CL971 Air Pollution, Climate Change & Human Health

**Module Registrar:** Dr Iain Beverland  
**Taught To (Course):** MSc Env Eng & other MSc programmes; MEng Civil & Env Eng / Civil Eng

**Other Lecturers Involved:**

**Credit Weighting:** 10  
**Semester:** 1

**Assumed Prerequisites:**

**Compulsory or optional**  
**Academic Level:** 5

---

### Module Format and Delivery (hours):

<table>
<thead>
<tr>
<th></th>
<th>Lecture</th>
<th>Tutorial</th>
<th>Laboratory</th>
<th>Project</th>
<th>Assignments</th>
<th>Private Study</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>24</td>
<td>5</td>
<td></td>
<td>15</td>
<td>56</td>
<td></td>
<td>100</td>
</tr>
</tbody>
</table>

---

### Educational Aims

The class provides students with knowledge & skills applicable to atmospheric pollution impacts, ranging from local to global scales. This includes a focus on the assessment & management of impacts on human health through effective interface between the public health sciences of environmental epidemiology and environmental toxicology; and environmental engineering approaches to manage environmental risks.

The class achieves these aims through research-led teaching at the interface between public health and environmental engineering, with a particular focus on methodologies based on risk-centred approaches. The class is delivered using conventional lectures based on a well-established textbook. Student interaction is encouraged throughout the class through directed reading, project work, student-led presentation & question sessions, and structured feedback.

---

### Learning Outcomes (UK SPEC suggests no more than 4 learning outcomes per module. Statements must be broad and be syllabus free and link in with the intended learning outcomes on the programme specifications.)

On completion of the module the student is expected to be able to:

**LO1** Understand the fundamental physical & chemical processes that determine atmospheric pollution ‘climates’.

**LO2** Understand and make informed judgement about public health-based methodologies used to assess & manage impacts of air pollution, climate change, & stratospheric ozone depletion on human health.

**LO3** Ability to critically evaluate & synthesise complex information from primary research and technical literature

---

### Syllabus

**Air Pollution, Climate Change, & Human Health (10 credits)**

- **Principles of risk, exposure assessment & environmental epidemiology**
  - Hazard identification
  - Exposure assessment
  - Risk assessment (including environmental epidemiology)
  - Risk management (including health-based environmental standard setting)

- **Urban air pollution**
  - Air pollution episodes & long-term pollution climates
  - Risk-based assessment & management of impacts on human health

- **Climate change**
  - Physical & chemical processes
  - Evidence of climate change
  - Prediction of future change
  - Risk-based assessment & management of impacts on human health (including civil & environmental engineering approaches to mitigation & adaptation)

- **Stratospheric ozone depletion**
  - Chemical mechanisms; Human health impacts; International management approaches
Assessment of Learning Outcomes

For each of the class Learning Outcomes the following criteria will be used to make judgements on student learning: [Note: Criteria break the LO down into ‘teachable’ elements but do not become syllabus orientated i.e. no mention of CAD package names, components etc.]

Criteria:

**LO1 Understand the fundamental physical & chemical processes that determine atmospheric pollution ‘climates’**.
- C1 Ability to identify roles & importance of processes that influence atmospheric composition.
- C2 Understanding of primary determinants of processes and feedback mechanisms
- C3 Understanding of interactions between processes at different temporal and spatial scales

**LO2 Understand and make informed judgement about public health-based methodologies used to assess & manage impacts of air pollution, climate change, & stratospheric ozone depletion on human health.**
- C1 Understanding of the concepts and main components of risk-based approaches to assessing & managing environmental pollution effects on human health
- C2 Quantitative technical understanding of approaches to quantify human exposure to air pollutants
- C3 Ability to discriminate between association and causation in relationships between environmental quality and human health

**LO3 Ability to critically evaluate & synthesise complex information from primary research and technical literature**
- C1 Ability to critically evaluate primary research & technical literature and to synthesise large amounts of complex information across different disciplines
- C2 Ability to analyse and interpret quantitative example information to illustrate general concepts
- C3 Ability to summarise and present complex inter-disciplinary information, including scientific writing & presentation skills

The standards set for each criterion per Module Learning Outcome to achieve a pass grade are indicated on the assessment sheet for all assessment.
12 Principles of Assessment and Feedback (on Learning & Teaching web pages: www.strath.ac.uk/learnteach/teaching/staff/assessfeedback/12principles/ ) Please state briefly how these are incorporated in this module.

Some examples of the use of these principles of assessment include (but are not restricted to) the following:

1. Help clarify what good performance is.
This programme specification, issued at the start of the class, includes simple & clear guidance on performance criteria by reference to the University Guidance on Marking for Undergraduate Courses http://www.strath.ac.uk/media/ps/cs/gmap/academicaffairs/policies/markin g_for_UG_courses.pdf. Reference is made to equivalent p/g marking schemes in MSc handbooks. Marking criteria are outlined clearly in the assignment handout and multiple opportunities for clarification are available in class. The criteria-based marking sheet is provided in the assignment handout. Feedback sheets demonstrate what constitutes "excellent" work. Further specific guidance is given to students via formative feedback on major and/or example components of assessment, including formative assessment of a plan for the case-study work. The programme includes some assessment scenarios where creativity and ability to solve open-ended problems are valued (e.g. research-led poster presentations). In such scenarios tightly specified goals or outcomes in advance may be inappropriate. Instead students are guided about the nature of the assignment and actively engaged in making their own judgements about what would constitute quality.

2. Encourage 'time and effort' on challenging learning tasks.
This programme specification and assignment handbooks issued at start of Semester include simple & clear guidance on the overall assessment load throughout the Semester. Expectations in terms of time and effort are outlined clearly in the presentation of each assignment. These expectations are communicated clearly in class. Weightings for each assignment underscore the time expectations.

3. Deliver high quality feedback information that helps learners self-correct.
A range of formative and summative assessment methods are used to provide feedback to students, including practice examination questions, assignments, group and/or individual presentations. Feedback sheets provide information allow students to compare their work to the expectations for each assignment and reflect on improvements for future work.

4. Provide opportunities to close any gap between current and desired performance.
Criterion based feedback to students is an integral part of teaching. This is collated into 'generic' feedback that is shared with the whole class, to complement individual feedback for each student. The generic feedback is particularly useful inasmuch as any common or recurring difficulties experienced by many in the class could suggest ways in which teaching and guidance could be improved. The individual feedback is directed at how each student can improve, in all cases avoiding comparisons between students. Opportunities are provided to students to close gaps between current and desired performance by the prompt return of feedback on early formative assignments.

5. Ensure that summative assessment has a positive impact on learning.
Formative and summative assessments are aligned by giving students opportunities to gain practice on tasks that are later formally assessed (e.g. through formative feedback on example practice examination questions). Experience with this approach has found that students are highly motivated to utilise formative feedback they receive on practice examples of work that will be subject to subsequent formal assessment.

6. Encourage interaction and dialogue around learning (peer and teacher-student)
See points 1-4 above. Project work encourages interaction between students and lecturers.

7. Facilitate the development of self-assessment and reflection in training
Self-assessment tasks are included to support student self-assessment and reflection.

8. Give choice in the topic, method, criteria, weighting or timing of assessments
Students are given opportunities to engage in optional (research-led) extensions to some project/portfolio work using carefully managed mechanisms of only counting the contribution of this additional work if these the marks are in the student’s favour. This encourages more able students to try to achieve higher overall marks by taking their learning to a more advanced level, while at the same time avoiding overly penalising overloaded and/or less able students who may be overwhelmed by the additional workload in these extensions to the ‘standard’ assessment portfolio.

9. Involve students in decision-making about assessment policy and practice
Students are involved through representation on committees that discuss assessment policies and practices.

10. Support the development of learning communities

11. Encourage positive motivational beliefs and self-esteem

12. Provide information to teachers that can be used to shape teaching.
See points 1-9 above. Regular formative assessment tasks provide information about the development of students’ understanding and skills.
Assessment Method(s) Including Percentage Breakdown and Duration of Exams

<table>
<thead>
<tr>
<th>Examinations</th>
<th>Courseworks</th>
<th>Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>Duration</td>
<td>Weighing</td>
</tr>
<tr>
<td>1</td>
<td>2 hours</td>
<td>85%</td>
</tr>
</tbody>
</table>

Indicate which learning outcomes (L01, L02 etc) are to be assessed by exam/coursework/project as required.

Coursework Submissions deadlines:
Coursework 1 – S1 week 12

Resit Assessment Procedures:
Resit examinations will be held during the August diet. Resit courseworks and/or project are by individual arrangement.

PLEASE NOTE:
Students need to gain a summative mark of 50% to pass the class. Students who fail the class at the first attempt will be re-examined during the August diet. This re-examination will consist entirely of exam and/or coursework.

Essential and Recommended Reading


All of above textbooks are held in Main Library.
An extended reading list will be supplied at the start of Part 1 and Part 2 of the class.

Additional Student Feedback
(Please specify details of when additional feedback will be provided)

Details are provided in class timetable.

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Room No</th>
</tr>
</thead>
</table>

Session:

Approved:

Course Director Signature: Iain Beverland

Date of Last Modifications: February 2012

(Updated November 2010)
## MODULE TIMETABLE

<table>
<thead>
<tr>
<th>Module Code:</th>
<th>CL9XX</th>
<th>Module Title:</th>
<th>Air Pollution, Climate Change, &amp; Human Health</th>
</tr>
</thead>
</table>

### Brief Description of Assessment:
Learning objectives are assessed in relation to criteria specified above through an examination and coursework covering all of the main syllabus areas.

### Assessment Timing:-
Indicate on the table below the Start/Submission dates for each Assignment/Project and the timing of each Exam/Class Test(s).

<table>
<thead>
<tr>
<th>Semester One</th>
<th>WK1</th>
<th>WK2</th>
<th>WK3</th>
<th>WK4</th>
<th>WK5</th>
<th>WK6</th>
<th>WK7</th>
<th>WK8</th>
<th>WK9</th>
<th>WK10</th>
<th>WK11</th>
<th>WK12</th>
<th>Exam Period</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Deadline - draft material for formative feedback</td>
<td>Formative feedback</td>
<td>Course-work deadline</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Semester Two</th>
<th>WK1</th>
<th>WK2</th>
<th>WK3</th>
<th>WK4</th>
<th>WK5</th>
<th>WK6</th>
<th>WK7</th>
<th>WK8</th>
<th>WK9</th>
<th>WK10</th>
<th>WK11</th>
<th>WK12</th>
<th>Exam Period</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>