

**DEREE COLLEGE SYLLABUS FOR:**

**ES 4124 AIR QUALITY AND GLOBAL ATMOSPHERIC CHANGES**

**3/0/3**

(Updated Fall 2022)

**UK LEVEL: 6  
UK CREDITS: 15**

**PREREQUISITES:**

ES1010 Environmental Science: Energy Resources and Pollution

**CATALOG DESCRIPTION:**

Discussion of the structure of the atmosphere, urban air pollution, acid deposition, stratospheric ozone depletion, global climate change and their impacts. Policy issues, international legislation, energy options and solutions towards a more sustainable future are examined.

**RATIONALE:**

Air Quality and Global Atmospheric Changes is a science course designed for environmental studies majors (with emphasis on environmental science) and aims at giving them a more thorough understanding of atmospheric and climate sciences and of the human impact on climate. The course provides a scientific background on issues such as the structure of the atmosphere, atmospheric pollution, acid deposition, ozone depletion and climate and climate change. Current policies and global international agreements that effectively address air quality issues, climate change and lead toward a more sustainable future are extensively discussed. The course is addressed to Environmental Studies majors and to any other student who wishes to develop an understanding of air quality and climate protection.

**LEARNING OUTCOMES:**

As a result of taking this course, the student should be able to:

1. Demonstrate knowledge and understanding of the principles of ambient air pollution, its sources, its effects, and mechanisms for its management.
2. Demonstrate knowledge of the ozone depletion problem and of air pollution problems, including chemistry, sources, consequences and solutions to these problems.
3. Demonstrate knowledge of policy and legislation on atmospheric issues and critically assess strategies used at local and global level for climate protection, ozone layer protection and minimization of air pollution.
4. Assess a topic related to a specific atmospheric issue by collecting data and information, critically appraise adopted methods and processes and propose relevant solutions finally, planning and composing a project report.
5. Demonstrate ability to communicate research findings effectively in several forms (e.g. written, graphical and verbal) and defend them in a professional manner.

**METHOD OF TEACHING AND LEARNING:**

In congruence with the learning and teaching strategy of the college, the following tools are used:

- Class lectures, interactive learning (class discussions, group work), video presentations, and case studies discussed in class.
- Exercises and primary source documents are assigned as homework, the answers and critical response to which are reviewed in class
- Students' projects and presentations
- Use of a blackboard site, where instructors post course information, lecture notes, assignments, announcements, as well as additional resources.
- 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.

<b>ASSESSMENT:</b>	<p><b>Summative:</b></p> <table border="1" data-bbox="638 195 1380 428"> <tr> <td data-bbox="638 195 1203 365">Student's research paper (approximately 3,000 words) (research on a selected topic; literature review/evaluation/synthesis; and paper preparation in class).</td> <td data-bbox="1203 195 1380 365">40</td> </tr> <tr> <td data-bbox="638 365 1203 428">Final examination (2-hour, comprehensive) – (Essay-type questions)</td> <td data-bbox="1203 365 1380 428">60</td> </tr> </table> <p><b>Formative:</b></p> <table border="1" data-bbox="638 485 1380 552"> <tr> <td data-bbox="638 485 1203 552">Critical response to selected questions during the semester – including a sample test</td> <td data-bbox="1203 485 1380 552">0</td> </tr> </table> <p>The formative tests aim to prepare students for the final examination and for the research project. The student's research project primarily tests learning outcomes 4 and 5 and, depending on the topic, learning outcomes 1 and/or 2 and/or 3. The final examination tests all learning outcomes.</p>	Student's research paper (approximately 3,000 words) (research on a selected topic; literature review/evaluation/synthesis; and paper preparation in class).	40	Final examination (2-hour, comprehensive) – (Essay-type questions)	60	Critical response to selected questions during the semester – including a sample test	0
Student's research paper (approximately 3,000 words) (research on a selected topic; literature review/evaluation/synthesis; and paper preparation in class).	40						
Final examination (2-hour, comprehensive) – (Essay-type questions)	60						
Critical response to selected questions during the semester – including a sample test	0						
<b>INDICATIVE READING:</b>	<p><b>Required Reading:</b></p> <ul style="list-style-type: none"> <li>• Jacobson, M.Z. 2012. <i>Air Pollution and Global Warming: History, Science and Solutions</i>. Cambridge University Press.</li> <li>•</li> </ul> <p><b>Recommended Readings:</b> Davis, W.T., Fu, J.S. and Godish, T. 2021. <i>Air Quality</i>. 6nd ed., CRC Press.</p>						
<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>	Verbal skills using academic/professional English						
<b>SOFTWARE REQUIREMENTS:</b>	Word, Powerpoint, Excel						
<b>WWW RESOURCES:</b>	<ul style="list-style-type: none"> <li>• EC DG Environment <a href="https://ec.europa.eu/environment/index_en.htm">https://ec.europa.eu/environment/index_en.htm</a></li> <li>• European Environment Agency <a href="https://www.eea.europa.eu/">https://www.eea.europa.eu/</a></li> <li>• Environmental Protection Agency <a href="https://www.epa.gov/">https://www.epa.gov/</a></li> <li>• UNFCCC <a href="https://unfccc.int/">https://unfccc.int/</a></li> <li>• IPCC <a href="http://www.ipcc.ch/">http://www.ipcc.ch/</a></li> <li>• EU Science Hub <a href="https://ec.europa.eu/jrc/en">https://ec.europa.eu/jrc/en</a></li> <li>• WHO Air Pollution <a href="https://www.who.int/health-topics/air-pollution#tab=tab_1">https://www.who.int/health-topics/air-pollution#tab=tab_1</a></li> </ul>						
<b>INDICATIVE CONTENT:</b>	<ol style="list-style-type: none"> <li>1. Basics – Atmospheric Chemicals</li> <li>2. Structure and Composition of the Atmosphere</li> <li>3. Urban Air Pollution</li> <li>4. Meteorology and Air Pollution</li> <li>5. International Regulations of Urban Smog</li> <li>6. Indoor Air Pollution</li> <li>7. Acid Deposition</li> </ol>						

- |  |   |
|--|---|
|  | <ol style="list-style-type: none"><li>8. Global Stratospheric Ozone Depletion</li><li>9. The Greenhouse Effect and Global Climate Change</li><li>10. Addressing Air Pollution and Global Climate Change</li></ol> |
|--|---|