**MODULE DESCRIPTION FORM**

**CL948: Principles of Environmental Microbiology**

<table>
<thead>
<tr>
<th>Module Registrar:</th>
<th>Taught To (Course):</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr Charles Knapp</td>
<td>MSc Environmental Engineering (compulsory), BSc Environmental Health (compulsory), MSc Sustainability &amp; Environmental Studies (optional), MSc Hydrogeology (optional), MSc Environmental Health (optional), MEng Civil &amp; Environmental Engineering (optional), MRes Integrated Pollution Prevention &amp; Control (optional), MRes Geo-Environmental Engineering</td>
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<table>
<thead>
<tr>
<th>Other Lecturers Involved:</th>
<th>Credit Weighting:</th>
<th>Semester:</th>
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<tbody>
<tr>
<td>Ms Sandra Currie &amp; Ms Seáin McCluskey</td>
<td>10 credit</td>
<td>Autumn</td>
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<thead>
<tr>
<th>Assumed Prerequisites:</th>
<th>Compulsory/Optional class</th>
<th>Academic Level:</th>
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<td></td>
<td>See above</td>
<td>5</td>
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**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>
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<tbody>
<tr>
<td>22</td>
<td>0</td>
<td>12</td>
<td>0</td>
<td>12</td>
<td>54</td>
<td>100</td>
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**Educational Aim**

This module aims to introduce microbiology in a manner that is of practical importance in environmental engineering and science.

Emphasis is placed on the microbial ecology and microbiology of dilute nutrient solutions such as lakes, subsurface environmental and biological treatment processes. Microbial physiology and biochemistry will be discussed in detail as it pertains to environmental systems. Both biodegradation and public health aspects of microbiology are included. The course combines theoretical and fundamental concepts in biology, and laboratory analytical skills to provide a basic background in microbiology grounded in practical applications.

**Learning Outcomes**

**Knowledge and understanding**

On completion of the module the student should:
- be conservant of microbiology such that they can communicate about biological systems
- be familiar with basic laboratory skills such that microbiological laboratory data can be properly interpreted
- understand enzyme catalysis as it pertains to the biodegradation of contaminants
- understand the nutritional needs of microorganisms and describe how organisms process carbon and generate energy
- develop a working knowledge of the basics of microbial ecology and learn how microbial systems impact local and global nutrient cycles
- to use basic principles of microbiology to optimise the biotechnical application of microorganisms

**Disciplinary/professional skills**

- sound knowledge and skills to understand biological processes in the environment and biotechnology.
- understand the complexity associated with the ecological interactions of microorganisms and their impact on the environment

**Transferable skills**

- Research skills and report writing
- Effective communication (written, verbal and graphic)
- Time management and ability to work independently
- Team-working & building

**Syllabus**

Instruction will be provided through structured lectures, individual and group laboratory exercises, and group discussions. Laboratory exercises will be drawn from current research activities with the Department of Civil Engineering.

**See syllabus handout at start of class for details.**
Topics:
- cell structure and function
- molecular genetics
- enzymes and kinetics
- growth and nutrition
- microbial ecology

Assessment of Learning Outcomes

Criteria

LO-1: conservant of microbiology…
  c-1: Coursework #1 – written essay using biological keywords on a bacterium that is biotechnologically relevant
  c-2: Coursework #1 – brief presentation to classroom
  c-3: Projects – 3 laboratory reports

LO-2: be familiar with basic laboratory skills…
  c-1: Projects – 3 laboratory analyses /written reports

LO-3: understand enzyme catalysis …
  c-1: Project – degradation experiment (lab 2)/written report
  c-2: Examination

LO-4: understand nutritional requirements…
  c-1: Project – experimental determination of nutrient needs (lab 3) / written report
  c-2: Examination

LO-5: develop a working knowledge of basic microbial ecology
  c-1: Examination

LO-6: use basic principles of microbiology to optimise biotechnical application of microorganisms
  c-1: Coursework #1 – written essay
  c-2: Examination

The standards set for each criterion per Module Learning Outcome to achieve a pass grade are indicated on the assessment sheet for all assessment.

Assessment Method(s) Including Percentage Breakdown and Duration of Exams

<table>
<thead>
<tr>
<th>L/Outcomes</th>
<th>Number</th>
<th>Duration</th>
<th>Weighting</th>
<th>Courseworks</th>
<th>Number</th>
<th>Weighting</th>
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<tbody>
<tr>
<td>Exam</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>2 hr</td>
<td>75%</td>
<td></td>
<td>3</td>
<td>25%</td>
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<td>All LO</td>
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Coursework / Submissions deadlines:
See syllabus details.

Resit Assessment Procedures:
Resit will comprise entirely of exam.

PLEASE NOTE:
Students need to gain a summative mark of 40% / 50% (please delete as appropriate) 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 exam / coursework / viva (please delete as appropriate).

Recommended Reading


Handouts and supplemental reading will also be provided.

Date of Last Modifications: 08/2012