



# Catalogue of Courses to be Revised and Developed

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Deliverable Number: D4.1  
Contractual Date of Delivery: 30/03/2014  
Actual Date of Delivery: 30/03/2014  
Title of Deliverable: Catalogue of courses to be revised and developed  
Work-Package contributing to the Deliverable: WP4  
Dissemination Level: IL  
Nature of the Deliverable: R  
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Version Date Comments & Status Distribution 20/03/2014 initial version  
Draft 22/03/2014 comments from all project team

## **Project Funding**

Project Full Title: **Developing an Interdisciplinary Minor in Climate Change and Sustainability Policy**

Project Acronym: **CLIMASP**

Project number: **543879 TEMPUS-1-2013-1-GR-TEMPUS-JPCR**

EC Programme: **TEMPUS**

Agreement number: **JPCR (2013-2013-5043/001-001)**

Start date: **1st December, 2013**

Duration: **3 years**

Budget: **1 246 635 €**

## **Executive Summary**

This deliverable outlines mapping of courses related to climate change in each partner university. It was of critical importance to elicit information about such courses as these courses will serve as the data base for revision and development in the subsequent deliverables. In each partner university, the design teams were assigned to identify 25-30 courses from at least three different academic faculties in order to satisfy the interdisciplinary perspective. About 300 courses were identified across the 10 partner universities. In the following tables, the identified course are presented.

## EGYPT

<b>MAPPING COURSES RELATED TO CLIMATE CHANGE EDUCATION AND SUSTAINABLE DEVELOPMENT: HELIOPOLIS UNIVERSITY</b>				
	COURSE NAME	FACULTY	NAME OF INSTRUCTOR	SHORT DESCRIPTION OF THE COURSE
1	Pharmacognosy I	Pharmacy	Assoc. Prof. Amira Abdel Motaal	The course covers the medicinal leaves, flowers, barks, woods and their derived drugs: classification, morphology, histology, monographs, powdered drug identification, adulteration, chemical tests, active constituents, uses, and pharmaceutical preparations of leaves e.g. senna, belladonna, digitalis, and henna; flowers e.g. clove, pyrethrum, chamomile, and calendula; barks and woods e.g. cinchona, cinnamon, cassia, and pomegranate. Quassia, guaiacum, yellow sandal, and pine wood.
2	Pharmacognosy II	Pharmacy	Assoc. Prof. Amira Abdel Motaal	The course covers the medicinal seeds, fruits, herbs, subterranean organs, natural products derived from animals and marine products and their derived drugs: classification, morphology, histology, monographs, powdered drug identification, adulteration, chemical tests, active constituents, uses, and pharmaceutical preparations of seeds e.g. cardamom, nigella, fenugreek, and psyllium; fruit e.g. anise, <i>Ammi visnaga</i> , capsicum, and cratagus; herbs e.g. mentha, thyme, lobelia, and ergot; subterranean organs e.g. squill, rhubarb, ginger, and liquorice; animal and marine derived drugs e.g. cod liver oil, gelatin, heparin, insulin; unorganized drugs e.g.

				colophony, myrrh, asafetida, and aloe.
3	Phytochemistry I	Pharmacy	Assoc. Prof. Amira Abdel Motaal	The course describes the fundamentals of phytochemistry and plant constituents: extraction, isolation, characterization and quantitative evaluation of plant constituents, applications of chromatography, spectroscopy and chemometrics in the analysis of natural products. Volatile oils: physical properties, methods of preparation, storage, quality control, and chemistry. Carbohydrates: monosaccharides, disaccharides, trisaccharides, tetrasaccharides, homopolysaccharides, heteropolysaccharides, biologically active carbohydrates, and sweeteners. Resins: resin combinations and other isoprenoids.
4	Phytochemistry II	Pharmacy	Assoc. Prof. Amira Abdel Motaal	The course covers plant secondary metabolites: alkaloids; isolation, characterization and quantitative evaluation of different types of alkaloids (pyridine, quinoline and isoquinoline, indole, carboline, imidazole, purine and diterpene, Phenolic compounds; simple flavonoids, polyphenols, tannins, anthranoids, miscellaneous secondary compounds, and finally, basic understanding of the role of natural products in drug discovery.
5	Herbal Medicine	Pharmacy	Assoc. Prof. Amira Abdel Motaal	The course describes the detailed preparation and formulation of Phytopharmaceuticals. Requirements for quality control and standardization of herbal drugs, legal and professional

				framework (in Egypt and Europe) for production, dispensing of herbal medicines also will be covered critical appraisal of the overall process of developing a medicine from a botanical drug, sound understanding of the importance of pharmacovigilance of herbal medicines and finally, physician and industrial perspectives in herbal medicine.
etc				

<b>MAPPING COURSES RELATED TO CLIMATE CHANGE EDUCATION AND SUSTAINABLE DEVELOPMENT: HELIOPOLIS UNIVERSITY</b>				
	<b>COURSE NAME</b>	<b>FACULTY</b>	<b>NAME OF INSTRUCTOR</b>	<b>SHORT DESCRIPTION OF THE COURSE</b>
1	Introduction to Water Engineering	Water Engineering Department (Major course)		Introduction to building materials. Soil mechanics. Engineering of water supply and sanitation. Waste resources management. Water management and quality. Introduction to reinforced concrete structures. Introduction to steel structures. Groundwater engineering. Transport planning and transport engineering. Processes of water and waste water treatment. Introduction to hydraulic engineering.
2	Water Engineering Project	Water Engineering Department (Major course)		Population studies, Surveying of water resources, Collecting typical data of any site, analyze, charting, and presents a report. Typical economical study of water resource problems including natural, underground, waste, etc. Surveying the technology used in water engineering industry. Preparing a full report regularly, and presentation for discussion to explain the issues of the subject.

3	Soil-water-plant relationship	Water Engineering Department (Major course)		Soil-Plant-Water relationships, Irrigation water requirements, Irrigation efficiency and calculating periods between irrigations, Low rates and irrigation time, Different types of field water application : Surface irrigation methods, Sprinkler and drip irrigation, Subsurface irrigation, Planning Design, Management, Operation and maintenance for different methods, Canal lining.
4	Sanitary Engineering	Water Engineering Department (Major course)		Introductory level analysis of pollution transport, treatment, containment, remediation, Process engineering approach to contaminant removal methods, including use of appropriate computer software, Sources and characteristics of water and wastewater, water quality criteria and monitoring, principles and application of physical, chemical, and biological processes for water purification and wastewater treatment, Design and operation of treatment systems to meet water quality and effluent standards. Water pollution; Water supply engineering; Water purification works; Water distribution system and storage tanks; Sanitary drainage; Sewerage system; Wastewater treatment Works.
5	Water and Waste water Treatment	Water Engineering Department (Major course)		This course familiarizes students with appropriate design criteria and the design process for water and wastewater treatment in industry. This includes Introduction to wastewater treatment plant design, operation of waste water treatment in industry, design flow rates, design mass loadings, process selection, and elements of conceptual process

				design, Physical unit operations - flow measurement, flow equalization and mixing.
6	Desalination	Water Engineering Department (Major course)		Global and local water resources, water quality and analysis, technical and economic analysis of major desalination processes such as multi-stage flash, reverse osmosis, multiple-effect distillation and electro dialysis
7	Microbiology	Water Engineering Department (Elective course)		The theory and application of microbiology as related to environmental engineering; understanding and controlling the performance of biological unit processes when used in treatment of wastes and wastewater, Microbial morphology, Introduction to microbiology, Microbiological laboratory techniques, Coliforms as indicators of fecal pollution, How to measure Coliforms Review of organic chemistry, Nutrition and environmental requirements, Quantitative growth of batch and continuous culture systems, Aerobic and anaerobic metabolism, biomass growing in wastewater treatment plant.
8	Ground water flow and contaminated transport	Water Engineering Department (Elective course)		Development and application of models for fluid flow and contaminant transport in porous media. Derivation of governing equations, analytical and numerical solutions, and application to the movement of groundwater and transport of contaminants at an actual field site
9	Hazardous wastewater management	Water Engineering Department (Elective course)		This course focuses on management planning, definition and characterization, source, transportation and storage, treatment and disposal method, minimization and recycling, permitting process,

				site remediation, legal mechanism of hazardous wastewater
10	Introduction to coastal engineering	Water Engineering Department (Elective course)		Problems of design in the ocean and coastal environment. Mechanics of wave motion, tides and storm surge, littoral processes, wave forces on structures and design of coastal structures. Includes observations of hydraulic model tests in the Ocean Engineering Laboratory
11	Sustainable Development and Environment	Core Courses		Egypt, the Nile and desert ecosystems. Limnology, Nature's networks. Learning communities. Culture and nature. Theoretical concepts and practice of sustainable development (SD). Social responsibility of organizations and individuals. Sustainable cultural and social development (Ethics). Sustainability and environmental science (air, water, energy, soil, animals, plants, mineral resources) – Political perspective on sustainable development. Standards for social responsibility.
12	Ecology and community building	Core Courses		<ul style="list-style-type: none"> <li>- The social construction of reality</li> <li>- Human community: principles of social ecology; Learning communities: principles of learning &amp; development</li> <li>- Sociological processes and social networking: a socio-technical perspective</li> <li>- The development of human communities in the Arab world</li> </ul>

13	Social research and networking	Core Courses		<ul style="list-style-type: none"> <li>-Social competence in the interaction with students and colleagues</li> <li>-Good realization as well as further development of the existing concepts</li> <li>- Tolerance and openness for various styles</li> <li>- Process oriented and open for change and development</li> <li>- High technical skills</li> <li>- Practical experience in the specific scope</li> </ul>
14	Renewable Energy Project	Energy Engineering Department (Major Course)		<p>Surveying of energy resources. Collecting typical data of any site, analyze, charting, and presents a report.</p> <p>Typical economical study of replacing traditional energy resources by renewable energy system ( such as solar water heater to replace electrical water heater, PV for lighting, ..etc.), prepare a presentation for discussion to explain the issues of replacement.</p> <p>Writing a full report with conclusions.</p>
15	Introduction to Bio Energy Conversion	Energy Engineering Department (Elective Course)		<p>Concept of Bioenergy: photosynthesis process, biofuels, biomass resources bio based chemicals and materials.</p> <p>Thermo chemical Conversion: pyrolysis, combustion, gasification, liquification.</p> <p>Biochemical Conversion: aerobic and anaerobic conversion, fermentation etc.</p> <p>Biofuels: importance, production and applications.</p>

<b>MAPPING COURSES RELATED TO CLIMATE CHANGE EDUCATION AND SUSTAINABLE DEVELOPMENT: HELIOPOLIS UNIVERSITY</b>				
	<b>COURSE NAME</b>	<b>FACULTY</b>	<b>NAME OF INSTRUCTOR</b>	<b>SHORT DESCRIPTION OF THE COURSE</b>
1	Orientation to Sustainable Development	Business & Economics	Dr. Maged Wassef	Global organizations such as

	from an Economic, Enterprise & Development Perspective (ORN101)			the United Nations (UN) have begun to establish measures to improve institutions worldwide dealing with environmental matters a cleaner and healthier earth. In the 1980's, the notion that development must be sustainable rose to the international . For any enterprise, with local or global presence, the focus on developing the surrounding communities started to take an intricate role to guarantee its existence. They shape their policies to comply with the new concept and to maintain the international agreements within their internal procedures. This course aims to explore this view and to internalize the concept of Sustainable Development.
2	Macro-Economics (ECD111)	Business & Economics	Dr. Maha Mostafa	Macro-Economics deal with the economy on a holistic scale. By viewing the economy as a whole rather than fragmented pieces, trends begin to emerge and a clearer understanding of the workings of an economy and the reasons for the various levels of economic development among different nations emerge. After reorienting the course to address sustainability, the course deals with Macro-environmental issues as well as the economic costs of pollution and a lack of human rights.
3	Developmental Economics (ECD203)	Business & Economics	Dr. Maha Mostafa	Developmental economics discusses methods of developing an economy in under-developed economy. It stress the essentials of education, justice, wealth distribution and human rights in developing a nation. After

				reorienting the course, it now has an additional focus on sustainable development, by achieving the same results of development without compromising the ability of future generations to continue in this development process and prosper.
4	Entrepreneurship (ENP305)	Business & Economics	Dr. Rasha Wahieb	Entrepreneurship is related to teaching the students how to take a scientific approach to starting a new and upcoming enterprise. By establishing guidelines on creating feasibility studies and evaluating the viability of the original concept, the students are given the path to minimize failure and maximize the benefits from an innovation. This course also discusses the importance of sustainability in these new companies and how it can help ensure growth and a place in the community in the future.
5	Cost Accounting (ACT331)	Business & Economics	Not yet offered	Upon successful completion of this course, students should be able to: Understand the fundamental cost terms, concepts, and classifications. Identify the cost elements of manufactured products. Understand the cost behavior in greater depth, and analyze mixed costs using different methods. Distinguish between process costing and job-order costing and identify companies that would use each costing method. Describe product costing under a job-order costing system. Explain how variable costing differs from absorption costing in product costing and internal decision making. Identify and analyze relevant and irrelevant costs in a decision

				situation.
6	Business Ethics (MGT207)	Business & Economics	Dr. Rasha Wahieb	Business ethics discusses the different, ambiguous nature of ethics in relation to dealing in business. The idea that the legal is not always the ethical is emphasized and the benefits (both economic and community-wise) of applying ethics in a business environment are discussed. The ethics of pollution and wastefulness are stressed upon as well as the benefits of applying sustainable, environmentally friendly practices.
7	A Sustainable Approach to Development (DVP 306)	Business & Economics	Not yet offered	This course deals with applying sustainable aspects whilst pursuing development. By understanding the hidden costs of over-consumption and pollution, the concept of developing while ensuring a sustainable environment is understood. This course also discuss the importance of the community in the developmental process and that they must be partners, not victims, of progress.
8	Developmental Economics 2 (ECE204)	Business & Economics	Not yet offered	This course aims to provide a broad knowledge base for a culturally based developmental economics .To compare and contrast communally based self-sufficiency with a culturally based developmental economy. To connect conscious evolution, micro enterprise-wise, with developmental economics, macro economics-wise.
9	Social Economics	Business &	Not yet offered	The course aims to provide a

	(ECD305)	Economics		critique of market based economic from a social economic perspective to position the emerging knowledge economy in a social context, and to understand the nature and scope of co-operative enterprise.
10	Living Economics (ECD407)	Business & Economics	Not yet offered	This course aims to integrate self sufficient, developmental, social and living economics, position living economics as an evolution of market based, free enterprise-and-comparative advantage, and interconnect living economics and sustainable development.
11	Natural Resources Planning and Management (ERE204)	Business & Economics	Not yet offered	This course aims to provide guidelines for managing natural resources from both a governmental and an organizational perspective. The importance of planning for the usage and depletion of these resources along with alternatives to be used instead are highlighted.
12	Global Environmental Issues (ERE 306)	Business & Economics	Not yet offered	This course aims to teach the students about the major environmental issues facing the world today, the most common pollutants that fill the world's ecosystems, and the major problems that need to be addressed by the communities of the world.
13	Renewable energy Economics and Management (ERE305)	Business & Economics	Not yet offered	This course discusses the different, viable systems of renewable energy and their future in the world. The economics of these resources are discussed comparatively with their non-renewable counterparts. Students are taught how to manage these sources and how to accurately follow the net gain from

				installing and utilizing them.
14	Sustainable Development and Policies (DVE407)	Business & Economics	Not yet offered	This course builds off of the previous courses regarding sustainable development by exploring the impact of different governmental and organizational policies on achieving sustainable development. Furthermore, the course delves into the different policies adopted by countries around the world in their attempt to achieve sustainable development; their success as well as their failures are discussed.
15	Development Beyond Modernization (DVP305)	Business & Economics	Not yet offered	The course aims to conceive of development in terms of modernization, to re-conceive of “northern” modernization in terms of “southern” dependency theory, and to uncover “world systems analysis” to view development in a holistic context.
16	Green Marketing (MRK371)	Business & Economics	Dr. Omar Ramzy	This course responds to a contemporary and social need to better understand consumer demand for green products and the implications of this demand within the marketing system. The course helps students to clearly identify the growing demand by so-called “green” consumers for products, services and systems that support environmental and social sustainability, as well as changing patterns of consumer demand and changing propensities to pay for environmentally sustainable products and services. This course will help students to be prepared for work in a business environment where environmental and social sustainability are increasingly

				important and are expected components of best practice business operations. Students will explore issues associated with product innovation and design, as well as appropriate pricing and promotion strategies for green products and services.
17	Marketing and Corporate Social Responsibility (MRK473)	Business & Economics	Dr. Omar Ramzy	This course examines how multinational corporations and LDC communities interact to further their respective objectives; how their civil society partners such as NGOs, advocacy groups and host country governments engage in these processes; and what the role of the media is in affecting the outcome. Alignments and tensions within and between all of the entities characterize these complex dynamics: forces that are critical for the Corporate Social Responsibility professional to understand as s/he navigates these often-choppy waters.
18	Macroeconomics Theory (ECN322)	Business & Economics	Not yet offered	In this course, the very foundations of Macro-Economics are explored. The fundamentals placed by the giants of Economics are given to the students in order to understand the origin of what they had studied before.
19	Advanced Developmental Economics (ECN324)	Business & Economics	Not yet offered	This course delves deeply into the concepts and theories surrounding developmental economics. The concepts of cultural consciousness and the economics of a developing nation.
20	Environment Economics (ECN325)	Business & Economics	Not yet offered	Environment Economics deals with methods of calculating and assessing environmental performance in an economics setting. Through the economy of the environment, true

				economic performance is more accurately represented as it takes into account environmental degradation as a part of the over-all economic performance.
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<b>MAPPING COURSES RELATED TO CLIMATE CHANGE EDUCATION AND SUSTAINABLE DEVELOPMENT: ASWAN UNIVERSITY</b>				
	<b>COURSE NAME</b>	<b>FACULTY</b>	<b>NAME OF INSTRUCTOR</b>	<b>SHORT DESCRIPTION OF THE COURSE</b>
1	Fish adaptation and climatic change	Fish and fisheries technology	-----	Scientific bases of climate change and the greenhouse effect on earth and Fisheries. Greenhouse gases and carbon dioxide emissions. The land as a container for the storage of carbon emissions and ways to monitor the degradation of land and water resources as a result of climate change. The role of farming plants in reducing the impact of carbon dioxide and the use of computer models in the management of climate change.
2	Paleoecology Course	Science	Prof Abdel- ziz Tantawy	Overview of environmental changes through time, local environmental changes and regional to global climate change of the past, synecology of fossils, paleobiodiversity, changes in communities over geologic time, stable isotopes of oxygen and carbon, paleotemperature. Objectives - to learn and apply methods for determining how environments and climate on Earth have changed through time. Learning Outcomes - an understanding of how paleoenvironments and paleoclimate change are studied in the field and lab, and major changes that have occurred.
3	Astronomy and	Fish and fisheries	Fish and fisheries technology	Climatic factors and their impact on the conditions of the sea -

	meteorology	technology		marine and air attraction- climate loading and interpretations - fishing operations and the weather - the interrelationships between elements of meteorology and fish behavior and provide their own food - storms and their impact on the presence of the fish migration
	Folra and plant taxonomy	science	Prof Mohamed sheded	Study the plant distribution and taxonomy in different regions in Egypt with relation to soil and climatic factors which affect of the distribution of these species.
4	Plant Ecology	science	Dr Usama Mahalel	Climatic factors affecting on the plant environment and how it affect on the plant cover. Climatic factors effect on soil type and soil formation. The negative and passive relationships among the biotic components of the environment.
5	Ecology of Algea	science	Dr Ahmed El-Otify	Environment of algae and effects of climatic factors such as light temperature on life cycle of algae and its biomass. Phytoplankton blooming in relation with climatic change.

<b>MAPPING COURSES RELATED TO CLIMATE CHANGE EDUCATION AND SUSTAINABLE DEVELOPMENT SUEZ CANAL UNIVERSITY</b>				
	<b>COURSE NAME</b>	<b>FACULTY</b>	<b>NAME OF INSTRUCTOR</b>	<b>SHORT DESCRIPTION OF THE COURSE</b>
1	Microbial Ecology	Science	Prof M Bahgat	Energitics, diversity and regulation of metabolic processes- microbes in elements cycling (C, N, P, S, Fe)- methods for environmental analysis- association with plants and animals- usage of microorganisms for environmental and biotechnology (eg. Bioremediation and public health microbiology)

2	Production of bio-fuel by algae	Science	Prof H Shafiq	Mass cultures, cultivating algae for liquid fuel production, green fuel bioreactors, converting algae into biofuel
3	Man and environment	medicine	Prof Enas	Determinant of health, pollution, levels of prevention
4	Emerging and reemerging diseases	medicine	Prof Enas	Climate change , change in infectious agent distribution , re-emerging diseases
5				
etc				

## JORDAN

<b>MAPPING COURSES RELATED TO CLIMATE CHANGE EDUCATION AND SUSTAINABLE DEVELOPMENT: HASHEMITE UNIVERSITY</b>				
	<b>COURSE NAME</b>	<b>FACULTY</b>	<b>NAME OF INSTRUCTOR</b>	<b>SHORT DESCRIPTION OF THE COURSE</b>
1	<b>Introduction to Sustainability</b>	<b>Educational Sciences</b>	<b>Dr. Theodora De Baz</b>	<p>This course is designed to introduce students to the goals, principles, and practical application of sustainability. The course is also designed to explore the potential of sustainable development to overcome the environmental and social challenges facing humanity in the 21st century. The course will examine the major environmental issues and trends happening in modern society from a scientific and practical perspective, including energy use and consumption, pollution, climate change, population growth, market economics, and technological innovation. The meaning and implications of sustainable development are considered by examining core principles that include: environmental protection and equity within and between generations. Topics include restoring ecological and environmental health, creating</p>

				economic welfare, and ensure social justice. The variety of viewpoints on questions of sustainability is emphasized through the discussion of controversies and case studies
2	<b>ICT-Enabled Education for Sustainable Development</b>	<b>Educational Sciences</b>	<b>Dr. Theodora De Baz</b>	ICT-Enabled Education for Sustainable Development This course will introduce students to the Concept of Sustainable Development, sustainable practices, sustainable learning and how technology can be used to enable Education for Sustainable Development (ESD). It will also examine the origins of Education for Sustainable development (ESD), from the Brundtland report to Agenda 21, the Millennium Development goals to the Decade of education for Sustainable Development. The issues of Human Rights, Sustainable Urbanization, with focus on Urban Poverty, the Environment, Health Promotion will also be presented. Activities on how to facilitate meaningful learning will be introduced.
	<b>COURSE NAME</b>	<b>FACULTY</b>	<b>NAME OF INSTRUCTOR</b>	<b>SHORT DESCRIPTION OF THE COURSE</b>

3	<b>Physics Concepts and their Teaching Methods</b>	<b>Educational Sciences</b>	<b>Dr. Saed Sabah</b>	Present the concepts: matter and energy, force and motion, science, misconceptions and teaching physical science concepts and generalizations. Strategies of teaching these concepts such as: lab based science teaching methods, demonstrations, discovery, inquiry and problem solving, wet and dry laboratory, integration of ICT and internet with science education.
4	<b>Education for Sustainable Development</b>	<b>Educational Sciences</b>	<b>Dr. Saed Sabah</b>	Include the concepts of sustainability and its relationship with education. It also seeks to raise the students' awareness of the importance of directing education to realizing sustainability in various natural environments. Furthermore, in this course, students are required to try out several strategies to integrate sustainability concepts in the various educational curricula
5	<b>Cancer Biology</b>	<b>Science</b>	<b>Dr. Lubna Tahtamouni</b>	The course describes the mechanism of cancer formation, types of cancer, migration of tumor cells, and the factors leading to cancer formation: in vivo insults and ex vivo insults (global warming, UV, mutagens like pesticides)...
6	<b>Developmental Biology</b>	<b>Science</b>	<b>Dr. Lubna Tahtamouni</b>	The course explains development of various organisms from fertilization till birth, gene regulating developments, the role of developmental biologist in the society and the effect of human actions

				(global warming, change in temperature, uncontrolled waste production ) on human development specially embryonic development
7	<b>Multi Media Programming</b>	<b>Information Technology</b>	<b>Dr. Ibrahim Al-Oqily</b>	This course teaches the concepts and skills of using text, images, sound, animation, and video to create multimedia projects and applications. Students will learn the basic principles of each media type including digital representation and issues that arise when media are combined. Students will deal with ethical and legal issues, design considerations including usability, hardware and software that enable multimedia, data representation and file types, data storage, data transmission, digitizing and compression techniques

<b>MAPPING COURSES RELATED TO CLIMATE CHANGE EDUCATION AND SUSTAINABLE DEVELOPMENT: JERASH UNIVERSITY</b>				
	<b>COURSE NAME</b>	<b>FACULTY</b>	<b>NAME OF INSTRUCTOR</b>	<b>SHORT DESCRIPTION OF THE COURSE</b>
1	Algorithms Design and Analysis	Information Technology and Computer Science	Assis. Prof. Dr. Ghaith Jaradat	This course aims at introducing mechanisms of analyzing the efficiency and effectiveness of algorithms and methods that are used in designing and developing Algorithms. Topics covered by the course are: sorting and searching, divide and concur, greedy methods, dynamic programming, special aspects of trees and their operations and schema. In the practical side of this course, students are asked to write programs to solve various

				issues related to the concepts learned in this course.
2	Language Planning	Art	Assis. Prof. Dr. Abdullah AL-Badarnah	This course aims at introducing the general principles of planning and linguistic fields and types. It also includes the study of the process of developing vocabulary and planning for the acquisition of English language in order to identify the problems and put forward solutions acquired.
3	Social Psychology	Education	Assoc. Prof. Dr. Bassem Hawamdeh	The concepts and the importance of social psychology. Methods of Research in social psychology. The features of the group and its inter related elements. In addition to the innate and learned behavior motives, socialization, social development, self-concept, personality, leadership and the various factors which effect the socialization process whether positively or negatively.

<b>MAPPING COURSES RELATED TO CLIMATE CHANGE EDUCATION AND SUSTAINABLE DEVELOPMENT: AMERICAN UNIVERSITY MADABA</b>				
	<b>COURSE NAME</b>	<b>FACULTY</b>	<b>NAME OF INSTRUCTOR</b>	<b>SHORT DESCRIPTION OF THE COURSE</b>
1	Energy and Environment	Engineering / Science	Asaal Haddad	This is a course offered by the faculty of Sciences in cooperation with the faculty of engineering; the instructor is usually from the department of civil engineering. It is offered as elective university requirement for any student at AUM. It deals with energy resources and related environmental issues
2	Supply Chain Management	Business	Lo'ai Jreissat	This course is offered for business students and introduces issues related to economy, resource management, uncertainty, etc...

3	Sustainable Development	Science (in cooperation with other faculties)	Still unknown	This course can be offered by the faculty of Science and developed as part of this project. It would be an elective university requirement and would include various aspects of sustainable development including adaptation to climate change
4	Applied Ecology	Science	Fares Khoury	This is an elective course for the students of Biology and Biotechnology. It includes a variety of applications which are based on ecological concepts and interactions, e.g. sustainable yield, range land and ecosystem management, biological control, biological conservation.
5				
etc				

<b>MAPPING COURSES RELATED TO CLIMATE CHANGE EDUCATION AND SUSTAINABLE DEVELOPMENT UNIVERSITY OF JORDAN</b>				
	<b>COURSE NAME</b>	<b>FACULTY</b>	<b>NAME OF INSTRUCTOR</b>	<b>SHORT DESCRIPTION OF THE COURSE</b>
1	Environmental Science	Science	Prof. Hani Khouri	<ol style="list-style-type: none"> <li>1. Basic Issues in Environmental Science</li> <li>2. Thinking Critically about the Environment</li> <li>3. Systems and Change</li> <li>4. The Biogeochemical Cycle</li> <li>5. Human Population as an Environmental</li> <li>6. Problem Ecosystems and Ecosystem Management</li> <li>7. Biological Diversity</li> <li>8. Biogeography</li> <li>9. Biological Productivity and Energy Flow</li> <li>10. Ecological Restoration</li> <li>11. First Hourly Exam 20%</li> <li>12. World Food Supply</li> <li>13. Effects of Agriculture on</li> </ol>

				<p>the Environment</p> <p>14. Forests, Parks, and Landscapes</p> <p>15. Wildlife, Fisheries, and Endangered Species</p> <p>16. Environmental Health, Pollution, and Toxicology</p> <p>17. Energy: Some Basics</p> <p>18. Fossil Fuels and the Environment</p> <p>19. Alternative Energy and the Environment</p> <p>20. Second Hourly Exam 30%</p> <p>21. Nuclear Energy and the Environment</p> <p>22. Water Supply, Use, and Management</p> <p>23. Water Pollution and Treatment</p> <p>24. Atmosphere, Climate, and Global Warming</p> <p>25. Air Pollution</p> <p>26. Indoor Air Pollution</p> <p>27. Ozone Depletion</p>
2	Environmental Monitoring and control	Agriculture	Dr. Jawad AlBakri	<p>1. Introduction: environment, environmental science, global concerns about environment, monitoring, Legal and institutional status of environment in Jordan.</p> <p>2. Environmental Protection and sustainability: principles of sustainability, structure of natural systems, causes of land degradation and environmental pollution, population growth and environment.</p> <p>3. Principles of Ecology: Biomes and aquatic life zones, ecosystem functions and services, self-sustaining mechanisms, human ecology, human population and environment, stabilizing human population and</p>

				<p>strategies for sustainability, Preserving biological diversity, managing grasslands and forests.</p> <p>4. Concepts of monitoring and survey: steps of environment monitoring and control, indices and indicators, sampling methods for soils and vegetation, wildlife, new methods of sampling and roles of new technology, interpretation and analysis.</p> <p>5. Monitoring of agricultural systems: understanding soils and soil degradation process, sustainable agriculture, control of agricultural pollution and building a sustainable agricultural systems, growing crop sustainability.</p> <p>6. Monitoring of water Pollution: water resources and their preservation, protecting aquatic systems, issues of demand and supply, water pollution, sources of water pollution in Jordan, monitoring of water quality in Jordan.</p> <p>7. Monitoring of Air Pollution: Environmental problems related to air pollution, Green House effects and impacts, acid deposition (process and effects), stratospheric Ozone depletion, air pollution and noise, air pollution control.</p> <p>8. Hazardous and solid wastes: hazardous wastes terms and problems, managing hazardous wastes, solid wastes problems and solutions.</p> <p>9. Environment and energy:</p>
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				nonrenewable energy sources, guidelines for creating a sustainable energy sources, renewable energy sources and their sustainability
3	Geographic Information System (GIS)	Agriculture	Dr. Jawad AlBakri	<ol style="list-style-type: none"> <li>1. Introduction to GIS</li> <li>2. Data Models</li> <li>3. Geodesy, Datums and Projections</li> <li>4. Data sources and data entry</li> <li>5. Basic spatial analysis</li> <li>6. Spatial estimation, interpolation, prediction and core area delineation</li> <li>7. Terrain Analysis</li> <li>8. Data Standards and Quality</li> <li>9. Attribute data and tables</li> </ol>
4	Environmental Education for Young Children	Educational sciences	Dr. Diala Hamaidi	Identifies educational materials for children, their importance, sources and types, choosing ready – made materials according to appropriate criteria and identifying their uses in the classroom. Students will learn to design needed materials which promote children’s thinking abilities such as classification, sorting, numbers, special relations, measurement, time, causality... etc. Emphasis is also placed on designing materials in ways that enhance children’s total development and also to

				judge the efficiency of the produced learning materials.
5	Climatology	Arts /Geography Department	Dr. Ali Ghanem	The course is designed to provide the students with the basic knowledge about the atmosphere elements and phenomena : radiation, temperature, pressure, winds condition and precipitation.
6	Applied Climatology	Arts /Geography Department	Dr. Ali Ghanem	Application of Climatology in the fields of agriculture, industry, transportation, human health and comfort.
7	Environmental Engineering	Engineering	Dr. Ahmad Abu Yaghi	Environmental systems and sub-systems, water pollution and water quality parameters. Natural water and waste water treatment process. Mass conservation and dissolve oxygen balance in water. Sources, characteristics and impacts of air pollution. Atmospheric dispersion and air pollution control. Solid waste classification, handling, processing and ultimate disposal. Sources, quantities, and treatment process of industrial waste waters. Noise pollution and control
8	Environmental Impact Assessment	Engineering	Dr. Ahmad Abu Yaghi	Study of environmental impacts of engineering projection the environmental components of air, water and soil. Social, economical and cultural impacts will also be studied. Various impacts will be identified and predicted and mitigational measures will be suggested

## LEBANON

MAPPING COURSES RELATED TO CLIMATE CHANGE EDUCATION AND SUSTAINABLE DEVELOPMENT LEBANESE AMERICAN UNIVERSITY				
	COURSE NAME	FACULTY	NAME OF INSTRUCTOR	SHORT DESCRIPTION OF THE COURSE

1	ENV200 Introduction to Environmental Science [3-0, 3 cr.]	Arts and Sciences	Ahmad Hourri, Roy Khalaf	This is an introduction to the environmental problems and challenges facing mankind. Global problems will be directly related to issues facing the regional, and local environment. The course covers environmental problems and their causes, ecosystems and how they work, deforestation, loss of biodiversity, species extinction, air pollution, global warming, ozone depletion, solid waste disposal, renewable energy technologies, and applications to alleviate environmental problems. Case studies will be presented, and potential solutions will be attempted. The course includes field trips.
2	BIO203 Introduction to Ecology [3-0, 3 cr.]	Arts and Sciences	George M. Baroudy	This course introduces the organization of individual organisms into populations, communities, and ecosystems. It focuses on the interactions between living organisms and their physical environment. Concepts such as diversity, competition, natural selection, adaptation, climate changes, migration, extinction and deforestation are covered. Additionally the course tackles concepts of environmental microbiology in relation to pollution, remediation and recycling of liquid and solid wastes.
3	ENV427 Environmental Physics [3-0, 3 cr.]	Arts and Sciences	N/A	The course comprises aspects of atmospheric physics, soil physics and many aspects of applied physics. It introduces the essentials in environmental physics, and describes the basics in environmental spectroscopy e.g. black body radiation and the solar UV and Life. It also addresses the global climate, energy balance,

				energy available for human use, transport of pollutants, and noise pollution. The course also discusses risk estimations, energy saving and nature and future thinking in the context of the global society.
4	CHM340 Environmental Chemistry [3-0, 3 cr.]	Arts and Sciences	Samira Korfali	This course is a study of natural and non-natural chemical substances in the environment and their chemical transformations. It involves chemistry of energy resources, atmosphere, hydrosphere, biosphere, and, lithosphere (natural and in polluted environment). Principles of chemical reactions, chemical equilibrium and reaction kinetics are applied in this course. Other covered topic is waste treatment and chemical processes. Parallel with these is learning the methods of environmental chemical analysis.
5	ENV423 Environmental Microbiology [2- 3, 3 cr.]	Arts and Sciences	N/A	This ecologically based course discusses the relationship of microorganisms with one another and with their environment. It stresses the three major domains of life – Eucaryota, Archaea and Bacteria and studies their diversity, interactions and physiology in their natural environments. Biodegradation of organic matter, bio-geo-cycling of minerals and waste bio-treatment are emphasized. The course also deals with metagenomic, metaproteomic techniques and applications as well as the use of microarrays in Microbial Ecology.
6	BIO331 Ecology [3-3, 4 cr.]	Arts and Sciences	Mohammad Zein, Amira M. Bekdash, Nawal A. Al-Hakawati, George M.	This course covers the study of the relationships between living organisms and their environment. Major concepts related to the structure,

			Baroudy	function, organization, and regulation, at various levels (population community, ecosystems, and biomes), are covered via theory, laboratory work, and field trips.
7	DES523 Environmental Systems I [3 cr.]	School of Architecture & Design Lebanese American University	Nada El-Khoury	This course covers the study and design of plumbing systems, in addition to heating, ventilation and air-conditioning systems, with a survey of the different systems and their properties, cost analysis and environmental factors, including a survey of environmentally sound alternatives such as solar energy and heating, insulated walls, and alternative materials. Multidisciplinary approach with invited lecturers and field trips. Sustainability vision for teaching environmental systems
8	DES524 Environmental Systems II [3 cr.]	School of Architecture & Design Lebanese American University	Nada El-Khoury	This course deals with two subjects – lighting and electrical circuits, and acoustics. The first part addresses the analysis of the basic electric circuits, with emphasis on energy management. The second part is a survey of basic acoustical systems, theories. Multidisciplinary approach with invited lecturers and field trips. Sustainability vision for teaching environmental systems
	CIE526 Environmental Remediation [3- 0, 3 cr.]	School of Engineering, Lebanese American University	Part-time faculty	This course deals with processes employing microorganisms, fungi, plants or their enzymes to return contaminated environments, such as polluted waters and soils, to their natural conditions. The control, optimization and monitoring of bioremediation is discussed as well as the

				environmental factors and microbial populations involved. In-situ, ex-situ applications and genetic engineering approaches are emphasized.
	CIE525 Environmental Policy and Management [3-0, 3 cr.]	School of Engineering, Lebanese American University	Part-time faculty	This course explores human made problems in the environment parallel with concepts in environmental ethics, management and policies so as solutions are provided concerning preservation of the environment. Topics covered are toxic and solid wastes, pollution of air, water, food and soil, international and national environmental ethics, management and policies.
	CIE522 Environmental Impact Assessment [3-0, 3 cr.]	School of Engineering, Lebanese American University	Part-time faculty/Jean Chatila/Mahmoud Wazne	This course is the study and evaluation of the impacts of large scale projects on the quality of the physical, biological, and socio-economic environment taking into account environmental laws and regulations and EIA guidelines, identification of impacts, quantification methods, mitigation measures, and monitoring plans. Case study involving the preparation of an EIA report.
	CIE723 Water Resources Planning and Management [3-0, 3 cr.]	School of Engineering, Lebanese American University	Part-time faculty/Jean Chatila	This course covers the major issues in the planning and management of water resource systems, and the techniques — such as linear programming, dynamic programming and nonlinear programming — that are used to solve them. Practical problems in water resource systems such as water allocation, water quality management, reservoir operations, flood control, water resources management, basin modeling and flood and drought forecasting demonstrated are discussed with system analysis

				methods.
	CIE724 Air Quality Management [3-0, 3 cr.]	School of Engineering, Lebanese American University	Part-time faculty	This course covers the analysis of air pollution sources and methods for controlling emissions, with a focus on transportation-related air pollution. The course also encompasses a summary of fundamental chemical and physical processes governing pollutant behavior, and a quantitative overview of the characterization and control of air pollution problems. The analysis of key elements of the air pollution system such as the sources and control techniques, atmospheric transformations, atmospheric transport and modeling are discussed.
	CIE426 Wastewater Collection and Treatment [3-0, 3 cr.]	School of Engineering, Lebanese American University	Jean Chatila/Mahmoud Wazne	Design of sanitary and storm sewers and related appurtenances, mass balances and hydraulic flow regimes; reaction order and rates, analysis of experimental data, attached and suspended growth biological wastewater treatment systems including: activated sludge and its variations, aerated lagoons, SBR, trickling filters, RBC; basic nitrification-denitrification processes; oxygen requirements; introduction to sludge treatment and disposal.
	CIE582 Infrastructure Management [3-0, 3 cr.]	School of Engineering, Lebanese American University	Gebran Karam	General methods of engineering systems management and the different types of infrastructure. Application of different methods for the planning and analysis of complex infrastructure projects considering possible financing alternatives, engineering solutions, and overall management issues during the life cycle of the project. Review of selected case studies from

				the Arab Gulf countries.
	CIE520 Solid Waste Management [3-0, 3 cr.]	School of Engineering, Lebanese American University	Jean Chatila/Part time faculty	Quantity and quality of municipal and industrial solid wastes, collection, transfer, disposal, treatment and recovery of solid wastes, hazardous and non-hazardous residues, solid waste management principles and processes, environmental impact assessment, environmental legislation and risk, and pollution control management.
	CIE585 Risk and Natural Hazard Management [3-0, 3 cr.]	School of Engineering, Lebanese American University	Part time faculty	Types, frequency, effects of natural hazards, calculation of return period, planning and designing engineering systems to survive natural events, mitigation of damage.
	CIE725 Geo-environmental Engineering [3-0, 3 cr.]	School of Engineering, Lebanese American University	Part time faculty	This course covers the geotechnical practice in environmental protection and restoration. The characterization of contaminated sites, preliminary site assessment, site investigation techniques and site cleanup and remediation technologies, as well as the monitoring requirements, are discussed. The course also covers the methods of soil and site characterization for siting of waste repositories, the design of waste containment systems, including landfills, slurry walls and soil stabilization, as well as the applicability and use of geosynthetics.
	CIE424 Water Distribution and Treatment [3-0, 3 cr.]	School of Engineering, Lebanese American University	Jean Chatila/Mahmoud Wazne	Physical, chemical and biological water quality parameters and standards; water quantity, population estimation and use factors; methods of distribution and design criteria and periods; stresses in pipes and pipe materials, distribution system relate appurtenances;

				water treatment techniques: purpose, sedimentation, thickening, coagulation/flocculation processes and basin design, filtration, disinfection.
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**CLIMASP TEMPUS PROJECT  
NOTRE DAME UNIVERSITY**

**Faculty of Business Administration and Economics (FBAE)**

<b>MAPPING COURSES RELATED TO CLIMATE CHANGE EDUCATION AND SUSTAINABLE DEVELOPMENT</b>				
	<b>COURSE NAME</b>	<b>FACULTY</b>	<b>NAME OF INSTRUCTOR</b>	<b>SHORT DESCRIPTION OF THE COURSE</b>
1	ECN 434 Environmental and Natural Resource Economics	FBAE	Dr. Nancy Kanbar	An introduction to the natural resource and environmental economics, and sustainable development. Topics covered include: introduction to resource and environmental economics; ethical foundations of environmental economics; economic concepts and analysis for examining natural resource use; the valuation of environmental resources; the population problem; sustainability and sustainable development; depletable, recyclable, non recyclable and reproducible resources; the efficient and optimal use of environmental resources; the economics of pollution and pollution control policy; international and global environmental pollution problems
2	ECN 439 Economics of Developing Countries	FBAE	Dr. Nancy Kanbar	A study of the economics of developing countries. Topics covered include: meaning of underdevelopment; historical patterns of economic change in the developing countries; population problems; obstacles

				to development; role of industry and agriculture; inequality of income and wealth distribution; economic planning; foreign aid and indebtedness
3	TTM 445 Sustainable Tourism	FBAE	Ms. Carole Assaf	A deeper understanding and analysis of the business-society interface. Policy guidelines to bring both hospitality business and society towards sustainable, workable and mutually beneficial solutions are studies. Topics investigated: ecotourism, corporate policy and social responsibility, ethics and values in business, business interests and community issues, business and media relations, corporation and government relations
6	TTM 326 Domestic Travel and Tourism	FBAE	Mr. Omar Sakr	A study of the guiding principles of economic responsibility, social responsibility and environmental responsibility. A deep understanding of responsible tourism practices implemented in various types of domestic tourism activities. Topics investigated: nature tourism, rural tourism, agro-tourism, eco-tourism, community based tourism, pro-poor tourism, volunteerism and religious tourism.
7	BAD 431 Ethics in Business	FBAE	Mr. Omar Sakr	An introduction to Corporate Social Responsibility and environmental management. Topics investigated: the new ISO 26000 standard for social responsibility, ethics and the environment, the dimensions of pollution and resource depletion, the ethics of pollution control and the ethics of conserving depletable resources, the ethics of job discrimination and the ethics of consumer production and marketing
8	TTM 201 Introduction to		Omar Sakr	An introduction to Sustainable Hospitality and tourism

	Hospitality and Tourism Management			management. Topics covered include: The triple Ps (People, Profit, Planet), environmental management systems, the proper use of natural resources in hotels and food service operations, and responsible tourism practices in different types of tourism activities.
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Faculty of Natural and Applied Sciences

<b>MAPPING COURSES RELATED TO CLIMATE CHANGE EDUCATION AND SUSTAINABLE DEVELOPMENT</b>				
	<b>COURSE NAME</b>	<b>FACULTY</b>	<b>NAME OF INSTRUCTOR</b>	<b>SHORT DESCRIPTION OF THE COURSE</b>
1	<b>BIO 203 Discover Biology</b>	Faculty of Natural and Applied Sciences	T. G. Hage/D. El Khoury	A general introductory course that covers the basic principles and concepts of Biology with current applications. Not open for Biology students.
3	<b>BIO 212 General Biology II</b>	Faculty of Natural and Applied Sciences	T. G. Hage/ C. Kabrita Bou-Serhal	It covers the study of structure and life processes in plants and animals.
4	<b>BIO 226 Evolution</b>	Faculty of Natural and Applied Sciences	(n/a)	Study of processes that bring about evolutionary changes in organisms, evolutionary trends, patterns of adaptations, and principal factors that influence the patterns of speciation.
5	<b>BIO 314 Ecology</b>	Faculty of Natural and Applied Sciences	T. G. Hage	Principles of ecosystems; the interaction of organisms & their environment. Food web, energy flow & nutrient cycling in ecosystems. Factors which affect the distribution & abundance of species: Wildlife resources & extinction.
6	<b>BIO 316 Economic Botany</b>	Faculty of Natural and Applied Sciences	T. G. Hage	The course provides an introduction to the study of botany and the economic uses of plants in industry, production of food and

				medicine.
7	<b>BIO 324 Plant Physiology</b>	Faculty of Natural and Applied Sciences	T. G. Hage	Basic principles of plant physiology; the physiological processes of green plants and the effect of the environment on these processes
8	<b>BIO 325 Marine Biology</b>	Faculty of Natural and Applied Sciences	E.Sattout	Covers biology of marine life, with emphasis on the roles that marine plants and animals assume in their environmental situations, & the structural and physiological adaptations necessary to fulfill those roles.
9	<b>BIO 336 Basic Biotechnology</b>	Faculty of Natural and Applied Sciences	(n.a)	Covers broadly the development of the field of biotechnology: methods and applications. Covers topics such as principles of recombinant DNA technology and its applications to studies of animals, plants, medicine, forensics and human genome project.
10	<b>BIO 424 Conservation Biology</b>	Faculty of Natural and Applied Sciences	(n.a)	The application of biological principles to issues in the conservation biology will be examined within a context that integrates biology, land management, protection and development.
11	<b>BIO 451 Environmental Biotechnology</b>	Faculty of Natural and Applied Sciences	(n.a)	The use of biotechnology as it relates to various environmental technologies: biodegradation, remediation, biodegradable materials, energy saving process and chemical production from renewable resources.
12	<b>BIO 495 Research in Biology</b>	Faculty of Natural and Applied Sciences	Several	An independent research project in an area of biology under the direction of a faculty mentor.
13	<b>BIO 605 Research Methods in Biology</b>	Faculty of Natural and Applied Sciences	T. G. Hage	This core course is designed to introduce students to conduct scientific research. Under the supervision of an instructor, students select a research project through which they

				learn about literature review including the access and use of print and electronic resources, proposal writing, research methods, experimental design and analysis in addition to scientific writing. At the discretion of the instructor this project can be extended in taking an additional tutorial course. This may serve as the nucleus of research for students with thesis option.
14	<b>BIO 635 Population and Community Ecology</b>	Faculty of Natural and Applied Sciences	(n.a)	This course explores population dynamics, distribution and community structure. Emphasis will be placed on population growth and regulation, community stability and diversity, ecological succession, populations' interactions, and coevolution.
15	<b>BIO 636 Plant Ecology</b>	Faculty of Natural and Applied Sciences	T. G. Hage	Biotic and abiotic factors controlling plant distribution and plant communities with special emphasis on the Mediterranean biome. Field trips are required in order to emphasize examples from Lebanon.
16	<b>BIO 638 Invasive Alien Species</b>	Faculty of Natural and Applied Sciences	T. G. Hage	The biology and the impact of invasive alien species on natural ecosystems are discussed. Special emphasis will be placed on invasive alien plants in the Mediterranean biome.
17	<b>CHM 415 Environmental Chemistry I</b>	Faculty of Natural and Applied Sciences	R. Dib	Covers the natural chemical processes on Earth and the anthropogenic effects on the environment. The chemical processes occurring in the lithosphere, hydrosphere, and atmosphere are analyzed. The effects of primary and secondary pollutants, their interactions between each other and natural substances,

				and their propagation in the environment are covered.
18	<b>CHM 416 Environmental Chemistry II</b>	Faculty of Natural and Applied Sciences	R. Dib	Covers special chemistry topics relevant to environmental protection and environmental systems such as water, air, and soil. Selected topics include: polluted sites decontamination, wastewater and oil spill treatment, hazardous waste management, chemical sources of renewable energy, and an overview of Green Chemistry.
19	<b>CHM 431 Atmospheric Chemistry &amp; Pollution</b>	Faculty of Natural and Applied Sciences	(n.a)	Covers the chemical composition of the earth's atmosphere and the major factors that control its chemical composition. Emphasizes the effects of the biosphere and the changes induced by human activities. Topics such as climate change, ozone depletion, urban air pollution and acid rain will be developed.
20	<b>ENS 201 Introduction to Environmental Science</b>	Faculty of Natural and Applied Sciences	T. G. Hage/L. K. Kayrouz/R. Dib/P. Aad/E. Ghanem	Introduction to the basic environmental global problems facing the Earth with emphasis on pollution and the use of energy resources.
21	<b>ENS 202 The Environment and Sustainable Development</b>	Faculty of Natural and Applied Sciences	E. Sattout	Introduction to sustainable development: concepts, goals, ecological, economic and social aspects. Fundamental environmental issues in sustainable development: natural resources management, population, food production, energy. International organizations and efforts. Standards and policies. Emerging technological applications and their impact. Resolution of environmental conflicts.
22	<b>ENS 205 Environment, Society and</b>	Faculty of Natural and Applied	E. Sattout	Population dynamics and community organization. World's economic unbalance

	<b>Ethics</b>	Sciences		and consequent impacts on human health and quality of life. International Politics and the environment. Environmental Law. Ethics and sustainability.
23	<b>ENS 312 Environmental Health</b>	Faculty of Natural and Applied Sciences	D. Jaalouk	Provides general understanding of how environmental factors are involved in the transmission of communicable diseases. Health hazards resulting from exposure to chemical and physical factors in the environment are emphasized as well.
24	<b>ENS 323 Air Pollution</b>	Faculty of Natural and Applied Sciences	L. K. Kayrouz	Composition of the atmosphere. Climate and weather. Global atmospheric changes. Indoor and outdoor air pollution. Air pollution control processes, air pollutants dispersion modeling.
25	<b>ENS 420 Energy Resources</b>	Faculty of Natural and Applied Sciences	(n.a)	Fossil fuels energy resources. Mineral resources. Alternative energy resources. Technological hazards and environmental impacts including political, economic and social consequences of their exploitation.
26	<b>ENS 422 Pollution of Marine Environment</b>	Faculty of Natural and Applied Sciences	E. Sattout	Introduction to the marine ecosystems, sources and types of pollutants, environmental degradation and its impact. Marine pollution management. International legislation for the conservation of marine environment
27	<b>ENS 490 Senior Project</b>	Faculty of Natural and Applied Sciences	L. K. Kayrouz	After consultation with the Department, students run an environmental research project (case study) that will be presented as a seminar.
28	<b>GIS 331 Implementations of GIS</b>	Faculty of Natural and Applied Sciences	(n.a)	This course focuses on applications in vector data analysis and manipulation, network analysis, spatial

				analysis, surface modeling, 3-D modeling, and field trips.
29	<b>GIS 441 Cartography, Geodesy and GPS</b>	Faculty of Natural and Applied Sciences	(n.a)	This course introduces the nature of cartography, basic geodesy, map projections, scaling, referencing and coordinate systems, cartographic perception and design. It also describes Global Positioning System (GPS), map data collection and design.
30	<b>GIS 452 Advanced Remote Sensing</b>	Faculty of Natural and Applied Sciences	(n.a)	This course focuses on hands on applications of Remote Sensing data collection, data preparation and processing, image distortion, radiometric and geometric corrections, image enhancement and classification, image mosaicking, space triangulation, and digital representation of relief stereoscopy.
31	<b>GIS 490 Senior Project</b>	Faculty of Natural and Applied Sciences	(n.a)	Assigned project supervised by a faculty member. The grade will be based on project evaluation and individual oral presentation.

Faculty of Engineering

<b>MAPPING COURSES RELATED TO CLIMATE CHANGE EDUCATION AND SUSTAINABLE DEVELOPMENT</b>				
	<b>COURSE NAME</b>	<b>FACULTY</b>	<b>NAME OF INSTRUCTOR</b>	<b>SHORT DESCRIPTION OF THE COURSE</b>
1	CEN 461 WATER POLLUTION CONTROL AND TREATMENT	ENGINEER ING	S. GHANIMEH/ E. IBRAHIM	Fundamental principles and engineering application of physical, chemical, and biological processes (like sedimentation, filtration, coagulation, flocculation, membranes, aerobic, anaerobic biological processes) are discussed.
2	CEN 462 ENVIRONMENT AL	ENGINEER ING	S. GHANIMEH/ E. IBRAHIM	Quantitative evaluation of the environmental, economic, and technical

	ENGINEERING			problems involved in control of pollutants of the air, water, and land.
3	CEN 463 WATER AND WASTEWATER NETWORKS	ENGINEER ING	S. GHANIMEH/ E. IBRAHIM	Quantities of water and wastewater; collection, transportation, and distribution; water distribution network; design of sanitary and storm- water sewer systems.
4	CEN 465 ENVIRONMENTAL ENGINEERING LABORATORY	ENGINEER ING	Y. MAALOF/ N. YOUNIS	Laboratory and field experiments related to pollution of air, water and soil. Tests include air sampling, water testing, sound measurement, wastewater treatment, compost tests and landfill cover performance.
5	CEN 471 CIVIL ENGINEERING LAWS AND ETHICS	ENGINEER ING	(n/a)	Survey of Lebanese construction codes and regulations; civil engineering practice as related to environmental destruction and moral behavior
6	CEN 560 AIR POLLUTION ENGINEERING	ENGINEER ING	(n/a)	Characterization of sources, emissions, transport, transformation, effects, and control of air pollutants.
7	CEN 594 SELECTED TOPICS IN CIVIL ENGINEERING	ENGINEER ING	F. COMAIR/ N. KHOURY	Structured presentations of new and developing areas of knowledge in civil engineering offered by the department to augment the formal courses available
8	MEN 510 ENERGY CONVERSION	ENGINEER ING	(n/a)	Fundamentals of energy conversion: thermal powerplants, nuclear and fossil fuels, etc.; Energy resources; Energy conservation and recovery; Energy Storage; Pollution and environmental issues.
9	MEN 517 SOLAR ENERGY	ENGINEER ING	E. KINAB	Fundamentals of solar radiation, design and analysis of solar systems

				for both low and high temperature applications, passive and active solar thermal engineering, design of solar collectors, energy storage systems
10	MEN 518 RENEWABLE ENERGY RESOURCES AND SYSTEMS	ENGINEER ING	(n/a)	Solar energy, wind energy, geothermal energy, biomass, etc. Applications in buildings and power generation.
11	MEN 578 APPLIED ENERGY LABORATORY	ENGINEER ING	W. DAOU	Experiments dealing with energy related technology. Topics include heating, ventilating, air-conditioning, refrigeration, combustion techniques, energy conversion, renewable energy – solar, wind, etc...