

<b>DEREE COLLEGE SYLLABUS FOR:</b>	
<b>ES 1000 LE ENVIRONMENTAL SCIENCE: ECOSYSTEMS AND BIODIVERSITY</b>	
<b>3/2/4</b>	
<b>UK LEVEL: 4</b>	
<b>UK CREDITS: 20</b>	
(Updated Fall 2022)	
<b>PREREQUISITES:</b>	No prerequisites
<b>CATALOG DESCRIPTION:</b>	Principles of environmental science with emphasis on sustainability, ecosystem structure and function, biodiversity, the human impact on ecosystems, soil and food production, water resources, conservation and protection of natural resources.
<b>RATIONALE:</b>	Environmental Science: Ecosystems and Biodiversity is a science course designed for students with little background in science and aims at giving them an understanding of the structure, function and sustainability of ecosystems and of the way human activities affect biodiversity, ecosystem processes, the climate and human societies. It also provides an introduction to issues related to water resources, soil science and food production with emphasis on sustainable management of resources and production processes. It is a required course for environmental studies majors as it provides them with background knowledge needed to attend more advanced courses of the program.
<b>LEARNING OUTCOMES:</b>	As a result of taking this course, the student should be able to: <ol style="list-style-type: none"> <li>1. Demonstrate knowledge and understanding of the concept of sustainability, of its ecological, social, economic and political dimensions, as well as of major environmental issues of contemporary societies.</li> <li>2. Demonstrate knowledge of core concepts and principles on the following topics: ecosystem structure and function, evolution and ecosystem change, human population issues, biodiversity and its protection, soil and food production, water resources.</li> <li>3. Explain the scientific method and how it applies to the study of environmental issues and discuss the interdisciplinary approach needed in environmental problem solving, analyzing specific case studies.</li> <li>4. Develop skills for using basic methods in environmental science, including the ability to use appropriate laboratory and field equipment and to acquire, process and evaluate data.</li> </ol>
<b>METHOD OF TEACHING AND LEARNING:</b>	In congruence with the learning and teaching strategy of the college, the following tools are used: <ul style="list-style-type: none"> <li>• Class lectures, interactive learning (class discussions, group work, flipped class activities), video presentations, and critical thinking questions/exercises discussed in class.</li> <li>• Laboratory and field activities (including practical work and laboratory reports).</li> <li>• Use of Blackboard course management system, through which instructors post course information, lecture notes, assignments, announcements, as well as additional resources; use of textbook online platforms that provide additional learning resources.</li> <li>• Group work in class/labs or with the help of Blackboard interactive tools (Discussion Board, Blog, Journal, Groups).</li> <li>• Office hours: students are encouraged to make full use of the office hours of their instructor, where they can ask questions, see their exam paper, and/or go over lecture/lab material.</li> </ul>

<b>ASSESSMENT:</b>	<p><b>Summative:</b></p> <table border="1"> <tr> <td>Midterm examination (2 hours) (Multiple choice/short answers/essay questions)</td> <td><b>35%</b></td> </tr> <tr> <td>Final examination (2 hours) (Multiple choice/short answers/essay questions) (non comprehensive)</td> <td><b>40%</b></td> </tr> <tr> <td>Lab report(s)</td> <td><b>25%</b></td> </tr> </table> <p><b>Formative:</b></p> <table border="1"> <tr> <td>Essay questions (as homework assignments)</td> <td><b>0</b></td> </tr> <tr> <td>In-class or online quizzes</td> <td><b>0</b></td> </tr> </table> <p>The formative tests aim to prepare students for the examinations. Students are expected to submit feedback on their performance. The lab reports test Learning Outcomes 3 and 4. The midterm examination tests Learning Outcomes 1, 2, and 3, focusing on the first part of the content. The final examination also tests Learning Outcomes 1, 2, and 3, focusing on the second part of the content.</p>	Midterm examination (2 hours) (Multiple choice/short answers/essay questions)	<b>35%</b>	Final examination (2 hours) (Multiple choice/short answers/essay questions) (non comprehensive)	<b>40%</b>	Lab report(s)	<b>25%</b>	Essay questions (as homework assignments)	<b>0</b>	In-class or online quizzes	<b>0</b>
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Essay questions (as homework assignments)	<b>0</b>										
In-class or online quizzes	<b>0</b>										
<b>INDICATIVE READING:</b>	<p><b>Required Reading:</b></p> <ul style="list-style-type: none"> <li>Miller G.T. and Spoolman, S. 2020. <i>Living in the Environment: Principles, Connections, and Solutions</i>. 20th edition, Cengage.</li> </ul> <p><b>Recommended Readings:</b></p> <ul style="list-style-type: none"> <li>Wright, R.T. and Boorse, D. 2020. <i>Environmental Science: Toward a Sustainable Future</i>. 14th edition, Prentice Hall.</li> </ul>										
<b>INDICATIVE MATERIAL:</b> (e.g. audiovisual, digital material, etc.)	<p><b>REQUIRED MATERIAL:</b> N/A</p> <p><b>RECOMMENDED MATERIAL:</b> N/A</p>										
<b>COMMUNICATION REQUIREMENTS:</b>	<p>Verbal skills using academic/professional English</p>										
<b>SOFTWARE REQUIREMENTS:</b>	<p>Word, PowerPoint, Excel</p>										
<b>WWW RESOURCES:</b>	<ul style="list-style-type: none"> <li>Scientific American web site: <a href="http://www.sciam.com">www.sciam.com</a></li> <li>United Nations Environment Program: <a href="http://www.unep.org">www.unep.org</a></li> <li>International Union for the Conservation of Nature: <a href="http://www.iucn.org">www.iucn.org</a></li> <li>Ecologist web site: <a href="http://www.theecologist.org">www.theecologist.org</a></li> <li>International Institute for Sustainable Development: <a href="http://www.iisd.org">www.iisd.org</a></li> <li>U.S. Environmental Protection Agency: <a href="http://www.epa.gov/">http://www.epa.gov/</a></li> <li>European Environment Agency: <a href="http://www.eea.europa.eu/">http://www.eea.europa.eu/</a></li> <li>European Commission – Environment: <a href="https://ec.europa.eu/environment/index_en">https://ec.europa.eu/environment/index_en</a></li> <li>The Intergovernmental Panel on Climate Change website: <a href="https://www.ipcc.ch/">https://www.ipcc.ch/</a></li> <li></li> </ul>										
<b>INDICATIVE CONTENT:</b>	<ol style="list-style-type: none"> <li>Environmental Science: An Introduction <ul style="list-style-type: none"> <li>The Global Environmental Picture</li> <li>Sustainability and Sustainable Development</li> </ul> </li> <li>Science, Matter, Energy and Systems</li> </ol>										

- Scientific Method
  - Basics on Matter
  - Basics on Energy
  - Systems
3. Ecosystems: Structure and Function
    - Ecology and Ecosystems
    - Components of Ecosystems: Biotic and Abiotic Factors
    - Major Trophic Categories
    - Energy Flow in Ecosystems
    - Matter Flow through Ecosystems – Nutrient Cycles
    - How Scientists Study Ecosystems
  4. Biodiversity and Evolution
    - Biodiversity and its Importance
    - Changes in Species: Natural Selection and Evolution
    - The Importance of Species Diversity in Ecosystems
  5. Biodiversity, Species Interactions and Population Control
    - Competition, Predation, Parasitism, Mutualism and Commensalism
    - Population Balance and Factors that Affect It
    - Changes in Ecosystems: Ecological Succession
  6. The Human Population
    - The Human Population Explosion More Developed and Less Developed Countries:
    - The Demographic Transition
    - Population Growth and Development: Addressing the Problem
  7. Terrestrial and Aquatic Biodiversity
    - Factors that Affect the Climate
    - Climate and Major Terrestrial Biomes
    - Human Impacts on Terrestrial Ecosystems
    - Aquatic Systems
  8. Sustaining Biodiversity
    - The Value of Wild Species
    - Human Impact on Biodiversity
    - Protection of Biodiversity: The Species Approach
    - Protection of Biodiversity: The Ecosystem Approach
  9. Soil and Food Production
    - Formation and Properties of Soil
    - Food Production
    - Environmental Problems from Food Production
    - Sustainable Agriculture
  10. Water Resources
    - The Hydrologic Cycle and the Human Impact on It
    - Overdrawing Surface Water and Groundwater Resources: Problems
    - Water Resources Management: Conservation and Sustainable Practices

**LAB OUTLINE:**

Lab activities are performed in the laboratory or outdoors.

Examples of lab activity topics include, but are not limited to, the following:

- Safety and Laboratory Rules
- Ecological & Water Footprints
- Food Chains and Food Webs
- Map Reading and Positioning
- Major Terrestrial Biomes
- Aquatic Life Zones
- Evolution Timeline & Adaptation
- Demographics - Human Population Growth in More and Less Developed Countries
- Mediterranean Ecosystems

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|--|---------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <ul style="list-style-type: none"><li>• Sustaining biodiversity</li><li>• Soil Properties</li><li>• Water Resources</li><li>• Food Production</li></ul> |
|--|---------------------------------------------------------------------------------------------------------------------------------------------------------|