MODULE DESCRIPTION FORM

CL970 Environmental pollution management

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

Other Lecturers Involved: Professional staff from: SEPA; AEA Technology plc; Golder Associates (UK) Ltd; GlaxoSmithKline plc; Glasgow City Council Air Quality Unit; and Falkirk Council Air Quality Unit.

Credit Weighting: 10
Semester: 2

Assumed Prerequisites: Compulsory or optional
Academic Level: 3

Module Format and Delivery (hours):

<table>
<thead>
<tr>
<th>Lecture</th>
<th>Tutorial</th>
<th>Laboratory</th>
<th>Project</th>
<th>Assignments</th>
<th>Private Study</th>
<th>Total</th>
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<tbody>
<tr>
<td>24</td>
<td>5</td>
<td>40</td>
<td>15</td>
<td>16</td>
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Educational Aims

The class develops in-depth knowledge & skills regarding the science, engineering & management of environmental pollution control approaches to protect public health. 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. Lecture sessions are complemented by industrial & government case studies in contemporary air quality management practice. 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 Critically evaluate environmental engineering-based systems of pollution control and assessment - taking account of available technical solutions, environmental management concepts, and practical & financial constraints (including emission control & quantification approaches, air quality monitoring and modelling)

LO2 Understand systems of environmental management (inc. relevant pollution control legislation & policies)

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

Syllabus

Environmental pollution management (10 credits):

- Review of principles of environmental pollution control
  - Pollution control concepts & technical approaches
    - Best available technologies
    - Best practicable environmental option – including:
      - Environmental pathways & pollutant fluxes between air, water and soil
      - Contextual links (carefully avoiding duplication) to related classes in Contaminated Land, Water & Environmental Management, Waste Management
  - Regulatory approaches
    - Process-based (Pollution Prevention & Control) standards
    - Outcome (Environmental Quality Criteria) standards
  - Assessing compliance with standards
    - Inter-related environmental monitoring & modelling
    - Evaluation of monitoring and modelling

- Integrated pollution prevention and control
  - Grangemouth petrochemical refinery case study (SEPA, Golder Associates Ltd)
  - Irvine pharmaceutical plant case study (GlaxoSmithKline plc.)

- Local environmental pollution management
  - Environmental impacts of road traffic – integrated transport & environmental models
  - Local air quality management (Glasgow City Council, Falkirk Council)

- National pollution management (AEA Technology plc)
  - National pollutant emissions inventories
  - National pollutant monitoring networks
  - National pollution models
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 Critically evaluate environmental engineering-based systems of pollution control and assessment - taking account of best available technical solutions, environmental management concepts, and practical & financial constraints (including emission control & quantification approaches, air quality monitoring and modelling)
  - C1 Understanding of pollution control concepts in the context of real world case study applications
  - C2 Ability to critically appraise possible technology options for pollution control based on site-specific parameters; including identification of relative strengths and weaknesses of alternative options
  - C3 Quantitative understanding of inter-related air quality monitoring and modelling approaches

LO2 Understand systems of environmental management (inc. relevant pollution control legislation & policies)
  - C1 Understanding of approaches for setting & implementation of health-based environmental quality standards and objectives.
  - C2 Awareness of range of environmental engineering solutions, tools and techniques to manage urban & industrial air pollution (including pollution control system standards, reporting, appraisal and indicators).
  - C3 Understanding of inter-related roles and inter-disciplinary working of environmental engineering & public health professionals involved in control & regulation of environmental pollution

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/marking_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. The case study (project) components of the assignment portfolio are expected to be a substantial time commitment. 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 allowing 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.

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

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<tr>
<th>L/Outcomes</th>
<th>Examinations</th>
<th>Courseworks</th>
<th>Projects (assignment portfolio)</th>
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Indicate which learning outcomes (L01, L02 etc) are to be assessed by exam/coursework/project as required.

Coursework / Submissions deadlines:
Project (assignment portfolio)– S2 week 12

Resit Assessment Procedures:
Resit assignment portfolio 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 resubmission of assignment portfolio.

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.

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Session:

Approved:

Course Director Signature: Iain Beverland
Date of Last Modifications: February 2012

(Updated November 2010)
 MODULE TIMETABLE

**Module Code:** CL9XX

**Module Title:** Environmental Pollution Management

**Brief Description of Assessment:**
Learning objectives are assessed in relation to criteria specified above through an assignment portfolio (project) 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).

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