MODULE DESCRIPTOR 2022/23

CL970 Environmental pollution management

Course Registrar: Dr Iain Beverland	**Taught To (Programme):** Civil Engineering; Civil & Env Engineering; Env Engineering; Env. Health Sci; Sustainability & Env Studies; Interested students from any other discipline.	
Other Lecturers Involved: Invited pollution control professionals from: Ricardo Energy & Environment; Glasgow City Council; Falkirk Council; Scottish Environmental Protection Agency (SEPA); Transport Scotland.	**Credit Weighting:** 10	**Semester:** 2
Assumed Pre-requisites: An open-minded interest in world around us & how it affects people.	**Compulsory/ optional/ elective course**	**Academic Level:** 5

Course Format and Delivery (hours):

Lecture	Tutorial	Laboratory	Coursework	Project	Private Study	**Total**
20	2			78		100

Course Aim(s)

This class develops knowledge & skills on environmental pollution control. This includes a focus on the assessment & management of impacts of air pollution on human health through interface between public health sciences of environmental epidemiology & toxicology; & environmental engineering approaches to manage risks.

The class achieves these aims through research-led teaching at the interface between public health & environmental engineering, with a focus on risk-centred methods. Lecture sessions are complemented by transport & industrial case studies in contemporary environmental pollution management practice (including foci on the inter-disciplinary roles of government & commercial organisations in air pollution management in the City of Glasgow, and at the Grangemouth petrochemical complex).

The class is delivered using lectures based on a well-established textbook and project-based teaching. Learning objectives are assessed through a formative portfolio covering the main syllabus areas. Student interaction is encouraged throughout the class through structured feedback sessions, directed reading, student-led question sessions & directed questions sessions.

Learning Outcomes

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

- LO1 Understand underlying processes that determine atmospheric pollution ‘climates’, and the methods used to assess & manage risks of air pollution on human health
- LO2 Critically evaluate environmental engineering-based systems of pollution control & assessment (including emission controls, air quality monitoring and modelling)
- LO3 Understand systems of environmental management (inc. pollution control legislation & policies)
- LO4 Ability to critically evaluate & synthesise information from primary research & technical literature

Syllabus

- Principles of risk, exposure assessment & environmental epidemiology
    - Hazard identification; Exposure assessment; Risk assessment; Risk management (including health-based environmental standard setting)
    - Air pollution episodes & long-term pollution climates; Risk-based assessment & management of impacts on human health (including civil & env. engineering solutions to env. pollution problems)
- 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
        - Links to classes in Contaminated Land, Water & Env Management, Waste Management
    - Assessment of compliance with standards
        - Process-based (Pollution Prevention & Control) standards
        - Outcome (Environmental Quality Criteria) standards
        - Inter-related environmental monitoring & modelling

- Integrated pollution prevention and control
    - Grangemouth petrochemical refinery case study (SEPA, Falkirk Council)
- 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 (Ricardo Energy & Environment, Transport Scotland)
    - National pollutant emissions inventories
    - National pollutant monitoring networks; National pollution models

Assessment Criteria

For each of the Course Learning Outcomes the following criteria will be used to make judgements on student learning:

LO1 Understand underlying processes that determine atmospheric pollution 'climates' and methods used to assess & manage impacts of air pollution and climate change on human health

- C1 Ability to identify roles & importance of processes that influence atmospheric composition, including understanding of interactions between processes at different temporal and spatial scales
- C2 Understanding of the concepts and main components of risk-based approaches to assessing & managing environmental pollution effects on human health
- C3 Quantitative technical understanding of approaches to quantify human exposure to air pollutants
- C4 Ability to discriminate between association and causation in relationships between environmental quality and human health
- C5 Ability to demonstrate how civil & environmental engineering can provide solutions to environmental pollution problems

LO2 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

LO3 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

LO4 Ability to critically evaluate & synthesise complex information from primary research & 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 Learning Outcome to achieve a pass grade are indicated on the assessment sheet for all assessments.

Principles of Assessment and Feedback *see https://www.strath.ac.uk/staff/policies/academic/*
Use of University principles of assessment include (but are not restricted to) the following:

ASSESSMENT AND FEEDBACK PRACTICES PROMOTE EFFECTIVE STUDENT LEARNING
Information issued at start of Semester includes 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.

ASSESSMENT AND FEEDBACK PRACTICES ARE APPROPRIATE, FAIR, AND TRANSPARENT
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.

ASSESSMENT & FEEDBACK PRACTICES ARE CLEARLY COMMUNICATED TO STUDENTS AND STAFF
Information 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*. 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 guide is provided on MyPlace.
* Guidance on Marking for Undergraduate Courses: https://www.strath.ac.uk/staff/policies/academic/

ASSESSMENT AND FEEDBACK PRACTICES ARE CONTINUOUSLY REVIEWED
Assessment practice is continually reviewed in response to curriculum changes, peer and student feedback. Students are involved in decision-making about assessment policy and practice through representation on committees that discuss assessment policies and practices.

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

Resit Arrangements

Resubmission of assignment portfolio.

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

Date	Time	Room No
Week 7	TBA	TBA
Week 10	TBA	TBA
Week	12 noon	Via MyPlace

Recommended Reading

- Tiwary A, Williams I, Colls J (2019) Air Pollution: Measurement, Modelling and Mitigation. Fourth Edition, Taylor & Francis, ISBN 13: 978-1-4987-1945-2. **Recommended textbook for class.**
  Library holds short loan and electronic book copies:
  https://suprimo.lib.strath.ac.uk/permalink/f/k7ss9a/SUALMA51111918010002996

Further specific reading will be recommended during class lectures.

Approved

Programme Director Signature: Iain Beverland

Date of Last Modifications: 22 August 2022

Assessment and Feedback Schedule

Class Code	CL970	Class Title	Environmental Pollution Management

Brief Description of Assessment

Learning objectives are assessed in relation to criteria specified above through an assignment portfolio covering all of the main syllabus areas:
Part A Air pollution hazard /exposure / risk assessment (research poster)
Part B Management of industrial pollution management (research poster)
Part C: Management of traffic-related air pollution (research report)

Indicate in the tables below the Hand-Out (H), Submission (S) and Feedback (F) dates for each lab report/coursework/project and the timing of each Exam/Class Test (E), (T). Include duration of exam in brackets (e.g. E (2)).

Semester 2

Assessment type (& title)	LOs	Weight (%)	Individual / Group	WK1	WK2	WK3	WK4	WK5	WK6	WK7	WK8	WK9	WK10	WK11	Exam Period
Assessment portfolio – Part A	1,4	25	Individual	Hand –Out (H). Initial work possible from this time.				Submission. (S)		Feedback (F)					
Assessment portfolio – Part B	1-4	25	Individual	Hand–Out (H). Initial work possible from this time.							Submission. (S)		Feedback (F)		
Assessment portfolio – Part C	1-4	50	Individual	Hand–Out (H). Initial work possible from this time.										Submission (S)	