



**UCA**

Universidad  
de Cádiz

**PROSPECTUS:**

**BSc. ENVIRONMENTAL SCIENCES  
UNIVERSITY OF CADIZ**

<b>PROSPECTUS DATE:</b>	<b>June 2015</b>	<b>VERSION:</b>	<b>ENGLISH</b>
<b>TRANSLATOR:</b>	<b>Samantha Louise Blakeman</b>		

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## 1. Description of the Degree.

### 1.1. Basic Information.

GENERAL INFORMATION	
<b>Name of the Degree:</b>	BSc ENVIRONMENTAL SCIENCES
<b>Specialties:</b>	
<b>Universities:</b>	UNIVERSITY OF CADIZ

<b>Knowledge Branch:</b>	Science		
<b>ISCED1 Code:</b>	422	<b>ISCED2 Code:</b>	

HEAD OF DEGREE			
<b>1st Surname:</b>	QUIROGA	<b>2nd Surname:</b>	ALONSO
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<b>Centre:</b>	MARINE AND ENVIRONMENTAL SCIENCES FACULTY		

### 1.2. Distribution of the Degree Credits.

GENERAL DISTRIBUTION OF DEGREE CREDITS	
<b>Total Credits:</b>	240
<b>Number of Basic Learning Credits</b>	66
<b>Number of External Practice Credits</b>	0
<b>Number of Optional Credits</b>	54
<b>Number of Mandatory Credits</b>	108
<b>Number of Final Project Credits</b>	12

### 1.3. Centre Information.

CENTRES
Facultad de Ciencias del Mar y Ambientales (Marine and Environmental Sciences Faculty)

NEW PLACE OFFERS	
<b>First Year:</b>	75
<b>Second Year:</b>	75

<b>Third Year:</b>	75
<b>Fourth Year:</b>	75

ECTS				
	Full Time		Part Time	
	Minimum ECTS credits	Maximum ECTS credits	Minimum ECTS credits	Maximum ECTS credits
<b>First Year</b>	60	78	24	36
<b>Following Years</b>	40	78	24	36

OTHER INFORMATION:	
<b>Type of Learning</b> ( <i>presential, semipresential, long distance</i> ):	presential
<b>Permanence rules:</b>	<a href="http://www.uca.es/secretaria/normativa/disposiciones-generales/alumnos/reglamento-permanencia-uca">http://www.uca.es/secretaria/normativa/disposiciones-generales/alumnos/reglamento-permanencia-uca</a>
<b>Languages:</b>	Spanish

## 2. Objectives and Competences.

### 2.1. Basic Competences

CODE	BASIC COMPETENCES
<b>CB1</b>	Students have demonstrated knowledge and understanding of a subject matter taught to a higher level, this subject having been taught previously at secondary school level and improved upon with the help of advanced textbooks.
<b>CB2</b>	Students know how to apply their knowledge to their work or vocation in a professional manner and possess the competences that are usually shown by elaborating and putting

	forward arguments and resolving problems found within the study field.
<b>CB3</b>	Students are capable of collecting and interpreting relevant data (within their field of study) this includes reflecting upon relevant social, scientific and ethical themes.
<b>CB4</b>	Students possess the ability to portray information, ideas, problems and solutions to a specialized and non-specialised public.
<b>CB5</b>	Students have developed learning abilities that are necessary for studying in the future with a high level of independence.

## 2.2. General Competences.

CODE	GENERAL COMPETENCES
<b>CG1</b>	Develop sensitivity towards oceanic environmental and social problems that vary from ethical commitment to sustainability.

## 2.3. Specific Competences

CODE	SPECIFIC COMPETENCES
<b>CE1</b>	General level of knowledge in the fundamental principles of science: mathematics, physics, chemistry, biology and geology.
<b>CE2</b>	Know and analyse the environment as a system, identifying factors, behaviours and interactions that occur within.
<b>CE3</b>	Knowledge of field and laboratory techniques.
<b>CE4</b>	Know environmental regulations and their application in environmental assessment and management.
<b>CE5</b>	Know the relationships between the natural environment and society.
<b>CE6</b>	Know territorial planning and ordination tools and interpret thematic cartography.
<b>CE7</b>	Link experimental data obtained in the field or laboratory with theoretical knowledge.
<b>CE8</b>	Interpret and apply environmental knowledge and develop environmental policies.
<b>CE9</b>	Be able to carry out management plans and environmental audits.
<b>CE10</b>	Identify and evaluate environmental costs and their application in the development of clean technology.
<b>CE11</b>	Develop environmental impact prevention (risks) and evaluation programmes.
<b>CE12</b>	Know and understand essential events, concepts, principles and theories related to biology.
<b>CE13</b>	Know how to link cell function and structure, differentiate types of cells, tissue and different groups of organisms as well as where they are found within the living organism groups.
<b>CE14</b>	Know fundamental concepts of infinitesimal calculations and linear algebra.
<b>CE15</b>	Know basic applications of simple models and practical problems.
<b>CE16</b>	Evaluate the speed at which geological processes happen and their spatial scope.
<b>CE17</b>	Acquire the ability to recognize effects and consequences of internal and external geological processes.

<b>CE18</b>	Evaluate environmental implications of exploiting geological resources.
<b>CE19</b>	Know fundamental concepts of physics and have the ability to link fundamental aspects to different environmental phenomena.
<b>CE20</b>	Acquire the ability to create simple experiments in the laboratory and link the results to the laws of physics.
<b>CE21</b>	Know and understand fundamental aspects of chemistry as well as material physical-chemical properties.
<b>CE22</b>	Know and understand fundamental concepts of organic and inorganic compounds found in the environment and their chemical analysis.
<b>CE23</b>	Acquire the ability to link fundamental aspects of chemistry to environmental phenomena.
<b>CE24</b>	Apply basic statistical sampling, analysis, synthesis and data interpretation techniques.
<b>CE25</b>	Use computer resources to resolve problems and search for information on environmental sciences.
<b>CE26</b>	Know biological classification and taxonomy.
<b>CE27</b>	Know anatomy, adaptive processes and physiological basis of different animal and plant groups.
<b>CE28</b>	Know the organization levels used whilst studying nature.
<b>CE29</b>	Know ecosystems' structure and dynamics and the difference between evolutionary ecological analysis and thermodynamic ecological analysis.
<b>CE30</b>	Understand the relative concepts of niche, succession, population dynamics, diversity, limiting factors and trophic network.
<b>CE31</b>	Know how to interpret paleoclimatic indicators.
<b>CE32</b>	Know how to interpret a hydrograph.
<b>CE33</b>	Know hydrogeochemical facies and how to interpret geochemical differences in subterranean waters regarding the composition of an aquiferous system.
<b>CE34</b>	Know the main applications of natural and artificial isotopes in the hydrological cycle.
<b>CE35</b>	Identify and evaluate soil components and properties and classify soil types.
<b>CE36</b>	Know how to interpret the autodepuration role of soil in degradation processes.

<b>CE37</b>	Know the basic principles of microbiology and be able to apply them to their knowledge of the environment.
<b>CE38</b>	Know and understand microorganism growth, their control and applications at a technological and industrial level.
<b>CE39</b>	Know the microorganisms representativeness, cutting-edge identification methods and the importance of their activity in the general functioning of the biosphere.
<b>CE40</b>	Know the chemical principles that govern important environmental processes.
<b>CE41</b>	Acquire the necessary ability to link chemical principles with different phenomena that occur in different environmental compartments.
<b>CE42</b>	Know the environmental importance of water-soil and water-atmosphere interactions.
<b>CE43</b>	Ability to create simple programmes to solve problems numerically.
<b>CE44</b>	Know how to work with quantities affected by errors so that the error does not spread and affect significantly estimates made with these quantities.
<b>CE45</b>	Know how to apply numerical methods when the exact solution of the problem is impossible or presents disadvantages compared to the estimated solution.
<b>CE46</b>	Know how to formulate a problem by using differential equations and extracting conclusions from the system's properties equation.
<b>CE47</b>	Understand the complexity of sustainable development and be able to tackle it (diagnostics, designing instruments and managing their application) from an integrated perspective.
<b>CE48</b>	Analyse the different variables involved in environmental processes, whilst understanding that they are influenced by complex phenomena, for instance various natural and social factors and agents.
<b>CE49</b>	Understand the constant interaction processes that exist between the physical-natural, socio-economic and judicial-administrative subsystems.
<b>CE50</b>	Know and interpret the new environmental regulations that address integrated and sustainable planning and management of environment quality.
<b>CE51</b>	Know and interpret environmental legislation at national, European and international level, especially on land, water, atmosphere, natural resources, conservation, urban design and zoning protection.
<b>CE52</b>	Acquire dexterity in managing, analysing and processing environmental regulations.
<b>CE53</b>	Understand the concepts of legal; environment; felony and penalty and other related concepts.
<b>CE54</b>	Understand the differences between sanctions and how the different branches of the law work.
<b>CE55</b>	Know the means and ways of protecting the environment with criminal sanctions.

<b>CE56</b>	Know the different economic activity areas through microeconomic and macroeconomic markets at a basic level. Know the relationship between supply and demand, understand the rational behaviour of consumers, analyse companies' cost structures and production volumes and understand market characteristics.
<b>CE57</b>	Analyse environmental problems with economical analytical ideas and perspective. Understand the impact of production and consumption activities on nature and the necessity of pollution control as the main objectives of environmental economy.
<b>CE58</b>	Develop the ability to give a reasoned opinion on economical phenomena and present adequately related aspects of economic activity.
<b>CE59</b>	Know the fundamentals of cartography, photointerpretation and remote sensing and how to work with topography maps, aerial photographs and satellite images.
<b>CE60</b>	Know and manage Geographical Information Systems and Remote sensing programmes and their applications in environmental sciences.
<b>CE61</b>	Know remote sensors characteristics and link and apply the information they provide to physical, chemical, geological and biological processes that occur in the environment.
<b>CE62</b>	Knowledge and understanding of the scientific fundamentals of different instrumental techniques which are important in chemical analysis of the environment.
<b>CE63</b>	Know the basic components of the studied instrumental equipment and the technical requirements for their use.
<b>CE64</b>	Know how to use and apply different types of analytical techniques to environmental samples and analytes, as well as the requirements for each type.
<b>CE65</b>	Ability to select the ideal instrumental technique for every chemical environmental problem.
<b>CE66</b>	Know and manage statistical techniques that allow reduction and classification of environmental data information.
<b>CE67</b>	Know and apply regression models in the adjusting and prediction of environmental data.
<b>CE68</b>	Apply results and temporal analysis tools to environmental information.
<b>CE69</b>	Use of basic environmental technology terminology.
<b>CE70</b>	Know basic scientific technology processes used in resolving environmental problems.
<b>CE71</b>	Know environmental problems and assessment strategies.
<b>CE72</b>	Know measurement systems and data treatment.
<b>CE73</b>	Analyse environmental systems using material and energy balances.
<b>CE74</b>	Know water, atmosphere and soil quality criteria.
<b>CE75</b>	Identify contaminant properties, origin and effects.
<b>CE76</b>	Know the different strategies of environmental sampling and applicable procedures.



<b>CE77</b>	Ability to choose the optimum analysis methodology for every type of sample.
<b>CE78</b>	Dexterity in solving practical cases of environmental problems using chemical, biological and geological analysis.
<b>CE79</b>	Know the basics of natural resource conservation.
<b>CE80</b>	Know the management and conservation tools of natural protected areas.
<b>CE81</b>	Know and understand methods and technical analysis of mining, soils and water resources.
<b>CE82</b>	Know and understand risk constituent natural processes.
<b>CE83</b>	Know biodiversity analysis and evaluation techniques.
<b>CE84</b>	Know managing techniques of flora and fauna (conservation plans, reintroduction of species, control of invasive species, etc.).
<b>CE85</b>	Know fundamental aspects of flora, fauna and landscape diversity in natural areas (Andalusia and Morocco) and their use as indicators and regulators of the degree of alteration in natural areas.
<b>CE86</b>	Know and understand events, concepts, principles and theories related to land planning and urban development.
<b>CE87</b>	Analyse the current situation of territorial planning, evaluate possible scenarios and make management decisions.
<b>CE88</b>	Know the regulations of territorial planning and urban development.
<b>CE89</b>	Know the basics of the general instruments used in urban development and territorial planning.
<b>CE90</b>	Know the basic techniques of territorial planning.
<b>CE91</b>	Evaluate the quality of urban and territorial ordination plans.
<b>CE92</b>	Know the regulatory environmental impact assessment procedures and how to execute environmental impact studies.
<b>CE93</b>	Introduce and develop environmental management systems and know their regulations.
<b>CE94</b>	Introduce and develop quality management systems.
<b>CE95</b>	Design, develop and execute environmental and quality audit procedures.
<b>CE96</b>	Acquire the ability to analyse the World's, European's and Spanish energy status.
<b>CE97</b>	Know energy analysis and evaluation techniques for different energy sources.
<b>CE98</b>	Know and apply energy efficiency criteria to industry production processes.
<b>CE99</b>	Apply adequate epidemiological investigation designs to specific environmental problems and know how to interpret their impact on public health.

<b>CE100</b>	Know basic toxicology concepts and main experimental methods used in toxicity evaluation.
<b>CE101</b>	Know how to collect toxicology information and how to analyse, process and present it.
<b>CE102</b>	Know the processes that determine a climate, evidence of climate change and their future evolution using climate models.
<b>CE103</b>	Understand climate variation at different time and space scales, especially the consequences of abrupt climate changes.
<b>CE104</b>	Interpret the effect of carbon dioxide emissions on anthropogenic carbon distributions in oceans and its influence in the global carbon cycle.
<b>CE105</b>	Examine the influence of climate change on biodiversity and know the ecosystem's reaction.
<b>CE106</b>	Understand feedback mechanisms and synergies between different components of the climate system and their consequences on a global scale.
<b>CE107</b>	Know international initiatives that promote aerial emission reductions, including its potential and its socio-economic implications.
<b>CE108</b>	Know general aspects of developing a project in the marine environment.
<b>CE109</b>	Know the general aspects of a report.
<b>CE110</b>	Learn to use necessary design and project development tools.
<b>CE111</b>	Present correctly a document, in a written or oral manner.
<b>CE112</b>	Design economy reports and company plans.
<b>CE113</b>	Know the procedures for obtaining administrative authorisations.
<b>CE114</b>	Know the continental water ecosystem's role in the water cycle, its genesis and its morphometric and functional characteristics.
<b>CE115</b>	Know the determining role of physical-chemical factors in the functioning and structure of epicontinental water systems.
<b>CE116</b>	Know the main biological transformations in the element cycles of aquatic systems.
<b>CE117</b>	Ability to recognise main organism and community groups and their role in the functioning of aquatic ecosystems.
<b>CE118</b>	Know the different structures and functioning models of rivers, dams, lakes and wetlands.
<b>CE119</b>	Ability to apply limnological basis to the management and conservation of continental aquatic ecosystems.
<b>CE120</b>	Understand biogeographical processes that determine spatial distribution and abundance variations in biomass and species.
<b>CE121</b>	Know the parameters that describe a population's genetic structure and its evolutionary change mechanisms.

<b>CE122</b>	Learn genetic variation assessment techniques for natural populations.
<b>CE123</b>	Know the principles and analysis and conservation techniques of genetic resources considered essential biodiversity components.
<b>CE124</b>	Be able to predict biodiversity alterations associated with future climate and environmental changes.
<b>CE125</b>	Know and understand the biological and environmental processes that generate, maintain and erode biodiversity.
<b>CE126</b>	Know the geological processes that are responsible for weathering and identify resulting shapes, as well as landscape and environmental values.
<b>CE127</b>	Identify structural and lithological controls of surface shapes, their current function and environmental value, as well as the processes involved in their genesis and dynamics.
<b>CE128</b>	Know the associated processes of fluvial dynamics, the resulting shapes and study methods of drainage basins and fluvial canals.
<b>CE129</b>	Identify geomorphs of climatic origin, their implications in human activity and environmental singularity.
<b>CE130</b>	Understand physical-geological processes that act upon coastal zones, conditioning factors and resulting erosive and sedimentary forms.
<b>CE131</b>	Know how to interpret, in the field, processes that act on a given area from the present geomorphs, as well as their function or relict character and geoenvironmental value.
<b>CE132</b>	Know how to apply criteria that identify natural area values from a geodiversity perspective, as well as knowing cataloguing and preservation regulations.
<b>CE133</b>	Know how to apply computer techniques and photointerpretation to develop geomorphological and geoenvironmental cartography, as well as the cartography inventory of relevant geological elements for the preservation of geological heritage.
<b>CE134</b>	Know how to apply valid protocols to the evaluation of the state of environmental conservation of geohabitats of community interest and singular geological elements of environmental interest.
<b>CE135</b>	Select the best treatment scheme for liquid effluents and gaseous emissions which resolves specific problems by minimising discharges and emissions in order of impact.
<b>CE136</b>	Select the best management sequence of a specific waste.
<b>CE137</b>	Propose a decontamination and soil recuperation treatment scheme to resolve a specific problem.
<b>CE138</b>	Incorporate knowledge into the resolution of global environmental problems.
<b>CE139</b>	Apply the law to environmental pollution problems.
<b>CE140</b>	Apply environmental technologies to resolve problems.
<b>CE141</b>	Incorporate different operations and processes.

<b>CE142</b>	Specific equipment and installations.
<b>CE143</b>	Compare and select alternatives and techniques.

## 2.4. Transversal Competences

CODE	Transversal Competences
<b>CT1</b>	Maximise, oral and written, public communication of information, ideas, problems and solutions in English and Spanish.
<b>CT2</b>	Work in groups and promote entrepreneurial and innovative spirit.
<b>CT3</b>	Ability to use computers confidently at a user level and within the degrees context.

## Graduate Profile

All of the above leads to the graduate of Environmental Sciences being a professional highly committed to society through their commitment to the environment, with a solid scientific basis, ability to link and discuss with specialists of various fields and the ability to synthesise and identify interrelationships between circumstances that surround specific problems related to the environment and society.

The acquired competences dot them with the knowledge and abilities to, from an inter and multidisciplinary perspective, approach with great success mutual relationships and reciprocate influences between all and part of the environmental sciences. They possess a B1\* level in a second language, expert level in office automation and specific software for their professional field and the basic knowledge necessary to create their own company.

## 3. Teaching Plan

### 3.1. General Study Plan Structure.

To establish the study structure of the BSc. in Environmental Sciences the guidelines of R.D.1393/2007, the White Book (Libro Blanco), the agreements of the Science Branch Commission of the Andalusian University Council and the rules of the University of Cadiz were taken into consideration.

The BSc. Environmental Sciences is structured into 4 years of 240 ECTS credits which are split into 60 ECTS credits per year or 30 ECTS credits per term. These credits have been distributed as follows:

STUDY PLAN CREDIT DISTRIBUTION	
<b>Total Credits</b>	240
<b>Number of Basic Learning Credits</b>	66
<b>Number of External Practice Credits</b>	0
<b>Number of Optional Credits</b>	54
<b>Number of Mandatory Credits</b>	108
<b>Number of Final Project Credits</b>	12

### 3.2 General Description of Modules and Materials.

The fundamental aspects of the Degree are structured into modules and materials, which contain the different subjects. The structure may be revised if necessary following the regulations and procedures of the University of Cadiz.

The study plan is organised into 11 modules separated by the thematic affinity of the subject matter. 7 modules are mandatory and the remaining 4 are optional. The 4 optional modules are divided into 2 modules of reinforced content and 2 modules of specialized orientation (MOr).

MODULES	MODULE TYPE	MODULES	MODULE TYPE
M1	Basic Learning	M7	Mandatory
M2	Optative	M8	Optative
M3	Mandatory	M9	Mandatory
M4	Mandatory	MOr1	Optative
M5	Mandatory	MOr2	Optative
M6	Mandatory		

The module-subject structure and study plan timeline is found in the following table:

#### Study Plan.

FIRST TERM				SECOND TERM			
FIRST YEAR							
M1	BIOLOGY	6		M1	PHYSICS		6
M1	GEOLOGY	6		M1	ZOOLOGY AND BOTANY		9
M1	MATHEMATICS I	6		M3	PUBLIC ENVIRONMENTAL LAW		9
M1	CHEMISTRY	6		M2	MICROBIOLOGY		6
M1	STATISTICS	6					

SECOND YEAR						
M1	PHYSICAL ENVIRONMENT	12		M1	ECOLOGY	9
M2	ENVIRONMENTAL CHEMICAL BASIS	6		M3	ENVIRONMENT, ECONOMY AND SOCIETY	9
M2	MATHEMATICS II	6		M4	INTRUMENTAL TECHNIQUES FOR ENVIRONMENTAL ANALYSIS	6
M4	GIS AND REMOTE SENSING	6		M6	LAND USE, URBAN PLANNING AND THE ENVIRONMENT	6
THIRD YEAR						
M4	APPLIED STATISTICS	6		M6	NATURAL AREAS AND RESOURCE MANAGEMENT	9
M5	ENVIRONMENTAL ENGINEERING BASIS	6		M6	NATURAL RISKS	6
M5	UNITARY OPERATIONS FOR EFFLUENT, EMISSION AND WASTE TREATMENT	6		M7	ENVIRONMENTAL MANAGEMENT TOOLS	9
M5	ENVIRONMENTAL POLLUTION EVALUATION	12		M7	ENERGY MANAGEMENT	6
FOURTH YEAR						
M7	ENVIRONMENTAL TOXICOLOGY AND PUBLIC HEALTH	6		M8	CLIMATE CHANGE	6
				M9	ENVIRONMENTAL PROJECT DRAFTING AND EXECUTION	6
				M9	FINAL DEGREE PROJECT	12
	<b>ORIENTATION</b>	<b>24</b>			RECOGNITION EXTRACURRICULAR CREDITS	6
<b>Orientation 1</b> NATURAL AREAS CONSERVATION MODULE						
	LIMNOLOGY	6		<b>MODULES</b>		
	BIOGEOGRAPHY AND BIODIVERSITY	9		M1	GENERAL SCIENTIFIC BASIS	
	GEOMORPHOLOGY AND GEODIVERSITY	9		M2	REINFORCED CONTENT	
				M3	SOCIAL, ECONOMIC AND LEGAL SCIENCES	
<b>Orientation 2</b> ENVIRONMENTAL TECHNOLOGY MODULE						
	WATER TREATMENT	6		M4	INSTRUMENTAL MATERIAL	
	ATMOSPHERIC AND ACOUSTIC POLLUTION TREATMENT	9		M5	ENVIRONMENTAL TECHNOLOGY	
	WASTE AND CONTAMINATED SOIL MANAGEMENT	9		M6	RURAL AND URBAN ENVIRONMENT CONSERVATION, PLANNING AND MANAGEMENT	
				M7	COMPANY AND ADMINISTRATION ENVIRONMENTAL QUALITY MANAGEMENT	
				M8	CLIMATE CHANGE	
				M9	TRANSVERSAL KNOWLEDGE AND ENVIRONMENTAL TECHNIQUES	

### 3.3 Study Plan academic justification

This report includes a detailed description of the BSc's material, with specific information of objectives, capabilities, competences and content. The relevant aspects of the activities related to these subjects are also mentioned.

#### 3.3.1 Activities

The Marine and Environmental Sciences Faculty have established the inclusion of some or all of the following activities in the different materials of each degree:

STUDY PLAN ACTIVITIES	
NUMBER	ACTIVITY DESCRIPTION
<b>1. THEORY CLASSES</b>	They take place in a classroom and are explanations of matter given by a professor: competency analysis, explanation and demonstration of abilities and knowledge in the classroom, using participating methods.
<b>2. LABORATORY CLASSES</b>	Group work sessions supervised by a professor. Activities in specialised areas with specific equipment that improves learning through interaction. These classes take place in a laboratory where the professor sets objectives, directs the work and follows progress.
<b>3. COMPUTER CLASSES</b>	Group work sessions supervised by a professor. These classes take place in a computer room for case studies and data treatment. They allow development of knowledge through interaction and activity. The professor sets objectives and collaborates with data interpretation.
<b>4. PRACTICAL PROBLEM AND/OR CASE SOLVING</b>	They are group work sessions supervised by a professor and their objective is to resolve set problems or cases. The professor sets

<b>CLASSES</b>	the objectives, directs the work and corrects mistakes.
<b>5. FIELD OR BOAT PRACTICALS</b>	Group work sessions supervised by a professor. This includes field excursions and visits to installations, improving learning by using interaction and the students actively applying their knowledge.
<b>6. WORK AND/OR DEBATE DRAFTING AND PRESENTATION</b>	Development of a topic, with or without public speaking, individually or in groups, supervised by a professor who sets the objectives and directs the work. The participation is shared by the students and the topic is presented and/or debated. This activity requires more non-presential work than previous activities and must be programmed into each subject timetable.
<b>7. TUTORIALS</b>	Allow significant building of knowledge through student interaction and activity, the sessions may be individual or in reduced groups, where the professor guides and resolves questions.
<b>8. SEARCHES</b>	Group or individual work sessions directed by a professor which consist of searching data or information in libraries, data bases, internet, etc. The professor indicates the necessity of increasing knowledge and directs the search. This activity requires more non-presential work than previous activities and must be programmed into each subject timetable.
<b>9. NON-PRESENTIAL ACTIVITIES</b>	<b>Group work sessions directed by a professor. Autonomous work, data, library and internet searches.</b>
<b>10. EVALUATION</b>	Set of oral and/or written tests used to evaluate the student.

### 3.4 Planning and management of local and foreign student movement.

The Marine and Environmental Sciences Faculty of the University of Cadiz is involved in an intense exchange of students with other universities, Spanish and foreign. It must be said that the Marine and Environmental Sciences Faculty is the centre of the Puerto Real Campus that takes part in the most number of foreign student exchanges. The success of leaving students is high and the experiences and knowledge received by students are positive and complete their learning. There is a high annual intake of students, both Spanish and foreign.



### 3.5 Module Description. Subject Files.

The following files contain a detailed description of the different degree materials, indicating in each case the module it belongs to, the time frame it occupies in the degree, objectives, abilities and competences that the student acquires and a brief description of the content. Under each material is a description of the subjects it contains. The files have been written coherently including modules, material and competences which are required for the degree, following the graduate profile and the recommendations of the White Book (Libro Blanco) and the agreements of the Environmental Science Branch Commission of the Andalusian University Council.

The activities are coherent with the student dedication and module or material and the annual evaluation of the degree includes the analysis of the study plan design. The activities are divided into each module or material assuring their planning according to the established temporal organisation.

<b>MODULE 1</b>	
<b>NAME OF MODULE:</b>	<b>General Scientific Basis</b>

<b>MATERIAL 1 OF MODULE 1</b>			
<b>MATERIAL 1:</b>	<b>BIOLOGY</b>		
<b>CHARACTER:</b>	<b>Basic Formation</b>	<b>LANGUAGE:</b>	<b>Spanish</b>
<b>ECTS:</b>	<b>24</b>	<b>TIME FRAME:</b>	<b>1st, 2nd and 4th Term</b>

<b>SUBJECTS OF MATERIAL 1</b>			
<b>Subject 1:</b>	<b>Biology</b>		
<b>CHARACTER:</b>	<b>Basic Formation</b>	<b>LANGUAGE:</b>	<b>Spanish</b>
<b>ECTS:</b>	<b>6</b>	<b>TIME FRAME:</b>	<b>1st Term</b>
<b>Subject 2:</b>	<b>Zoology and Botany</b>		
<b>CHARACTER:</b>	<b>Basic Formation</b>	<b>LANGUAGE:</b>	<b>Spanish</b>
<b>ECTS:</b>	<b>9</b>	<b>TIME FRAME:</b>	<b>2nd Term</b>
<b>Subject 3:</b>	<b>Ecology</b>		
<b>CHARACTER:</b>	<b>Basic Formation</b>	<b>LANGUAGE:</b>	<b>Spanish</b>
<b>ECTS:</b>	<b>9</b>	<b>TIME FRAME:</b>	<b>4th Term</b>

<b>MATERIAL 2 OF MODULE 1</b>			
<b>MATERIAL 2:</b>	<b>MATHEMATICS</b>		
<b>CHARACTER:</b>	<b>Basic Formation</b>	<b>LANGUAGE:</b>	<b>Spanish</b>
<b>ECTS:</b>	<b>12</b>	<b>TIME FRAME:</b>	<b>1st Term</b>

<b>SUBJECTS OF MATERIAL 2</b>			
<b>Subject 1:</b>	<b>Mathematics I</b>		
<b>CHARACTER:</b>	<b>Basic Formation</b>	<b>LANGUAGE:</b>	<b>Spanish</b>
<b>ECTS:</b>	<b>6</b>	<b>TIME FRAME:</b>	<b>1st Term</b>

<b>Subject 2:</b>	<b>Statistics</b>		
<b>CHARACTER:</b>	<b>Basic Formation</b>	<b>LANGUAGE:</b>	<b>Spanish</b>
<b>ECTS:</b>	<b>6</b>	<b>TIME FRAME:</b>	<b>1st Term</b>

<b>MATERIAL 3 OF MODULE 1</b>			
<b>MATERIAL 3:</b>	<b>GEOLOGY</b>		
<b>CHARACTER:</b>	<b>Basic Formation</b>	<b>LANGUAGE:</b>	<b>Spanish</b>
<b>ECTS:</b>	<b>6</b>	<b>TIME FRAME:</b>	<b>1st Term</b>

<b>SUBJECTS OF MATERIAL 3</b>			
<b>Subject 1:</b>	<b>Geology</b>		
<b>CHARACTER:</b>	<b>Basic Formation</b>	<b>LANGUAGE:</b>	<b>Spanish</b>
<b>ECTS:</b>	<b>6</b>	<b>TIME FRAME:</b>	<b>1st Term</b>

<b>MATERIAL 4 OF MODULE 1</b>			
<b>MATERIAL 4:</b>	<b>PHYSICS</b>		
<b>CHARACTER:</b>	<b>Basic Formation</b>	<b>LANGUAGE:</b>	<b>Spanish</b>
<b>ECTS:</b>	<b>6</b>	<b>TIME FRAME:</b>	<b>2nd Term</b>

<b>SUBJECTS OF MATERIAL 4</b>			
<b>Subject 1:</b>	<b>Physics</b>		
<b>CHARACTER:</b>	<b>Basic Formation</b>	<b>LANGUAGE:</b>	<b>Spanish</b>
<b>ECTS:</b>	<b>6</b>	<b>TIME FRAME:</b>	<b>2nd Term</b>

<b>MATERIAL 5 OF MODULE 1</b>			
<b>MATERIAL 5:</b>	<b>CHEMISTRY</b>		
<b>CHARACTER:</b>	<b>Basic Formation</b>	<b>LANGUAGE:</b>	<b>Spanish</b>
<b>ECTS:</b>	<b>6</b>	<b>TIME FRAME:</b>	<b>1st Term</b>

<b>SUBJECTS OF MATERIAL 5</b>			
<b>Subject 1:</b>	<b>Chemistry</b>		
<b>CHARACTER:</b>	<b>Basic Formation</b>	<b>LANGUAGE:</b>	<b>Spanish</b>
<b>ECTS:</b>	<b>6</b>	<b>TIME FRAME:</b>	<b>1st Term</b>

<b>MATERIAL 6 OF MODULE 1</b>			
<b>MATERIAL 6:</b>	<b>PHYSICAL ENVIRONMENT</b>		
<b>CHARACTER:</b>	<b>Basic Formation</b>	<b>LANGUAGE:</b>	<b>Spanish</b>
<b>ECTS:</b>	<b>12</b>	<b>TIME FRAME:</b>	<b>3rd Term</b>

<b>SUBJECTS OF MATERIAL 6</b>			
<b>Subject 1:</b>	<b>Physical Environment</b>		
<b>CHARACTER:</b>	<b>Basic Formation</b>	<b>LANGUAGE:</b>	<b>Spanish</b>
<b>ECTS:</b>	<b>12</b>	<b>TIME FRAME:</b>	<b>3rd Term</b>

<b>BIOLOGICAL MATERIAL INFORMATION</b>			
<b>ACQUIRED COMPETENCES:</b>			
<b>BASIC</b>	<b>GENERAL</b>	<b>SPECIFIC</b>	<b>TRANSVERSAL</b>
CB1,CB2,CB3,CB4,CB5		CE1, CE2,CE3, CE7, CE12,CE13, CE14,	CT1, CT2, CT3

		<b>CE22, CE23, CE24, CE25, CE26, CE27, CE28, CE29, CE30,</b>	
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<b>BRIEF DESCRIPTION:</b>
<p><b>Subject: Biology</b></p> <ol style="list-style-type: none"> <li>1.- Molecular basis of organisms: biomolecules, their structure and their function .</li> <li>2.- Structure and function of animal and plant cells: metabolism and reproduction.</li> <li>3.- Structure, organisation and development of organisms: tissues, organs and systems of animals and plants.</li> <li>4.- Animal and plant biodiversity.</li> <li>5.-Origin and evolution of organisms.</li> </ol> <p><b>Subject: Zoology and Botany</b></p> <ol style="list-style-type: none"> <li>1. Foundations and models. Animal design. Shape and function.</li> <li>2. Metazoa classification.</li> <li>3. Diploblastic metazoa.</li> <li>4. Triploblastic metazoa: acoelomata, pseudocoelomata and coelomata invertebrates.</li> <li>5. Triploblastic metazoa: Chordata.</li> <li>6. Plant diversity and evolution.</li> <li>7. Autotrophic protists and prokaryotics.</li> <li>8. Heterotrophic protists and fungi.</li> <li>9. Bryophytes.</li> <li>10. Traqueophytes: pteridophytes, spermatophytes.</li> </ol> <p><b>Subject: Ecology</b></p> <ol style="list-style-type: none"> <li>1. Introduction to Ecology: history, dominion and methods.</li> <li>2. Organisms and ecological factors: conditions and resource acquisitions.</li> <li>3. Biosphere: Metabolic, taxonomic and structural diversity.</li> <li>4. Population ecology: Population structure and growth models.</li> <li>5. Organisation of the ecosystem: Material and energy flow in food webs.</li> <li>6. Material and energy flows in the ecosystem: biogeochemical cycles of carbon, nitrogen and oxygen.</li> <li>7. Interaction between species: competition and predation.</li> <li>8. Biological communities' structure.</li> <li>9. Spatiotemporal changes in biodiversity: spatial gradients and ecological succession.</li> </ol>
<b>OBSERVATIONS:</b>

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MATHEMATICAL MATERIAL INFORMATION			
ACQUIRED COMPETENCES:			
BASIC	GENERAL	SPECIFIC	TRANSVERSAL
CB1, CB2, CB3, CB5,		CE1, CE7, CE14, CE15, CE24, CE25	CT1, CT3

BRIEF DESCRIPTION:
<p><b>Subject: Mathematics I</b></p> <ol style="list-style-type: none"> <li>1. Systems of linear equations. Matrices. Vectors. Linear applications. Autovectors. Diagonalisation.</li> <li>2. Real functions of a variable. Derivatives and their applications. Integrals and their applications.</li> <li>3. Functions of various variables. Partial derivatives, gradient vector. Vectorial fields: divergence and curl.</li> <li>4. Double and triple integrals for simple areas. Integration in polar, cylindrical and spherical coordinates.</li> </ol> <p><b>Subject: Statistics</b></p> <ol style="list-style-type: none"> <li>1. Introduction in data analysis. Organisation, graphical representation and synthesis of information.</li> <li>2. Basic concepts in calculating probabilities and statistical inference. Contrasting hypothesis.</li> <li>3. Treating experimental data by computer.</li> <li>4. Analysis of variance regression models. Validate models.</li> <li>5. Apply statistical techniques, using computers, to the analysis of real or simulated data.</li> </ol>
OBSERVATIONS:

GEOLOGICAL MATERIAL INFORMATION
ACQUIRED COMPETENCES:

BASIC	GENERAL	SPECIFIC	TRANSVERSAL
CB1, CB2, CB3, CB4, CB5,		CE1, CE2, CE3, CE6, CE7, CE16, CE17, CE18, CE25,	CT1, CT2, CT3

BRIEF DESCRIPTION:
<p><b>Subject: Geology</b></p> <ol style="list-style-type: none"> <li>1. Geological time scale.</li> <li>2. Global structure and tectonics.</li> <li>3. General mineralogy and petrology.</li> <li>4. Superficial and subterranean water and floors.</li> <li>5. Geological resources.</li> <li>6. Internal and external geological processes.</li> </ol>
OBSERVATIONS:

PHYSICAL MATERIAL INFORMATION			
ACQUIRED COMPETENCES:			
BASIC	GENERAL	SPECIFIC	TRANSVERSAL
CB1, CB2, CB4, CB3, CB5,		CE1, CE2, CE3, CE7, CE19, CE20, CE24, CE25	CT1, CT2, CT3

BRIEF DESCRIPTION:
<p><b>Subject: Physics</b></p> <ol style="list-style-type: none"> <li>1. Dynamics and kinematics.</li> <li>2. Gravitation.</li> <li>3. Oscillatory movement.</li> <li>4. Undulatory movement.</li> <li>5. Fluids. Hydrostatic and fluid dynamics.</li> <li>6. Thermodynamic principles.</li> <li>7. Electricity and Magnetism.</li> <li>8. Radioactive disintegration. Alfa, beta and gamma radiation.</li> </ol>
OBSERVATIONS:

CHEMICAL MATERIAL INFORMATION
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ACQUIRED COMPETENCES:			
BASIC	GENERAL	SPECIFIC	TRANSVERSAL
CB3, CB4, CB5,		CE1, CE3, CE21, CE22, CE23,	

BRIEF DESCRIPTION:
<p><b>Subject: Chemistry</b></p> <ol style="list-style-type: none"> <li>Matter structure. Periodic system.</li> <li>Chemical bond: ionic bond, covalent bond and metallic bond.</li> <li>Stoichiometry and chemical calculations.</li> <li>Thermodynamic and kinetic aspects of chemical reactions.</li> <li>Chemical equilibriums in aqueous solutions (acid-base, complex formation, oxidation-reduction and precipitation) and their analytical applications.</li> <li>Fundamental aspects of organic chemistry.</li> </ol>
OBSERVATIONS:

PHYSICAL MATERIAL INFORMATION			
ACQUIRED COMPETENCES:			
BASIC	GENERAL	SPECIFIC	TRANSVERSAL
CB1, CB2, CB3, CB5		CE1, CE2, CE3, CE6, CE7, CE15, CE16, CE17, CE19, CE20, CE25, CE31, CE32, CE33, CE34, CE35, CE36,	CT1, CT2, CT3

BRIEF DESCRIPTION:
<p><b>Subject: Physical Environment</b></p> <ol style="list-style-type: none"> <li>Atmospheric structure and composition.</li> <li>Terrestrial solar radiation. Heat average balance. Greenhouse effect.</li> <li>Meteorological variables, clouds and precipitations.</li> <li>The wind: models. General atmospheric circulation.</li> <li>Atmospheric pollution processes.</li> <li>Climatic classification criteria. Climatic variations and their environmental implications.</li> <li>Paleoclimatic indicators. Evolution and paleoclimatic tendencies.</li> <li>Hydrological cycle. Hydrology of hillsides, river beds and lakes. Flow analysis.</li> <li>Aquifers. Material hydrogeological properties.</li> <li>Subterranean hydrodynamics. Recharge and discharge.</li> <li>Aquifer hydrogeochemistry. Isotopic hydrology.</li> <li>Exploration, catchment and exploitation of subterranean waters. Environmental consequences: aquifer contamination; overexploitation.</li> <li>Soil components and properties.</li> <li>Soil forming factors and edafogenetic processes.</li> <li>Soil classification.</li> <li>Soil degradation.</li> </ol>

<b>OBSERVATIONS:</b>

MODULE 2			
NAME OF MODULE:		REINFORCED CONTENT	

MATERIAL 1 OF MODULE 2			
MATERIAL 1:	BIOLOGY		
CHARACTER:	Optative	LANGUAGE:	Spanish
ECTS:	6	TIME FRAME:	2nd Term

SUBJECTS OF MATERIAL 1			
Subject 1:	Microbiology		
CHARACTER:	Optative	LANGUAGE:	Spanish
ECTS SUBJECT:	6	TIME FRAME:	2nd Term

MATERIAL 2 OF MODULE 2			
MATERIAL 2:	CHEMISTRY		
CHARACTER:	Optative	LANGUAGE:	Spanish
ECTS:	6	TIME FRAME:	3rd Term

SUBJECTS OF MATERIAL 2			
Subject 1:	Environmental Chemical Basis		
CHARACTER:	Optative	LANGUAGE:	Spanish
ECTS SUBJECT:	6	TIME FRAME:	3rd Term

MATERIAL 3 OF MODULE 2			
MATERIAL 3:	MATHEMATICS		
CHARACTER:	Optative	LANGUAGE:	Spanish
ECTS:	6	TIME FRAME:	3rd Term

SUBJECTS OF MATERIAL 3			
Subject 1:	Mathematics II		
CHARACTER:	Optative	LANGUAGE:	Spanish
ECTS SUBJECT:	6	TIME FRAME:	3rd Term

BIOLOGICAL MATERIAL INFORMATION			
ACQUIRED COMPETENCES:			
BASIC	GENERAL	SPECIFIC	TRANSVERSAL
CB1, CB2, CB3, CB4, CB5,	CG1	CE1, CE2, CE3, CE5, CE7, CE37, CE38, CE39, CE40, CE41, CE46	CT1, CT2, CT3

BRIEF DESCRIPTION:
<p><b>Subject: Microbiology</b></p> <ol style="list-style-type: none"> <li>1. General structure of microorganisms and their cell functions.</li> <li>2. Microorganism study methods.</li> <li>3. Microbial growth, control and importance at an industrial and technological level.</li> </ol>



4. Microbial biodiversity. Microorganisms origin and evolution.
5. Microbial activity and implication in the natural environment.
<b>OBSERVATIONS:</b>

CHEMICAL MATERIAL INFORMATION			
ACQUIRED COMPETENCES:			
BASIC	GENERAL	SPECIFIC	TRANSVERSAL
CB1, CB2	CG1	CE1, CE2, CE3, CE40, CE41, CE42	

<b>BRIEF DESCRIPTION:</b>
<b>Subject: Environmental Chemical Basis</b>
<ol style="list-style-type: none"> <li>1. Chemical composition of aquatic systems: Continental and oceanic waters.</li> <li>2. Chemical reactivity in aquatic systems: acid-base systems, redox sequences and complexation.</li> <li>3. Chemical and photochemical reactions in the atmosphere. Main cases of interest.</li> <li>4. Chemical reactivity in soils: acid-base and ionic exchange reactions. Macro and micronutrients.</li> <li>5. Chemical interaction between environmental compartments: water-atmospheric interactions.</li> <li><b>6.</b> Chemical interaction between environmental compartments: water-solid phase interactions.</li> </ol>
<b>OBSERVATIONS:</b>

MATHEMATICAL MATERIAL INFORMATION			
ACQUIRED COMPETENCES:			
BASIC	GENERAL	SPECIFIC	TRANSVERSAL
CB2		CE1, CE43, CE44, CE45, CE46	CT2, CT3

<b>BRIEF DESCRIPTION:</b>
<b>Subject: Mathematics II</b>
<ol style="list-style-type: none"> <li>1. Methods in non-linear equations.</li> <li>2. Interpolation and approximation of functions. Application in determining numerical differentiation formulas.</li> <li>3. Numerical resolution of linear equation systems. Calculation of eigenvalues.</li> <li>4. Numerical integration methods.</li> <li>5. Differential equations and their numerical resolution.</li> <li>6. Introduction to scientific programming. Computer arithmetic and error analysis.</li> </ol>
<b>OBSERVATIONS:</b>



MODULE 3	
<b>NAME OF MODULE:</b>	Social, Economic and Legal Sciences

MATERIAL 1 OF MODULE 3			
<b>MATERIAL 1:</b>	GEOGRAPHY AND ECONOMY		
<b>CHARACTER:</b>	Mandatory	<b>LANGUAGE:</b>	Spanish
<b>ECTS:</b>	9	<b>TIME FRAME:</b>	4th Term

SUBJECTS OF MATERIAL 1			
<b>Subject 1:</b>	Environment, Economy and Society		
<b>CHARACTER:</b>	Mandatory	<b>LANGUAGE:</b>	Spanish
<b>ECTS:</b>	9	<b>TIME FRAME:</b>	4th Term

MATERIAL 2 OF MODULE 3			
<b>MATERIAL 2:</b>	LAW		
<b>CHARACTER:</b>	Mandatory	<b>LANGUAGE:</b>	Spanish
<b>ECTS:</b>	9	<b>TIME FRAME:</b>	2nd Term

SUBJECTS OF MATERIAL 2			
<b>Subject 1:</b>	Public Environmental Law		
<b>CHARACTER:</b>	Mandatory	<b>LANGUAGE:</b>	Spanish
<b>ECTS:</b>	9	<b>TIME FRAME:</b>	2nd Term

GEOGRAPHICAL AND ECONOMIC MATERIAL INFORMATION			
ACQUIRED COMPETENCES:			
BASIC	GENERAL	SPECIFIC	TRANSVERSAL
CB2, CB3, CB4, CB5	CG1	CE2, CE4, CE5, CE8, CE9, CE10, CE11, CE47, CE48, CE49, CE56, CE57, CE58	CT1, CT2, CT3

BRIEF DESCRIPTION:
<p><b>Subject: Environment, Economy and Society</b></p> <ol style="list-style-type: none"> <li>Analysis and evaluation of the natural and social environment and of the landscape as an expression that integrates both.</li> <li>Fundamental factors of the relations between human beings and their surroundings: epistemological, economical, technological, demographic and social evolution; globalisation and sustainable development.</li> <li>Mechanisms and tools to guide relationships between human beings and their environment: political institutionalisation of environmental concern; information, participation and social mobilisation.</li> <li>Planning and management of sustainable development: Local Agenda 21s and sustainable development plans.</li> <li>The economy: concept, classification and fundamental problems.</li> <li>Family economic behaviour as a goods and services demandant. Company economic behaviour as a goods and services supplier: production and costs. Market analysis.</li> <li>Economy and the environment</li> <li>Analytical tools of environmental economics.</li> </ol>
OBSERVATIONS:

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LEGAL MATERIAL INFORMATION			
ACQUIRED COMPETENCES:			
BASIC	GENERAL	SPECIFIC	TRANSVERSAL
CB2,CB5,	CG1	CE4, CE8, CE50, CE51,CE52, CE53, CE54, CE55	CT3

BRIEF DESCRIPTION:
<p><b>Subject: Public Environmental Law</b></p> <ol style="list-style-type: none"> <li>1 Previous legal considerations and basic conceptual aspects of Administrative Environmental Law.</li> <li>2 Legal framework and competencies of Administrative Environmental Law.</li> <li>3 Public instruments of prevention and protection of the environment.</li> <li>4 Sectorial protection (water, atmosphere, soil, natural resources).</li> <li>5 Introduction to criminal law and the concept of felony.</li> <li>6 Environmental criminal protection: legal rights and criminal policy.</li> <li><b>7</b> Specific environmental protection offenses.</li> <li><b>8</b> European and international environmental legal framework.</li> </ol>
OBSERVATIONS:

MODULE 4	
<b>NAME OF MODULE:</b>	Instrumental Material

MATERIAL 1 OF MODULE 4			
<b>MATERIAL 1:</b>	PHYSICS, GEOLOGY AND GEOGRAPHY		
<b>CHARACTER:</b>	Mandatory	<b>LANGUAGE:</b>	Spanish
<b>ECTS:</b>	6	<b>TIME FRAME:</b>	3rd Term

SUBJECTS OF MATERIAL 1			
<b>Subject 1:</b>	GIS and Remote Sensing		
<b>CHARACTER:</b>	Mandatory	<b>LANGUAGE:</b>	Spanish
<b>ECTS:</b>	6	<b>TIME FRAME:</b>	3rd Term

MATERIAL 2 OF MODULE 4			
<b>MATERIAL 2:</b>	CHEMISTRY		
<b>CHARACTER:</b>	Mandatory	<b>LANGUAGE:</b>	Spanish
<b>ECTS:</b>	6	<b>TIME FRAME:</b>	4th Term

SUBJECTS OF MATERIAL 2			
<b>Subject 1:</b>	Instrumental Techniques for Environmental Analysis		
<b>CHARACTER:</b>	Mandatory	<b>LANGUAGE:</b>	Spanish
<b>ECTS:</b>	6	<b>TIME FRAME:</b>	4th Term

MATERIAL 3 OF MODULE 4	
<b>MATERIAL 3:</b>	MATHEMATICS

<b>CHARACTER:</b>	<b>Mandatory</b>	<b>LANGUAGE:</b>	<b>Spanish</b>
<b>ECTS:</b>	<b>6</b>	<b>TIME FRAME:</b>	<b>5th Term</b>

<b>SUBJECTS OF MATERIAL 3</b>			
<b>Subject 1:</b>	<b>Applied Statistics</b>		
<b>CHARACTER:</b>	<b>Mandatory</b>	<b>LANGUAGE:</b>	<b>Spanish</b>
<b>ECTS:</b>	<b>6</b>	<b>TIME FRAME:</b>	<b>5th Term</b>

<b>PHYSICAL, GEOGRAPHICAL AND GEOLOGICAL MATERIAL INFORMATION</b>			
<b>ACQUIRED COMPETENCES:</b>			
<b>BASIC</b>	<b>GENERAL</b>	<b>SPECIFIC</b>	<b>TRANSVERSAL</b>
<b>CB2, CB3, CB4, CB5,</b>		<b>CE4, CE5, CE6, CE7, CE59, CE60, CE61, CE62, CE63, CE64, CE65, CE66, CE67</b>	<b>CT1, CT2, CT3</b>

<b>BRIEF DESCRIPTION:</b>
<p><b>Subject: GIS and Remote Sensing</b></p> <ol style="list-style-type: none"> <li>Foundations of cartographic representation.</li> <li>Photogrammetry and photointerpretation principles.</li> <li>Data models, functions and applications of Geographic Information Systems in Environmental Sciences.</li> <li>Characteristics of remote sensors and main spatial platforms for terrestrial observation.</li> <li>Treatment of satellite images.</li> <li><b>6.</b> Application of remote sensing in the study of the environment.</li> </ol>
<b>OBSERVATIONS:</b>

<b>CHEMICAL MATERIAL INFORMATION</b>			
<b>ACQUIRED COMPETENCES:</b>			
<b>BASIC</b>	<b>GENERAL</b>	<b>SPECIFIC</b>	<b>TRANSVERSAL</b>
<b>CB2, CB3, CB4, CB5,</b>		<b>CE1, CE3, CE5, CE62, CE63, CE64, CE65</b>	<b>CT1, CT2</b>

<b>BRIEF DESCRIPTION:</b>
<p><b>Subject: Instrumental Techniques for Environmental Analysis</b></p> <ol style="list-style-type: none"> <li>Instrumental techniques for analysing major water constituents.</li> <li>Trace water contaminants analysis techniques: organic compounds and heavy metals.</li> <li>Solid sample analysis techniques: biological, soil, sediment and sludge samples.</li> <li>Direct analysis techniques of solid samples.</li> <li>Gaseous fraction analysis techniques: direct and indirect methods.</li> <li><b>6.</b> Particulate fraction analysis techniques in atmospheric analysis: direct methods and particle solution methods.</li> </ol>
<b>OBSERVATIONS:</b>

MATHEMATICAL MATERIAL INFORMATION			
ACQUIRED COMPETENCES:			
BASIC	GENERAL	SPECIFIC	TRANSVERSAL
CB2, CB3, CB5,		CE5, CE66, CE67, CE68	CT3

BRIEF DESCRIPTION:
<p><b>Subject: Applied Statistics</b></p> <ol style="list-style-type: none"> <li>1. Linear Models               <ol style="list-style-type: none"> <li>i. Linear regression</li> <li>ii. Logistical regression</li> </ol> </li> <li>2. Time series               <ol style="list-style-type: none"> <li>i. ARMA</li> <li>ii. ARIMA</li> </ol> </li> <li>3. Information reduction techniques               <ol style="list-style-type: none"> <li>i. Main components</li> <li>ii. Correspondence analysis</li> <li>iii. Factorial analysis</li> </ol> </li> <li>4. Information classification techniques               <ol style="list-style-type: none"> <li>i. Cluster analysis</li> <li>ii. Discriminant analysis</li> </ol> </li> </ol>
OBSERVATIONS:

MODULE 5	
NAME OF MODULE:	Environmental Technology

MATERIAL 1 OF MODULE 5			
MATERIA 1:	ENVIRONMENTAL TECHNOLOGY		
CHARACTER:	Mandatory	LANGUAGE:	Spanish
ECTS:	12	TIME FRAME:	5th Term

SUBJECTS OF MATERIAL 1			
Subject 1:	Environmental Engineering Basis		
CHARACTER:	Mandatory	LANGUAGE:	Spanish
ECTS:	6	TIME FRAME:	5th Term

SUBJECTS OF MATERIAL 1			
Subject 2:	Unitary Operations for Effluent, Emission and Waste Treatment		
CHARACTER:	Mandatory	LANGUAGE:	Spanish
ECTS:	6	TIME FRAME:	5th Term

MATERIAL 2 OF MODULE 5	
MATERIAL 2:	ENVIRONMENTAL POLLUTION

<b>CHARACTER:</b>	<b>Mandatory</b>	<b>LANGUAGE:</b>	<b>Spanish</b>
<b>ECTS:</b>	<b>12</b>	<b>TIME FRAME:</b>	<b>5th Term</b>

<b>SUBJECTS OF MATERIAL 2</b>			
<b>Subject 1:</b>	<b>Environmental Pollution Evaluation</b>		
<b>CHARACTER:</b>	<b>Mandatory</b>	<b>LANGUAGE:</b>	<b>Spanish</b>
<b>ECTS:</b>	<b>12</b>	<b>TIME FRAME:</b>	<b>5th Term</b>

<b>ENVIRONMENTAL TECHNOLOGY MATERIAL INFORMATION</b>			
<b>ACQUIRED COMPETENCES:</b>			
<b>BASIC</b>	<b>GENERAL</b>	<b>SPECIFIC</b>	<b>TRANSVERSAL</b>
CB1,CB2, CB3,CB5,	CG1	CE2, CE3, CE5, CE7, CE10, CE69, CE70, CE72, CE73,	CT1, CT2

<b>BRIEF DESCRIPTION:</b>
<p><b>Subject: Environmental Engineering Basis</b></p> <ol style="list-style-type: none"> <li>1. Environmental engineering tools: quantity and unit systems.</li> <li>2. Matter and energy equilibriums.</li> <li>3. Transport mechanisms.</li> <li>4. Unitary operations. Classification.</li> <li>5. Application of engineering basic principles in environmental sciences.</li> </ol> <p><b>Subject: Unitary Operations for Effluent, Emission and Waste Treatment.</b></p> <ol style="list-style-type: none"> <li>1. Operations and physical processes.</li> <li>2. Operations and chemical processes.</li> <li>3. Operations and biological processes.</li> <li>4. Effluent, emission and waste treatment installations.</li> </ol>
<b>OBSERVATIONS:</b>
<p><b>Tutorial activities are not considered presential</b></p>

<b>ENVIRONMENTAL POLLUTION MATERIAL INFORMATION</b>			
<b>ACQUIRED COMPETENCES:</b>			
<b>BASIC</b>	<b>GENERAL</b>	<b>SPECIFIC</b>	<b>TRANSVERSAL</b>
CB1, CB2, CB3,CB5,	CG1	CE2, CE3, CE4, CE7, CE74, CE75, CE76, CE77, CE78	CT1, CT2

<b>BRIEF DESCRIPTION:</b>
<p><b>Subject: Environmental Pollution Evaluation</b></p> <ol style="list-style-type: none"> <li>1. Concept of pollution.</li> <li>2. Source of contamination and entrance of contaminants into the environment.</li> <li>3. Environmental quality evaluation and diagnostic strategies.</li> <li>4. Description and classification of the main types of soil, water and air contaminants.</li> </ol>

5. Contaminant transport, dispersion, distribution and transformation processes that occur in the environment.
6. Design and take samples for environmental analysis.
- 7.** Environmental contaminants evaluation: sample treatment and analysis methods.

**OBSERVATIONS:**

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MODULE 6	
NAME OF MODULE:	Rural and Urban Environment Conservation, Planning and Management

MATERIAL 1 OF MODULE 6			
MATERIAL 1:	GEOGRAPHY		
CHARACTER:	Mandatory	LANGUAGE:	Spanish
ECTS:	6	TIME FRAME:	4th Term

SUBJECTS OF MATERIAL 1			
Subject 1:	Land Use, Urban Planning and the Environment		
CHARACTER:	Mandatory	LANGUAGE:	Spanish
ECTS:	6	TIME FRAME:	4th Term

MATERIAL 2 OF MODULE 6			
MATERIAL 2:	BIOLOGY AND GEOLOGY		
CHARACTER:	Mandatory	LANGUAGE:	Spanish
ECTS:	9	TIME FRAME:	6th Term

SUBJECTS OF MATERIAL 2			
Subject 1:	Natural Areas and Resource Management		
CHARACTER:	Mandatory	LANGUAGE:	Spanish
ECTS:	9	TIME FRAME:	6th Term

MATERIAL 3 OF MODULE 6			
MATERIAL 3:	GEOLOGY		
CHARACTER:	Mandatory	LANGUAGE:	Spanish
ECTS:	6	TIME FRAME:	6th Term

SUBJECTS OF MATERIAL 3			
Subject 1:	Natural Risks		
CHARACTER:	Mandatory	LANGUAGE:	Spanish
ECTS:	6	TIME FRAME:	6th Term

GEOGRAPHICAL MATERIAL INFORMATION			
ACQUIRED COMPETENCES:			
BASIC	GENERAL	SPECIFIC	TRANSVERSAL
CB1, CB2,CB3,CB4	CG1	CE5, CE6,CE7, CE9, CE80, CE86, CE87,CE88, CE89, CE90, CE91	CT1,CT2,CT3

BRIEF DESCRIPTION:
<p>Subject: Land Use, Urban Planning and the Environment</p> <ol style="list-style-type: none"> <li>Theoretical and conceptual aspects of urban planning, territorial ordination and landscaping.</li> <li>Relations between territorial ordination, urban planning and the environment.</li> </ol>

<ol style="list-style-type: none"> <li>3. Territorial planning methodology. Development phases.</li> <li>4. Territorial planning strategies, instruments and techniques.</li> <li>5. Managing territorial ordination and urban planning.</li> <li>6. Information and sources of territorial planning. Participation in territorial ordination.</li> </ol>
<b>OBSERVATIONS:</b>

BIOLOGICAL AND GEOLOGICAL MATERIAL INFORMATION			
ACQUIRED COMPETENCES:			
BASIC	GENERAL	SPECIFIC	TRANSVERSAL
CB1, CB2, CB3, CB4	CG1	CE3, CE4, CE5, CE8, CE9, CE10, CE79, CE80, CE81, CE83, CE84, CE85	CT1, CT2, CT3

BRIEF DESCRIPTION:
<p><b>Subject: Natural Areas and Resource Management</b></p> <ol style="list-style-type: none"> <li>1. Classification of natural resources.</li> <li>2. Mineral resources: genesis, exploitation, impacts and environmental management.</li> <li>3. Hydric and eolic erosion factors and mechanisms on hillsides and canals. Quantification, prevention and mitigation methods. Land erosion maps.</li> <li>4. Land evaluation maps. Floor and water degradation processes.</li> <li>5. Desertification and sustainable management of aquifers and drainage basins.</li> <li>6. Ecology and economy: sustainable exploitation of natural resources.</li> <li>7. Biodiversity. Conservation biology. Measures and threats.</li> <li>8. Natural Spaces. Populations, communities, ecosystems and conservation. Conservation of natural spaces: objectives and strategies.</li> <li>9. Management and conservation of natural protected areas on different levels. Biodiversity and geodiversity.</li> </ol>
<b>OBSERVATIONS:</b>

GEOLOGICAL MATERIAL INFORMATION			
ACQUIRED COMPETENCES:			
BASIC	GENERAL	SPECIFIC	TRANSVERSAL
CB1, CB2, CB3, CB4	CG1	CE3, CE5, CE6, CE82, CE86, CE87	CT1, CT2, CT3

**BRIEF DESCRIPTION:****Subject: Natural Risks**

1. Natural risk study methods. Risk cartography.
2. Climatic and meteorological risks.
3. Internal geological risks: nature and prediction.
4. Rise and floods: processes, effects, prediction and prevention. Structural and non-structural defence measures.
5. Coastal risks: flooding, erosion, unwanted landfilling. Study, prediction and prevention methods.
6. Terrain instability and other natural risks.

**OBSERVATIONS:**

MODULE 7	
NAME OF MODULE:	Company and Administration Environmental Quality Management

MATERIAL 1 OF MODULE 7			
MATERIAL 1:	ENVIRONMENTAL MANAGEMENT		
CHARACTER:	Mandatory	LANGUAGE:	Spanish
ECTS:	9	TIME FRAME:	6th Term

SUBJECTS OF MATERIAL 1			
Subject 1:	Environmental Management Tools		
CHARACTER:	Mandatory	LANGUAGE:	Spanish
ECTS:	9	TIME FRAME:	6th Term

MATERIAL 2 OF MODULE 7			
MATERIAL 2:	ENERGY MANAGEMENT		
CHARACTER:	Mandatory	LANGUAGE:	Spanish
ECTS:	6	TIME FRAME:	6th Term

SUBJECTS OF MATERIAL 2			
Subject 1:	Energy Management		
CHARACTER:	Mandatory	LANGUAGE:	Spanish
ECTS:	6	TIME FRAME:	6th Term

MATERIAL 3 OF MODULE 7			
MATERIAL 3:	BIOLOGY		
CHARACTER:	Mandatory	LANGUAGE:	Spanish
ECTS:	6	TIME FRAME:	7th Term

SUBJECTS OF MATERIAL 2			
Subject 1:	Environmental Toxicology and Public Health		
CHARACTER:	Mandatory	LANGUAGE:	Spanish
ECTS:	6	TIME FRAME:	7th Term

ENVIRONMENTAL MANAGEMENT MATERIAL INFORMATION			
ACQUIRED COMPETENCES:			
BASIC	GENERAL	SPECIFIC	TRANSVERSAL
CB1, CB2, CB3, CB4, CB5	CG1	CE2, CE3, CE4, CE5, CE7, CE8, CE9, CE10, CE11, CE92, CE93, CE94, CE95	CT1, CT2, CT3

BRIEF DESCRIPTION:
<p>Subject: Environmental Management Tools</p> <ol style="list-style-type: none"> <li>1. Environmental management tools: environmental impact evaluation.</li> <li>2. Environmental management and audit systems.</li> <li>3. Life cycle analysis.</li> </ol>

4. Ecolabels and ecodesign.
5. Environmental study methodology.
6. Environmental and sustainability indicators.
7. Normalised environmental management systems: ISO, EMAS and others.
8. Environmental audit and quality procedures.
- 9.** Environmental risk analysis and evaluation methodology

**OBSERVATIONS:**

**Tutorial activities are not considered presential.**

**ENERGY MANAGEMENT MATERIAL INFORMATION**

**ACQUIRED COMPETENCES:**

BASIC	GENERAL	SPECIFIC	TRANSVERSAL
CB1, CB2, CB3, CB4, CB5	CG1	CE3, CE5, CE10, CE11, CE96, CE97, CE98	CT1, CT2, CT3

**BRIEF DESCRIPTION:**

**Subject: Energy Management**

1. Energy sources.
2. Clean technology and renewable energy. Cogeneration.
3. Environmental repercussions of different sources of energy.
4. Industrial energy management. Ecoefficiency. Energetic audit.
5. Energy policies and plans.

**OBSERVATIONS:**

**Tutorial activities are not considered presential.**

**BIOLOGICAL MATERIAL INFORMATION**

**ACQUIRED COMPETENCES:**

BASIC	GENERAL	SPECIFIC	TRANSVERSAL
CB3, CB5		CE99, CE100, CE101	CT2

**BRIEF DESCRIPTION:**

**Subject: Environmental Toxicology and Public Health**

1. General principles of environmental toxicology and ecotoxicology.
2. Toxicity mechanisms and their relation with the toxic effects of environmental contaminants.
3. Toxicity evaluation.
4. Health determinants. Relation between environment and health. General principles of environmental epidemiology.
5. Public health surveillance. Indicators.
- 6.** Health problems from contaminated waters, waste, atmosphere and food.

**OBSERVATIONS:**



MODULE 8	
<b>NAME OF MODULE:</b>	Climate Change

MATERIAL 1 OF MODULE 8			
<b>MATERIAL 1:</b>	BIOLOGY, PHYSICS, GEOLOGY AND CHEMISTRY		
<b>CHARACTER:</b>	Optative	<b>LANGUAGE:</b>	Spanish
<b>ECTS:</b>	6	<b>TIME FRAME:</b>	7th Term

SUBJECTS OF MATERIAL 1			
<b>Subject 1:</b>	Climate Change		
<b>CHARACTER:</b>	Optative	<b>LANGUAGE:</b>	Spanish
<b>ECTS:</b>	6	<b>TIME FRAME:</b>	7th Term

BIOLOGICAL, PHYSICAL, GEOLOGICAL AND CHEMICAL MATERIAL INFORMATION			
ACQUIRED COMPETENCES:			
BASIC	GENERAL	SPECIFIC	TRANSVERSAL
CB2, CB3, CB5	CG1	CE2, CE5, CE7, CE8, CE10, CE102, CE103, CE104, CE105, CE106, CE107	CT1, CT2

BRIEF DESCRIPTION:
<p><b>Subject: Climate Change</b></p> <ol style="list-style-type: none"> <li>1. Climate and forming factors: concepts.</li> <li>2. Climate change and climate evolution indicators. Climatic models.</li> <li>3. Climatic variability: recent and abrupt climate change.</li> <li>4. Oceans role in climate change: carbon global cycle and anthropogenic carbon. Possible scenarios.</li> <li>5. Climate change and biodiversity. Effects on ecosystems.</li> <li>6. Climate change and global change. Interrelation and synergies.</li> <li>7. Atmospheric carbon dioxide emissions mitigation techniques: alternatives and future perspectives, international regulations.</li> </ol>
OBSERVATIONS:

MODULE 9	
<b>NAME OF MODULE:</b>	Transversal Knowledge and Environmental Techniques

MATERIAL 1 OF MODULE 9			
<b>MATERIAL 1:</b>	ENVIRONMENTAL PROJECT DRAFTING AND EXECUTION		
<b>CHARACTER:</b>	Mandatory	<b>LANGUAGE:</b>	Spanish
<b>ECTS:</b>	6	<b>TIME FRAME:</b>	8th Term

SUBJECTS OF MATERIAL 1			
<b>Subject 1:</b>	Environmental Project Drafting and Execution		
<b>CHARACTER:</b>	Mandatory	<b>LANGUAGE:</b>	Spanish
<b>ECTS:</b>	6	<b>TIME FRAME:</b>	8th Term

MATERIAL 2 OF MODULE 9			
<b>MATERIAL 2:</b>	FINAL DEGREE PROJECT		
<b>CHARACTER:</b>	Mandatory	<b>LANGUAGE:</b>	Spanish
<b>ECTS:</b>	12	<b>TIME FRAME:</b>	8th Term

SUBJECTS OF MATERIAL 2			
<b>Subject 1:</b>	Final Degree Project		
<b>CHARACTER:</b>	Mandatory	<b>LANGUAGE:</b>	Spanish
<b>ECTS:</b>	12	<b>TIME FRAME:</b>	8th Term

ENVIRONMENTAL PROJECT DRAFTING AND EXECUTION MATERIAL INFORMATION			
ACQUIRED COMPETENCES:			
BASIC	GENERAL	SPECIFIC	TRANSVERSAL
CB1, CB2, CB3, CB4, CB5	CG1	CE1, CE2, CE3, CE4, CE5, CE6, CE7, CE8, CE9, CE10, CE11, CE108, CE109, CE110, CE111, CE112, CE113	CT1, CT2, CT3

BRIEF DESCRIPTION:
<p><b>Subject: Environmental Project Drafting and Execution</b></p> <ol style="list-style-type: none"> <li>1.- General aspects of environmental projects.</li> <li>2.- General aspects of a report.</li> <li>3.- Necessary tools for environmental project designs and achievement.</li> <li>4.- Public speaking techniques.</li> <li>5.- Economy report and company plan designs.</li> <li>6.- Administrative authorisation attainment procedures.</li> </ol>
OBSERVATIONS:



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FINAL DEGREE PROJECT MATERIAL INFORMATION			
<b>ACQUIRED COMPETENCES:</b>			
BASIC	GENERAL	SPECIFIC	TRANSVERSAL
CB1,CB2,CB3,CB4,CB5	CG1	De CE1 a CE143	CT1,CT2, CT3
<b>BRIEF DESCRIPTION:</b>			
<p>The Final Degree Project will include activities that integrate knowledge and transversal and specific competences which the student has acquired throughout the degree. It must be original and integrative work in the Environmental Science field and may be a part of one of the following: laboratory work, field work, work experience, bibliographical revision.</p> <p>The presentation and evaluation will be individual.</p>			
<b>Resultados del aprendizaje:</b>			
<ol style="list-style-type: none"> <li>1. Acquire global competences linked to developing and applying knowledge.</li> <li>2. Acquire competences linked to searching and organising information and relevant documents on the study topic.</li> <li>3. Convey acquired knowledge and abilities by presenting them in a rigorous and convincing manner, written or oral, to a specialised or non-specialised public.</li> <li>4. Know how to apply obtained knowledge and demonstrate professional critical comprehension, with the ability to define and synthesise a topic, problem or study area and apply coherent reasoning in order to elaborate a pertinent and contextualised answer.</li> <li>5. Know how to apply processes and procedures to the collection, analysis and data and relevant information interpretation in a methodical manner in order to reach a conclusion for a topic, problem or study area, using new technologies as tools and support material.</li> <li>6. Understand systematically and critically a topic, problem or study area, incorporating theoretical framework and available knowledge, as well as judgements that include social, scientific and ethical reflections.</li> <li>7. Acquire commitments and exercise professional personal responsibilities, practicing individual work habits which are essential in developing complex intellectual activities.</li> </ol>			
<b>OBSERVATIONS:</b>			
<p>The student must have passed all basic and mandatory material to be able to defend their Final Degree Project.</p>			
<b>Teaching Methodology:</b>			

Although there are different types of projects they all require personalised, active and participatory, attention, supervised directly and via virtual campus to make sure they follow the guidelines of the project's type.

TUTORIAL. The Final Degree Project will be tutored by professors with that area of expertise. All professors associated with the degree may be tutors. The tutors may propose a project and have it approved by the Final Degree Project Commission.

ORIENTATION 1 MODULE	
NAME OF MODULE:	Natural Areas Conservation Module

MATERIAL 1 OF ORIENTATION 1			
MATERIAL 1:	BIOLOGY		
CHARACTER:	Optative	LANGUAGE:	Spanish
ECTS:	15	TIME FRAME:	7th Term

SUBJECTS OF MATERIAL 1			
Subject 1:	Limnology		
CHARACTER:	Optative	LANGUAGE:	Spanish
ECTS:	6	TIME FRAME:	7th Term
Subject 2:	Biogeography and biodiversity		
CHARACTER:	Optative	LANGUAGE:	Spanish
ECTS:	9	TIME FRAME:	7th Term

MATERIAL 2 OF ORIENTATION 1			
MATERIAL 2:	GEOLOGY		
CHARACTER:	Optative	LANGUAGE:	Spanish
ECTS:	9	TIME FRAME:	7th Term

SUBJECTS OF MATERIAL 2			
Subject 1:	Geomorphology and Geodiversity		
CHARACTER:	Optative	LANGUAGE:	Spanish
ECTS:	9	TIME FRAME:	7th Term

BIOLOGICAL MATERIAL INFORMATION			
ACQUIRED COMPETENCES:			
BASIC	GENERAL	SPECIFIC	TRANSVERSAL
CB2, CB3	CG1	CE2, CE3, CE5,CE7, CE114, CE115, CE116, CE117, CE118, CE119, CE120, CE121, CE122, CE123, CE124, CE125	CT1, CT3

BRIEF DESCRIPTION:
<p><b>Subject: Limnology</b></p> <ol style="list-style-type: none"> <li>1. General and differentiating characteristics of continental aquatic ecosystems.</li> <li>2. Physical-chemical factors in ecosystem organisation.</li> <li>3. Organism role in elements cycle.</li> <li>4. Organisms and communities.</li> <li>5. Continental aquatic ecosystems: rivers, reservoirs, lakes, wetlands.</li> <li>6. Applied limnology.</li> </ol> <p><b>Subject: Biogeography and Biodiversity.</b></p> <ol style="list-style-type: none"> <li>1. Global and regional scale biogeographic patterns.</li> <li>2. Species and biomass evolutionary history.</li> <li>3. Biodiversity analysis and determining processes.</li> <li>4. Genetic mechanisms of evolutionary change.</li> <li>5. Genetic structure analysis of natural populations.</li> <li>6. Biodiversity threatening factors I: genetic consequences.</li> <li>7. Biodiversity threatening factors II: ecological consequences.</li> <li>8. Biodiversity conservation I: IUCN criteria for developing threatened flora/fauna catalogues.</li> <li>9. Biodiversity conservation II: conservation and restoration of genetic resources.</li> </ol>
OBSERVATIONS:

GEOLOGICAL MATERIAL INFORMATION			
ACQUIRED COMPETENCES:			
BASIC	GENERAL	SPECIFIC	TRANSVERSAL
CB2, CB3	CG1	CE2, CE3, CE4, CE5, CE6,CE7, CE8, CE126, CE127, CE128, CE129, CE130, CE131, CE132, CE133, CE134	CT1,CT2,CT3

BRIEF DESCRIPTION:
<p><b>Subject: Geomorphology and Geodiversity</b></p> <ol style="list-style-type: none"> <li>1. Processes and morphologies of structural and lithological weathering.</li> <li>2. Fluvial forms and processes: drainage basins and canal dynamics, alluvial sequences.</li> <li>3. Cold environment geomorphology, glacial and periglacial forms and processes.</li> <li>4. Hot environment geomorphology, desert and tropical forms and processes.</li> <li>5. Coastal environment geomorphology.</li> <li>6. Environmentally applied geomorphology, thematic cartography.</li> <li>7. Geological heritage: definition and types, catalogue and characterisation criteria and methods.</li> <li>8. Community interest geohabitats: types and methods of environmental quality evaluation.</li> <li>9. Geodiversity protection and follow up plans.</li> </ol>

OBSERVATIONS:

ORIENTATION 2 MODULE	
NAME OF MODULE:	Applied Environmental Technology Module

MATERIAL 1 OF ORIENTATION 2			
MATERIAL 1:	POLLUTION AND TECHNOLOGY		
CHARACTER:	Optative	LANGUAGE:	Spanish
ECTS:	24	TIME FRAME:	7th Term

SUBJECT OF MATERIAL 1			
Subject 1:	Water Treatment		
CHARACTER:	Optative	LANGUAGE:	Spanish
ECTS:	6	TIME FRAME:	7th Term
Subject 2:	Atmospheric and Acoustic Pollution Treatment		
CHARACTER:	Optative	LANGUAGE:	Spanish
ECTS:	9	TIME FRAME:	7th Term
Subject 3:	Waste and Contaminated Soil Management		
CHARACTER:	Optative	LANGUAGE:	Spanish
ECTS:	9	TIME FRAME:	7th Term

POLLUTION AND TECHNOLOGY MATERIAL INFORMATION			
ACQUIRED COMPETENCES:			
BASIC	GENERAL	SPECIFIC	TRANSVERSAL
CB2, CB3, CB5	CG1	CE2, CE3, CE4, CE5, CE6, CE7, CE135, CE136, CE137, CE138, CE139, CE140, CE141, CE142, CE143	CT1, CT2

BRIEF DESCRIPTION:
<p>Subject: Water treatment:</p> <ol style="list-style-type: none"> <li>1. Sewage characteristics.</li> <li>2. Sewage contaminant flow and quantity.</li> <li>3. Introduction to the sewage and drinking water plants project.</li> <li>4. Physical treatment: equipment and installations, operation, dimensioning control parameters and selection criteria.</li> <li>5. Chemical treatment: equipment and installations, operation, dimensioning control parameters and selection criteria.</li> <li>6. Biological treatment: equipment and installations, operation, dimensioning control parameters and selection criteria.</li> <li>7. Advanced water treatment: equipment and installations, operation, dimensioning control parameters and selection criteria.</li> <li>8. Sludge treatment and management: equipment and installations, operation, dimensioning control parameters and selection criteria.</li> <li>9. Liquid effluent evacuation.</li> </ol> <p>Subject: Atmospheric and Acoustic Pollution Treatment</p> <ol style="list-style-type: none"> <li>1. Pollution source correction. Catchment and preconditioning system.</li> <li>2. Choice of gas purifying system. Aspects to consider and selection criteria.</li> <li>3. Mechanical particle separators. Electrostatic separators.</li> </ol>

4. Gas purification by absorption phenomena.
5. Gas purification by combustion.
6. Gas purification by chemical conversion.
7. Chimneys: chimney calculations. Transport and dispersion models. Applications.
8. Introduction to acoustic pollution: definition, acoustic principles. Indices, parameters.
9. Permissible levels of noise and vibrations. Noise regulation and ISO policies.
10. Traffic noise and noise maps. Action and development procedures. Measurement equipment, instrumentation and application software.

**Subject: Waste and Contaminated Soil Management.**

1. Waste definition, classification and problems.
2. Minimisation, valuation and recycling techniques.
3. Treatment techniques.
4. Geological storage techniques.
5. Landfill disposal.
6. Integral management of urban solid waste.
7. Specific wastes.
8. In situ land treatment: operation equipment and installations, dimensioning control parameters and selection criteria.
- 9.** Ex situ land treatment: operation equipment and installations, dimensioning control parameters and selection criteria.

**OBSERVATIONS:**

Table 4 contains a list of investigation groups of the University of Cadiz whose line of investigation is associated with the Marine and Environmental Sciences Faculty.

Table 4 .- Investigation Groups

UNIVERSITY OF CADIZ INVESTIGATION GROUPS		
ASSOCIATED WITH THE MARINE AND ENVIRONMENTAL SCIENCES FACULTY		
DEPARTAMENT	GROUP PAI	NAME
Pathological Anatomy, Cellular Biology, Histology, Science History, Legal and Forensic Medicine and Toxicology.	RNM-345	Environmental and Analytical Toxicology
Biology.	RNM-213	Marine Biology and Fisheries
	RNM-329	Coastal Wetlands Conservation
	RNM-243	Fish Population Dynamics
	RNM-214	Aquatic Ecosystems Structure and Dynamics
	RNM-216	Marine Species Pathology and Histophysiology
Molecular Biochemistry and Biology, Microbiology, Preventative Medicine and Public Health, Physiology and Genetics.	BIO-219	Applied Microbiology and Molecular Genetics.
Earth Sciences.	RNM-328	Coastal and Marine Geology and Geophysics.
Material Sciences and Metallurgic and Inorganic Chemistry Engineering.	TEP-231	Corrosion and Protection.
Applied Physics.	RNM-205	Physical Oceanography: Dynamics.
	RNM-337	Oceanography and Remote Sensing.
Applied Physics and Earth Sciences.	RNM-160	Radioactivity and the Environment.
History, Geography and Philosophy	HUM-117	Coastal Planning and Management.
Chemical Engineering, Food Technology and Environmental Technology.	TEP-181	Environmental Quality and Residue and Liquid and Gas Effluent Technology.
Physical Chemistry.	RNM-144	Oceanography and Coastal Contamination.
Organic Chemistry.	FQM-285	Natural Marine Products.
Condensed Material Physics.	TEP-115	New sol-gel material processing.
Analytical Chemistry.	RMN-236	Marine Geochemistry.
Mathematics.	FQM-315	Theoretical and numerical analysis of experimental sciences models.
Public Law.	SEJ-152	Cadiz Chair of Administrative Law