods and their role in degrading land resources, and roles of governmental policies in mitigating land degradation. Course participants will learn about a range of economic approaches and methods explicitly designed to solving land degradation issues. Upon completion, students will gain theoretical and applied knowledge about different methods which bring together economic, the environment, and social dimensions associated with land resources.

Course Keywords: *Land Resources, Market Failure, Environmental Degradation, Sustainability, Economic Growth, Biodiversity and Valuation, Cost-Benefit Analysis, Policy Measures, Economic Efficiency, Social Costs and Benefits, Expected Value, Land Value, Degradation Assessment, Externalities, Public Goods.*

The course is structured into three main phases:

1. Introduction to Environmental Economics and Land Resources. This part is confined to the issues related to land resources as perceived in the science of economics, economic efficiency, optimal rates of land degradation, externalities and public goods issues, and the supply of and demand for land and other natural resources.
2. Economic Assessment of Benefits and Costs of Land Resources. This part curbs policy measures adopted by governments to mitigate land degradation and the assessment of social costs and benefits, as opposed to those of private costs and benefits.

3. Project Appraisal. This part is a practice for students to do their own calculation of costs and benefits associated with preventing land from being degraded.

2 – Intended learning outcomes of course (ILOs)

C- Knowledge and understanding:

a1- Explain why economic analysis can be a useful tool for decision-makers.
a2- Discuss the important scientific terms commonly used in environmental economics as a field of specialty in economics.
a3- Identify the different aspects that lead to land resources degradation.
a4- Describe the steps behind each valuation method, the underlying assumptions and methods, along with empirical limitations.

D- Intellectual skills:

b1- Contrast how theory might look relatively easy comparing to applying the theoretical principles to issues related to land degradation incidents in reality. Past and present examples encountered all over the world will be presented to students.
b2- Compose a suitable method for valuation of a non-marketed good or service, depending on the type of good or service in question.
b3- Assess critically the choice of valuation method, its application, and results for an existing valuation study.

E- Professional and practical skills:

c1- Examine and develop simple research designs for economic assessment of land degradation.

F- General and transferable skills:

d1- Complete running of a simple cost-benefit-analysis.

3- Contents

Contents
<u>Week 1: Introduction to Resource and Environmental Economics:</u> - Market Failure - Waste and Recycling - Sustainable Development - Environmental Degradation - Alternative Energy Sources - Population & Economic Growth - Natural Resource Management - Environmental Ethics
<u>Week 2: Important Concepts and Calculations in Environmental Economics:</u> - Scrutinizing efficiency - Cost-benefit analysis

- Types of efficiency
- What goods and services should be produced?
- With what resources should goods and services be produced?
- Who will receive the final products?
- Supply and demand
- Expected-value calculations

Week 3: Market Failure:

- Imperfect competition
- Imperfect information
- Externalities
- Public Goods

Week 4: The Role of Government:

- The Meaning and Purpose of Government
- What is government
- Is government necessary
- The Role of Government
- Historical Ideologies
- Modern Problems with private solutions
- Government Solutions to Market Failure
- Enforcement of property rights
- Provision of public goods
- Liability
- Regulations
- Education and Moral Leadership
- Dispute Resolution

Week 5: Trade-offs and the Economy:

Trade-offs between present and future

- Why discount future benefits
- Why discount future costs
- Dynamic efficiency
- Present-Value calculation
- Discount Rates –who's got the number
- What's your number?

•Trade-offs between growth and the environment

- Growth versus Welfare
- Is "green" growth and Oxymoron
- Treading Lightly

Week 6: Water Quality and Valuation:

- The Value of Clean Water
- Policy
- Education
- Market-Based Incentives

Week 7: Environmental Quality and Valuation:

What is quality of the environment?
- Terms of trade

Where do we go from here? A brief look
- Policy
- Education
- Market-based Incentives

<u>Week 8: Energy:</u>

Energy Terminology
- Fossil Fuels
- Nuclear Energy
- Alternative Fuels

Energy Policy
- Efficient Source Selection
- Market Structure and Price Control
- Deregulation
- Policy and Automobiles
- CAFÉ Standards

<u>Week 9: Sustainability:</u>

Sustainability Criteria
- Weak Sustainability
- Strong Sustainability
- The Downside of Mistaken Judgment
- Other Types of Sustainability

Sustainability and Efficiency

Walking the walk
- Recycling
- Current Trend
- Is It Efficient?
- Recycling Policy

<u>Week 10: Biodiversity and Valuation:</u>
- Biodiversity Loss
- Cost-Benefit Applications
- The Noah Ark Model
- Valuing Costs and Benefits
- Types of Values

Measures of Value
- Market Prices
- Contingent Valuation
- Hedonic Pricing

<u>Week 11: Water Resource Management:</u>
- Water Rights
- Water Pricing
- Water Use Sustainability

Week 12: Perspectives on Environmental Policy: - Command-and-Control Regulations - Incentive-Based Solutions - Punishment and Deterrence
Week 13: Project Presentation and Oral Exams
Week 14: Final written Exam

4– Teaching and learning methods

4.1- Lectures using PowerPoint Presentations.

4.2- Assignments including case-study analysis and formulation of small-scale projects which show economic thinking of land degradation issues. Assignments are to be made in groups.

4.3- Searching scientific articles which handle the economics of land degradation in different parts of the world. Critical analysis of some articles is to be made.

5- Student assessment methods

5.1 Oral to assess the skills of analyses and discussion. This is made in project presentations.
5.2 Case study analysis to judge the skills of problem solving and data presentation and discussion.
5.3 Assignments to measure students' ability to working in groups.

5.4 A written final exam to weigh the student's overall understanding of the main concepts of the course.

Assessment schedule

Assessment 1: Project Presentation and Oral Exam – Week 13
Assessment 2: Case Studies - Weeks 6 to 9
Assessment 3: Group assignments – Weeks from 5 to 10
Assessment 4: Final Exam - Week 14

Weighing of assessments

Final-term examination:	50%
Oral examination and project presentation	20%
Semester work:	30%
Total:	100%

6- List of references

6.1- Course notes

- All of the course materials are of the electronic type. These materials are to be sent to students by e-mails or through the creation of a website to the students on Facebook or any other website venue.

6.2- Essential books (textbooks)

David A. Anderson. 2010. "Environmental Economics and Natural Resource Management", 4th Edition, Routledge. ISBN-13: 978-0415640961
ISBN-10: 0415640962.

6.3- Recommended books

Molly Espey. Workbook APEC 257. Natural Resources, the Environment and Economics. Department of Agricultural and Applied Economics Clemson University. https://www.sc.edu/sustainableu/Espey257test.pdf

S Callan and J Thomas. 2000. Environmental Economics and Management: Theory, Policy and Applications. 2nd edition. Fort Worth: Dryden Press.

G.Carlson., D Zilberman and J Miranowski. 1993. Agricultural and Environmental Resource Economics. 1st edition only. Oxford: Oxford University Press.

6.4- Periodicals, Web sites, … etc.

Determination of a number of research articles written on economics of land degradation is to be made. Research articles are mostly on the following link: http://ageconsearch.umn.edu/. This is a scientific research link associated with the University of Minnesota, Twin Cities, USA, Department of Applied Economics.

7- Facilities required for teaching and learning

- Computer
- Field visits to some locations.
- Data Show.

Course coordinator: Professor Sherin Ahmed Sherif

Head of Department:

Date: / /

Mandatory Module: Bioeconomics of land management

Mandatory Course: Biostatictical Analysis

University: Alexandria **Faculty:**

Program on which the course is given: Sustainable Land Management (SLM)

Major or minor element of program: Bioeconomics of land management

Department offering the program: Soil and Water Sciences

Department offering the course: Agronomy

Academic year / Level: Master

Date of specification approval:

A- Basic Information

Title: Biostatistical Analysis **Code:**

Credit Hours / ECTS: 2 / 6

Lecture: 1 **Tutorial/Practical:** 2 **Total:** 2

B- Professional Information

1 – Overall aims of course

Statistics is the study of using theory and methods for the analysis of data arising from random processes or phenomena, i.e. the study of how to make sense of data.
The field of statistics provides some of the most fundamental tools and techniques of the scientific method:

- Formulating a hypothesis
- Designing experiments and observational studies
- Data collection
- Summarizing data
- Statistical inference

Biostatistics is the branch of applied statistics directed toward application in biological sciences. The course is intended to provide the students with conceptual overview of statistical methods with emphasis on applications commonly used in the biological research. The course will briefly cover the topics of descriptive statistics and probability followed by a detailed description of the widely used experimental designs. The goal is to provide the student with the information needed to be able to statistically design an experiment, perform analysis and interpret the results.

2 – Intended learning outcomes of course (ILOs)

1. Outline the functions and principles of biological statistics
2. Distinguish between the measures of location and measures of variation
3. Choose the best statistical design for a given biological experiment
4. Formulate the tested hypothesis

5. Analyze the data statistically according to the proper chosen experimental design
6. Conclude a statistical inference

3- Contents

Contents
Week 1: Introduction and concepts: - Functions of biological statistics - Definitions of data, variable, population and sample - Principles of statistics (repetition, randomization and local control) - Sampling (sources of samples, types of samples and factors determining sample size)
Week 2: Descriptive measures: - Measures of location - Measures of variation
Week 3: Probability theory and data distribution - Theories of probability - Normal distribution and data transformation
Week 4: t-test and F-test: - T-test in pairs comparison of means - T-test in groups comparison of means - F-test comparison of variance of two populations
Week 5: ANOVA and experimental designs: - Analysis of variance (ANOVA) - Complete randomized design (CRD) - Randomized complete block design (RCBD)
Week 6-8: ANOVA and experimental designs: - Latin square - Split and split-split - Factorial 2 and 3 factors - Nested design - Combined analysis (homogeneity of error) - Least significant difference (L.S.D.) - Regression analysis - Correlation analysis
Week 9: Chi square distribution - Non-parametric (categorical) statistics
Week 10: Multivariate analysis of variance (MANOVA)
Week 11: Principal component analysis (PCA)
Week 12: Clustering

4– Teaching and learning methods

Lecture

Directed Learning
Independent Learning
Exam preparation
Exam taking

5- Student assessment methods

Weighing of assessments

Mid-term written exam	20%
Final written exam	40%
Oral exam and/or final report	20%
Coursework and continuous assessment	20%
Total	100%

6- List of references

1. Gomez, K.A., and Gomez, A.A. (1984). Statistical procedures for agricultural research. Second edition. A Wiley-Interscience Publication. John Wiley and Sons.
2. Steel, R.G.D., and Torrie, J.H. (1980). Principles and procedures of statistics. Second edition. New York: McGraw-Hill.
3. John, P.W.M. (1971). Statistical design and analysis of experiments. New York: Macmillan.
4. Winner, L. (2004). Introduction to Biostatistics. University of Florida. *web.stat.ufl.edu/~winner/sta6934/st4170_int.pdf*

Course coordinator:

Head of Department:

Date: / /

Mandatory Module: Scientific English and Proposal Writing

Mandatory Course: English for Scientists and Proposal Writing

University: Alexandria **Faculty:**

Program on which the course is given: Sustainable Land Management (SLM)

Major or minor element of program: Scientific English and project proposal Writing

Department offering the program: Soil and Water Sciences

Department offering the course: Soil and Water Sciences

Academic year / Level: Master

Date of specification approval:

A- Basic Information

Title: English for Scientists and Proposal Writing **Code:**

Credit Hours / ECTS: 1 / 3

Lecture: 1 **Tutorial/Practical:** **Total:** 1

B- Professional Information

1 – Overall aims of the course

English is the language of science. Since the end of WWII, English has become the established language of scholarly communication, but not without controversy. The overwhelming majority of communication in the natural sciences today takes place in English; in print and at conferences; in E-mails and in Skype-mediated collaborations, confirmable by wandering through the halls of any scientific research facility worldwide. The adoption of English as the universal language of science is due in part to historical, political, and economic factors which favored English over other potential candidate languages such as Chinese, French, German, Russian, or Spanish. English is therefore well positioned to become the default language of science in the wake of the disruptive wars of the first half of the 20th century. The use of English as the scholarly ***lingua franca*** has become self-reinforcing, with academic reward schemes in many countries, placing great emphasis on publication in international (mostly English-language) journals. Roughly 80% of all the journals indexed in Scopus are published in English. It is, therefore, mandatory for scientists and researchers, in particular, to meet a certain level of English language proficiency. English for Scientists will develop the learners' language skills with practical reading and writing skills, to be utilized in writing proposals and applying for research funding. This is since the write-up of proposals is both a science and an art. A significant number of researchers do not either know it as a science or not gifted with it as an art. This course aims at equipping students with the scientific component, leaving the rest to the individual talents of the students.

2 – Intended learning outcomes of course (ILOs)

i- Knowledge and understanding:

a1- Describe the scientific thinking and the scientific ideology.

a2- Outline the concept of “research problem” and hypothesis testing.
a3- Locate the significance of literature review.

j- Intellectual skills:

b1- Identify attractive research objectives.
b2- Distinguish between outcomes and outputs.
b3- Arrange the research methodologies.
b4- Create a timeframe for his/her research project.

k- Professional and practical skills:

c1- Adjust the research activities to the specified timeframe.
c2- Justify the needed budget.
c3- Design a good and fund-raising research proposal.

3- Contents

Contents
<u>Week 1: Introduction and Expectations:</u> - Why English is the language of science? - Principles of writing scientific English. - Logical thinking, analysis and synthesis
<u>Week 2-3: Research proposal:</u> - What is a proposal? - Why write a proposal? - How to prepare for writing a proposal? - The concept notes - Communicating in science - Making good arguments
<u>Week 4: Build a proposal writing team:</u> - Introducing the role and responsibilities of the principle investigator (PI) in the project, as well as, the role of the Co-PI and the other team members - Introducing the IMRAD Format
<u>Week 5: Explaining the different components of a proposal:</u> - Title - Abstract - Keywords - Introduction and Review of Literature - The Problem - Objectives - Data and Methods - Analysis - Results - Conclusions and Recommendations
<u>Week 6: Explaining the different components of a proposal:</u> - Determining the problem and formulating the research hypothesis - Stating the objectives

- Outcomes and outputs
Week 7: Explaining the different components of a proposal: - Description of methodology and activities - Time plan - Budget and budget justification
Week 8: Project implementation, monitoring, evaluation, and follow up.
Week 9: Project risk management and SWOT analysis
Week 10: Logical framework matrix and Gantt chart
Week 11: Presenting research results
Week 12: Discussion of projects designed by the students' groups

4– Teaching and learning methods

4.1- Lectures
4.2- Practical sessions
4.3- Group assignments

5- Student assessment methods

5.1- Oral to assess the communication skills
5.2- Written to assess the understanding and scientific background
5.3- Practical to assess the intellectual skills
5.4- Assignments to assess the professional skills and team work skills

Assessment schedule

Assessment 1: Assignments – Week: 4th
Assessment 3: Practical exam – Week: 13th
Assessment 4: Oral exam – Week: 13th
Assessment 5: Final written exam – Week: 14th

Weighing of assessments

Final-term examination	40%
Oral examination	20%
Practical examination	20%
Group assignment and semester work	20%
Total	100%

6- List of references

5. How to Write a Research Proposal, http://www.ic.daad.de/accra, Accessed on December 24th, 2016.
6. Ellman, Patricia. 2014. English Grammar for Economics and Business. For students and professors with English as a foreign language. 2nd edition, ISBN 978-87-403-0653-8 and www.bookboon.com, Accessed on December 23rd, 2016.
7. National Science Foundation. A Guide for Proposal Writing. Directorate for Education and Human Resources. Catalog of Federal Domestic Assistance: CFDA 47.076.

https://www.nsf.gov/pubs/1998/nsf9891/nsf9891.htm, Accessed on December 22nd, 2016.
8. Greener, Sue and Joe Martelli. An Introduction to Business Research Methods. 2nd edition. ISBN 978-87-403-0820-4 and www.bookboon.com
9. Stapleton, Paul. Writing for research, presentation and project proposals. Online Draft Copy

7- Facilities required for teaching and learning

4. Computer 2. Data Show

Course coordinator:

Head of Department:

Date: / /

Mandatory Module: Scientific English and Proposal Writing

Mandatory Course: Research Methods and Scientific Communications

University: Alexandria **Faculty:**

Program on which the course is given: Sustainable Land Management (SLM)

Major or minor element of program: Scientific English and project proposal Writing

Department offering the program: Soil and Water Sciences

Department offering the course: Soil and Water Sciences

Academic year / Level: Master

Date of specification approval:

A- Basic Information

Title: Research Methods and Scientific Communications **Code:**

Credit Hours / ECTS: 1 / 3

Lecture: 1 **Tutorial/Practical:** **Total:** 1

B- Professional Information

1 – Overall aims of course:

The course aims at introducing the student with different ways to construct an academic concept in basic scientific methods and communication, as well as gaining awareness and skill in adapting writing and oral presentation style and technique to different audiences and formats and diagnose the numeracy and literacy skills for the students relevant to their discipline of study.

2 – Intended learning outcomes of course (ILOs)

l- Knowledge and understanding:

a1- Explain the differences between a conceptual and a technical research design;
a2- Describe features of an experimental, cross-sectional, and longitudinal design;
a3- Describe the pros and cons of different data collection methods;
a4- Discuss what random and non-random sampling is about;
a5- Discuss the reliability and validity of measurements;
a6- Discuss key research methodologies relating to communication in environmental sciences and
a7- Outline an experimental design and data analysis.

m- Intellectual skills:

b1- Determine elaborated research designs in the environmental sciences;
b2- Determine appropriate approaches to particular research questions;
b3- Develop skills in drafting and editing of texts and

b4- Develop skills in oral presentation.

n- Professional and practical skills:

c1- Illustrate and begin to apply the practical skills required in professional research, from question formulation to publication and

C2- Examine texts presenting the same content for different audiences, and reflect critically on the editing process and audience engagement.

o- General and transferable skills:

d1- Show findings orally in a group session.

3- Contents

Topic	No. of Hours	Lecture	Practical/Tutorial
A- Research methodology	**4**	**4**	**-**
B- Scientific writing	**8**	**8**	**-**

3.1- Tentative Timetable for the course:

Types	Topic
Topic A:	Week 1: FORMULATING A RESEARCH PROBLEM 1 Research: a way of thinking 2 The research process: a quick glance 3 Reviewing the literature 4 Formulating a research problem 5 Identifying variables 6 Constructing hypotheses
	Week 2: CONCEPTUALISING A RESEARCH DESIGN 7 The research design 8 Selecting a study design CONSTRUCTING AN INSTRUMENT FOR DATA COLLECTION 9 Selecting a method of data collection 10 Collecting data using attitudinal scales 11 Establishing the validity and reliability of a research instrument
	Week 3-4: SELECTING A SAMPLE 12 Selecting a sample
	Week 5-6: WRITING A RESEARCH PROPOSAL 13 How to write a research proposal

Topic B:	Week 7-9: COLLECTING DATA 14 Considering ethical issues in data collection
	Week 9-10: STEP VII PROCESSING AND DISPLAYING DATA 15 Processing data 16 Displaying data
	Week 11-12: STEP VIII WRITING A RESEARCH REPORT 17 Writing a research report 18 Research methodology and practice evaluation

4– Teaching and learning methods

4.1- Class Participation
4.2- Frontal lectures
4.3- Microteaching
4.4- Home reading and assignments
4.5- Discussion sessions
4.6- Course website

5- Student assessment methods

5.1 Exercises are useful to assess the skills of solving problems and presenting data and discussion;
5.2 Midterm exam is useful to assess the skills of understanding the scientific background of the material studied in the program;
5.3 5-minute research summary is important to assess the skills of ensuring academic integrity;
5.4 Research proposal is useful to point out what you hope to accomplish and your desired outcomes from the research. and
5.5. Final exam is useful to test the students' knowledge and understanding of a topic, as well as their ability for application, analysis, integration and synthesis.

Assessment schedule

Assessment 1 Exercises	Every 2 weeks
Assessment 2 Midterm exam	week: 7th
Assessment 3 Case study presentation	Week: 12th
Assessment 4 Oral exam	Week: 13th
Assessment 5 Final exam	Week 14th

Weighing of assessments

Exercises	10%
Midterm exam	10%
5-minute research summary	20%
Research proposal	20%
Final exam	40%
Total	100%

6- List of references

6.1- Course notes

Course handouts in a PDF format for different topics will be available for students.

6.2- Essential books (text books)

- **Kumar, R.** (2014). Research Methodology: A Step-by-Step Guide for Beginners. Sage Publications Ltd., ISBN 978-1-4462-6996-1.

6.3- Recommended books

- **Barnard**, C.F. and McGregor P., 2011. Asking questions in biology. A guide to hypothesis-testing, experimental design and presentation in practical work and research projects. Fourth edition. Benjamin Cummings.

6.4- Periodicals, Web sites, … etc

A course web site that will be initiated in the near future is the main website for the class

7- Facilities required for teaching and learning

- Computers and internet
- Video films
- Field visits
- Data-show

Course coordinator: Gaber M. Hassan, Ph. D.

Head of Department:

Date: / /

Specialization Module: Land Use Planning and Assessment

Elective Course: Land Use Planning & Sustainable Development

University: Alexandria **Faculty:**

Program on which the course is given: Sustainable Land Management (SLM)

Major or minor element of program: Land Use Planning and Assessment

Department offering the program: Soil and Water Sciences

Department offering the course: Soil and Water Sciences

Academic year / Level: Master

Date of specification approval:

A- Basic Information

Title: Land Use Planning for Sustainable Development **Code:**

Credit Hours / ECTS: 2 / 6

Lecture: 2 **Tutorial/Practical:** **Total:** 2

B- Professional Information

1 – Overall aims of course

This course aim at bridging the relationship between land use planning and social and environmental aspects of sustainability, exploring both dynamic drivers of land use plans and its societal and environmental consequences. Topics covered will include the planning process, as well as the sustainable development goals SDG's. Students will be encouraged to think critically and creatively about the role of land use change within broader sustainability agendas, such as those outlined in the Sustainable Development Goals

2 – Intended learning outcomes of course (ILOs)

1. Analyze the complex land use change dynamics,
2. Find cause/effect relationships across scales
3. Compare different land use planning techniques
4. Understand the effect of land use planning process on the sustainability
5. Calculate the environmental performance using different qualities

3- Contents

Topic
Week 1: Nature and scope of land use planning What is land-use planning? When is land-use planning useful? Making the best use of limited resources Goals The focus of land-use planning

Planning at different levels

Week 2: Overview of planning process
The need for flexibility
Planning and implementation
Planning as an iterative process
The land-use plan

Week 3-5: Steps in land use planning
Step 1. Establish goals and terms of reference
Step 2. Organize the work
Step 3. Analyze the problems
Step 4. Identify opportunities for change
Step 5. Evaluate land suitability
Step 6. Appraise the alternatives: environmental, economic and social analysis
Step 7. Choose the best option
Step 8. Prepare the land-use plan
Step 9. Implement the plan
Step 10. Monitor and revise the plan

Week 6-8: Sustainable Development Goals

1. No Poverty
2. Zero Hunger
3. Good Health and Well-being
4. Quality Education
5. Gender Equality
6. Clean Water and Sanitation
7. Affordable and Clean Energy
8. Decent Work and Economic Growth
9. Industry, Innovation and Infrastructure
10. Reduced Inequalities
11. Sustainable Cities and Communities
12. Responsible Consumption and Production
13. Climate Action
14. Life Below Water
15. Life on Land
16. Peace, Justice and Strong Institutions
17. Partnerships for the Goals

Week 9-10: Sustainable development indicators
1. Economic Prosperity
2. Long Term Unemployment

3. Poverty
4. Knowledge and Skills
5. Healthy Life Expectancy
6. Social Capital
7. Social Mobility in Adulthood
8. Housing Provision
9. Greenhouse Gas Emissions
10. Natural Resource Use
11. Wildlife
12. Water Use
13. Population Demographics
14. Debt
15. Pension Provision
16. Physical Infrastructure
17. Research and Development
18. Environmental Goods and Services Sector
19. Avoidable Mortality
20. Obesity
21. Lifestyles
22. Infant Health
23. Air Quality
24. Noise
25. Fuel Poverty
26. CO2 Emissions by Sector
27. Energy from Renewable Sources
28. Housing Energy Efficiency
29. Waste Disposal and Recycling
30. Land Use
31. Water Quality
33. Sustainable Fisheries
34. Priority Species and Habitats

Week 11-12: Student case study

Students will select one of these dimensions for further independent research, and will present an assignment in which they apply theoretical concepts to critically examining the societal/environmental challenges of land use change.

4– Teaching and learning methods

4.1-Lectures
4.2-Seminars
4.3- Internet search
4.4-Turorials

5- Student assessment methods

5.1 Exams	to assess student comprehension of the subject
5.2 tutorials	to assess student ability to think critically

Assessment schedule

Assessment 1 Midterm exam	Week 7
Assessment 2 Tutorials	Week 2, 4, 8
Assessment 3 Oral exam	Week 13
Assessment 4 Final exam	Week 14

Weighing of assessments

Mid-term examination	10%
Final-term examination	60%
Oral examination	10%
Semester work	20%
Total	100%

Any formative only assessments

6- List of references

Adger, W. N. et al. Advancing a political ecology of global environmental discourses . Centre for Social and Economic Research on the Global Environment, 2000. Available online:http://www.cserge.ac.uk/sites/default/files/gec_2000_10.pdf

Borrass Jr., S.; Franco, J. (2012). Global land grabbing and trajectories of agrarian change: a preliminary analysis. Journal of Agrarian Change, 12 (1), 34-59.

Cline-Cole, R. (1996) Dryland forestry: manufacturing forests & farming trees in Nigeria in Leach, M. & Mearns, R (eds). The lie of the land: challenging received wisdom on the African environment.

Foley, J. A., DeFries, R., et al. (2005). Global consequences of land use. Science.. , 309 (5734), 570-574.

Geist, H.J. and Lambin, E.F. (2002) Proximate Causes and Underlying Driving Forces of Tropical Deforestation.Bioscience. 52(2): 143-150

Lambin, E. F., et al. (2001). The causes of land-use and land-cover change: moving beyond the myths. Global environmental change: human and policy dimensions, 11 (4), 261-269.

Leach, M., & Mearns, R. (1996). The lie of the land: challenging received wisdom on the African environment. James Currey Ltd.

Meadows, D. H., Meadows, D. L., Randers, J., & Behrens, W. W. (1972). The limits to growth. New York, 102.

Mol, A.P.J., and Sonnenfeld, D.A., (eds.) 2000, Ecological modernisation around the world: persectives and critical debates, London Routledge.

Nelson, D. R., Adger, W. N., & Brown, K. (2007). Adaptation to environmental change: contributions of a resilience framework. Annual review of environment and resources, 32 (1), 395.

Raworth, K. (2012) “A Safe and Just Operating Space for Humanity: Can we live within the Doughnut? " Oxfam Discussion Paper Available online: https://www.oxfam.org/sites/www.oxfam.org/files/dp-a-safe-and-just-space-for-humanity-130212-en.pdf

Rockström, J., et al. (2009) "Planetary boundaries: exploring the safe operating space for humanity." Ecology and society [electronic resource]. 14.2

Scoones, I. (1998). Sustainable rural livelihoods: a framework for analysis. IDS Working Paper 72. Brighton: IDS

Course coordinator: Prof. Dr. Mohamed Bahnassy

Head of Department:

Date: / /

Specialization Module: Land Use Planning and Assessment

Elective Course: Advanced Land Evaluation

University: Alexandria **Faculty:**

Program on which the course is given: Sustainable Land Management (SLM)

Major or minor element of program: Land Use Planning and Assessment

Department offering the program: Soil and Water Sciences

Department offering the course: Soil and Water Sciences

Academic year / Level: Master

Date of specification approval:

A- Basic Information

Title: Advance Land Evaluation **Code:**

Credit Hours / ECTS: 2 / 6

Lecture: 2 **Tutorial/Practical:** **Total:** 2

B- Professional Information

1 – Overall aims of course

The course aim to provide the students with the types and methods of land evaluation, either land capability or suitability for different crops and determine the limitations of its productivity.

2 – Intended learning outcomes of course (ILOs)

p- Knowledge and understanding:

a1- Understand the different systems of land evaluation.
a2- Identify the limitations of soil productivity.
a3- Demonstrate how to use the different programmes of land evaluation.

q- Intellectual skills:

At the end of this course , the students will be able to:
b1 – Apply the land capability and suitability evaluation.
b2 – Determine the different attributes which the land capability and suitability for different crops.
b 3 – Select the proper system for land evaluation.
b4 – Develop the computer skills in relation to land evaluation.

r- Professional and practical skills:

c1-– Predict the land capability and suitability for different crops in different agroecosystems.
c2- Compare and assessed the different programs of land evaluation.

s- General and transferable skills:

d1- Use the modern technology in land evaluation.
d2- Develop the team work concept in land evaluation.
d3- Improve the creative thinking and communication skills in land evaluation issues.
d4 - Develop the holistic approach in land evaluation studies.

3- Contents

Topic
Week 1-3: Introduction to the aims and principles of land evaluation Types of land evaluation Some definition used in land evaluation
Week 4-5: Land capability evaluation: Concepts and assumption Structure of the classification Survey procedures and presentation of the results.
Week 6-7: Land suitability for different crops : Structure of the classification Procedures of Land suitability classification
Week 8-9: Parametric methods for calculating suitability indices Examples of software used in land evaluation GIS and RS techniques
Week 10-12: Land evaluation in different agroecosystems Irrigated land Dry land Rain-fed agriculture Extensive grazing.

4– Teaching and learning methods

4.1- Lectures
4.2- Seminars
4.3- Case studies and problems
4.4- Internet search

5- Student assessment methods

5.1 Quizzes
5.2 Mid-term Exam
5.3 Oral Examination
5.4 Final-term theoretical Examination

Assessment schedule

Assessment 1 Quizzes	Week: (week 3 & week 10)
Assessment 2 Mid-term Exam	Week: (week 8)
Assessment 3 Oral Exam	Week: (week 12)
Assessment 4 Final-term Exam	Week: (week 13)

Weighing of assessments

Mid-term examination	10%
Final-term examination	70%
Oral examination	10 %
Quizzes	10%
Total	100%

6- List of references

6.1- Course notes

. PowerPoint presentation

6.2- Essential books (text books)

Dent ,D. and Young ,A. (1981):Soil Survey and Land Evaluation. George Allen &Unvrin Ltd.,London U.K.

FAO (1976) :A Framework for Land Evaluation. Bulletin No.32.

6.3- Recommended books

FAO (1985) :Guidelines : Land Evaluation for Irrigated Agric. Bulletin No.55.
FAO (1985) :Guidelines : Land Evaluation for Rainfed Agric. Bulletin No.52.
FAO (1991) :Guidelines : Land Evaluation for extensive grazing Bulletin No.58.

6.4- Periodicals, Web sites, … etc

Soil Sci. Soc. Amer. J.
Geoderma
J. Soil and Water Conservation
J. Soil Sci.
J. Env. Quality
FAO.org

7- Facilities required for teaching and learning

Computer --- Data show

Course coordinator:

Head of Department:

Date: / /

Specialization Module: Land Use Planning and Assessment

Elective Course: Climate Change and Food Security

University: Cairo **Faculty:**

Program on which the course is given: Sustainable Land Management (SLM)

Major or minor element of program: Land Use Planning and Assessment

Department offering the program: Soil and Water Sciences

Department offering the course: Soil and Water Sciences

Academic year / Level: Master

Date of specification approval:

A- Basic Information

Title: Climate Change and Food Security **Code:**

Credit Hours / ECTS: 2 / 6

Lecture: 2 **Tutorial/Practical:** **Total:** 2

B- Professional Information

1 – Overall aims of course

This course presents Earth's climate system and explores the science of global climate change. Course topics include the greenhouse effect, El Niño, ocean circulation, the science of global warming and climate change impacts on agricultural production. Students will learn: how the climate system works; what factors cause climate to change across different time scales and how those factors interact; how climate has changed in the past; how scientists use models, observations and theory to make predictions about future climate; and the possible consequences of climate change for our planet. The course explores evidence for changes in ocean temperature, sea level and acidity due to global warming. Students will learn how climate change today is different from past climate cycles and how satellites and other technologies are revealing the global signals of a changing climate. The course looks at the connection between human activity and the current warming trend and considers some of the potential social, economic and environmental consequences of climate change. Students will explore the concept of food security in all of its dimensions including production, storage, distribution, access and stability. We will place special emphasis on challenges to global food security, constraints on the modern "conventional" farming system, and sustainable strategies to increase global food production. Topics of food production systems, population growth, food production in developing countries, and novel strategies to address food security. Students will describe potential impacts of climate change on food security; and understand how climate change effects fit into the array of food security determinants at local and global level.

2 – Intended learning outcomes of course (ILOs)

a- Knowledge and understanding: At the end of this course will be able to:

1. Demonstrate a solid understanding of the climate system.
2. Explore the concept of energy balance and the greenhouse effect and How does climate works?
3. Evaluate the various factors that shape climate.

4. Describe changes in the Earth's climate through time, with special emphasis on the Ice Ages and the last 1000 years.
5. Describe how past climates contribute to our current understanding of climate change.
6. Illustrate components of the Earth's carbon cycle and quantitatively describe how addition of CO2 to the atmosphere through burning fossil fuels will influence the climate.
7. Describe the character of climate models (GCM) and how they are constructed
8. Examine the drivers and forcing's of climate change and What causes the climate to change
9. Gain the historical perspective necessary to assess our recent changes in climate (i.e. global warming over the last 100 years)
10. Explain the consequences, risks, and uncertainties of climate change.
11. Address What is food security and how is it measured?
12. Outline challenges to global food security,
13. Describe potential impacts of climate change on food security; and understand how climate change effects fit into the array of food security determinants at local and global level
14. How are food systems being transformed by globalization and climate change?,

b- Intellectual skills

b1 Identify causes for climate change and to classify causes based on time-scales.
b2-… Analyze circulation in the atmosphere and ocean.
b3-… Criticizes study of ocean acidification and marine life
b4- Compare among the different scenarios of IPCC for climate change with an evaluation of their environmental impacts
b5- Differentiate between adaptation and mitigation of climate changes
b6- Analyze the risk assessment and management plans for climate change
b7- Choose the appropriate physical equation for expressing earth's temperature
b8- Assess the character of climate models and how they are constructed.
b9- Evaluate the current food system in the context of climate change
b10- Synthesis of several key trends in the food and climate systems
b11- Suggest measures for achieving food security in the face of climate change

c- Professional and practical skills

c1- Identify basic methods for determining past climates.
c2- Calculate earth temperature with changing CO2, Albedo, emmisivity
c3- Use the climate change interactive models
c4- Solve simple mathematical models og climate change
c5- Measure and Monitor GHG emissions
c4- Implement measures to reduce emissions of GHGs to the atmosphere

d- General and transferable skills

d1-1. Develop effective communication skills — Written, oral, interpersonal, group.
d2. Develop higher cognitive skills — Critical thinking, creativity, analytical ability.
d3. Cultivate the virtues — Ethics, responsibility, honor, tolerance, respect for others, empathy.
d4. Develop focus and depth in one or more disciplines.
d5. Develop leadership skills — Ability to stimulate and direct collaborative learning and collaborative action.

d6. Develop a global perspective — Broad intellectual and cultural experience through active
d7. Engagement, an understanding of the interactions among the individual, society, and the natural world.
d8. Prepare for lifelong learning — Independent thinking and learning, learning to find information, asking the right questions..

3- Contents

Week	Topic	Lectures	Assignment
1	Introduction to climate : How Does Climate Work?	• Review the course orientation. • Explore the concept of energy balance and the greenhouse effect. • Analyze circulation in the atmosphere and ocean.	Exercise 1: climate trend of home town Essay 1: 10 years of Climate records (Hometown) Readings: http://www.grida.no/climate/ipcc_tar/wg1/pdf/TAR-01.pdf
2	History of Earth's climate	• Discover how ice cores are used to decipher past climate • Ice Age Climate Cycles - Milankovitch Theory	Exercise 2: Climate trends Through the Last 1000 Years Essay 2, Ice core Science
3	What Causes Climate to Change?	• Explore early climate science with the Keeling Curve. • Global warming: An Overview, -The Role of Carbon Dioxide, / Methane, • The Earth's Carbon Reservoirs	Exercise 3, Calculate GHG footprint of your country. Essay 3, Reduce your footprint
4	GCMs & predictions	• Examine the drivers of climate change. • Understand the relationship between drivers and forcing's.	Exercise 4, Critically read and summarize a scientific article on a GCM. Exercise 4: Test Typical GCM Essay 4, Your GCM
5	How Does the Climate System Respond to Input?	• Climate feedbacks. • How feedbacks can amplify or damp the temperature response. • Temperature response with feedbacks.	Exercise 5, feedbacks https://www.futurelearn.com/courses/causes-of-climate-change/0/steps/13593
6	Climate change impact on agriculture	• Predicted Changes for Agricultural Production Systems Across Regions	Exercise 6 Analyze data http://www.agritrade.org/events/documents/JKEANEweb_FINAL.pdf
7	Constraints on Food and Farming from	• Climate change impacts and consequences for food systems • Indirect consequences of	Essay 6: http://environ.andrew.cmu.edu/m3/s2/subsect/predict.htm

	Climate Change	climate change impacts on the different dimensions of food security	
8	Risk assessment & management of CC impacts	Mitigation Strategies Adaptation strategies Examples of Success stories Climate change adaptation and food security	Exercise 5, Essay 6,
9	Challenges for food systems: Biofuels & GM crops	How will biofuel production affect food security and poverty? GMO and food security http://economia.unipv.it/naf/otherNAFPUBL/Master/GMO/GMOs.pdf	Reading: http://www.fao.org/docrep/017/i3126e/i3126e.pdf
10	Reducing risks to food security from climate change	Disaster risk reduction www.preventionweb.net/files/31093_carloscaramella.pptx	Reading: http://www.sciencedirect.com/science/article/pii/S2211912415300262

4– Teaching and learning methods

Lectures	are used to provide basic information about key concepts and important characteristics of agricultural systems.
Tutorials	serve to reinforce and extend some of the ideas raised in the lectures and practical. They are also designed to require students to find information and interpret it.
Practical demonstrations	are used to illustrate some of the production practices described in the lectures and to in traduce students to some of the terminology used in agriculture. The students work as a group and many of the demonstrations also help to build teamwork and to foster the relationships between students. Aspects of these demonstrations are assessed in a practical exam.
The formal practical classes	are used to (a) introduce students to terms commonly used in agricultural science ('the language of the discipline'), The practicals are interactive with periods of discussion interspersed during the practical exercises. The activities of the practical exercises are assessed in a practical exam at the end of the semester as well as a short report on two practicals.
The essay	is used to develop written communication skills and to encourage critical

	evaluation if information. Students have the choice to resubmit the essay after it is marked after responding to the comments on the essay from the marker. Students are also required to find primary sources of information and are encouraged to use the library data bases to find relevant information.

Workload

The information below is provided as a guide to assist students in engaging appropriately with the course requirements.

The work load is 6 contact hours per week, which will be based on 2-3 hours of lectures, a 1-hour tutorial and 2-3 hours of practical work or practical demonstrations. The amount of contact time will vary from week to week depending on the nature of the practicals. For example, in a number of weeks at Roseworthy there will not be any lectures but there will be demonstrations and practical exercises in the morning and afternoon.

It is expected that students will spend an average of approximately 5 hours per week in addition to the formal contact time on assignments,

5- Student assessment methods

5.1. Assignment	To assess the ability to work independently and discussion
5.2.Homework	To assess understanding
5.3.Term paper	To assess the ability to work in group to form subject from pieces
5.4.Presentation	To assess the ability to communicate and discuss
5.5.Essay report	To assess IT skills
5.6.Case study	To assess the skills of Solve problems, Present data
5.7 Mid-Term Exam	To monitor the learning outcomes
5.8.Oral exam	To assess skill of analysis and discussion
5.9.Practical exam	To assess the professional skills
5.10.Final written exam	To assess the ability to remember, understand, analysis, problem solving skills

Assessment Schedule

	Week No.	%
1. Assignment	Every week	3
2.Homework	Every week	3
3.Term paper	Week 5, 9	5
4.Presentation	10	5
5.Essay report	2, 5, 8	6
6.Case study	6	3
7 Mid-Term Exam	7	10
8.Oral exam	11	10
9.Practical exam	12	15

10.Final written exam		40
Total		100%

Any formative only assessments

6- List of references

6.1- Course notes

Handout and hard copy of PP-presentations

6.2- Essential books (text books)

1- Climate change: Impacts, vulnerabilities And adaptation In developing countries
https://unfccc.int/resource/docs/publications/impacts.pdf
2- Climate Change: Current Issues
https://www.ifw-kiel.de/pub/e-books/climate_change.pdf
3- Food security and global security
http://www.ieee.es/Galerias/fichero/cuadernos/CE_161_B.pdf
3- Chicago Council on Global Affairs, Advancing Global Food Security in the Face of a Changing Climate, 2014. Download at:
http://www.thechicagocouncil.org/files/Studies_Publications/TaskForcesandStudies/GADI/advancing_global_foodsecurity_in_face_climate_change.aspx

6.3- Recommended Readings

Required Text Reading	Optional Supplemental Reading
Intro to Climate Change Research	*The Discovery of Global Warming* by Spencer Weart *Global Climate Change Research Explorer*
History of Earth's Climate	*What is Paleoclimatology?* by US NOAA *Earth's Climatic History* by Pidwirny
Causes of Climate	*Global Warming Facts and Our Future* *Causes of Climate Change* by US EPA Encyclopedia of Earth: *GH effect*
World of Tomorrow: Computer Simulation Models	*Simple Models of Climate Change* by Weart *GCMs* by Weart IPCC *Chapter on GCMs*
Plants & CO_2 Climate Change & Biosphere	*Food Quality* by Bloom Encyclopedia of Earth: *Biosphere, Ecosystem Disturbance, Species Shifts*
Mitigation	IPCC Mitigation of Climate Change Report, *Transportation*
Mitigation	IPCC Mitigation of Climate Change Report, *Energy Supply* IPCC Mitigation of Climate Change Report, *Buildings* IPCC Mitigation of Climate Change Report, *Industry* IPCC Mitigation of Climate Change Report, *Agriculture, Forestry, and Other Land Use*

6.4- Periodicals, Web sites, … etc

7- Facilities required for teaching and learning

Course coordinator:

Head of Department:

Date: / /

Specialization Module: Land Use Planning and Assessment

Elective Course: Modeling of Land Use Changes

University: Alexandria **Faculty:**

Program on which the course is given: Sustainable Land Management (SLM)

Major or minor element of program: Land Use Planning and Assessment

Department offering the program: Soil and Water Sciences

Department offering the course: Soil and Water Sciences

Academic year / Level: Master

Date of specification approval:

A- Basic Information

Title: Modeling land Use Changes **Code:**

Credit Hours / ECTS: 2 / 6

Lecture: 1 **Tutorial/Practical:** 2 **Total:** 2

B- Professional Information

1 – Overall aims of course

Continual, historical, and precise information about land use/cover changes of Earth's surface is extremely important for any kind of sustainable development program, where land use/cover serves as one of the major input criteria. As a result, the importance of analyzing, monitoring, and mapping of land use/cover and its change as well as updating it through time has been acknowledged by various research workers.

Modeling of land use/cover change is an advanced course on the use of satellite remote sensing to monitor land use and land cover change. The course emphasizes digital image processing techniques to detect landscape dynamics using remote sensing data. Topics include pre-processing data for change detection, accuracy assessment of change maps, and methodologies to detect changes such as urban expansion, desertification, deforestation, seasonal variations in vegetation, agricultural expansion, and vegetation health.

2 – Intended learning outcomes of course (ILOs)

- Understand the main Remote Sensing Systems and programs (sensors, platforms, etc.) and assess their potential to land use/cover change monitoring.
- Demonstrate an understanding of how satellite data can provide spatial information for land use/cover change modeling and consequently for sustainable land management.
- Design and implement methods of digital image processing ranging from preprocessing to image classification, and accuracy assessment for the identification of land use inventories.
- Skill to use change detection techniques for land use/cover change modeling.
- Demonstrated ability to plan and conduct projects in the area of land use/cover change modeling for sustainable land management

Keywords: Land use change detection, land use and land cover classification systems, satellite image classification, land use models

3- Contents

Topic
Week 1: Introduction to land use/cover change analysis Week 2: Land use and land cover classification systems (Anderson 1967, FAO LCCS 2015, CLUE 2010, ect. …) Week 3: Analytic Hierarchy Process (AHP) Week 4: Remote sensing Data collection tools, handling and manipulation Week 5 : Top-down and bottom-up dynamics in land use Week 6: Impacts of land use and land cover changes Week 7: Vegetation spectral indices Week 8: Urban (non-vegetation) and water spectral indices Week 9: Image classification and change detection techniques Week 9: Land use models and how to select suitable one Week 10: GIS as a land use modeling tool Week 11-12: Case Studies and students discussions

4– Teaching and learning methods

- Discussion
- Presentation
- Midterm exam
- Problem Assignment
- Project Assignment
- Final exam

5- Student assessment methods

Weighing of assessments

Mid-term examination	10%
Final-term examination	60%
Oral examination	10%
Practical examination	15%
Semester work	5%
Total	100%

6- List of references

Natural Resources Canada: Fundamentals of Remote Sensing. accessed December 2016. http://www.nrcan.gc.ca/node/9309

Coppin, P., Jonckheere, I., Nackaerts, K., Muys, B., and Lambin, E. (2004). Digital change detection methods in ecosystem monitoring: A review. International Journal of Remote Sensing 25 (9), 1565–1596.

Eastman, R. J. (2006). IDRISI Andes: Guide to GIS and image processing. Worcester,MA: Clark Labs, Clark University.

ERDAS. (2007). ERDAS imagine professional: Tour Guides. Norcross, GA: Leica Geosystems Geospatial Imaging, LLC.

Singh, A. (1989). Digital change detection techniques using remotely-sensed data. International Journal of Remote Sensing, 10(6), 989e1003.

Lu, D., Mausel, P., Brondizio, E., & Moran, E. (2004). Change detection techniques. International Journal of Remote Sensing, 25(12), 2365e2407.

Jensen, J.R. (2005). Introductory Digital Image Processing: A Remote Sensing Perspective. 3rd Edition. Prentice-Hall, Upper Saddle River, NJ.

Abd El-Kawy, O.R., J.K. Rød., H.A. Ismail and A.S.Suliman (2011). Land Use and Land Cover Change Detection in the Western Nile Delta of Egypt using Remote Sensing Data. Applied Geography, 31; 483-494.

European Communities. 2001. Manual of concepts on land cover and land use information systems. Luxembourg: Office for Official Publications of the European Communities

European Communities. 2007. INSPIRE - Infrastructure for Spatial Information in Europe - Data Specification on Land Use – Technical Guidelines. European Commission Joint Research Centre.

FAO. 2016. Land Cover Classification System – software V3. FAO, Rome.

Course coordinator:

Head of Department:

Date: / /

Specialization Module: Land Use Planning and Assessment

Elective Course: Land Use Policies and Legislations

University: Alexandria **Faculty:**

Program on which the course is given: Sustainable Land Management (SLM)

Major or minor element of program: Land Use Planning and Assessment

Department offering the program: Soil and Water Sciences

Department offering the course: Soil and Water Sciences – Civil Law (Faculty of Law)

Academic year / Level: Master

Date of specification approval:

A- Basic Information

Title: Land Use Policies and Legislations **Code:**

Credit Hours / ECTS: 2 / 6

Lecture: 2 **Tutorial/Practical:** **Total:** 2

B- Professional Information

1 – Overall aims of course

This course outlines the relationship between land use policies and legislations as affects the social and environmental aspects of the community. Topics covered in the course will include Egypt environment law, national laws related to pesticides use, farming, water use in agriculture, Agricultural incentive, and use of wastewater in agriculture. Students will be encouraged to think critically and creatively about the applications of these laws and their role in orchestrating the different uses of agricultural practices.

2 – Intended learning outcomes of course (ILOs)

The student will be introduced to the different laws and policies related to different agricultural activities and practices, as well as the water crisis in the world.

3- Contents

Topic
Week 1: introductory note about agricultural policies Week 2: Egypt Sustainable development strategy until 2030 Week 3-4: Egypt sustainable agricultural development strategy until 2030 Week 5-6 : Egypt environment law 4 – 1994 and its amendments Week 7: Egypt land reclamation strategy Week 8: Egypt water resource management strategy Week 9: Agricultural reform in Egypt Week 10: Pesticides use and regulation laws

Week 11: Farming and nursery laws Week 12: Case Studies

4– Teaching and learning methods

4.1-Discussions
4.2-Seminars
4.3-Case studies
4.4-Presentations

5- Student assessment methods

2000 word essay – 'critically examine the relationship between different agricultural policies and legislations

Weighing of assessments

Mid-term examination	20%
Final-term examination	70%
Oral examination	10%
Total	100%

Any formative only assessments

6- List of references

6.1- Course notes

Hand-outs will be distributed weekly to the sdudents

6.2- Essential books (text books)

Local laws related to agriculture and water use in Egypt.

7- Facilities required for teaching and learning

Computer lab – Internet -

Course coordinator:

Head of Department:

Date: / /

Specialization Module: Environmental Soil and Water Resources Management

Elective Course: Advanced Soil and Water Pollution and Remediation

University: Alexandria **Faculty:**

Program on which the course is given: Sustainable Land Management (SLM)

Major or minor element of program: Environmental Soil and Water Resources Management

Department offering the program: Soil and Water Sciences

Department offering the course: Soil and Water Sciences

Academic year / Level: Master

Date of specification approval:

A- Basic Information

Title: Advanced Soil and Water Pollution and Remediation **Code:**

Credit Hours / ECTS: 2 / 6

Lecture: 1 **Tutorial/Practical:** 2 **Total:** 2

B- Professional Information

1 – Overall aims of course

This course will examine current interdisciplinary topics on soil and groundwater pollution and their remediation. Topics include: environmental pollutants and their types and sources in the environment, pathways to contaminate soils and groundwater, impacts on the environment, fates and transport in soils, and remediation, vulnerability and risk assessment of soil and groundwater pollution, and selected case studies on soil and groundwater pollution with various pollutants. Development and application of new remediation technologies of contaminated soils and groundwater will be the focus of this course.

2 – Intended learning outcomes of course (ILOs)

t- Knowledge and understanding:

a1- Know different types and sources of pollutants in soils and groundwater.

a2- Identify different environmental impacts of soils and groundwater pollution.

a3- Explain pathways of different pollutants in the environment.

u- Intellectual skills:

b1-Classify remediation techniques of polluted soil and groundwater resources.

b2-Design a strategic monitoring plan of soil and water resources.

b3-Assess the vulnerability and risk of groundwater to pollution with different pollutants.

v- Professional and practical skills:

c1-Show the behavior and dynamics of different pollutants in soils and groundwater.

c2-Illustrate the governing processes and factors controlling transport and fate of pollutants in soil and groundwater.

c3-Examine the obtained data of groundwater pollution risk assessment.

c4- Calculate parameters related to sorption, degradation and transport of pollutants in soils

w- General and transferable skills:

d1-Use the computer capabilities of editing reports, presentations and calculations.

d2- Communicate with different agencies and labs concerned with environmental soil and water issues.

3- Contents

Week No.	Topic
1	Review of types, sources and environmental impacts of contaminants of soils and groundwater resources.
2	Heavy metals and radionuclides in the soil system: Speciation, biochemical effects and bioavailability and uptake by plants.
3	Pollution mechanisms and soil-pollutants interaction: Physical processes and mechanisms of pollution (Adsorptive & Non-adsorptive)- pollutants transport (Microscopic & Macroscopic dispersion)- Behavior of Non-Aqueous Phase Liquids (NAPLs) in Soils.
4	Pollutants' alteration, transformation, and initiation of chemical changes within the soil: Chemical mobility, Dissolution-precipitation, Chemical transformation processes, Biodegradation, enzymatic and biologically supported transformations.
5	Monitoring of soil pollution: monitoring procedures and plans, Field and laboratory investigations, Biological monitoring.
6	Planning and realization of soil remediation- Categories of pollutants- scale of pollution- Risk level- Soil remediation technologies (Chemical and physical remedial techniques, Biological treatment, Solidification/Stabilization methods & Thermal treatment).
7	Review of groundwater systems- Physical properties- Different types of groundwater systems- Geological, Physical and hydraulic properties of different types of aquifers Chemical properties, redox geochemistry, microbiology.
8	The concept of groundwater quality- Natural degradation of groundwater quality- Point and nonpoint sources of pollution- Contaminants in groundwater (Heavy metals, veterinary drugs and hormones, pesticides).
9	Pollutants in groundwater environments: Phase partitioning, sorption, evaporation, Plumes in groundwater, Dispersion & retardation, Understanding transport and dissolution, Redox reactions and biodegradation, Monitored natural attenuation, Quantification and degradation pathways of pollutants using stable isotopes

10	Evaluation of groundwater vulnerability to pollution using DRASIC model: Hydrologic settings, Factors affecting pollution potential, Assignment of factor weightings, Testing the model and displaying the system, Coupling of GIS and DRASTIC model- Problems.
11	Risk assessment of groundwater pollution: Fundamental concept of pollution risk, Organizational basis for risk assessment, Characterization of subsurface contaminant load, Estimation of point and nonpoint-source pollution, implementation of risk assessment- Demonstration of a study case.
12	Groundwater remediation using active and passive processes: The basics of pump-and-treat systems, The basics of permeable reactive barrier (PRB) systems, Cost comparison between pump-and-treat and PRB systems, Engineering of permeable reactive barriers- Case studies.
13	Oral and Practical Exams
14	Final Exam

4– Teaching and learning methods

4.1. Lectures.
4.2. Group discussion.
4.3. Assignments.
4.4. Seminars.
4.5. Case study.

5- Student assessment methods

5.1. Case study report **to assess** comprehensive thinking and criticism.
5.2. Oral exam **to assess** self confidence, interaction and presentation skills.
5.3. Practical exam **to assess** connecting theoretical with application and practices.
5.4. Written exam **to assess** understanding of key concepts and relationships.

Assessment schedule

Assessment 1: Case study report	Week: 7
Assessment 2: Oral exam	week: 13
Assessment 3: Practical exam	Week: 13
Assessment 4: Written exam	Week: 14

Weighing of assessments

Mid-term examination	10%
Final-term examination	40%
Oral examination	10 %
Practical examination	20%
Semester work	10%
Other types of assessment	10%
Total	100%

Any formative only assessments

6- List of references

6.1- Course notes

Handouts and electronic lecture notes and power point presentation will be provided.

6.2- Essential books (text books)

Mirsal, I. A. (2008) Soil Pollution: Origin, Monitoring & Remediation. 2nd Ed. Springer-Verlag Berlin Heidelberg, Germany.

Berkowitz, B., I. Dror, and B. Yaron (2008) Contaminant Geochemistry: Interactions and Transport in the Subsurface Environment. Springer-Verlag Berlin Heidelberg, Germany.

6.3- Recommended books

Foster, S. and R. Hirata (1995) Groundwater Pollution Risk Assessment. Pan Am. Center Sanitary Eng. Lima, Peru.

6.4- Periodicals, Web sites, … etc

Aisopou, A., P. J. Binning, H. Albrechtsen and P. L. Bjerg (2015) Modeling the Factors Impacting Pesticide Concentrations in Groundwater Wells. GROUNDWATER. 53: 722–736

Baloch, M. A. and L. Sahar (2014) Development of a Watershed-Based Geospatial Groundwater Specific Vulnerability Assessment Tool. GROUNDWATER. 52: 137–147.

Evaluation Report TE-97-01. Carnegie Mellon University, Department of Civil and Environmental Engineering. Pittsburgh, PA

Kim, Y.-J., C.J.G. Darnault, N.O. Bailey, J.-Y. Parlange, and T.S. Steenhuis. (2005) An equation for describing solute transport in field soils with preferential flow paths. Soil Sci. Soc. Am. J. 69, no. 2: 291–300.

Sims, J.L., R.C. Sims, and J.E. Matthews (1989) Bioremediation of Contaminated Surface Soils. EPA Environmental Research Laboratory. Report No. 800/9-89/0/3

Trisha B. Johnson, Larry D. McKay, Alice C. Layton, Sidney W. Jones, Greg C. Johnson, Jennifer L. Cashdollar, Daniel R. Dahling, L., F. Villegas, G. S. Fout, D. E. Williams and G. Sayler (2011) Viruses and Bacteria in Karst and Fractured Rock Aquifers in East Tennessee, USA. GROUNDWATER. 49: 98–110.

7- Facilities required for teaching and learning

Laptop - Data show - VIS/UV Spectrometer- Various chemical analysis lab facilities.

Course coordinator:

Head of Department:

Date: / /

Specialization Module: Environmental Soil and Water Resources Management

Elective Course: systems Approach to Water Resource Management

University: Alexandria **Faculty:**

Program on which the course is given: Sustainable Land Management (SLM)

Major or minor element of program: Environmental Soil and Water Resources Management

Department offering the program: Soil and Water Sciences

Department offering the course: Soil and Water Sciences

Academic year / Level: Master

Date of specification approval:

A- Basic Information

Title: Systems Approach to Water Management **Code:**

Credit Hours / ECTS: 2 / 6

Lecture: 1 **Tutorial/Practical:** 2 **Total:** 2

B- Professional Information

1 – Overall aims of course: By the end of this course the student should be able to:

- Diagnose surface and ground water resources at different spatial and temporal scales;
- Construct water resources protection plans and
- Plan sustainable water resources management strategies.

2 – Intended learning outcomes of course (ILOs)

x- Knowledge and understanding:

a1- Describe the hydrological water cycle;
a2- Identify surface and ground water resources characteristics and
a3- Discuss the appropriate technical measures to improve water management at different spatial and temporal scales.

y- Intellectual skills:

b1- Investigate the expected performance of the proposed water management measures and analyze these at (i) field/farm level and (ii) watershed level and
b2- Compose water management issues into research topics that are conceptually and methodologically grounded.

z- Professional and practical skills:

c1- Design intervention water management plans in a professional manner.

aa- General and transferable skills:

d1-Provide an education suitable for a wide variety of careers in the environment following graduation

3- Contents

In comparison with other natural resources, water resources are a very special nature and essentially unique, as they do not have any substitute and their presence is a necessary condition for human existence and the development of any kind of life on earth. Therefore, Understanding the character, occurrence, and movement of water recourses to achieve sustainable management strategies at spatial and temporal scales is the main goal of this course “System approach to water management ". Students must have some background in all aspects of the hydrologic cycle. They are concerned with precipitation, evaporation from open surfaces, evapotranspiration from ground, surface water, seepage, infiltration, ground water, aquifers and saltwater encroachment. Readers interested in one of these topics will find a comprehensive treatment of the subjects in the literature. Although we have attempted to provide a broad interdisciplinary coverage of the interaction between surface water and ground water principles taking into consideration the different historical background of the attendants; Agronomy, Engineering, environment, and soil and water sciences. Thus the course is designed to be accessible to a variety of attended graduate students. From the practicality point of view, it was not possible to include detailed information on the technical aspects of ground water such topics as well pumps, ground water sampling methods, procedures for chemical analysis of ground water and also the simulation models of ground water. The principles of these practical and important techniques and different models are discussed in detailed in the relevant literature. The objective of this course lectures is to provide a brief presentation on the general topics associated with water management. An appropriate conjugated connected illustrative figures with numerical examples are also presented, in hopes of reducing stress and panic the first few times performing a new task.

Topic	No. of Hours	Lecture	Practical/Tutorial
A- Water resources	**8**	**4**	**-**
B- Hydrological structures	**4**	**2**	**-**
C- Modeling of water resources systems management	**8**	**4**	**-**
D- Case studies of on system approach of water resources	**4**	**2**	**-**

3.1- Tentative Timetable for the course:

Topic No.	Subjects
Topic A	**Week 1: Introduction in water resources management. An overview of water management issues.** **Surface water:** Hydrological cycle; precipitation; surface water bodies such as rivers, lakes and reservoirs; infiltration; evapotranspiration; recharge; and surface runoff.
	Week 2-3: Ground water: Ground water occurrences; source of ground water; factors controlling ground water; water bearing properties of soils and rocks; type of aquifers; ground water flow; functions of ground water systems; ground water exploration; aquifer performance test; saltwater encroachment ; well-acceptance tests and well efficiency. Application of Darcy's law in ground water flow: Case1: horizontal flow; Case2: horizontal flow.
Topic B	**Week 4: Precipitation and conveying system:** Measurement of rainfall; rainfall harvesting; roof water harvesting; water harvesting by ponds. Conveying system network; designing open channels; measuring devices for water quantities. **Virtual and sweet water:** The concepts of water footprint and virtual water; Strategic issues; Specific water demand per crop type per country; Global trade in virtual water. Sweet water: Artificial rain; affordable desalinization.
	Week 5-6: Hydrological structures: Percolation tanks; Check dams; Aquifer storage recovery wells.
Topic C	**Week 7: Applied system analysis:** What is system approach? Types of models (mathematical and simulation) **Methods of water resources system management:** Simulation- optimization- multi-objective analysis
	Week 8-9: Water management under uncertainty approach (Fuzzy models) **Water resource system management for sustainable development** Principle, fairness, risk and reversibility of sustainable water resource decision-making
	Week 10: Implementation of water resource management tools using simulation, optimization and multi-objective
	Week 11: Case study 1. rain water harvesting in North West Coast: Open discussions and conclusion

Topic D	**Week 12: Case study 2**. Irrigation water management in the Nile Delta: Open discussions and conclusion

4– Teaching and learning methods

4.1- Class Participation
4.2- Frontal lectures
4.3- Microteaching
4.4- Home reading and assignments
4.5- Discussion sessions
4.6- Course website

5- Student assessment methods

5.1 Exercises are useful to assess the skills of solving problems and presenting data and discussion;
5.2 Midterm exam is useful to assess the skills of understanding the scientific background of the material studied in the program;
5.3 Case study presentation is important to assess the skills of ensuring academic integrity;
5.4 Oral exam is useful to assess the skills of engaging in oral communication on a familiar topic covered by the class syllabus and probing of the students' knowledge and
5.5. Final exam is useful to test the students' knowledge and understanding of a topic, as well as their ability for application, analysis, integration and synthesis.

Assessment schedule

Assessment 1 Exercises	Weeks: 2^{nd} ,5^{th} ,7^{th} ,9^{th} ,11^{th} , and 12^{th} .
Assessment 2 Midterm exam	week: 7^{th}
Assessment 3 Case study presentation	Week: 12^{th}
Assessment 4 Oral exam	Week: 13^{th}
Assessment 5 Final exam	Week 14^{th}

Weighing of assessments

Exercises	% 15
Midterm exam	% 15
Case study presentation	%15
Oral exam	% 15
Final exam	% 40
Total	% 100

6- List of references

6.1- Course notes

Course handouts in a PDF format for different topics will be available for students.

6.2- Essential books (text books)

Patel, A.S. and Shah, D.L.2008. Water management. New Age International Limited, New York, USA, 2008.

6.3- Recommended books

- **Anderson**, M.P., and Woessner, W.W.1992. Applied Ground water Modeling: Simulation of
- flow and advective Transport. Academic Press, San Diego, CA.
- **Arora,** K.R. 2002. Irrigation, Water Power and Water Resources Engineering. Standard Publishers Distributors. NAISARAK, DEIHI.
- **Ghosh,** S.N., and Desai, V.R. 2006. Environmental Hydrology and Hydraulics. Published by Science publishers, Enfield, NH, USA.
- **Glover**, J., and Mc Culloch, J.S.G. 1968. The empirical relationship between Solar radiation and hours of sunshine. Q.J.R. Meteorol. Soc. 82: 172 – 175

6.4- Periodicals, Web sites, … etc

A course web site that will be constructed in the near future is the main website for the class

7- Facilities required for teaching and learning

- **Computers and internet**
- **Video films**
- **Field visits**
- **Data-show**

Course coordinators: Gaber M. Hassan, Ph. D.

Rasha M. Badr, Ph. D.

Head of Department:

Date: / /

Specialization Module: Environmental Soil and Water Resources Management

Elective Course: Socioeconomic Aspects of Water Resource Management

University: Alexandria **Faculty:**

Program on which the course is given: Sustainable Land Management (SLM)

Major or minor element of program: Environmental Soil and Water Resources Management

Department offering the program: Soil and Water Sciences

Department offering the course: Agricultural Economics

Academic year / Level: Master

Date of specification approval:

A- Basic Information

Title: Socioeconomic Aspects of Water Resource Management **Code:**

Credit Hours / ECTS: 2 / 6

Lecture: 2 **Tutorial/Practical:** **Total:** 2

B- Professional Information

1 – Overall aims of course

This course is designed to offer materials that can be applied in assessing water resource allocation problems and the socioeconomic aspects of water resource management. It displays an economist's perspective about the allocation of water resources, and other related topics. In this course, the prospective graduate student heading for a Master's degree in sustainable land management (SLM) is introduced to water resources, law, and resource economics concepts. Economics is of critical importance in determining the allocation of water; namely, where water flows and how and when it is stored. The course also introduces the student to solving the problem of how society can try to make water move from one place to the another, especially when this another place is not a natural place for water to end up. This course also shows how economics also plays a role in determining existing level of water quality for many water bodies, because society engages in certain economic activities that are polluting, and then must decide whether and how much of this pollution to clean up, given the cost of doing so. The course of is a special significance to the Master's degree in SLM as water constitutes the largest portions of land resources.

Course Keywords: *Physical Scarcity, Water Flows and Stocks, Water Balance Models, Water Supply, Water Law, The Water Market, Market Failures and Externalities, Discounting and Uncertainty, Transactions Costs, Water Quality, Control Cost Analysis, Benefits Analysis, Water Prices and Rates, Elasticities, Water Factor Demand, Water Values, Modelling Irrigation Technologies, Market-Based Incentives, Supply and Demand Uncertainties for Water, Groundwater, Environmental and Recreational Values.*

2 – Intended learning outcomes of course (ILOs)

bb- Knowledge and understanding:

a1- Identify the roles each entity in the economy plays within the water institutional, economic, and social framework and settings.
a2- Explain how and why economists perceive water as a matter of peculiar nature.
a3- Describe how economics can affect the allocation, movement, and utilization of water resources.

cc- Intellectual skills:

b1- Decide on policies within the water institutional, economic, and social setting.
b2- Investigate how to analyze the different utilization of water resources in a socioeconomic framework.
b3- Assess the socioeconomic factors impacting water-quality management practices.

dd- Professional and practical skills:

c1- Examine designs implemented for economic assessment of water resources policies.
c2- Illustrate issues related to water management and its sustainability.

3. Course Contents

Contents
Week 1: Introduction to water resources economics and law - Earth's water supply, physical scarcity, water flows and stocks, water balance models, water supply and runoff, types of human water use, unnatural moving of surface water, water law, Economics, markets, and water resources.
Week 2: Review of basic microeconomics applied to water resources - Part 1 - consumer theory, price-elasticity of demand, production, cost functions, constrained optimization.
Week 3: Review of basic microeconomics applied to water resources - Part 2 - consumer's surplus, supply side of water, producer's surplus and shadow prices, water markets, efficient allocations, Pareto criterion, market failure and water, externalities in consumption, discounting: the farmer, water value, and uncertainty, water markets and transactions laws.
Week 4: Water quality issues - valuation of water quality improvement, assessing economic success or failure of water quality legislation, control cost analysis, benefits analysis.
Week 5: Water prices and rates for residential use

- The supply side, the water utility as regulated monopolist, the natural monopoly, rates and residential water supply, purpose and types of rates, embedded cost rate structure, rating alternatives, the demand side, elasticities, municipal water supply.
Week 6: Water and agriculture - Water as factor demand, approaches to finding the value of water, uncertainty, government intervention, modeling production and irrigation technologies, empirical application of agricultural production models, estimated value of water in agriculture, water quality in agriculture, economic solutions and market-based alternatives, market failures, uncertainty and agriculture, uncertainty and expected profit, the farmer as speculator or investor.
Week 7: Uncertainty and risk in supply and demand of water resources - Demand and supply under uncertainty, consumer demand, the expected utility model, demand for water in the context of risk, factor demand under uncertainty, supply under uncertainty, risk premiums, futures markets and forward contracting, water's allocative efficiency under risk.
Week 8: Groundwater - Meaning of groundwater, managing or mining groundwater, groundwater as a common property resource, valuing groundwater, groundwater's future.
Week 9: In situ uses of water: Environmental and recreational uses - Water-based recreation, quality changes and recreation, non-market valuation applied to water, water-based values and recreation, *In situ* or instream flow value estimates. Case studies.
Week 10: Floods and droughts and the role of dams - economic damages of floods, costs and benefits of flood control, market failure and the optimal provision of flood control, drought impacts, the water bank game, case studies
Week 11: Water issues in the developing countries - Economic problems in developing and low-income countries, violent conflicts and the potential for more in the future, economic reform, water markets and water pricing.
Week 12: Summary, suggestions for future work, and conclusions - Water transfers, markets, and water law, uncertainties, economic analysis in developing countries.

4– Teaching and learning methods

4.1- Lectures using PowerPoint Presentations.

4.2- Comparative Case Study Analysis for water management in the developed and the developing world.

4.2- Homework Assignments

4.3- Searching scientific articles which handle the socioeconomics aspects of water resources in different parts of the world. Critical analysis of some articles is to be made.

5- Student assessment methods

5.1 Oral to assess the skills of analyses and discussion.
5.2 Case study analysis to assess the skills of problem solving and data presentation and discussion.
5.3 A midterm exam to evaluate the progress of students in the middle of the semester.
5.4 A written final exam to assess the student's overall understanding of the main concepts of the course.

Assessment schedule

Assessment 1: Midterm Exam – Week 7
Assessment 2: Oral Exam – Week 13
Assessment 3: Case Study - Week 6 till 10
Assessment 4: Final Exam - Week 14

Weighing of assessments

Mid-term examination:	10%
Final-term examination:	50%
Oral examination:	10%
Homework and case study analysis:	30%
Total:	100%

6- List of references

6.1- Course notes

- All electronic notes are to be sent to students by e-mails or through the creation of a website to the students on Facebook or any other website.

6.2- Essential books (textbooks)

Shaw, Douglas W. Water Resource Economics and Policy: An Introduction. Edward Elgar Publishing Limited, Cheltenham, UK – Northampton, MA, USA. 2005. ISBN 1 84376 917 4 (cased).

6.3- Recommended books

Ronald C. Griffin. Water Resource Economics: The Analysis of Scarcity, Policies, and Projects. ISBN: 9780262072670. 2005

Walter Lukenga. Water Resource Management. www.bookboon.com 1st Edition. ISBN 978–87-403-0978-2. 2015.

6.4- Periodicals, Web sites, … etc.

Determination of a number of research articles written on the socioeconomic aspects of water resources is to be made. Research articles are mostly found on the following link: http://ageconsearch.umn.edu/. This is a scientific research link associated with the University of Minnesota, Twin Cities, USA, Department of Applied Economics.

7- Facilities required for teaching and learning

- Computer
- Data Show.

Course coordinator:

Head of Department:

Date: / /

Specialization Module: Environmental Soil and Water Resources Management

Elective Course: Sustainable Soil Fertility Management

University: Alexandria **Faculty:**

Program on which the course is given: Sustainable Land Management (SLM)

Major or minor element of program: Environmental Soil and Water Resources Management

Department offering the program: Soil and Water Sciences

Department offering the course: Soil and Water Sciences

Academic year / Level: Master

Date of specification approval:

A- Basic Information

Title: Sustainable Soil Fertility Management **Code:**

Credit Hours / ECTS: 2 / 6

Lecture: 2 **Tutorial/Practical:** **Total:** 2

B- Professional Information

1 – Overall Aims of Course

This course will provide an advanced sustainable management of soil fertility as it relates to plant nutrients and soil fertility, plant nutrient use and environment, soil fertility problems; challenges and responses at the farmer's level, modelling yield response to added nutrients in farming systems, and computer based diagnostic soil fertility tools. Students are expected to gain an understanding of the principles and practices of nutrient requirements and management for crop production and the implications of soil fertility management practices on agricultural sustainability and environmental protection.

Moreover, the course is organized in a foreword three main subjects. Part I: aims at integrating aspects controlling availability of nutrient to plant uptake in the soil/plant/nutrient system and their interrelationships and interaction. Part II: aims at optimization of fertilizer use through applying scientific bases and calculations and integrating organic matter application. And Part III: treats the relationships between mineral nutrition and balance between economic production-food quality-environmental risks. Case studies and practical parts of this course are designed to strengthen the theoretical part.

2 – Intended Learning Outcomes of Course (ILOs)

e- Knowledge and Understanding:

a1- Explain What soil fertility means and what makes a soil fertile and productive.

a2- Identify soil nutrient problems and opportunities.

a3- Describe the plant nutrient balance system.

a4- list benefits of integrated nutrient management system.

f- Intellectual Skills

b1- Demonstrate how mineral nutrients influence plant growth and understand the importance of nutrient placement and management in various soils and plant production systems.

b2- Apply a participatory approach to designing and implementing an integrated nutrient management program.

b3- Propose methodologies and tools to assess suitability, economic feasibility, and impacts of Integrated Soil Fertility Management (ISFM) on agricultural production, soil fertility, and the environment.

b4-Propose fertilizer recommendations that are agronomically efficient, environmentally sustainable, and economically profitable.

g- Professional and Practical Skills

c1- Apply modeling yield response to added nutrients.

c2- Evaluate sources and flows of nutrients in farming.

c3- Practice nutrient flow analysis.

c4- Use computer based diagnostic soil fertility tools.

h- General and Transferable Skills

d1- Communicate and present soil fertility idea, principles and theories through written, oral and visual means.

d2- Evaluate approaches to problem-solving related to soil fertility.

d3- Develop skills in communicating tasks within a group setting, take part in group discussions and co-operative learning.

3- Contents

weeks	topics
1-2	**Introduction to soil fertility,** **Essential nutrients, Plant-soil-nutrients interrelationship;** • Processes affecting nutrient availability. Soil chemical, physical, biological properties affecting availability-processes. Plant factors affecting availability-processes. • How to manage processes towards more ecological use of a nutrient?
3	**Diagnostic techniques for nutritional disorders (soil fertility evaluation)** • Soil and plant tests for nutrients and their interpretations. • Soil constituents as modifiers for soil test interpretation. • Case study I. available or published data (reports)
4	**Case study II. Field trip, soil and plant sampling**
5-6	**Scientifically based fertilizers recommendation** • Based on soil test • Based on soil budget • Based on both soil and plant test (fruit crops)
7-8	**High vs. low agriculture inputs** • Over fertilization and nutrient unbalance • Nutrient mining and consequence effects • Nutrient deficiency symptoms and correction • Case studies (reports)

9-10	**Integrated Nutrient Management (INM) and Best Management Practices (BMP)** • Goal of INM and BMP • Nutrient application, conservation, cycling and alternative sources • Nutrient use efficiency by crops and cropping systems. • Models creations through discussion groups and home work
11	**Site specific soil fertility management**. • Case studyII, fertility status-, recommendation-, and yield- mapping (variable rate technology and GIS as tool).
12-13	**Mineral nutrition (MN) vs human health and environmental risks** • MN vs food quality • MN vs. plant diseases • MN vs. environmental risk • How to manage nutrients with care?
14	**Student's presentations for both case studies.**
15	**Final exam**

Case study and Lab work.

week	Activity
1-2-3	------
4	Field trip, soil and plant sampling
5	Soil and plant samples preparation for analysis
6	EC, organic matter, CEC determinations
7-8	Available nutrients in soil
9-10	Plant analysis for nutrient content
11-13	Data analysis and reporting
14	Project presentations

4. Teaching and Learning Methods

4.1. Mini lectures,
4.2. Team work, problem solving and consultation,
4.3. Watching educational videos or/and accessing web sites searching for specific information,
4.4. homework/assignment,
4.5. Interacting with instructors or classmate (e-mail, new groups and browse documents).
4.6. Hands-on experience during the laboratory time.

5- Student Assessment Methods

5.1. Group Assignments to assess written communication, time management, teamwork, problem solving, and IT skills
5.2. Oral exam and presentation to assess oral communication skill
5.3. Written exam to assess knowledge and intellectual skills
5.4. Research paper to assess self learning and practical skill

Assessment Schedule

Assessment 1: Assignments reports and presentations	During the semester
Assessment 2: Midterm exam	Week 6th
Assessment 3: Oral exam	Week 11th
Assessment 4: research paper presentation	Week 12th
Assessment 5: Final exam	Week 13th

Weighting of Assessments

Mid-term Examination	10%
Final-term Examination	60%
Oral Examination.	10%
Research Paper	10%
Semester Work	05%
Other types of assessment	05%
Total	100%

6- List of References

6.1- Course Notes

Environmental Management of Soil Fertility (Hand-out)

6.2- Essential Books (Text Books)

1. Havlin, J.L.; J.D. Beaton; S.L. Tisdale and W.L. Nelson. 1999. Soil Fertility and Fertilizers. An Introduction to Nutrient Management. Sixth edition, Prentice Hall, New Jersey, USA.

6.3- Recommended Books

1. Foth, H.D. and B.G. Ellis. 1996. Soil fertility. John Wiley and Sons, New York.
2. Marschner, Horst. 1995. Mineral nutrition of higher plants (2nd Edition). Academic Press Inc. San Diego, CA, USA.
3. Mengel, K. and E.A. Kirkby. 1987. Principles of plant nutrition (4th Edition). International Potash Institute, Worblaufen-Bern, Switzerland.
4. Prasad, R. and J.F. Power. 1997. Soil fertility management for sustainable agriculture. CRC Press LLC, Lewis Publishers, Florida, USA.
5. Rodriguez-Barrueco. 1994. Fertilizers and Environment. Kluwer Academic Publishers, The Netherlands.
6. Westerman, R.L. 1990. Soil testing and plant analysis (3rd Edition). Soil Science Society of America, Inc., Madison, WI.
7. T. Defoer, A. Budelman, C. Toulmin, S. Carter, J. Ticheler, 1998. Soil fertility management in Africa: A resource guide for participatory learning and action research. A KIT Publication, Amsterdam, The Netherlands.

6.4- Periodicals, Web Sites, … etc

- Soil Fertility Management - http://agguide.agronomy.psu.edu/CM/Sec2/Sec2toc.html
- Michigan State University's CSS 430: Soil Fertility and Chemistry - http://www.css.msu.edu/css430/
- Worldwide Portal to Information on Soil Health - http://mulch.mannlib.cornell.edu/browse.html
- Guidelines and manuals (FAO's AGL Division) - http://www.fao.org/ag/agl/agll/farmspi/docs.stm#ffs-manual
- Online documents on plant nutrition (FAO's AGL Division) - http://www.fao.org/ag/agl/agll/oldocsp.jsp
- Soil biodiversity portal (FAO's AGL Division) - http://www.fao.org/ag/agl/agll/soilbiod/default.stm
- Online documents on Fertilizers, soil fertility, plant nutrition (AGNET) - http://www.agnet.org/library/list/subcat/E.html
- Miscellaneous resources on soil fertility, acidity, alkalinity (AGRIFOR) - http://agrifor.ac.uk/hb/5a12a57a48789740ed6e74f24fca59b2.html
- International fertiliser industry association - http://www.fertilizer.org/ifa/
- Integrated plant nutrition systems resource documents (FADINAP) - http://www.fadinap.org/ipns/index.htm
- Soil Fertility and Fertilizers (Open Directory) - http://dmoz.org/Science/Agriculture/Soils/Soil_Fertility_and_Fertilizers/
- Soil: Fertility & Chemistry (Portal site) - http://homepages.which.net/~fred.moor/soil/links/l0102.htm
- Soil Fertility Guide -http://www.gov.nf.ca/agric/pubfact/Fertility/FertiGuide.htm
- Soil Information compiled by Dept. of Land Management, Universiti Putra Malaysia (Directory) - http://agri.upm.edu.my/jst/soilinfo.html
- Natural Ressources Conservation Service: Soils - http://soils.usda.gov/
- Fertilizers and their efficient use - http://www.fertilizer.org/ifa/publicat/PDF/introd.pdf
- International Fertilizer Industry Association - http://www.fertilizer.org/ifa/

Course Coordinator: Prof. Abdou Abdou Soaud

Head of Department:

Date: / /

Specialization Module: Environmental Soil and Water Resources Management

Elective Course: Alternative Agricultural Systems

University: Cairo **Faculty:**

Program on which the course is given: Sustainable Land Management (SLM)

Major or minor element of program: Environmental Soil and Water Resources Management

Department offering the program: Soil and Water Sciences

Department offering the course: Soil and Water Sciences

Academic year / Level: Master

Date of specification approval:

A- Basic Information

Title: Alternative Agricultural Systems **Code:**

Credit Hours / ECTS: 2 / 6

Lecture: 1 **Tutorial/Practical:** 2 **Total:** 2

B- Professional Information

1 – Overall aims of course

This course provides a short history of agriculture which enables the students to gain a better understanding of the transitional development of the current agricultural systems. Considering the evolution of agriculture and the emergence of the modern systems that are so essential to the modern civilization. Studying the pros and cons of various strategies of alternative farming systems. Hence, this course is split into two inter-related parts, firstly an abridged history of agriculture is given, which acts as a foundation in order to appreciate the philosophies and backgrounds of current systems, particularly pre-existing 'organic' agriculture, and secondly the development of the 'conventional' and the 'alternative' schools of thought and their respective production systems.

2 – Intended learning outcomes of course (ILOs)

a - Knowledge and Understanding:

By the end of this course the student should be able to:

A.1. Summarizes the history of agriculture in the world.

A.2. Recognize Knowledge of alternative land use options

A.3. Identify of the field crops composition and programs of alternative land use in the agricultural policy of different regions.

A.4. List the pros and cons of various strategies of farming (conventional, integrated, low input, organic, precision, etc..).

A 5. Summarize the alternative land use systems, including the application of subsidies

A.6. Explain the designs of alternative management systems focused on the use of phytomass to produce food, energy and industrial raw materials

A.7. Determine the optimal management systems to maintain sustainability in alternative agricultural systems

A.8. Write a list of standards of natural, chemical and biological soil under the alternative agricultural systems.

b - Intellectual skills:

B.1. Uses the theories, models, concepts and principles in the field of alternative agricultural systems.

B.2. Collects, analyzes and summarizes the information in the field of alternative agricultural systems.

B.3. Analyze and interpret the observations and data of alternative agricultural systems.

B.4. Recognize and identify problems and propose and implement solutions, taking into account the environmental dimension.

B .5. Integrates and applies concepts and principles of alternative agricultural systems to another and linking them to environmental science.

B.6. Plans to set up an agricultural systems that coup with specific tasks.

B.7. Choose the most suitable service systems to maintain sustainability in the alternative agricultural systems.

B.8. Propose appropriate ways to modify the characteristics of the soil to reach out to a good quality

C - Professional and practical Skills:

C.1. Determine the soil, water and plant quality attributes using appropriate techniques.

C.2 . Helps the farm to the adoption of a new agricultural system.

C.3. Design with good specifications appropriate techniques for alternative agricultural systems

C.4. Runs an alternative agricultural system for the production of safe food with the application of standards to preserve the environment.

C.5. Efficiently apply protocols of alternative agricultural systems

D - General Skills (Transferable)

D.1. Use information technology to collect, interpret and display data for alternative agricultural systems.

D.2. Writes reports to interpret the results and make recommendations

D.3. Works within a team and share knowledge effectively.

D.4. Apply self-learning skills, time management and work order to determine the personal goals and academic and career development.

D.5.Communicate with professionals in different field of study

D.6.Make decisions, organize and plan ahead

D.7.design and managing projects

3 - Course Content:

Theoretical content

Week	Subject	Source/s
1	The concept / the origin and development of world agriculture.	Miller 2008: World Regional Trends in Agriculture ftp://ftp.fao.org/docrep/fao/006/Y5160e/Y5160e04.pdf
2	Patterns and the foundations of conventional agriculture	Foley et al 2011: Solutions for a cultivated planet http://www.nature.com/nature/journal/v478/n7369/full/nature10452.html
3	Development of sustainable agricultural systems	Weil, R. R. 1990. Defining and using the concept of sustainable agriculture. J. Agron. Educ. 19:126-130. What Is Sustainable Agriculture? http://www.sarep.ucdavis.edu/concept.htm#Top

4	Conventional / Standard Agriculture vs. Conservation Farming	Do industrial agricultural methods actually yield more food per acre http://grist.org/food/do-industrial-agricultural-methods-actually-yield-more-food-per-acre-than-organic-ones/ Organic versus conventional farming http://ec.europa.eu/agriculture/rica/pdf/FEB4_Organic_farming_final_web.pdf
5	Organic Agriculture	Kristiansen, P. Taji, A. And Reganold, J eds. Organic Agriculture. A global perspective. CABI (2006) http://base.dnsgb.com.ua/files/book/Agriculture/Organic-Agriculture/Organic-Agriculture.pdf
6	Bio-Dynamic agriculture: Principals, Design, pros and cons	Biodynamic agriculture and organic farming http://quantum-agri-phils.com/Applying+Biodynamics+in+Organic+Seed+%20System.pdf
7	Agroforestry: Principals, Design, pros and cons Biosaline Agriculture	World Agroforestry: http://worldagroforestry.org/sites/default/files/ICRAF%202011-12%20annual%20report-29th%20August.pdf Biosaline Agriculture http://www.halophyte.org/pdfs/drkhan_pdfs/104.pdf
8	Permaculture: Principals, Design, pros and cons Rhodale : Principals, Design, pros and cons urban agriculture systems: garden, vertical, roof-top etc..	Essence of Permaculture - English - Permaculture Principles https://permacultureprinciples.com/wp-content/uploads/.../Essence_of_Pc_EN.pdf Permaculture design fundamentals - Open Permaculture School https://www.openpermaculture.com/wp-content/uploads/.../permaculture-ebook.pdf Rodale's LaSalle on organic farming to mitigate global warming: http://www.eenews.net/tv/video_guide/796 Urban Agriculture https://sustainabledevelopment.un.org/content/documents/5764Urban%20Agriculture.pdf
9	Precision agriculture: Principals, Design, pros and cons – Climate Smart Agriculture: Principals, Design, pros and cons	The concept and implementation of precision farming and rice integrated crop management systems for sustainable production in the twenty-first century http://www.fao.org/3/a-a0869t/a0869t04.pdf Climate-Smart Agriculture Sourcebook - Food and Agriculture www.fao.org/docrep/018/i3325e/i3325e.pdf
10	Evidence of physical, chemical, and biological to the quality of the soil under alternative agricultural systems..	Assessing Soil Quality https://organic-center.org/reportfiles/SoilQualityReport.pdf

11	Management systems for the sustainable agriculture .(crop rotation. mulching – green fertilization - coverage)	Sustainable soil management http://soilslab.cfr.washington.edu/Watershed_Stewardship/Sustainable_soil.PDF Agricultural sustainability: concepts, principles and evidence http://rstb.royalsocietypublishing.org/content/363/1491/447
12	Managing Water and Fertilizer for Sustainable Agricultural Intensification	http://www.iwmi.cgiar.org/Publications/Books/PDF/managing_water_and_fertilizer_for_sustainable_agricultural_intensification.pdf?galog=no Best Management Guidelines for Sustainable Irrigated Agriculture http://www.saiplatform.org/uploads/Library/%23516-Bestmanagementguidelinesforsustainableirrigatedagriculture.pdf

3-Practical content

Week	Subject
1	View and discuss the film of organic agriculture.
2	Visit the organic farm and open discussion and writing the report.
3	Visit the Egyptian Centre for Organic Agriculture and write the report of the visit
4	Presentation and discussion of the film for biodynamic agriculture
5	Determination of the rate of soil respiration lab
6	Determination of organic carbon in the soil and compost.
7	mid semester exam.
8	Determination of carbon to nitrogen ratio in the compost
9	Separation of the components of humus, compost
10	Determination of available nitrate and ammonium in the soil.
11	Extraction and assessment of phosphorus from organic fertilizers.
12	Activity of compost and commercial bio fertilizer.

4-Teaching and Learning Methods:

4.1- Active Lectures: power point presentation and blackboard.
4.2- Term paper: selected Topics for student groups.
4.3- laboratory projects
4.4- Demonstrations
4.5- Clarification Pauses
4.6- Muddiest points
4.7 Group discussion
4.8 Seminar

5- Student Assessment attributes:

Assessment	Objective	Week	Degree %
Assignment:	To assess the ability to work independently and discussion	Weekly	3
Homework :	To assess understanding	Weekly	2
Term paper:	To assess the ability to work in group to form subject from pieces	3,6 and 9	12
Presentation :	To assess the ability to communicate and discuss	5 and 10	8

Internet report:	To assess IT skills	3,6 and 9	Combined with term paper
Case study:	To assess the skills of Solve problems, Present data	11	5
Mid-Term exam		7	10
Oral exam:	To assess skill of analysis and discussion	11	5
Practical exam:	To assess the professional skills	12	15
Final written exam	To assess the ability to remember, understand, analysis, problem solving skills	??	40

6- List of References:

6.1. Course notes :

Handout and hard copy of PP-presentations

6.2. Essential Textbook :

Kristiansen, P. Taji, A. And Reganold, J eds. 2006. Organic Agriculture. A global perspective. CABI

6.3 Recommended Readings:

Miguel A. Altieri, "Agroecology, Small Farms, and Food Sovereignty," Monthly Review, 2009, download at: http://monthlyreview.org/author/miguelaaltieri

S. D. Williams and Heidi Fritschel, "Farming Smarter," Insights, Vol. 2 no. 2, .Available at : http://ebrary.ifpri.org/cdm/singleitem/collection/p15738coll2/id/126967/rec/9

Ecomodernist Manifesto, download at http://www.ecomodernism.org

Paarlberg, "Precision Agriculture: Can Small Farmers Participate https://www.thechicagocouncil.org/blog/global-food-thought/precisionagriculture-smallholders-paarlberg-harvard

7. Facilities Required for Teaching and Learning:

Portable Thermometer with datalogger PC connected
Portable CO_2-meter with datalogger PC connected
Luxmeter - IR-Thermometer
Computer and Data Show - internet
Digital balance and UV-VIS Spectrophotometer
Automatic pipettes, Automatic Digital Buretts, Dispensers

Course coordinator:

Head of Department:

Date: / /

Specialization Module: Farm System Modeling in Land Management

Elective Course: Plant System Modeling in Land Management

University: Alexandria **Faculty:**

Program on which the course is given: Sustainable Land Management (SLM)

Major or minor element of program: Farming system modeling in land management

Department offering the program: Soil and Water Sciences

Department offering the course: Soil and Water Sciences

Academic year / Level: Master

Date of specification approval:

A- Basic Information

Title: Plant System Modeling in Land Management **Code:**

Credit Hours / ECTS: 2 / 6

Lecture: 2 **Tutorial/Practical:** **Total:** 2

B- Professional Information

1 – Overall aims of course

Plants have developed sophisticated mechanisms to capture and use resources efficiently. Complex internal molecular/biochemical mechanisms mediate the transport, accumulation, transformation of nutrients in the different compartments of the plant. Specialised structures are formed to exploit resources availability in space. While the components required for these basic processes are becoming increasingly well characterised, little is still known of their precise coordination and control in space and time. In the Plant Systems Modelling, a quantitative approach is developed to understand and predict the precise nature of the coupling between these genetic and biophysical processes.

Increasingly, agricultural decision support systems are being delivered for use under various cropping and management systems over large geographic areas with diverse environments and soils. These systems are mathematical models of various types which combines the most recent knowledge achievements of agricultural research and experiences. Therefore, this course will include an introduction to mathematical modeling and simulation with an explanation of basic concepts and ideas, which includes definitions of terms such as system, model, simulation, mathematical model, reflections on the objectives of mathematical modeling and simulation, on characteristics of ‘‘good’’ mathematical models, and a classification of mathematical models. A hands-on application of specific methods will be explained, such as regression or neural network, methods or differential equations (DEs).

2 – Intended learning outcomes of course (ILOs)

On completion of this course, the student will be able to:

1. Describe the different plant growth stages.

2. Identify the different factors affecting plant growth and development.
3. Distinguish between the different types of stresses facing plant growth.
4. Define models, mathematical models and simulation.
5. Name the different modeling methods and types of mathematical models.
6. Apply mathematical methods for solving equations and curve fitting to experimental data.
7. Analyze different mathematical models for their type, structure, parameters and input-output data.
8. Justify the suitability of different mathematical approaches and its application.

3- Contents

Week	Contents
Part I: Plant growth and development as basis for modeling	
1	<u>Introduction to plant growth and development:</u> - Plant growth vs. plant development - Stages of plant growth and the growth curve - Plant growth factors in relation to crop farming - Genetic factors, environmental factors and G x E interaction
2	<u>Factors affecting plant growth: I. Climatic factors:</u> - Temperature - Moisture supply - Radiant energy - Components of the atmosphere (air quality – air pollutants – CO_2)
3	<u>Factors affecting plant growth: II. Soil factors:</u> - Soil aeration - Soil reactions - Availability of soil nutrients (mechanisms of uptake and translocation)
4	<u>Biotic and Abiotic stresses:</u> - Biotic stresses - Abiotic stresses (heat – salinity – drought) - Stress tolerance vs. Stress avoidance - Mechanisms of stress tolerance/avoidance
Part II: Principles of mathematical modeling	
5	- Models, mathematical models and simulation - Principles of mathematical modeling and scientific method - Some methods of mathematical modeling - Dimensional analysis (Dimensions and Units, Dimensional homogeneity, Systems of units) - Scaling (Abstraction and scale, linearity and geometric scaling, scaling in equations, design of experiments, perceptions of presented data as models) - Problems
6	- Approximating and validating

	- Taylor's formula - Algebraic approximations - Numerical approximations - Significant figures - Validating the model (adequacy, errors, accuracy and precision) - Fitting curves to data - Elementary statistics - Problems
7	- Exponential growth and decay - Exponential functions and their differential equations - Radioactive decay - A Nonlinear Model of Population Growth - Optimization (Continuous optimization Modeling, optimization with linear programming) - Choosing the best alternative (Rankings and pairwise comparisons, borda counts and pairwise comparisons, rank reversals) - Pairwise Comparisons and Making Decisions - Problems
8	- Classification of mathematical models - Phenomenological models (Elementary statistics, linear, multiple linear and nonlinear regression, neural networks) - Mechanistic models (ordinary and partial differential equations) - Fitting ODE's to data - Analytical and numerical solutions to PDE (finite difference and finite element methods) - Problems
Part III: Applications	
9	<u>Crop Growth Modelling:</u> - RI-RUE concept - Crop development and photosynthesis - Assimilate portioning - Dynamics of shoot - Model parameters and simulation using SFELLA model
10	<u>Photosynthesis and Carbon Assimilation:</u> - Mathematical model of C3 photosynthesis - Canopy photosynthesis, measurements, models
11	<u>Root growth and activity and soil-plant-water relationships:</u> - Branching and distribution models of root growth - Factors affecting root growth - Water potential in soil and plant - Below ground processes - Above ground Processes - Combining below and above ground

	- Modelling water uptake
12	Plant growth stress: - Modelling transient root zone salinity (Concept, boundary conditions) - Modelling solute transport - Modelling chemical interaction - Modelling plant response - Application SALTMED model

4– Teaching and learning methods

4.1-Case Studies
4.2-Presentations
4.3-Tutirial

5- Student assessment methods

Weighing of assessments

Mid-term written exam	20%
Final written exam	40%
Oral exam and/or final report	20%
Coursework and continuous assessment	20%
Total	100%

Any formative only assessments

6- List of references

The following textbooks and research articles provide valuable background materials for this course. We do not expect the students to purchase these books to undertake the course as they are available across the faculty and university libraries. Some materials are already available in the PDF format. Further reading materials will be provided via lecture and lab notes.

1. Dym C. L. (2004) Principles of Mathematical Modeling. Claremont, California. USA.
2. Kuttler C. (2010) Basics of Mathematical Modeling. Lecture Notes.
3. Murthy, V. R. K. (2010) Crop growth modeling and its application in agricultural meteorology. Satellite Remote Sensing and GIS Applications in Agricultural Meteorology pp. 235-261.
4. Velten, K. (2009) Mathematical Modeling and Simulation: Introduction for Scientists and Engineers. 2009 WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim, Germany.
5. Rössel, D., H. Ortiz-Laurel, N. Kanswohl and M. Schlegel (2008) Mathematical modelling for precisely improving inputs supply for crop production. Agronomy Research 6 (Special issue), 307–314.

Course coordinator:

Head of Department:

Date: / /

Specialization Module: Farm System Modeling in Land Management

Elective Course: Animal System Modeling in Land Management

University: Cairo **Faculty:**

Program on which the course is given: Sustainable Land Management (SLM)

Major or minor element of program: Farming system modeling in land management

Department offering the program: Soil and Water Sciences

Department offering the course: Soil and Water Sciences

Academic year / Level: Master

Date of specification approval:

A- Basic Information

Title: Animal System Modeling in Land Management **Code:**

Credit Hours / ECTS: 2 / 6

Lecture: 1 **Tutorial/Practical:** 2 **Total:** 2

B- Professional Information

Summary

There are different agriculture either plant (crops, vegetables, ...etc.) or animal (ruminants, poultry, fish, ...etc.) productive systems in exhibiting a mosaic pattern both at the national, regional, or International levels. Each mosaic pattern is the result of the geographical location of the centers of origin of animal/plant in the world and their dispersion during history. The way humans choose and combine animal/plant is the result of the interactions among physical (soil and climate), biological (animal, plant, disease, pest, ...etc.) and socio-economic factors (population growth, credit, etc.). For each of the biological production systems, these elements will be highlighted to understand the guiding forces behind the equilibrium among different production systems. The analyses of these elements will create opportunities to formulate models (integrated productive systems) to improve production existing systems if necessary and in what way. The theoretical and innovative proposed animal based models will then discussed and might be implemented on real cases by each student.

1 – Overall aims of course

Overall Aims of the Course: This course deliver knowledge and provide skills to create ideas helping the students to formulate models of integrated Animal-based productive systems for sustainable land management. The following topics planned to be covered: Introduction to Agricultural productive systems (Livestock: Animal, Poultry, and Fish; Plant: crops, vegetables ...etc); Integrated agricultural systems modiling; targeted animal-based systems pre-modeling components, requirements, criteria, and limitations; designing a complete systems modeling; evaluate the proposed model; Logical Framework Matrix (LFM; Indicators, verifications and risk mitigation); model traceability, coding and certification.

2 – Intended Learning Outcomes (ILOs):

a. Knowledge and Understanding:

1. Remember types of different animal productive systems.

2. List types of different plant productive systems.
3. State the differences between agricultural productive systems and systems model.
4. Categorize the main components required for systems modeling.
5. Define the concept of animal-based systems modeling.
6. Explain the requirements to build an organic integrated system (model).
7. Discuss the meaning of integrated system modeling.
8. Classify the characteristics of good agriculture integrated productive systems model.
9. Recognize the Logical Framework Matrix (LFM) components.
10. Identify the suitable code of traceability for certifying a new model.

b. Intellectual Skills:

1. Solve several problems related to pre-model limitations in a targeted area.
2. Identify specific problems associated with animal-based systems model.
3. Design a pre-model for integrated agricultural productive systems.
4. Think creatively to suggest new animal-based systems model for sustainable land use.
5. Create a suitable Logical Framework Matrix (LFM) for a suggested model.
6. Innovate a traceability coding for suggested systems model certification.

c. Professional and Practical Skills

1. Present a suggested Animal-based systems modeling for a targeted area.
2. Summarize systems modeling indicators.
3. Calculate economical impacts of a suggested Animal-based systems modeling.
4. Analyze the sustainable limitations in a targeted area.
5. Prioritize the managerial structure criteria related to targeted area.
6. Verify the risk assessment components of a suggested Animal-based systems modeling.
7. Suggest risk mitigation with suitable contingency plan(s).

d. General and Transferable Skills:

1. Use information technology (IT) facilities for self-learning.
2. Contribute constructively to class and group discussion.
3. Work in small groups for problem solving.
4. Write effectively a scientific report in English.

3- Contents:

Week(s)	Lecture title	Tutorial/Practical title
1	Introduction to Animal Livestock Productive Systems	Examples of Animal, Poultry, Fish Productive Systems
2	Introduction to Plant Productive Systems	Examples of Crops, Vegetables, other agricultural Productive Systems
3	Agricultural productive system vs. Agricultural systems modeling	Examples for sustainable agricultural integrated productive systems
4	Requirements to build a systems modeling (integrated, organic, ecological, economical, and productive model)	Sustainable limitations in a targeted area (identify problems to strength diversity)
5		Managerial structure criteria (budget, team and resources)
6		Designing a pre-model

7	Midterm	
8	Examples for integrated systems modeling	Designing a complete animal-based systems modeling (project)
9		
10	Evaluation criteria for an integrated model	Evaluate proposed animal-based systems modeling (project)
11	Logical Framework Matrix (LFM) components	LFM indicators and verification
12	Risk assessment	Risk mitigation and contingency plan
13	Traceability coding and certification	Examples on traceability coding
14	Practical and Oral Exam	
15		
16	Final Exam	

4. Teaching and Lecturing Methods:

1. Effective lectures including simulating tools.
2. Group discussion and assessment.
3. Case study.
4. Course notes and additional readings.

5- Student assessment methods, schedule and weighting:

a. Assessment tools (methods):

1. Mid-term exam to assess obtained knowledge and understanding, and intellectual skills.
2. Practical exam to assess technical and technological skills.
3. Oral exam to assess all required skills (intellectual, technical/professional, technological and soft/social skills).
4. Final written exam to assess retained knowledge and understanding, and intellectual skills.
5. Writing and present a project related to the course to assess general and transferable, knowledge and understanding, technological, professional and technical skills.

b. Assessment schedule:

Assessment 1: Mid-term exam	Week 7
Assessment 2: Project report	Week 8-13
Assessment 3: Practical exam	Week 14 and/or 15
Assessment 4: Oral exam	Week 15
Assessment 5: Final written exam	Week 16

c. Weighting of assessments:

Mid-Term Examination	10%
Final report	20%
Practical Exam	20%
Oral Exam	10%
Final-Term Examination	40%
Total	100%

6- List of References

6.1- Course notes.

6.2- Essential books (text books)

- Altieri M. A. 1995. Agroecology: The science of sustainable agriculture, second edition. Westview Press, Boulder, Colorado, USA.
- Bouma J. and van Beukering P. 2015. Ecosystem Services: From concept to practice. Cambridge University Press (267 p).
- Ford A. 1999. Modeling the Environment: An Introduction to System Dynamics Models of Environmental Systems.
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- Thornley J. H. M. 2000. Plant and Crop Modeling: A Mathematical Approach to Plant and Crop Physiology.
- Tidwell J. H. 2012. Aquaculture Production Systems. ISBN: 978-0-8138-0126-1. John Wiley & Sons, Ltd., Publication. 2121 State Avenue, Ames, Iowa 50014-8300, USA.
- Vandermeer J. H. 2010. The ecology of agroecosystems. Jones & Bartlett Learning, Sudbury, MA.
- Vaneekeren N., A. Maas, H. W. Saatkamp, and M. Verschuur. 2006. Small-scale chicken production. ISBN Agromisa: 90-8573-069-4. ISBN CTA: 978-92-9081-347-7. Agromisa Foundation and CTA, Wageningen, Netherlands.

Course coordinator: Prof. Dr. Hosam Safaa

Head of Department:

Date: / /

Specialization Module: Farm System Modeling in Land Management

Elective Course: Integrated Pest Management

University: Zagazig **Faculty:**

Program on which the course is given: Sustainable Land Management (SLM)

Major or minor element of program: Farming system modeling in land management

Department offering the program: Soil and Water Sciences

Department offering the course: Pesticides Chemistry

Academic year / Level: Master

Date of specification approval:

A- Basic Information

Title: Integrated Pest Management (IPM) **Code:**

Credit Hours / ECTS: 2 / 6

Lecture: 1 **Tutorial/Practical:** 2 **Total:** 2

B- Professional Information

Course Description

Integrated Pest Management (IPM) is designed to introduce students to the theory and practice of integrated pest management systems in major agronomic and horticultural crops; turf grass and pasture systems; and aquatic, non-cropland, and urban settings. The course aims at combining knowledge with analytical, managerial, and communication skills to address real-world problems in a diversity of management systems.

1 – Overall Aims of Course

1. Understand the IPM decision-making process and how it differs from conventional pest control
2. Understand how pest biology and behavior affects the success of management practices.
3. Develop/increase skills in monitoring, record-keeping, setting treatment thresholds, using non-chemical prevention and treatment methods, using reduced-risk pesticides as a last resort, and developing customer cooperation with the IPM service.
4. Learn how to incorporate IPM concepts and methods into a structural pest control business

2 – Intended Learning Outcomes of Course (ILOs)

i- Knowledge and Understanding:

- Describe damage/injury caused by different pests.
-Know the alternatives of chemical control methods
- List benefits of integrated pest management.

b- Intellectual Skills

- Demonstrate economic threshold for different pests.

- Evaluate IPM program.
- Evaluate approaches to problem-solving related to integrated pest management.
- forecast pest outbreaks.
- Propose suitable control methods for integration.
- Propose suitable methods for measuring pest control efficiency.

c- Professional and Practical Skills

- Apply different pest control methods (or techniques) .
- Record population size periodically.
- Use computer for forecasting pests outbreaks.
- Monitoring pest population and fluctuation
- Diagnose pests caused damage

d- General and Transferable Skills

- Write and Communicate scientific reports related to IPM
- Contribute constructively to class and group discussion.
- Work in small groups for problem solving.
- Write effectively a scientific report in English.
- Utilize information technology (IT) and electronic resources effectively.

4 - Contents

Date	**Topic**
Week 1	History of Integrated Pest Management and appropriate definitions .
Week 2	Host plant resistance, crop rotation and cultural practices .
Week 3	Principles of weed, insect, disease and nematode management (strategies, thresholds, issues) .
Week 4	Environmental fate of pesticides, pesticide use, pesticide registration process, pesticide resistance, and utilization of GM traits in pest management .
Week 5	Managing pests in organic systems .
Week 6	Using peanut to demonstrate IPM principles (host plant resistance, crop rotations, risk indices, weather-based advisories, decision tools, fumigation, plant populations, tillage systems, secondary pest outbreaks, international agriculture) .
Week 7	Examples of large-scale management programs : Vegetable and crops (insects, disease and greenhouse operations) .

Week 8 Turf grass and nursery crops (aesthetics, propagation) .

Week 9 Livestock and pastures (grazing, feedlots) .

Week 10 Urban IPM (insects and rodents) .

Week 11 Post-harvest handling of vegetables, commodities, etc.

Week 12 Consultant and Extension roundtable

4- Teaching and Learning Methods

- Effective Lectures
- Practical sessions
- Assignments
- Case Study

5- Student Assessment Methods

- mid-term exam to assess obtained knowledge and understanding and skills assess
- Oral exam to assess knowledge, understanding, and intellectual skills
- Practical exam to assess professional, intellectual, and general skills

Final exam to assess retained knowledge, understanding and skills

- Class attendance and activities

Assessment Schedule

Assessment 1: Assignments reports and presentations during the semester	
Assessment 2: Midterm exam	7th Week
Assessment 3: research paper presentation	12th Week
Assessment 4: Oral exam	13th Week
Assessment 5: Practical exam	14th Week
Assessment 5: Final exam	15th Week

Weighting of Assessments

Mid-term Exam	10%
Final Exam	40%
Case study & reporting	20%
Oral Examination	10%
Practical Exam	20%
Total	100%

6- List of References

6.1- Course Notes

Integrated Pest Management (Hand-out)

6.2- Essential Books (Text Books)

Elliott, N. C., Farrell, J. A., Gutierrez, A. P., van Lenteren, J. C., Walton, M. P., & Wratten, S. (1995). *Integrated pest management*. D. Dent (Ed.). Springer Science & Business Media.

Gent, D. H., Barbour, J. D., Dreves, A. J., James, D. G., Parker, R., Walsh, D. B., & O'Neal, S. (2009). Field Guide for Integrated Pest Management in Hops. Oregon State University, University of Idaho, USDA Agricultural Research Service, Washington State University, USA.

Hill, D. S. (2008). *Pests of crops in warmer climates and their control*. Springer Science & Business Media.

6.3- Recommended Books

- Common Sense Pest Control, W. Olkowski, Sheila Daar, Helga Olkowski. 1991 Newtown, CT: The Taunton Press. 715 pp.

- NPMA Field Guide to Structural Pests by Eric H. Smith and Richard C. Whitman, Published 1992

- Handbook of Pest Control by Arnold Mallis, Published by Franzak & Foster Co.

- Integrated Pest Management for Schools: A How-To Manual (written by BIRC staff)

6.4- Periodicals, Web Sites, … etc

- IPM Institute

http://www.ipminstitute.org/school biblio buildings.htm

- California Department of Pesticide Regulation

http://www.cdpr.ca.gov/cfdocs/apps/schoolipm/school ipm law/26 exempt text5.pdf

- University of California Statewide IPM Project
  http://axp.ipm.ucdavis.edu/PMG/selectnewpest.home.html

University of California at Riverside Entomology Department
http: //entmuseum.ucr. edu/bugfaq.html

University of Florida Entomology Department http://creatures.ifas.ufl.edu/main/search common.htm

University of Florida School IPM http://schoolipm.ifas.ufl.edu/

Marin County Department of Agriculture Model School IPM Program
http://www.co.marin.ca.us/schoolIPM/

&- Facilities Required for Teaching and Learning

8.1- Class room equipped with movable table and chairs, computers, data show and Internet .

8.2- Equipped Laboratory for pesticide toxicology and data analysis .

8.3- Facilities for Field trips and community outreaching .

Course coordinator:

Head of Department:

Date: / /

Specialization Module: Farm System Modeling in Land Management

Elective Course: Applied Bioeconomics

University: Alexandria **Faculty:**

Program on which the course is given: Sustainable Land Management (SLM)

Major or minor element of program: Farming system modeling in land management

Department offering the program: Soil and Water Sciences

Department offering the course: Soil and Water Sciences

Academic year / Level: Master

Date of specification approval:

A- Basic Information

Title: Applied Bioeconomics **Code:**

Credit Hours / ECTS: 2 / 6

Lecture: 2 **Tutorial/Practical:** **Total:** 2

B- Professional Information

Keywords**:** *Farming Systems, Land Resources, consumer behavior, producer behavior, market types, natural resources, consumer surplus, producer surplus, resource scarcity, opportunity cost.*

Course Description:
The course encompasses elements of agricultural and food economics, as well as natural resources economics and uses of the principles of microeconomics and macroeconomics pertinent to and with application to sustainable land management. The course considers sustainable food systems and food security from a wide range of perspectives. It examines farming as a social practice, as commercial food production, as a challenge to environmental policy, and as an integral part of sustainable and healthy consumption. Specifically, it provides the theoretical background to consumer and producer theories, market types, competition and natural monopolies, and why uncertainty affects economic analysis, especially when dealing with non-renewable natural resources. The course further displays the uses of the demand and supply analysis to determine the optimal levels of production, consumption, pollution, evaluate market structures, and price formulation for food and agricultural products and resources.

2 – Intended learning outcomes of course (ILOs)

1. Learn the basic microeconomic concepts needed for analysis and decision- making regarding environmental and agricultural resources.
2. Study the consumer behavior and demand to know what motivates people to consumer the services of land.

3. Analyze and make decisions to solving production problems. This is since production leads to resource exhaustion and degradation and yields pollution as a secondary undesired product.
4. Understand the fundamental principles needed for market supply and demand analysis, market price determination, and forms of market competition.
5. Understand the fundamental principles needed for sources of risk and risk management analysis, economic policy analysis, and natural resources economics and policy analysis.
6. Review the recent economic literature on land degradation and improvement.
7. Address that land degradation has higher economic returns than inaction.
8. Conceptualize the methodological areas for future research on the sustainability of land management.

3- Contents

The course is an intermediate level course focusing on aspects of consumption, production, organization, and exchange in the economy. It incorporates elements of agricultural and food economics, as well as natural resource economics, along with the utilization of microeconomics and macroeconomics. The course considers sustainable food systems and food security from a wide range of perspectives. Farming is examined as a social practice, a commercial food production, a contributor and challenger to environmental policy, and an integral part of sustainable and healthy consumption.

Week	Class Topics
Week 1	Introduction Course overview Important concepts in economics (scarcity and opportunity cost). Micro versus Macroeconomics. The farm and the food system. Natural resources and economics.
Week 2-3	Consumer behavior and Demand
Week 4-5	Producer decision making: single variable input and two variable inputs and enterprise selection.
Week 6-7	Production costs, supply, and price determination
Week 8	Production costs, supply, and price determinantion under uncertainty
Week 9	Competition, monopolies, natural monopolies, and the market
Week 10	Imperfect competition, role of governments, and market regulations pertaining to land resources.

Week	Class Topics
Week 11-12	Natural Resources Welfare Analysis (consumer and producer surpluses)

*Midterm and Final Exams will be held during the extra week(s) of the semester.

4– Teaching and learning methods

Lecture
Directed Learning
*In*dependent Learning
Exam Preparation
Exam Taking .

5- Student assessment methods

Weighing of assessments

Quizzes	25%
In-class participation and HW	10%
Midterm Exam	25%
Final Exam	40%
Total	100%

6- List of references

6.2- Essential books (text books)

Barkley & Barkley. Principles of Agricultural Economics, Routledge. 2013.
OECD, 2009. The bioeconomy to 2030: designing a policy agenda. Paris: OECD Publishing.

6.3- Recommended books

Introduction to Agricultural Economics 5/E by John B Penson, Jr., Oral Capps, Jr., C. Parr Rosson III, and Richard T. Woodward. Prentice Hall ISBN-13: 978-0-13-507026-0, ISBN-10: 0-13-507026-0. 2010.

The textbook provides a clear explanation of the concepts in agricultural economics and business. The student's understanding of the lectures will be enhanced by reading the assigned chapters before the class. Supplemental readings will be assigned occasionally during the semester. Class notes or handouts, exercises, and other materials will be provided. This is in addition to materials used in E-Learning.

Alisher Mirzabaev, Ephraim Nkonya, Joachim von Braun, Economics of Sustainable Land Management, Center for Development Research (ZEF), University of Bonn, Walter Flex Str,

53113 Bonn, Germany, International Food Policy Research Institutive (IFPRI), 2033 K St, NW Washington, DC 20006-1002, USA, ISSN 1864-6638, Bonn, March 2013.

Course coordinator:

Head of Department:

Date: / /

Specialization Module: Farm System Modeling in Land Management

Elective Course: Advanced Agricultural Waste Management

University: Zagazig **Faculty:**

Program on which the course is given: Sustainable Land Management (SLM)

Major or minor element of program: Farming system modeling in land management

Department offering the program: Soil and Water Sciences

Department offering the course: Soil and Water Sciences

Academic year / Level: Master

Date of specification approval:

B- Basic Information

Title: Advanced Agricultural Waste Management **Code:**

Credit Hours / ECTS: 2 / 6

Lecture: 1 **Tutorial/Practical:** 2 **Total:** 2

C- Professional Information

1 – Overall aims of course

This course covers principles of managing, handling, treating and applying animal and field and other agriculture wastes. Topics include waste characterization, role of soils in waste management, role of plant in waste management, agricultural waste management systems, and preparation of waste management plans, waste utilization and waste management equipment.

2 – Intended Learning Outcomes of Course (ILOs)

a. Knowledge and Understanding:

1. Define the Pollution versus contamination.
2. Define waste characterization and management terms
3. Names the factors affecting the pollution process.
4. Identify effects of animal waste on the water, air and animal resources.
5. Discuss role of Soils and plant in Waste Management.
6. List different agricultural wastes and its application
7. Select agriculture waste management system
8. Write the different methods of Waste Utilization
9. Mention suitable waste management equipment depending on the type of the waste.

b. Intellectual Skills:

1. Choose suitable methods of analysis of different agriculture waste
2. Choose suitable agriculture waste in different application
3. Have analytical thinking
4. Distinguishes between different Agriculture waste
5. Conclude the analysis of composts and silage

6. Distinguishes between different system of waste management
7. Summarises waste utilization

c. Professional and Practical Skills

1. Use instruments in analytical laboratories.
2. Detect the quality of analyzed agricukture waste.
3. Write full report justifying his judgment.
4. Apply results of agricultural waste analysis in different application
5. Apply waste utilization and management system
6. Have practical knowledge of planning an agricultural waste management system

d. General and Transferable Skills:

1. Interact efficiently with others.
2. Work effectively in a team.
3. Manage time effectively.
4. Make appropriate decisions depending on analysis results .
5. Collect the gained experiences in different waste utilization and management systems.
6. Write effectively a scientific report in English.

3- Contents:

Topic	Lecture	Tutorial/Practical
	Registration of Students	Registration of Students
1	Agricultural Wastes and Water, Air, and Animal Resources *Pollution versus contamination *Effects of animal waste on the water resource *Factors affecting the pollution process	Sample Preparation
2	Agricultural Wastes and Water, Air, and Animal Resources *Controlling the pollution process *Effects of animal waste on the air resource *Effects of animal waste on the animal resource	Proximate Analysis of Agriculture Waste * (Moisture– Protein - Carbohydrates – Ash – Mineral Matter)
3	Agricultural Waste Characteristics * Definitions of waste characterization terms * Animal waste characteristics * Field wastes * Other wastes	Proximate Analysis of Agriculture Waste * (Crude Fibre - Cellulose)
4	Role of Soils in Waste Management * Soil phases *Soil-agricultural waste interaction *Soil-agricultural waste mineralization relationship * Soil characteristics	Proximate Analysis of Agriculture Waste * (Hemicellulose - Lignins)
5	Role of Plants in Waste Management * Agricultural waste as a resource for plant growth * The plant–soil system * Plant nutrient uptake *Balancing plant nutrient needs with waste application	The Analysis of Composts * Determination of cation exchange capacity (CEC) in composts

6	Midterm Exam	
7	Application of agricultural waste	The Analysis of Composts * Determination of Ca, K, Mg and P in composts
8	Agricultural Waste Management Systems * Definitions of waste management terms * Waste management functions * Management Systems *Typical agricultural waste management systems	The Analysis of Composts * Determination of heavy metals in compost
9	Planning an agricultural waste management system	The Analysis of Silage * Determination of ammonium-N in silage
10	Waste Utilization * Waste consistency * Land application * Salinity * Plant nutrients * Nutrient management	The Analysis of Silage * Determination of moisture in silage * Determination of pH in silage
11	Waste Management Equipment * Waste production equipment * Waste collection equipment * Waste utilization equipment	The Analysis of Silage * Determination of volatile fatty acids (VFAs) in silage * Extraction method for obtaining silage juice for analysis for VFAs
12	Revision	Revision

4. Teaching and Lecturing Methods

4.9. Lectures.
4.10. Practical sessions.
4.11. Group discussions.
4.12. Data analysis.
4.13. Problem solving.
4.14. Seminars.
4.15. Reports
4.16. self-study

5- Student assessment methods

5.1. Mid-term exam
5.2. Oral exam
5.3. Practical exam
5.4. Final written exam
5.5. Writing on a subject related to the course

Assessment schedule

Assessment 1: Mid-term exam Week 6
Assessment 2: Practical exam Week 13
Assessment 3: Oral exam Week 13
Assessment 4: Final written exam Week 14

Assessment 5: report	Week 11, 12

Weighting of assessments

Mid-Term Examination	5%
Oral exam	5%
Practical exam	20%
Final report	10%
Final-Term Examination	60%

6- List of References

6.1- Course notes

Agricultural Waste Management (Hand-out)

6.2- Essential books (text books)

- Williams, P.T.; Waste treatment and disposal, 2005, John Wiley and Sons, England
- Vaughn J., Waste management handbook, 2009, AbcClio, Oxford, England
- Davis, M.L.; Cornwell, D.A. (1998): Introduction to environmental engineering, McGraw-Hill, Inc., New York, USA
- Agricultural Waste Management Field Handbook, United States Department of Agriculture

Course coordinator: Hend El-akkad / M. Momtaz/ Mohamed Ali/ Abdelhady Ali / Adham Elsaghir

Head of Department:

Date: / /

Events for promoting conservation and sustainable utilization of land

1. Conference on Sustainable Development of Livestock Production Systems

2. Conference on “Role of Engineering Towards Better Environment” RETBE’21

Towards achieving the 2030 vision, the Faculty of Engineering at Alexandria University is hosting the 12th International Conference “Role of Engineering Towards Better Environment” RETBE’21. The theme of the conference this year will be “Vision 2030: Engineering Challenges in the Midst of the Pandemic”.

The conference will be held from 20 to 22 December 2021 in Alexandria, Egypt. It continues to uphold the mission of the preceding successful series of RETBE conferences that started over 20 years ago, emphasizing the challenges facing the environment and the need for innovative actions and policies.

RETBE’21 conference is to bring together innovative Academia, Industry and Government in the fields of: Engineering, Technology and Environment to a common platform where researchers, scientists, and engineers can exchange their findings with global experts and officials.

Within the 2030 vision, the conference provides attendees and participants with the opportunity to share their experiences and ideas with peers from various parts of the world with the purpose of helping delegates to foster business and research relations for collaboration in the future

AGENDA

Day 1: Monday, December 20th, 2021		
08:30 am	Registration (all day)	**Faculty of Engineering**
09:00 am - 10:45 am	Opening Ceremony: **Prof. Rawya Kansoh**, Conference Coordinator, Faculty of Engineering, Alexandria University **Prof. Essam Wahba**, Vice Dean, Faculty of Engineering, Alexandria University **Prof. Said Allam**, Dean, Faculty of Engineering, Alexandria University **Prof. Abdelaziz H. Konsowa**, President, Alexandria University	**Hall A1**
11:00 am - 12:00 pm	**Keynote Speech** Water Scarcity Research and Education in the Eras of Climate Change and Sustainable Development **Prof. Hani Swelliem**, RWTH Aachen University, Germany	**Hall A1**
12:00 pm - 01:00 pm	**Coffee Break**	**SSP Building 1st floor**
01:00 pm - 01:15 pm	**Delta Building Systems**	
01:15 pm - 03:00 pm	Panel Discussion hosted by RETBE'21 **Climate Change and Global Warming « Getting ready for UN COP 27 »** Session Moderator: Prof. Rawya Kansoh, Faculty of Engineering, Alexandria University	**Hall A1**

Technical Virtual Meetings via ZOOM Coordinators: Dr Yousry Taha, Dr Dina Elgayar		
04:00 pm - 05:30 pm	Session #1: **Water Issues** *Chair Person: Prof. Haytham Awad *Co-chair: Dr Mohamed R. Torkomany **Meeting ID: 976 2365 8279** **Password: RETBE21**	Session #2: Sustainable Urbanism *Chair Person: Prof. Hassan K. Abdel Salam *Co-chair: Dr Dina Saadallah Meeting ID: **860 7787 8928** **Password: RETBE21**
	Critic comparative analysis approach for Alexandria port – Alexandria city – Egypt, **Mona Sayed Seifelislam, Amira. A Fathi, Ali Bakr.**	Assessment of Livability in the Urban Built Environment in Alexandria, Egypt, **Heba M. Affara, Hany M. Ayad, Dina M. Saadallah.**
	Assessment of The Long-Term Shoreline Changes of El Alamein Coastal Area, Egypt, **Ahmed Slama. Elstohey, Maysara Khairy El-Tahhan, Walid E. Reda, Hossam M. Moghazy.**	Coastal Cities' Blue-Green Infrastructure Model (BGIM) The Case of New El-Alamin City, Egypt, **Tasneem Amr, Asmaa Hassan, Khalid El Hagla.**

	Risk management and cost analysis of treated wastewater reuse: Proposal for the New Al-Alamein city, Egypt, **Sara AbdelMoula, Mohamed T. Sorour, Samia A. Aly.**	Creating Sustainable Cities: Biomimicry as Conducive Approach, **Sherouk Seif, Walid abdelal, Ali Bakr**
	The Performance of Novel Draw Solutions in Brackish Water Desalination Using Forward Osmosis, **T. M. Zewail, M.A. Dawod, S. M. Abd Elrazik, S.E. Elalfy, M. A. Saad, El-Sh. Ibrahim**	The Influence of Urban Economics on The Growth of Historic Cities (Case Study: Alexandria), **Rahma Hassan, Hassan Abdel Salam, Asmaa E. Hasan**
		Effects of Vertical Densification on the built environment in the city of Alexandria, **Walaa Khaled Helal, Dina M. Saadallah, Dina Taha.**
06:00 pm - 07:30 pm	Session #3: **Renewable Energy** *Chair Person: Prof Wael Elmaghlany *Co-chair: Dr Mohamed Elhelw **Meeting ID: 922 7832 3650** **Password: RETBE21**	Session #4: **Sustainable Architecture** *Chair Person: Prof Dina M. Nassar *Co-chair: Dr Ingi A. El Cherif **Meeting ID: 835 5232 7943** **Password: RETBE21**
	Can Egypt achieve its target of 20% of electric energy from renewables by 2022? **Tarek ElShennawy.**	Architectural Programming and physical Sustainability: Optimizing Adaptability in the Pre-Design Phase, **Sarah Essam, Hassan Abdel Salam, Asmaa E. Hasan**
	Optimization of Green Hydrogen Utilization for Power Generation and Liquefaction for Export, **A. Saleh, D. AbulMaaty, M. Mohsen, R. ElAdawy, Y. Mohamed, D. ElGayar, S. Haddara, H. Warda.**	Morphology of Architectural Structure: An Approach to Assess Quality of Spaces and Performance of The Resulted Built-Forms, **Yara H. Helmy, Ibrahim E. Ma'arouf, Asmaa E. Hasan**
	Validation and Optimization of a Three Floats Wave Energy Converter, **A. R. Bassiouny, Y. Welaya, Khaled A. Geba, T. M. Ahmed.**	Biomimicry Principles as a Tool for Evaluating Buildings, **Basma M. Abdel Aleem, Mohamed A. Fikry**
	Influence of the variations of the geometrical parameters on the flanged diffuser augmented wind turbine performance, **Amr M. Abdelrazek, Ahmad O. Abdelaziz, Sadek Z. Kassab.**	Enhance the Environmental Performance of Existing Office Building Using Passive Cooling Techniques, **Engy F. M. Ishak, Alessandro Rogora, Ibrahim H. Saleh, Zeyad M. Elsayed**
	The Effect of Endplate Addition on the Perf Wind Turbine: A 3-D study, **Sadek Z. Kassab, Chemengich S. Jamar, Eslam R. Lotfy.**	Improving Energy consumption in social housing by using different levels of retrofitting, **Allaa M. Abu Eldahb, Zeyad M. Elsayad, Ali F. Bakr.**

* Faculty of Engineering, Alexandria University

	Mass transfer Behavoir for a Gas Sparged rotating Cylinder electrode, **H. K. Ali, S. A. Nosier, I. H. Mohamed, G. H. Sedahmed, M. A. El-Naggar**	Behavior of Reusable T-Stub Beam Column Connection, **Mohaymen Moustafa, Ahmed M.Khalifa, Ahmed Shamel Fahmy.**
		Achieving resilience in COVID-19's New Normal: Changes in office buildings and workspaces design according to social distancing and teleworking parameters, **Mohammed S. Ali, Tarek A. Farghaly, Dina M. Saadallah.**
Day 2: Tuesday, December 21st, 2021		
06:00 pm – 07:30 pm	Session #7: **Energy** *Chair Person: Prof. Mohamed Teamah *Co-chair: Dr Ahmed Elwardany **Meeting ID: 939 6738 1304** **Password: RETBE21**	Session #8: **Technology in Architecture** *Chair Person: Prof Dina S. Taha *Co-chair: Dr Asmaa El Sayed **Meeting ID: 847 4126 5750** **Password: RETBE21**
	Numerical Investigation of Planning Hull Resistance Using Different Turbulence Models, **Alsmoual A. Alhassan, Adel A. Banawan, Yasser M. Ahmed, Tamer. M. Ahmed, Maged M. Abdelnaby**	(VIRTUAL HERITAGE) Digital Documentation and conservation of heritage, **Heba Slumah, Mohamed Fikry, Waled Abdel Aal.**
	Sustainable retrofits for high-rise building envelopes in North America: A communication, **H. M. Teamah, M. Teamah.**	Retrofitting Historical Buildings for Fire Resistance, **Renal Salama, Mohamed Anwar Fikry, Ibrahim Marof**
	Reducing Carbon Footprint of Thermal Natural Gas Power Plants Using Cryogenic Carbon Capture Technology, **Abdurrahman A. Alsanousie, Abdelhamid E. Attia, Mohamed Elhelw, Osama A. Elsamni.**	A Holistic Approach for the Digital Documentation of Urban Cultural Heritage Using HBIM, **Lara A. Awad, Khalid S. M. Al-Hagla, Dina M. Nassar**
	COVID-19 & the Nuclear Industry: Review of Impacts and Implications for Newcomer Countries, **Mohamed H. M. Hassan.**	Acoustic Environment and Architectural Characteristics of learning spaces via its Soundscape, **Ayat K. Kamal, Mostafa R. Ismail, Mohammed S. Mayhoub.**
	Spotlight on the influence of various parameters, related to the inlet injection region, on an air-water air lift pump performance, **Sadek Z. Kassab, Abdelrahman A. Abdelrazek, Eslam R. Lotfy.**	Designing Low Rise Green Buildings in Iraq with Emphasis on Structural Design Optimization and Thermal Performance, **Shaymaa Mohammed Abass, A.Shamel Fahmy, Zeyad M.ElSayad, Shreen Moustafa Sewilm.**
	Performance evaluation of a MOF-801 packed in copper foams-based adsorption cooling and desalination system, **Mohamed Rezk, Mahmoud Elsheniti, Osama A. Elsamni.**	Biomimetic Adaptation Techniques in Facades in Coastal Hot Climates, **A.W. Mariam, H. Asmaa, E.H. Khaled.**

* Faculty of Engineering, Alexandria University

3. Alexandria University – A Green University

Alexandria University is a pioneering University in changing many societal and environmental beliefs and practices that could negatively affect climate changes and carbon emissions. It has an important role in as a leader university and is committed to participate to developing environment friendly infrastructure, arranging universities according to sustainable development processes and adherence to green environment standards.

The university took an initiative towards to implement the state's general policies launched to ensure the role of universities to implement sustainability and a green environment through the university's unity and activities and the product of scientific research and its application.

The implementation green university is in line with of the goals of the United Nations to achieve true sustainable development, whether for the university community or the surrounding community. It is also in line with Egypt's 2030 Sustainable Development Plan and is compliant with the recommendations of the United Nations on the necessity of campus sustainability.

Sustainability indices for green universities is based on 10 basic axes that represent the basic concepts of the principles of preserving the environment, sustainability, environment friendly infrastructure and fulfilling the standards for both energy, climate exchange, waste management, water management, internal transport, environmental quality, and sustainability compliance with environmental laws and legislation.

Alexandria University adopted a set of integrated standards on strategies, tools and resources that the university should adopt and use in order to achieve the principle of sustainability. Such standards should bring about a positive change on the environmental aspect of the university campus, its buildings, reduce environmental impacts, work to reduce the environmental footprint of Alexandria University and raise the positive environmental footprint of the university.

Green economy as a context of sustainable development is one of the important tools available to achieve the areas of development, and it contributes to eliminating waste of resources, achieving economic growth, promoting social inclusion, improving human conditions, creating job opportunities and providing decent work for all. At the same time, this will ensure the sustainability of ecosystems' goods and services and a clear understanding of the interdependence between environmental sustainability and good political practices and effective institutional mechanisms, so that this will be decisive criteria for setting an effective national policy and making a fundamental contribution to the international efforts to achieve sustainable development.

Foundation of a green university has the following objectives:

- spreading the culture of sustainability in Egyptian universities.
- To contribute to having environment friendly buildings in Alexandria University

• Promote university-led social change in relation to sustainability goals.
• Contributing to achieving global goals for preserving the environment.

The criteria to achieve the principle of green sustainability in Alexandria university are as follows:

1. Energy and Climate Change (EC). Using solar energy as a clean source of electricity as an alternative to electricity based on fuels.
2. Providing green spaces on campus.
3. Transfer within the university. Adopting means of transportation inside and outside the university campus for students, staff and faculty members that do not pollute the environment.
4. Waste Management (WS).
5. Water (WR).

Smart Green University Proposal Indicators:

1. Energy and Climate Change (EC)

According to this indicator, solar energy is relied on as a clean and renewable source of electricity instead of relying on traditional sources of electric energy that depend on fossil fuels and pollute the environment. In this context, we suggest:

- The use of lighting poles inside the university campus equipped with solar cells for night lighting.
- Putting solar energy cells on the roofs of buildings inside the campus to provide those buildings with electric energy during work periods.
- Supplying cafeterias on campus with solar energy cells to generate electricity instead of the traditional sources of electric energy
- Adopting the use of LED lighting that save electrical energy inside the campus buildings instead of the traditional lighting that use more electrical energy.
- Taking into account the use of devices that help to save electricity as much as possible on the campus.



- Establishing a mechanism to save the use of electric energy inside the university campus that ensures the ideal use of electric energy inside the classrooms, as well as administrative offices during non-working hours, to prevent energy waste and achieve optimal use of it while continuing to maintain the efficiency of the educational process.
- Adopting the concept of the smart building in order to accommodate the use of all devices energy saving which means using internet-connected technology, as an integral part architecture engineering to monitor and control structural design elements to share information between users, systems and buildings.

2. Providing green spaces on campus

Designing open spaces inside the university campus in a way that provides the largest possible amount of green spaces and trees, which would reduce the rate of carbon dioxide emissions resulting from activities on the campus.

3. Transfer within from /to the University university

The transportation system plays an important role on the level of carbon emissions and pollution sources in the university. The transportation policy encourages reducing the number of cars in universities, and the use of campus buses and bicycles which collectively create a healthy environment. Also, this policy encourages students, staff, and faculty to walk around, and to avoid using private cars. The use of environmentally friendly public transportation will reduce the carbon level on campus.

- Providing bicycle parking in suitable spaces allows students and workers to use them to move within the university campus effectively as an alternative to traditional means of transportation.
- Providing mass transportation (buses) for staff and faculty members to travel to and from the university campus instead of using private cars as a single means of transportation, which will reduce carbon dioxide emissions.
- Adopting the state's initiative to provide bicycles announced by the Ministry of Youth and Sports under the slogan "Your bicycle is Your Health" for students and workers with supported prices to expand the base for practicing sports and play sports a lifestyle

4. Waste Management (WS)

According to this indicator, a policy is adopted to recycle waste by separating it from the source into four types:

• Organic waste and food residues.

• Plastic waste and plastic bags.
• Mineral waste and carbonated water cans.
• Paper waste

This allows for the recycling and utilization of as much of that waste as possible instead of disposing of it in landfills, which will eventually lead to its burning and the consequent pollution of the environment and the increase in emissions of greenhouse gases.

Alexandria University adopted a mechanism for healthy food and beverage within university dorms (providing healthy, balanced foods, a mechanism for packaging food and drinks, storing them, and a mechanism for maintaining a healthy atmosphere for dining places on campus).

5. Adoption of a preservation mechanism for water.

Water use in the campus is an important indicator in the sustainability scale. The aim is to urge universities to reduce water use, increase water conservation programs, and protect the environment.

The steps taken are: a water conservation program, a recycling program Water, Using Water-Saving Equipment, and Treating Wastewater . This was carried out through:
• Water-saving appliances are used instead of traditional appliances. This indicates the extent to which water-saving devices are used (for example, using a sensor-controlled automatic hand washing faucet, and highly efficient bathroom appliances.
• Supplying water taps with water saving units.
• Adopting a mechanism for maintaining water pipes to prevent waste resulting from leaks.
• Adopting plans and mechanisms to maintain the university's internal supply networks and taps to prevent water wastage.

• Providing a wastewater treatment plant in the university to make it suitable for irrigation of green spaces and gardens located within the university campus

A management Plan model for Omayed Biosphere Reserve

Within the activities of SUMAMAD International Project held at the detaprtment of Environmental Sciences Faculty of Science- Alexandria University, OMayed Biophere reserve was the focus of activities and a management plan for this protected area was implemented.

The plan is explained in the following 5 levels and is adopting two policies that can be used to deal with the impacts of climate change - mitigation and adaptation in OBR. Mitigation policies attempt to limit further changes in global climate. Mitigation policies either focus on reducing the cause of emission of greenhouse gases through, for example, enhancing greenhouse gas sinks which includes land use, land-use change. These comprise a) conservation of existing carbon pools, i.e. avoidance of overgrazing, clearance of vegetation cover and uprooting, b) sequestration by increasing the size of carbon pools, e.g. through ecosystem rehabilitation and restoration, and propagation of native species. r and c), capacity building/technology transfer, research/observation and training and education".
The current ecological conditions in OBR indicate that the present level of human pressure is leading to significant deterioration of its environment and calls for an urgent plan for conservation and development. The consequences of different scenarios are:
(a) Impacts on main ecological features,
(b) Effects on the future of resources,
(c) Exacerbating climate change impacts, and
(d) Results concerning socio-economic situation of land-users.
The proposed model simulates trends of variation in ecological conditions due to different land uses.

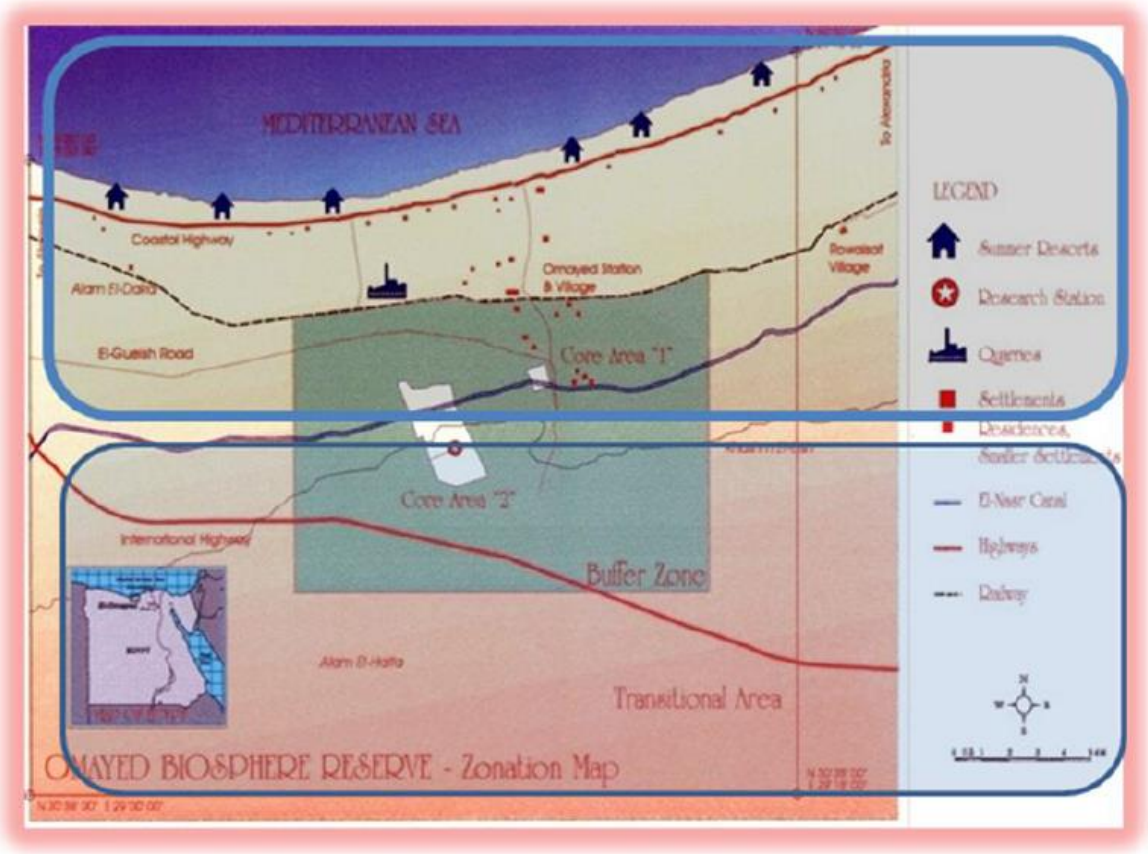

Figure 3. OBR divided into a northern and southern areas.

Level 1: Full protection, which is unrealistic, but is proposed only for the comparison of economic values with other scenarios. It is assumed that such scenario could be implemented in the core areas of the Biosphere reserve, and would call for established of more core areas in the biosphere, since there is only one core area (only 1m2), which is currently functioning, and would not suffice such scenario. The consequences of this scenario is: that each unit would evolve according to its regenerative capacity. Units where agricultural practices are suddenly abandoned are progressively invaded by plants of the type which gradually rebuild the native vegetation cover corresponding to the ecological conditions.

Level 2: Rangeland development and limitation of the ploughed fields, this scenario implies that annual crops cultivation and tree plantations would be limited only to suitable areas. This scenario implies also the adjustment of stocking rate on the ranges to the present grazing capacity, and to ensure the recovery of the plant cover by rotation in depleted areas. In this case, it becomes necessary to have supplementary feed during the transitional period of preceding the complete restoration of ranges. The consequences of such scenario with rational use of rangelands, is a biological recovery and satisfactory control of degradation. This is an aspect which is rarely taken into consideration by economists.

Level 3: Continuation of present practices and maintenance of present land-use system, Current practices indicate that with the present system of annual crop cultivation and tree plantation yields will remain low. Locations used for grazing will be gradually overgrazed and will decrease in area. Continuation of the present practices means in fact more ploughing for cropping and extension of orchards and annual cropping of cereal and vegetables, particularly after the extension of the supplementary irrigation canal from the Nile. This scenario means also an increase in the number of animals and means no planning management of rangelands (e.g. limitation of stocking rate according to the level of production of rangelands). Although

this scenario is the most probable, it will result in immediate limitations for land use .For instance, the harvesting of large areas of low yield cereals by hand is a bottleneck, since it will be difficult at present to visualize the introduction of mechanized harvesting in such low yield conditions. The Consequences of this scenario is a realistic hypothesis according to the actual degrees if attractivity of different units for grazing (and wood cutting) and ploughing. It may also result in an acceleration of the clearing of more attractive areas for ploughing. An associated constant decrease of areas used for grazing provokes permanent overgrazing during certain periods. Extension of cereal and vegetable farming and fig plantation in addition to overgrazing and severe uprooting promote an increase of degradation processes.

Level 4: Intensification of present practices, This scenario postulates that: the recent fast extension of orchards for economical reasons will still increase during the next twenty five years, that socio-demographic conditions necessitates new extension (due to possibility of mechanization) of cropping for human consumption and for feeding of animals and that investments are made for promoting the use of resources (e.g.) increase the number of watering points) with no acceptance by population of the principle of rational range management .The Consequences of this scenario is all possible misuses of the area accumulate with the mechanization of ploughing and other agricultural practices, and the creation of watering points without limitation of size of herd or of grazing period. Regeneration of vegetation becomes low or negligible everywhere, and the progressive reduction of the yield of all types of production leads necessarily to heavy investments for reclamation, less employment opportunities, and to limiting rural depopulation. At this level, we consider that the sensitivity will reach what we have referred to as the potential sensitivity; all areas being at their highest level of attractivity for grazing and ploughing.

Level 5: Extension in land reclamation using the supplementary irrigation canal as a source of irrigation water, such scenario of development must be evaluated according to the environmental potentials and availability of the local labour force. This scenario may provide a possibility for regional development if good yields are attempted for cereals and various feeder crops ,and if a limitation of animal stocking rates on rangelands is achieved. Simultaneous environmental conditions must be considered very carefully in order to avoid salinization and water logging. The consequences of this scenario are the use of heavy investments for introducing such level of intensity of human pressure. Such pressure should be conceived as rational management taking into account possibilities of irrigation according to soils and water resources, and according to the restriction of cereal and trees farming to suitable areas which benefit from direct run-off water as a result of natural topographic conditions. This system has the same results as those of level 2, but with the highest agricultural production due to the extension of irrigation.

It is important to take into account that there are several inter-correlated factors: predictable increase of population, socio-economic changes, trends in land management, variability in dynamics of ecosystems, evolution of renewable resources, and variability of rain. It is difficult to take care of such various factors at the same time. It appears however, that an optimum level of land use intensity should be determined on the basis of ecological considerations (in order to maximize resources, and to ensure a progressive recovery of soil and vegetation. Meanwhile, the management must take care of two main factors:

(a) traditional life style of local population, and

(b) socio-economic needs of the population, looking for progressive improvement in their standard of living.

Activity 6: selection of new core areas for the OBR

The selection of a new core areas has been implemented after updating the geodatabase that was generated in the first phase of the project. The geodatabase was extended to include a map

of all the protected areas in the western desert of Egypt, the existing core areas, the location of villages, and a more detailed digital elevation model. All these maps are included in the annex. It is proposed after consultations with the manager of the OBR that his proposal to the Ministry Environment included the suggestions that came out form SUMAMAD project. The suggestion is to divide the OBR into a northern area, which is currently land transformed into summer resorts and quarrying, and a southern area which is relatively still pristine and may serve for the selection of core areas. This is clear in the following Figure 3 below.

Figure 3. OBR divided into a northern and southern areas.

• The North coastal sector is 300km 2 , and starts from the sea shore to Khashim El Eish Ridge with 5 core areas, with 3 alternative areas (7km2)

• The Southern sector is 400km2 and starts From Khashim El Eish to the southern area of the Biosphere reserve

• Field investigation showed that grazing is carried out haphazardly, in different and distant areas in the Southern sector of the Biosphere, which might occupy the whole area of this sector (about 400km2).

• Observation showed that wild vegetation is highly degraded, due to haphazard grazing that is uncontrolled, and undefined timely. Indicator of such degradation is the observed reduction in plant cover,

• Overgrazing process has resulted in the reduction of palatable species populations. and the extinction of other important species used in grazing in the reserves. Previous Surveys in the Reserve recorded about 30 palatable species, the majority of which became extinct or of restricted distribution due to the current overgrazing process. The incomplete life cycles of these plants that do not reach the seed shedding stage that supports that development of these plats for the next season. It is also to be mentioned that the reduction in rain has highly affected this process. (160mm)

• Inventorying of animal counts that graze in Omayed area and classifying them into two categories, the first of which is owned by the local community of Omayed, and graze in its rangelands. This category reached about 8000 heads of sheep, goats and camels. The second category is owned by outsider herd owners but temporarily graze in rangelands of Omayed during their journey to neighboring areas. This category reached about 10000 heads.

The accurate locations of the core areas are under investigation with the state ministry of Environment. This work is to be continued in the next year. There is also a suggeston that a new core area could be added at Moghra lake, but this needs further work hopefully in the next phase

Activity 7 : Provision of income generating activities for men and women.

The income generating activities for women has started last year with provision of material and dies for producing handicrafts. This work has been extended this year to include the production of small carpets, hand bags, small carries bags. The quality of the products were checked and sold in the local market to tourists, visitors and local people. The revenues produced were used by the handicraft project members to buy more material. This activity has been so far successful, however more support is needed to produce new attractive products, to meet the market needs. This activity will be followed up in the activities of the next year. The following are some photos of the products produced and some members of the NGO giving advices.

Regarding the income generating activities for men, multipurpose olive propagates has been purchased and distributed to selected members form the four villages. These propagules are still in plastic growing on bags as they were purchased, and is expected to be transplanted to the appropriate fields at the appropriate time around the houses of the members of this practice. This activity will be continued in the next year of the project

Plant ATLAS

The Botanic Garden

Faculty of Science, Alexandria University

(ALEX)

By

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1st Edition

With 455 original colored photographs
(Photographed by the author)

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Protected Agriculture Techniques Program (Saba Basha College of Agriculture)

It is a program that prepares students to face current agricultural issues at the local and scientific levels to improve production and protect the environment. This program provides modern scientific knowledge in the fields of plant production, health management or plant care and water conservation, and trains students to be of applied skill be innovative, responsive to local and regional needs, and able to adapt to deal with market changes and rising production costs

Under the auspices of the University of Alexandria, the continuation of the veterinary convoys organized by the Faculty of Veterinary Medicine for the third week in a row in the most needy villages in Alexandria Governorate, where a group of professors and faculty members in the clinical departments examined and treated various animals and poultry free of charge in the villages of Abis Al-Rawda, Abis Al-Salam and Orabi village in the period from July 31 to August 2, 2022.