FACULTY OF ENGINEERING

MODULE DESCRIPTION FORM

EV908 Pollution and the rehabilitation of degraded ecosystems

<table>
<thead>
<tr>
<th>Module Code</th>
<th>EV908</th>
<th>Module Title: Pollution and the rehabilitation of degraded ecosystems</th>
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</thead>
<tbody>
<tr>
<td>Module Registrar: Dr Charles Knapp</td>
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<tr>
<td>Credit Weighting: 10</td>
<td>Semester: 1</td>
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Other Lecturers Involved:
Mr Peter Phillips (industry guest lecturer)
Dr Christine Switzer
Mr Andrew Pape

Compulsory/optimal/elective class:
MSc Sustainability & Environmental Studies;
MSc Environmental Engineering; MSc Environmental Entrepreneurship;
MRes in Geo-environmental Engineering
MRes in Integrated Pollution Prevention & Control;
MEng Civil & Environmental Engineering

Prerequisites: None

Module Format and Delivery (hours):

<table>
<thead>
<tr>
<th>Lecture</th>
<th>Tutorial</th>
<th>Assignments</th>
<th>Laboratories</th>
<th>Private Study</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>2</td>
<td>45</td>
<td>3</td>
<td>30</td>
<td>100</td>
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General Aims

The module aims to
1. Introduce students to ecological principles (organism, population, community, & ecosystem levels)
2. Introduce students to the impact of various forms of pollution on ecosystems;
3. Identify options available for monitoring pollution impacts;
4. Evaluate remediation alternatives, recovery management, or ways to enhance environmental systems.

Specific Learning Outcomes

By the end of this module students should be able to:
1. Explain the impacts of diverse types of pollution on major ecosystem types;
2. Identify means to monitor pollution and effects on ecosystems;
3. Discuss critically various remediation techniques;
4. Evaluate management options for ecosystem recovery and enhancement;

Syllabus

Tentative syllabus, as it is likely to change:

Weeks 1-4: Principles of ecology - organism, population, community & ecosystem (CK)
Week 5: Eco-management (PP)
Weeks 6-7: Marine systems + fieldwork (CS)
Week 8: BREAK + Statistics tutorial (optional; CS)
Week 9: Freshwater systems (OK)
Week 10: Soil systems (AP)
Week 11: Atmospheric systems (CK)
Assessment Method(s) Including Percentage Breakdown and Duration of Exams

<table>
<thead>
<tr>
<th></th>
<th>Duration</th>
<th>Weighting %</th>
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<tbody>
<tr>
<td>Examination</td>
<td>2 hr</td>
<td>40%</td>
</tr>
<tr>
<td>Coursework</td>
<td>No. of Assignments</td>
<td>60%</td>
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</tbody>
</table>

Coursework / Submission deadlines

<table>
<thead>
<tr>
<th>Coursework Title</th>
<th>Submission Date</th>
<th>Weighting %</th>
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<tbody>
<tr>
<td>1. Ecological principles (online exercises)</td>
<td>Week 6</td>
<td>20%</td>
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<tr>
<td>2. Fieldwork + report (statistical + reporting exercise)</td>
<td>Week 9</td>
<td>20%</td>
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<tr>
<td>3. Independent investigation (report)</td>
<td>Week 12</td>
<td>20%</td>
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Recommended Reading

- *Ecological applications: toward a sustainable world*
  Colin R. Townsend Dawsonera.
  Malden, MA ; Oxford : Blackwell 2008

- *Ecology: from individuals to ecosystems*
  Michael Begon Colin R Townsend; John L Harper; Dawsonera

Date of Last Modifications: September 2012

Contact information:

**Dr Charles Knapp** (module registrar)
DLCS, Graham Hills Rm 6.12
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(or by appointment)

**Dr Christine Switzer**
DLCS, Graham Hills Rm 6.10
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(by appointment)

**Mr Peter Phillips**
peterphillips1603@gmail.com

**Mr Andrew Pape**
andrew.pape@strath.ac.uk
(by appointment)
### GENERAL LEARNING OUTCOMES

#### Knowledge and Understanding

By the end of this module students should be able to:

5. Develop an understanding of ecological principles.
6. Explain the impacts of diverse types of pollution on major ecosystem types.
7. Identify means to monitor pollution and effects on ecosystems.
8. Discuss critically various remediation techniques.
9. Evaluate management options for ecosystem recovery.
10. Demonstrate appropriate report writing skills.

| Evidence of Achievement | Assignment 1: assess one’s understanding to apply ecological principles to brief case studies (online exercise/quiz on Moodle) | Assignment 2: fieldwork and reporting one’s findings, including appropriate statistical analysis | Assignment 3: investigate a topic of choice; based on literature findings – identify environmental threat/problem; outline monitoring strategy, management plan and expected outcome | Exam: assess one’s ability to recall information and demonstrate understanding of ecological principles, pollution impacts, monitoring needs, and possible management and/or remediation strategies. |

#### Intellectual Abilities

Students will be required to demonstrate understanding of complex processes and apply this knowledge in a critical fashion to practical issues. The module thus requires students to gather and process technical information from various sources, to analyse these in a critical manner and to select relevant information to apply to specific issues, showing powers of judgement and awareness of broader contextual issues. Students will also be required to show the ability to justify conclusions and be aware of the nature of competing arguments.

| Intellectual Abilities | Assignments 1 and 2 + exam |

#### Practical Skills

Scientific report writing + basic statistical analysis

<p>| Practical Skills | Assignment 2 |</p>
<table>
<thead>
<tr>
<th>General Transferable Skills</th>
<th>Report writing and data search</th>
<th>Assignment 3</th>
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<tbody>
<tr>
<td><strong>SPECIFIC LEARNING OUTCOMES IN ENGINEERING</strong></td>
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<tr>
<td><strong>Underpinning Science and Mathematics</strong></td>
<td>An understanding of the physical and chemical processes underlying pollution and remediation and the biological processes that subsequently occur within ecosystems. Ecological model analysis; population dynamics (mathematics) Basic statistical analyses</td>
<td>Assignments 1 + 3 + exam Assignment 1 + exam Assignment 2</td>
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<tr>
<td><strong>Engineering Analysis</strong></td>
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<tr>
<td><strong>Economic, Social and Environmental Context</strong></td>
<td>The ability to appreciate the wider social, political and economic context of pollution and evaluate critically conflicting views on alternative remediation options that arise from this context.</td>
<td>Assignments 2 + 3 + exam</td>
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<tr>
<td><strong>Design</strong></td>
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<tr>
<td><strong>Engineering Practice</strong></td>
<td>Outline management strategies as it may pertain to pollution remediation, resource protection and/or conservation</td>
<td>Assignment 3</td>
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