# Atmospheric Physics

<table>
<thead>
<tr>
<th>Module Code</th>
<th>PO4.1</th>
<th>FHEQ Level</th>
<th>Level 7</th>
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<tbody>
<tr>
<td>Pre-requisites</td>
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<td>Co-requisites</td>
<td>None</td>
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<tr>
<td>Primary Department</td>
<td>Physics</td>
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<tr>
<td>Module Leader</td>
<td>Dr Apostolos Voulgarakis</td>
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<tr>
<td>Additional Teaching Departments</td>
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<tr>
<td>Teaching Staff</td>
<td>Dr Apostolos Voulgarakis + Course Associates</td>
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### Programmes on which the Module is delivered

| All UG Physics programmes (F300, F303, F309, F325, F390, F3W3, F3XC, F3XD) | Elective |

### Learning Outcomes

- Be able to describe the basic structure of an atmosphere and the climate system.
- Be able to use fundamental thermodynamics to derive expressions for the variation of temperature, pressure, and total density, by height.
- Understand the concept of potential temperature and how it relates to static stability.
- Know the components of the Earth radiation balance.
- Understand optical depth and transmission function.
- Be able to write down Schwarzschild’s equation of radiative transfer and to solve it for both solar and thermal radiation streams under simple conditions.
- Derive a simple model of the “greenhouse effect”.
- Know the forces acting on a parcel of air and apply Newton’s 2nd Law to deduce the equations of motion for a compressible gas on a rotating planet.
- Know how to apply scale approximations to the equations of motion (e.g., hydrostatic and geostrophic approximations).
- Be able to derive the continuity equation and to calculate the concentration of an atmospheric species being given the chemical reactions involving it.
- Be able to identify the main anthropogenic and natural constituents that influence the Earth’s climate.
- Know how climate models can be used for weather forecasting, climate simulation, and investigations of the causes of climate change.

### Description of Content

To provide students an understanding of the physics behind the structure, the dynamics, the energetics and the glow of planetary atmospheres, with the main emphasis on the terrestrial atmosphere.

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<tr>
<th>Assessment</th>
<th>Assessment Type</th>
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<tr>
<td>Written Exam</td>
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<p>| Learning &amp; Teaching | Independent Study | Placement Hours | Total Hours |</p>
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<td>Date of introduction</td>
<td>Date of Last Revision</td>
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<td>04/05/17</td>
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