

## MSc Soils and Environmental Pollution

Awarding Institution: The University of Reading  
Teaching Institution: The University of Reading  
Faculty of Science Programme length: 12 months  
For students entering in 2004 Date of specification: 2003  
Programme Director: Dr M.E. Hodson  
Board of Studies: Dr M.E. Hodson, Dr S. Nortcliff, Dr M. Wood, Dr Petra Dark  
Accreditation: None

### Summary of programme aims

This MSc. aims to provide a thorough understanding of the key principles of Soil Science which are widely applicable to vocational specialisation in contaminated land, remediation, environmental assessment, protection and management.

### Transferable skills

The following are provided: experience of Information technology, problem solving skills, research project skills, presentation and writing skills

### Programme content

| Module code                                     | Module title                              | Credits | Level |
|---|---|---------|-------|
| <b>Autumn Term</b>                              |   |         |       |
| SSMHSL  | Soil Hydrology and Solute Leaching        | 10      | M     |
| SSMCSP  | Soil Constituents and Surface Properties  | 10      | M     |
| SSMCON  | Soil Contaminants                         | 10      | M     |
| SSMBIO  | Soil Microbiology and Biotechnology       | 10      | M     |
| SSMQAD  | Quantitative Analysis of Spatial Data     | 10      | M     |
| SSMTGS  | Transferable and generic skills           | 10      | M     |
| <b>Spring Term</b>                              |   |         |       |
| SSMSIR  | Site Investigation, and Risk Management   | 10      | M     |
| SSMREM  | Remediation                               | 10      | M     |
| SSMWEM  | Soils, waste and Environmental Management | 10      | M     |
| SSMWQ   | Soils and Water Quality                   | 10      | M     |
| SSMGAD  | Geostatistical Analysis of Soils Data     | 10      | M     |
| <b>In break between Spring and Summer terms</b> |   |         |       |
| SSMFC   | Integrated soil science - Field Class     | 10      | M     |
| <b>After 2<sup>nd</sup> set of Exams</b>        |   |         |       |
| SSMRP   | Research Project                          | 60      | M     |

### Part time / Modular arrangements

Part time participants may either follow all the modules taught in the Autumn term in their first year and all the modules taught in the Spring term in their second year or alternatively may follow half the modules from the Autumn and Spring terms in both their first and second years. The most appropriate arrangements for individual applications will be discussed with the Course Director. Part time students will be encouraged to consider running a long-term research project over the two years that they are registered on the course but may carry out their research project in either their first or

second year, again as is appropriate to these circumstances.

### **Progression requirements**

None

### **Summary of teaching and assessment**

Teaching is through a combination of lectures, seminars, practicals, computer-based self-taught exercises, site visits and talks by invited speakers.

Assessment is through a combination of exams, assessed practicals, essays, scientific reports and presentations.

The University's Masters classification is:

| <u>Mark</u>  | <u>Interpretation</u> |
|--------------|-----------------------|
| 70 % - 100 % | Distinction           |
| 60 % - 69 %  | Merit                 |
| 50 % - 59 %  | Pass                  |
| 0 % - 49 %   | Fail                  |

In all of the above, marks below 40% in a total of 20 credits will be condoned provided that the candidate has pursued the course for the module(s) with reasonable diligence and has attempted the examination.

A diploma will be awarded to candidates completing modules worth a total of 120 credits and achieving an overall average of 50 %. A certificate will be awarded to candidates completing modules worth a total of 60 credits and achieving an overall average of 50 %.

Normally candidates registered for a diploma will complete the taught courses offered in the Autumn and Spring terms and candidates registered for a certificate will complete either the taught courses offered in the Autumn or the Spring term.

### **Admissions requirement**

Entrants to this programme are normally required to have obtained:  
An upper second (2:1) in an Environmental Science-based degree

Admissions tutor: Dr J.S. Robinson

All candidates are normally interviewed by two members of staff.

### **Support for students and their learning**

University support for students and their learning falls into two categories. Learning support includes IT Services, which has several hundred computers and the University Library, which across its three sites holds over a million volumes, subscribes to around 4 000 current periodicals, has a range of electronic sources of information and houses Student Access to Independent Learning (S@IL) computer-based teaching and learning facilities. There are language laboratory facilities both for those students studying on a language degree and for those taking modules offered by the Institution-wide Language Programme. Student guidance and welfare support is provided by Programme Directors,

the Careers Advisory Service, the University's Special Needs Advisor, Study Advisors, Hall Wardens and the Students' Union.

### **Career prospects**

On completion of this course graduates may expect to find employment in the "Environmental Sector". Previous students on the course have found employment with consultancies, government research agencies, industry and within academia

### **Opportunities for study abroad or for placements**

During their research projects students may carry out field work abroad. Additionally during their projects students may be based abroad or within the UK at consultancies, governmental agencies, research institutes or industrial bodies provided that the Course Director is satisfied that suitable facilities and supervision are available to them.

### **Educational aims of the programme**

This M.Sc. aims to provide a thorough understanding of the key principles of Soil Science which are widely applicable to vocational specialisation in contaminated land, remediation, environmental assessment, protection and management. The course will provide the students with the intellectual skills required by professionals in environmental consultancy, contaminated land management and land remediation. Graduates from the course will have an in-depth knowledge of the chemical, physical and biological principles of Soil Science, experience of the major types of soil contamination, familiarity with regulatory and commercial aspects of contaminated land and land management and problem solving skills in relation to soil management and remediation.

## Programme Outcomes

### *Knowledge and Understanding*

#### **A. Knowledge and understanding of:**

1. Processes by which water and dissolved solutes are transported in soils using physical principles
2. The important chemical properties of soils, with an emphasis on the reasons for and consequences of the electrically charged surfaces of most soil constituents
3. A general understanding of the pathways of soil contamination
4. The most important groups of inorganic and organic pollutants and chemical properties and processes which govern their environmental fate
5. The major groups of micro-organisms in soils and their role in the cycling of C, N, P and S and their use in bioremediation
6. Classical and bespoke statistical methods that may be applied to environmental data
7. Key areas of environmental law and regulation in England and Wales
8. Techniques and processes involved in site investigation and risk assessment
9. Strategies and objectives of remediation
10. Sources, processing and disposal of waste materials
11. The behaviour of pollutants in soil, losses into water and current method of management to reduce the associated environmental hazards

#### **Teaching / learning methods and strategies**

Lectures, laboratory practicals, seminars, group discussions, videos, presentations by industrial practitioners, data handling exercises, computer based exercises

#### *Assessment*

Practical reports, examination, essays, computer and laboratory-based practicals

*Skills and other attributes*

**B. Intellectual skills – able to:**

1. Predict water and solute transport in soils using physical principles
2. Recognise and explain the important chemical properties of soils
3. Understand controls on mobility and availability of pollutants in soils
4. Outline the importance of micro-organisms in soil systems and their impact on the wider environment
5. Discuss key areas of environmental law and regulation in England and Wales including the impact of EU law
6. Compare and advocate remediation strategies
7. Illustrate sources of and disposal routes for industrial and domestic waste
8. Plan and carry out a research project

**Teaching / learning methods and strategies**

Lectures, laboratory and computer based practicals

*Assessment*

Exams (1 – 7), essays (2 – 4), presentations (2, 3), computer practicals (1), written reports (5 – 7), project thesis and presentation (8)

These skills link directly to specific modules and are assessed both during courses (see module descriptions for details) and in examinations.

**C. Practical skills – able to:**

1. Use computer packages to analysis and explain field data
2. Carry out chemical analysis of soils
3. Calculate toxic and acceptable concentrations of pollutants in soils
4. Isolate and characterise micro-organisms in soils and measure their activity
5. Analyse environmental data using classical statistical methods and geostatistics
6. Carry out risk assessments and site investigations
7. Describe soils in the field
8. Plan and carry out a research project

**Teaching / learning methods and strategies**

Laboratory practicals, seminars, lectures, independent research project

*Assessment*

Laboratory reports (1, 2, 4), reports in the style of those given to clients (5, 6), exams (3), field reports (7), project thesis and presentation (8)

These skills are assessed primarily with reference to specific modules (see module descriptions for details) though (1) is also assessed more generally throughout the course.

**D. Transferable skills – able to:**

1. Produce Word documents containing tables, numbered and bulleted lists, a variety of fonts, graphics and pictures
2. Sort data and perform basic arithmetic and statistical procedures within Excel
3. Produce charts and graphs in a variety of formats using Excel
4. Produce slides for a presentation within the PowerPoint package that include text, bullet points, drawings, use of pre-set animations for the appearance of text
5. Give clear presentations on a scientific topic
6. Produce clearly written scientific reports
7. Work in teams
8. Plan and carry out research projects including managing their time in an efficient fashion

**Teaching / learning methods and strategies**

Lectures, self-taught computer packages, seminars, individual research projects, team-based presentations and research projects

*Assessment*

Ability to produce specimen Word documents (1), Excel charts (2, 3) and PowerPoint presentations (4), course work written and submitted in the style of scientific reports to a client (5, 6), peer-assessed contribution to team-based practicals (7), project thesis and presentation (5, 6, 8)

This assessment is carried out directly (see module description dealing with transferable and generic skills) and indirectly throughout the course and forms a component of assessed course work.

*Please note:* This specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably expect to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. More detailed information on the learning outcomes, content and teaching, learning and assessment methods of each module can be found in module and programme handbooks.