

## MSc in Biometry

Awarding Institution:	The University of Reading
Teaching Institution:	The University of Reading
Faculty of Life Sciences	Programme length: 12 months
For students entering in 2004	Date of specification: July, 2004
Programme Directors:	Dr S C Todd and Dr A C Kimber
Board of Studies:	Postgraduate Board of Studies
Accreditation:	Programme is accredited by the Royal Statistical Society

### Summary of programme aims and learning outcomes

The aim of the MSc in Biometry is to train students to work in scientific research teams in the medical, pharmaceutical, agricultural and biological sciences. The programme introduces students to a range of topics and skills and provides an appreciation of the link between statistical theory and applications.

The learning outcomes of the programme include the following:

- appreciation of the role of statistical inference in the practice of data analysis
- the ability to formulate and fit a variety of statistical models and to interpret the results
- expertise in data management and analysis
- familiarity with a number of computer software packages for data analysis, including SAS, Genstat and R / S-plus
- awareness of issues relevant to the design of studies
- acquisition of a broad range of transferable employment-related skills
- competence in written and oral skills for communicating statistical ideas and the results of data analysis

### Transferable skills

On completion of the programme, students will have developed and enhanced the following transferable skills:

- ability to use computers for data management, data analysis, report writing and communication
- skills in writing reports and summarising computer output
- ability to work as part of a team and to make oral presentations

### Programme content

The profile which follows states which modules must be taken (the compulsory part) together with a list of modules from which the student must make a selection (the "selected" modules). The number of credits for each module is shown after its title.

<i>Compulsory modules</i>	<i>Credits</i>	<i>Level</i>
ASM10 <i>Data Analysis, Research Methods and Consultancy Skills</i>	30	M
ASM20 <i>Statistical Methods and Design of Experiments</i>	20	M
ASM30 <i>Linear Models and Study Design</i>	20	M

ASM40	<i>Generalised Linear Models and Modelling Structured Data</i>	20	M
ASM50	<i>Statistical Computing</i>	10	M
ASM00	<i>Dissertation</i>	60	M

*Optional modules* *Credits* *Level*

Modules totalling 20 credits must be selected from a list such as the following:

ASM120	<i>Clinical Trials</i>	5	M
ASM130	<i>Time to Event Analysis</i>	5	M
ASM150	<i>Statistical Genetics</i>	5	M
ASM160	<i>Epidemiology and Public Health</i>	5	M
ASM190	<i>Multivariate Analysis</i>	5	M
ASM200	<i>Sampling Methods</i>	5	M

### **Part-time arrangements**

The programme may be undertaken over two years on a part-time basis. Selection of modules between the two years will be agreed between the student and the Programme Directors at the start of the programme. Modules may be taken over more than one year, but will be assessed in the year that they are completed.

### **Progression requirements**

None.

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

Teaching is by a variety of methods, including lectures, tutorials, supervised computing practicals, individual feedback on written work and one-to-one supervision. Assessment of the taught compulsory modules is by examination taken early in the summer term and submission of reports on data analysis. Optional modules are assessed by a combination of open or closed book examinations, essays, data analysis and theoretical or practical exercises completed during the module. The dissertation is assessed by a written report normally submitted by 1 September. Marks should be interpreted within the following framework:

<i>Mark</i>	<i>Interpretation</i>
70% -100%	Distinction
60% - 69%	Merit
50% - 59%	Good standard (Pass)
<i>Failing categories:</i>	
40% - 49%	Work below threshold standard
0% - 39%	Unsatisfactory work

Students will have one opportunity for re-assessment in any module that they have failed.

To pass the MSc students must gain an average mark of 50 or more overall including a mark of 50 or more for the dissertation *and have no mark below 40 in modules ASM20, ASM30 and ASM40*. In addition the total credit value of all modules marked below 40 must not exceed 30 credits and for all modules marked below 50 must be less than 60 credits.\*

Students who gain an average mark of 70 or more overall including a mark of 70 or more for the dissertation and have no mark below 40 will be eligible for a Distinction. Those gaining an average mark of 60 or more overall including a mark of 60 or more for the dissertation and have no mark below 40 will be eligible for a Merit.

\*The provision to permit a candidate to be passed overall with a profile containing marks below 40 is made subject to the condition that there is evidence that the candidate applied his or herself to the work of those modules with reasonable diligence and has not been absent from the examination without reasonable cause.

### **Admissions requirements**

Entrants to this programme are normally required to have obtained a first or second class honours degree in Statistics or Mathematics.

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

University support for students and their learning falls into two categories. (1) 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 the 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. (2) Student guidance and welfare support is provided by the Programme Directors, the Careers Advisory Service, the University's Special Needs Advisor, Study Advisors, Hall Wardens and the Students' Union.

Support for graduate students in the School of Applied Statistics is similarly aimed at both learning and pastoral support. Learning support includes use of a workroom dedicated to MSc students with networked PCs and printer, a computing laboratory intended for use primarily by MSc students, a library of computing texts and manuals, provision of photocopying facilities and ready access to members of staff who are all respected scholars in the fields taught. Advice on statistical computing is available from the computing staff of the School of Applied Statistics. Pastoral support augments the University's care systems, with the Programme Directors acting as Personal Tutors to each student.

A comprehensive handbook is available for the programme; this is available on-line, as are a wealth of other resources via the School's intranet. There is an active Student-Staff Committee with postgraduate representation.

### **Career Prospects**

Careers talks are offered by employers anxious to attract graduates from the programme. Given the range of possible applications of Statistics, students completing an MSc in Biometry have a wide choice of careers. In recent years, students who have followed this programme have entered careers as statisticians in the pharmaceutical industry, university medical schools, medical research centres and agricultural research institutes, in the UK and overseas.

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

None at present, although the dissertation may involve collaboration from outside the UK.

## Educational aims of the programme

The programme aims to provide a Masters level education in Statistics. Students are required to operate at a more advanced level than in an Honours Degree, with emphasis on issues which arise in the applications of Statistics in Biometry.

## Programme outcomes

The programme provides opportunities to develop and demonstrate knowledge and understanding, skills, qualities and other attributes, in the following areas:

### *Knowledge and Understanding*

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

1. The role of statistical inference in data analysis
2. The formulation, fitting and interpretation of a variety of statistical models
3. The issues relevant to the design of studies
4. The use of software packages in general and SAS, Genstat, R / S-plus and Excel in particular
5. More specialist material for a selection of optional topics

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

The knowledge required for topics is generally delineated in formal lectures supported by problem sets of questions for students to tackle on their own. This is further supported by weekly 2-hour tutorials through which students can obtain additional help. Some modules seek to re-enforce the understanding of this material through supervised practical classes.

Data analysis assignments and solutions to problem sheets provide feedback on progress.

#### *Assessment*

Knowledge is assessed through coursework, unseen examinations or a combination of the two. The aspects given in A are also indirectly assessed through the MSc dissertation but with relative influence depending on the dissertation topic.

### *Skills and other attributes*

#### **B. Intellectual skills – able to:**

1. Think logically
2. Translate scientific questions into statistical hypotheses
3. Analyse and solve problems
4. Organise tasks into a well-structured form
5. Transfer appropriate knowledge and methods from one topic or application area within the subject to another
6. Recognise and use appropriate statistical methods in data analysis
7. Produce well-structured and well-argued accounts of work in both written and oral forms
8. Plan, organise and carry out independent project work

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

Skills 1-6 are developed through examples given in lectures, and analysing problems posed in practicals, exercises and the Data Analysis module.

Skills 7 and 8 are developed through a series of formative assessments on the Data Analysis module and the feedback they get on these. Students are also required to give oral presentations for some parts of this module. The MSc dissertation provides a further opportunity to develop these skills, supported by the project supervisor.

#### *Assessment*

Skills 1-6 are assessed indirectly through the examinations and coursework associated with the modules contributing to the programme.

Skills 7 and 8 are assessed through the coursework in the Data Analysis model and the MSc dissertation.

#### **C. Practical skills – able to:**

1. Formulate and solve statistical problems: both theoretical and application based
2. Use statistical software in an effective manner, for both analysis and data management
3. Interpret statistical output and be able to describe the implications to a non-statistician
4. Plan and carry out, with supervision, statistical research

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

The combination of lectures, supporting exercises, assignments and assessments in the Data Analysis module are designed to develop skills 1-3.

Skill 4 is developed and consolidated by the MSc dissertation.

#### *Assessment*

Skills 1-3 are formally assessed by coursework. In addition, skills 1 and 3 are assessed by examination. Skill 4 is assessed by the quality of the MSc dissertation produced at the end of the research period.

**D. Transferable skills – able to:**

1. Communicate scientific ideas in writing
2. Give oral presentations
3. Work effectively as part of a team
4. Synthesise relevant information from a wide range of sources
5. Manage time
6. Use IT (word-processing, spreadsheets, and statistical software)

**Teaching/learning methods and strategies**

Transferable skills are integrated into all parts of the programme.

Development of communication and teamwork skills (skills 1-3) is particularly prominent in the Data Analysis module.

Time management (skill 5) is essential for the effective completion of the programme, and specifically the MSc dissertation. Skill 4 develops during the programme while skill 6 develops as part of a dedicated computing module and is enhanced throughout the course.

*Assessment*

Skills 1-6 are all assessed through coursework. Skills 4-6 are further assessed through the dissertation.

*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 specifications and programme handbooks.