UNIVERSITY OF
NEWCASTLE UPON TYNE

FACULTY OF
SCIENCE, AGRICULTURE & ENGINEERING

DEGREE PROGRAMME SPECIFICATION
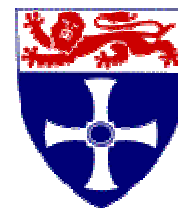
1. Awarding Institution	University of Newcastle upon Tyne
2. Teaching Institution	University of Newcastle upon Tyne
3. Final Award	MSc
4. Programme title	Integrated Pest Management
5. Programme Accredited by:	N/A
6. UCAS Code	N/A
7. QAA Subject Benchmarking Group(s)	N/A
8. Date of production/revision	**30 November** 2004

Programme Aims:

1. This programme will provide students with the scientific training necessary to understand the theory and the application in the field of biological principles required for the practical control of pests including animals, plant pathogens and weeds of agricultural crops. Specifically, the course will develop the skills and knowledge necessary for the application of chemical, biological and biotechnological methods of pest management emphasising their integration and compatibility with economic and social aspects in tropical and temperate environments. . The programme includes an element of conversion to allow students from a wide range of backgrounds to progress to the advanced science training commensurate with the focus of this Masters degree and also aims to offer opportunities for personal subject specialisation to aid career positioning. The training will provide candidates with an appropriate but flexible knowledge and technical skills base required for them to follow successful careers in biological and agricultural research, extension, environmental toxicology and modelling.

Specifically, the course aims to provide an advanced understanding of:
(a) The biology and ecology of crops, and other agricultural systems and their main pest groups, including insects, vertebrates, molluscs, acarines, weeds, pathogens such as fungi, viruses and bacteria;
(b) the science and knowledge that underpins control measures based on biological, environmental, chemical, biotechnological and social approaches;
(c) the integration of the various techniques for pest control in a sustainable and ecologically beneficial way;
(d) practical techniques in aspects of the pest and pest environment;
(e) the application of a systems approach to analysing and modelling the environment;
(f) recognition of pests and pest damage to crops and application systems of pest control agents;
(g) a range of appropriate optional subject specialisations to suite personal interests and career positioning including: environmental toxicology, tropical crop production; tropical animal production; GIS and remote sensing; and rural resource economics.

In addition to these academic and technical skills, the course aims to equip its graduates with a suite of key skills including the ability to communicate effectively, the ability to employ IT and library resources appropriately, the ability to prioritise work and to meet deadlines, the ability to work alone and with others, and the ability to use initiative and to solve problems.

2.   The qualities and attributes of graduates will be such that they are able to:
(a) deal with complex agricultural, environmental, social and pest management issues, make sound judgements in the absence of complete data, and communicate their conclusions clearly to specialist and non-specialist audiences;
(b) demonstrate self-direction and originality in tackling and solving problems, and act autonomously in planning and implementing tasks at a professional or equivalent level;
(c) continue to advance their knowledge and understanding, and to develop new skills to a high level; and will have:
(d) the qualities and transferable skills necessary for employment requiring:
the exercise of initiative and personal responsibility; decision-making in complex and unpredictable situations; and the independent learning ability required for continuing professional development.

3. Provision will address the needs of employers such as companies servicing the pest management industry throughout Europe, agricultural advisory services, independent consultants, food industry, environmental consultants and analysts, institutes and universities under contract or further degrees, charities, overseas national departments of agricultural extension and rural development or environment and natural resource management in the tropics, international development agencies such as the UK the Department for International Development (DFID), university departments and research institutes in the tropics, non-governmental organisations (NGOs) in the agricultural and rural development or sustainable environmental management, and international agricultural and environmental consultancies. These organisations need suitably trained staff with a specialised interdisciplinary background to implement their research and development programmes. Graduates will be suitable employees because they will have:
(a) a comprehensive understanding of scientific survey and experimental techniques appropriate for application in tropical environments;
(b) originality in the application of knowledge, together with a practical understanding of how established techniques of research and enquiry are used to develop effective management plans for sustainable pest management.
(c) conceptual understanding that enables the student: to evaluate critically current research and advanced scholarship in the discipline; and to evaluate methodologies and develop critiques of them and, where appropriate, to propose new hypotheses.

(4) The programme will enable students to meet the Masters level (M, level 4) of the QAA framework for higher education qualifications for England, Wales and Northern Ireland.

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1.   **Intended Learning Outcomes; Teaching and Learning Strategies and Methods; Assessment Strategies and Methods**

General Statement about the programme if felt appropriate

A   Knowledge and understanding

The programme provides opportunities for students to develop and demonstrate:
A1 An advanced knowledge and understanding of the biology and ecology of crops, and other agricultural systems and their main pest groups, including insects, vertebrates, molluscs, acarines, weeds, pathogens such as fungi, viruses and bacteria;
A2 An advanced knowledge and understanding of the science that underpins control measures based on biological, environmental, chemical, biotechnological and social approaches;
A3 An advanced knowledge and understanding of the integration of the various techniques for pest control in a sustainable and ecologically beneficial way;
A4 An advanced knowledge and understanding of practical techniques in aspects of the pest and pest environment;

A5 An advanced knowledge and understanding of the recognition of pests and pest damage to crops and application systems of pest control agents;

A6 An advanced knowledge and understanding of a range of appropriate optional subject specialisations to suite personal interests and career positioning including: environmental toxicology, applied crop protection; principles of plant disease management; techniques in pest management; social Impact of biotechnology, plant-animal-interactions; gene technology; novel organisms and natural products; trees.

Teaching strategy

Specialist knowledge and understanding of the compulsory material is taught via lectures (A1-A4, A6) (Table 1), practical classes (A1, A2, A5), seminars (A1-A3), case studies (A1-A3) and field classes (A1, A6) which form the advanced and conversion elements. A field based class (A5) allows students to experience a wide range of techniques in identifying pests and pest damage symptoms, evaluating crop pest problems, critical practical deployment of application methods employed in the industry and designing and evaluating field trials as well as exposure to professional methods. The 80-credit MSc research project enables independent experimental design and analysis to be taught in the context of a research project (A1-A5). Optional modules enable students to concentrate on advanced specialist material of individual interest (A6), and/or remedy deficiencies in specific background knowledge such as a basic understanding of biotechnology, toxicology and social impact of biology. The Diploma Dissertation (10 credits) allows Diploma candidates to be taught how to undertake a more in depth and critical analysis of any of topics A1-A6 based on library research or secondary data.

Learning strategy

The understanding of lecture material is encouraged through independent reading (A1-A6) (Table 3) assisted by the provision of prioritised reference lists. Such learning is reinforced by formative feedback provided by practical exercises (A2, A4- A6), seminars (A1,A2,A3,A6), case studies (A1,A2, A3, A6), or the Diploma Dissertation for Diploma candidates (A1-A6), with active participation in fieldwork and a major research project leading to the MSc thesis (A1-A6).

Assessment strategy

Assessment of specialist knowledge and understanding is by formal unseen examinations held at the end of the first phase (January) and by coursework exercises that provide a fuller test of student understanding of the material and relevant literature (A1-A4) both in conjunction with written examinations (phase 1) and on modules that are assessed only by coursework exercises (phase 2). This is intended to provide a transition during the course of the degree programme from examinations to continuous methods and to reporting, both in thesis and oral forms. The first two employ a range of approaches in order to accurately assess student abilities. Written papers include essay, calculation, multi-part questions. Assessed coursework comprises practical exercises, seminar presentations, case studies, literature reviews, scientific/technical reports, a poster paper and essays. Field class and other reports are also assessed (A4,A5). (Table 4) Some of A1-A6, (depending on the topic of the MSc project), are also examined by means of a written MSc thesis, or the Diploma Dissertation for Diploma candidates (A1-A6), and (at the discretion of the External Examiner) by *viva voce* examination.

B   Subject –specific/professional skills

A successful student will be able to:

B1 ability to evaluate and critically assess the biology and ecology of a pest management problem and to develop appropriate management approaches.

B2 practical experience of a range of laboratory techniques relevant to pest biology, the crop environment and toxicology.

B3 ability to critically assess the quality of data produced by these techniques.

B4 ability to select suitable control measures, using a combination of pesticides, varietal resistance, biological, biotechnological, cultural and environmental techniques, and application methods, as appropriate.

B5 ability to recognise a range of UK (and other) crops and pests and to know their life cycles, potential pest status and current control techniques.

B6 a range of specialised skills appropriate for specific career goals.

Teaching Strategy
Research, classification and critical assessment skills are taught via lectures, seminars, case studies and practical classes (B1- B3). Experimental design, analytical techniques, modelling, and data handling, presentation and appraisal (B3) are taught initially in hands-on computer or laboratory-based practical or problem solving classes. These skills are consolidated by more advanced training in the lectures, practical classes and case studies of subject-specific specialised modules and in the field class for pest identification. Further specialised skills (B6), are taught within optional specialised modules. More advanced training in several of skills B1-B6 is provided on an individual basis during the MSc thesis project, for which students usually work within an existing research group. Individual training for some of the skills B1-B6 are provided for Diploma candidates in the Diploma Dissertation.

Learning Strategy
Independent reading of recommended references is important in understanding how knowledge is applied and techniques used (B1-B3). However, students are encouraged to acquire skills through active participation in the project planning, experimental and survey design and data interpretation as part of the coursework covered initially in the specialised modules, and later through participation in field sampling, analysis and data interpretation in the field classes (B5). Learning is reinforced and further developed, as MSc students apply their skills in data collection, analysis, interpretation and presentation in their MSc project and thesis (B1-6).

Assessment strategy
Formal examinations (B1- B4) are used to assess some subject specific/professional skills, particularly when additional reading reinforces learning. However, most of these skills are assessed by coursework reports and presentations (B1-B6). Some of the skills (B1-B6) are further practiced and assessed by means of the MSc thesis and poster presentation, the Diploma Dissertation, and (at the discretion of the External Examiner) by *viva voce* examination.

C   Cognitive skills
A successful student will be able to:
C1 critically evaluate current research and advanced scholarship in the area of pest management
C2 present and summarise experimental and project data, and to critically appraise its significance, using appropriate statistical techniques, draw logical conclusions and propose directions for further study.
C3 develop logical thinking and a structured approach to problem-solving.
C4 critically assess the value and limitations of existing information on a given subject
C5 to solve problems
C6 formulate or recognise key hypotheses and test hypotheses using logical and consistent quantitative or qualitative criteria, and to identify key data that allow tests to be made**.**

Teaching strategy
The cognitive skills C2-C6 are developed initially in the degree programme's compulsory modules through a combination of lectures, practical classes, problem-solving exercises, case studies and field classes. They are progressed in the additional specialised optional modules, where they are applied to specific research or management issues, sometimes in a field-based environment (C4). Cognitive skills C1 are particularly developed through lectures, seminars and case studies involving literature reviews,

guided reading and critical analysis of presentations. The MSc project and thesis allow cognitive skills C1-C6 to be applied to a specific research problem or issue guided by individual supervision. The Diploma Dissertation teaches the use of cognitive skills C1-C6 in the context of an in-depth and critical review of research results.

Learning strategy
Students are encouraged to acquire cognitive skills in a variety of ways including: the development of a project proposal and peer-group presentation during the first phase; through experience of case studies, course work and discussion following seminars (C1-C6); and through designing field experiments and analysing the data for the techniques in pest management module (C3-C6). The design and practice of the lengthy MSc research project is also important and is particularly useful for further developing all these cognitive skills but particularly for understanding the development of and testing of hypotheses (C6). The Diploma Dissertation is useful in developing some of the cognitive skills C1-C5.

Assessment strategy
Cognitive skills C2-C4 imparted through the quantitative methods module are assessed by coursework (case studies, problem-solving exercises, in-course tests, scientific/practical reports, project proposals, seminars and presentations) in a number of the compulsory modules. Cognitive skills C1-C6 are further assessed in optional specialised modules by written formal examination in the first phase (C1-C5) and seminars and case study reports (C1-C4), field survey or professional reports, project proposals and the MSc thesis (C4-C6). Many other of the skills C1-C6 are also examined by means of the MSc thesis and (at the discretion of the External Examiner) by *viva voce* examination. Diploma candidates skills C1-C5 are also tested by means of the Diploma Dissertation.

D   Key (transferable) skills
A successful student will be able to:
D1 communicate conclusions clearly to specialist and non-specialist audiences
D2 plan, organise and prioritise work activities in order to meet deadlines
D3 show originality and initiative in tackling and solving problems
D4 work independently (or in a team) in planning and implementing tasks at a professional or equivalent level
D5 use library and other information sources skilfully and appropriately
D6 use IT resources skilfully and appropriately
D7 to make decisions in complex and unpredictable situations

Teaching strategy
The teaching of transferable skills is an important part of the MSc throughout many modules. Verbal presentation skills and dealing with critical feedback are initially developed in the compulsory modules and further encouraged and developed in seminars and presentations such as poster preparation and presentation (D1). All skills (D1-D7) are important in planning, carrying out, presenting and being examined in the research project and MSc thesis. Field classes (D2-D4), development of project proposals (D1, D3-D5, D7) and independent problem solving (D2-D7) teach students about the importance of communication skills, information sources and originality and independence in the professional implementation of their knowledge.

Learning strategy
A wide range of methods is used to reinforce the teaching of key skills and aid understanding. Whilst there is some recommended reading (D1-D7) most key skills are better developed though laboratory and field work (D1-D6), case studies and associated presentations (D1-D7), the MSc research project or Diploma Dissertation (D1-D8), seminars (D1, D3-D5, D7), and communicating information in short oral presentations.

Assessment strategy
Key skills are rarely assessed by formal examination (D5-D7). Scientific/technical reports (D1-D7), project proposals, the MSc thesis and oral examination or the Diploma Dissertation, and other elements of assessed coursework (D1-D4, D6-D7) are the main methods of assessment. Assessed seminar presentations test oral communication and presentation skills, as does the final *viva voce* examination of the MSc thesis. (D1).

11. Programme Features, Structure and Curriculum

A   Programme Features

This is a one-year, fulltime modular Masters degree programme (180 credits). It conforms to the modular structure of other MSc programmes taught jointly in the Schools of Biology, Agriculture Food and Rural Development over three phases (see Fig 1), and is delivered through interschool collaboration with other schools. It consists of 100 credits in the taught component (60 credits in MSc phase 1 and 40 credits in MSc phase 2) and 80 credits for a research project which takes place in MSc phase 3. The taught component is assessed in the examination period in January, at the end of MSc phase 1. The MSc thesis has to be submitted by end of August.

Most taught modules are of 10 credits. There are 5 10-credit compulsory modules in phase 1, and 2 10-credit compulsory modules in the second phase. These compulsory modules are part of the core pest management material for the degree. These include pesticide use, applied entomology and weeds and their control, integrated pest management and biological control, genetically-modified organisms and introduce the most important aspects of pest management. Quantitative methods is a compulsory module. Recommended options include principles of plant disease management and techniques in pest management which complete the basic course. Other optional modules are chosen from a limited list that enables students to substitute and add relevant specialist topics according to their preferences and their prior knowledge. In the first phase 60 credits are specified but up to 10 credits could be substituted. In the second phase 20 credits are specified and 20 credits can be chosen from the list.

Students will have to satisfy the standard MSc regulations that apply to MSc degrees in the School of Biology. Decisions on fail, pass, diploma, MSc and MSc merit and distinction awards will be made by the Board of Examiners in September and will be based on overall performance in all aspects of the subject.

The MSc degree utilises a wide range of expertise available in the Faculty of SAgE. It is an up to date course reflecting advances in pest management while providing the basic training in the theory and practical aspects. It provides the connection with the crop protection industry, through contact in attending the annual crop protection conference (BCPC), through the crop events held locally and visiting farms and demonstration sites and the possibility of industrial placements for the research project. Students are encouraged to present the results of their project in a poster at the BCPC. Project placements are also available in research institutes overseas, especially in developing countries for those with an interest in the tropics, or for students who come from such countries. To encourage placements within the EU there is an Erasmus exchange operating for the project phase with Universities in Italy and Greece at the graduate level.

B   Programme Structure
Modular MSc/Diploma Programme Structure

The courses are either of 12 months (MSc) or 9 months (Diploma) duration starting on 15^h September (*see Calendar and diagram included in this section*). A modular taught course structure, consisting of 180 credits (for MSc) or 120 credits (for Diploma), is common to this and other MSc degrees and Diploma programmes in the Schools. The MSc comprises 100 credits of taught modules and a research project (80 credits). Of the taught modules, 70 credits are compulsory modules appropriate to the focus of the degree. The remaining 30 credits are chosen from options offering flexibility and opportunity for personal specialisation and career positioning.

The teaching is provided by modules (10 credits each) that are given during Phase 1 and Phase 2 (*see diagram on adjacent page*). Phase 1 (September-January) has 6 modules, of which 5 are compulsory and there is one optional module (10 credits). In Phase 2 (which is shorter January – April) there are two compulsory modules (20 credits) and 2 optional modules (20 credits). Thus there are 10 taught modules, of which 7 are compulsory. Phase 1 modules are assessed by a mixture of coursework exercises and

formal examinations (taken in January) whilst Phase 2 modules are assessed by coursework.

MSc candidates undertake a research project in Phase 3 leading to a Thesis (submitted late August) (80 credits). A project proposal is developed towards the end of Phase 1. The oral examination will be in May or late August. Diploma candidates undertake a short dissertation (20 credits) to be submitted in late May.

Compulsory modules: Candidates for the MSc and the Diploma in Integrated Pest Management take the seven compulsory taught modules (worth 70 credits overall) listed below (1.)**.** These provide a conversion element but proceed to advanced science training commensurate with Masters-level teaching and include vocational elements appropriate to the specific aims and objectives of the degree programme.

Optional modules: chosen by the candidate, according to interest and career objectives, one module (10 credits) in Phase 1 and 2 in Phase 2. Normally, in Phase 1 a module is selected from those listed in 2.2.1 below and in Phase 2 includes the two recommended options in 2.1. However, other modules, may be selected from the list (2.2.2), which are timetabled. Alternative modules from the modular programme may also be selected by special arrangement depending on timetable availability.

1. Compulsory modules:
AES841 Integrated Pest Management and Biological Control (10 credits, phase 1)
AES827 Quantitative Techniques, Experimental Design and Data Analysis (10 credits, phase 1)
AES831 Genetically Modified Organisms: Impact, Evaluation and Crop Protection (10 credits, phase 1)
AES837 Pesticides: Use and Environmental Properties (10 credits, phase 1)
AGR804 Farming Systems and AgroEcology (10 credits, phase 1)
AES801 Applied Entomology (10 credits, phase 2)
AES840 Weeds and Their Management (10 credits, phase 2)
2. Optional modules:
2.1 Recommended options (2) for the course include:
BNS820 Principles of Plant Disease Management (10 credits, phase 2)
AES846 Techniques in Pest Management (10 credits, Phases 2-3)
2.2 Other options can be selected from the range of postgraduate modules available as part of the modular programme. For Integrated Pest Management these include;
2.2.1 Phase1:
AGR803 Applied Crop Protection (10 credits, phase 1)
AES832 Gene Technology (10 credits, phase 1)
AES825 Novel Microorganisms and Natural Products (10 credits, phase 1)
2.2.2 Phase 2:
AES842 Environmental Toxicology (10 credits, phase 2)
AES844 Plant-animal Interactions (10 credits, phase 2)
BNS806 Social Impact of Biotechnology (10 credits, phase 2)
AES845 Trees, Growth and Management and Environmental Impacts (10 credits, phase 2)
3. Candidates for the **MSc** also undertake a research project leading to a thesis:
AES894 MSc Thesis (80 credits, phase 3)
This aims to provide students with experience of undertaking an investigation involving analysis and interpretation of data, such as they may experience in the work-place, and to develop confidence to undertake an individual investigation and report their findings to others. There is flexibility to include a research/laboratory orientated project, a survey or recording exercise, an industrial liaison or placement, and/or overseas studies/fieldwork.

C Programme Curriculum

Degree of Master of Science and Diploma in Integrated Pest Management

Code: Integrated Pest Management: MSc - 5018; Diploma - 3303
Industrial Biotechnology: MSc - 5017; Diploma - 3310
1. (a) Candidates on both degree programmes shall take the following compulsory foundation modules:
Code   Credits Descriptive title
AES827   (10)   Quantitative Techniques, Experimental Design and Data Analysis
AES831   (10)   Genetically Modified Organisms: Impact Evaluation and Crop Protection
(b) Candidates on the Integrated Pest Management degree in addition to the compulsory foundation modules listed in 1(a) above must also take the following specialist modules:
Code   Credits Descriptive title
AES801   (10)   Applied Entomology
AES837   (10)   Pesticides: Uses and Environmental Properties
AES840   (10)   Weeds and their Control: the Molecular Basis to Plant Competitiveness
AGR804   (10)   Farming Systems and Agroecology
AES841   (10)   Integrated Pest Management and Biological Control
(c) Candidates on the Industrial Biotechnology degree in addition to the compulsory foundation modules listed in 1(a) above must also take the following specialist modules:
Code   Credits   Descriptive title
AES824   (10)   Fermentation Processes
AES825   (10)   Novel Organisms and Natural Products
AES833   (10)   Biological Diversity and Phylogeny
AES832   (10)   Gene Technology
AES858   (10)   Bioinformatics
(d) All candidates shall select, subject to the approval of the Degree Programme Director, further modules to a total value of 30 credits, normally chosen from the following:
Code   Credits   Descriptive title
NGR811 (10)   Microbial Transformation of Organic Pollutants
CPE831 (10)   Modelling and Control in Bioprocess Systems
AES842 (10)   Environmental Toxicology
AES844 (10)   Plant-Animal Interactions
AES846 (10)   Techniques in Pest Management
AES845 (10)   Trees: Growth, Management and Environmental Impacts
AGR803 (10)   Applied Crop Protection
BNS806 (10)   Social Impact of Biotechnology
BNS820 (10)   Principles of Plant Disease Management
Students may also, subject to the approval of the Degree Programme Director, elect to choose optional modules from the lists given in 1(b) and 1(c) depending on their degree programme.
Note: not all modules will necessarily be available in every year. Alternative modules may, subject to the approval of the Degree Programme Director, be substituted for any of the optional modules listed.

Development of specific Intended Learning Outcomes occurs through the following modules (compulsory modules in bold text, optional modules in normal, italic text)

Knowledge and understanding:
A1 An advanced knowledge and understanding of the biology and ecology of crops, and other agricultural systems and their main pest groups, including insects, vertebrates, molluscs, acarines, weeds, pathogens such as fungi, viruses and bacteria
AES841, AES831, AES837, AGR804, AES801, AES840, BNS820, AES846, AGR803, AES844, AES845, **AES894**

A2 An advanced knowledge and understanding of the science that underpins control measures based on biological, environmental, chemical, biotechnological and social approaches
AES841, AES831, AES837, AGR804, AES801, AES840, BNS820, AES846, AGR803, AES844,

AES845, **AES894,** AES832, AES825, AES844

A3 An advanced knowledge and understanding of the integration of the various techniques for pest control in a sustainable and ecologically beneficial way
AES841, AES831, AES837,AGR804, AES801, AES840, AES844

A4 An advanced knowledge and understanding of practical techniques in aspects of the pest and pest environment
AES841, AES837, AES840, AES846AGR803

A5 An advanced knowledge and understanding of the recognition of pests and pest damage to crops and application systems of pest control agents
AES846

A6 An advanced knowledge and understanding of a range of appropriate optional subject specialisations to suite personal interests and career positioning including: environmental toxicology, applied crop protection; principles of plant disease management; techniques in pest management; social Impact of biotechnology, plant-animal-interactions; gene technology; novel organisms and natural products; trees.
AES842, AGR803, BNS820, AES846, BNS806, AES844, AES832, AES825, AES845.

Subject specific/professional skills:
B1 ability to evaluate and critically assess the biology and ecology of a pest management problem and to develop appropriate management approaches
AES841, AES827, AES831, AES837, AGR804, AES801, AES840, AES846

B2 practical experience of a range of laboratory techniques relevant to pest biology, the crop environment and toxicology
AES837, AES846
B3 ability to critically assess the quality of data produced by these techniques
AES837, AES827

B4 ability to select suitable control measures, using a combination of pesticides, varietal resistance, biological, biotechnological, cultural and environmental techniques, and application methods, as appropriate
AES841, AES827, AES831, AES837, AGR804, AES801, AES840, AES846

B5 ability to recognise a range of UK (and other) crops and pests and to know their life cycles, potential pest status and current control techniques
AES841, AES840, AES846

B6 a range of specialised skills appropriate for specific career goals

AES846

Cognitive skills:
C1 critically evaluate current research and advanced scholarship in the area of pest management
AES841, AES831, AES837, AES801, AES840.

C2 present and summarise experimental and project data, and to critically appraise its significance, using appropriate statistical techniques, draw logical conclusions and propose directions for further study
AES837, AES831, AES894

C3 develop logical thinking and a structured approach to problem-solving
AES837, AES831, AES832, **AES894**

C4 critically assess the value and limitations of existing information on a given subject
AES840, AES894

C5 to solve problems
AES827, AES837, AES832, **AES894**

C6 formulate or recognise key hypotheses and test hypotheses using logical and consistent quantitative or qualitative criteria, and to identify key data that allow tests to be made
AES894

Key transferable skills:
D1 communicate conclusions clearly to specialist and non-specialist audiences
AES841, AES837, AES801, AES840, AES846, BNS806, **AES894**

D2 plan, organise and prioritise work activities in order to meet deadlines
AES841, AES831, AES837, AGR804, AES801, AES840, BNS820, AES846, AGR803, AES844, AES845, **AES894**

D3 show originality and initiative in tackling and solving problems
AES801, AES840, AES894

D4 work independently (or in a team) in planning and implementing tasks at a professional or equivalent level
AES840, AES846, AES894

D5 use library and other information sources skilfully and appropriately
AES841, AES831, AES837, AGR804, AES801, AES840, BNS820, AES846, AGR803, AES844, AES845, **AES894**

D6 use IT resources skilfully and appropriately
AES841, AES831, AES837, AGR804, AES801, AES840, BNS820, AES846, AGR803, AES844, AES845, **AES894**

D7 to make decisions in complex and unpredictable situations
AES894

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12   Criteria for Admission:

GCSEs required   N/A

A-Level Subjects and Grades   N/A

Alternative entry qualifications.
 A 2nd class degree from a UK University, or its overseas equivalent, is normally the minimum qualification for entry. Preferred first-degree subjects are biology, geography, environmental science or agriculture. Other relevant science degrees are also acceptable.

Admissions policy
Offers of places will be made to suitably qualified candidates based on information provided in the application form and will be conditional upon a satisfactory reference and upon the applicant achieving a minimum of a 2nd class degree, if they do not hold such a degree at the time of the

application.

Arrangements for non-standard entrants
Applicants who hold non-standard qualifications, and/or have relevant experience, will be considered on an individual basis.

Any Additional Requirements.
Applicants for whom English is not a first language must provide evidence of a satisfactory command of English, preferably by means of a TOEFL score of 575 or greater, or by an IELTS score of 6.5 or greater.

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13   Support for Students and their Learning:

Induction
The first week of the first term/semester is an Induction Week with no formal teaching. During this period all students will be given detailed programme information relating to their Stage and the timetable of lectures/practicals/labs/ tutorials/etc. In particular all new students will be given general information about the School and their course, as described in the Degree Programme Handbook. The International Office offers an additional induction programme for overseas students (see
 http://www.ncl.ac.uk/international/coming_to_newcastle/orientation.phtml).
An induction period takes place at the start of MSc Phase 1. This includes
- An introduction to the modular MSc and Diploma Programme from the Degree Programme Director and meeting with other staff and students.
- An interview with the degree Programme Advisor/Personal tutor.
- Registration in the School of Biology with the Degree Programme Director – collect Degree Programme Handbook etc..
- Tour of Department and the City of Newcastle.
- Language Centre test if English is not the students' first language.
- Report to the Registrar's and the Finance Office staff in the University Ballroom to collect Union and Library cards, etc.
- Module selection with Degree Programme Director and/or Advisor/Personal Tutor
- Faculty introduction to services and facilities and Faculty reception.
- Normally a selected skills audit.
- Library skills session.
- Induction in teaching methods, study skills and information sources
- Field excursion to consider techniques in environmental survey as part of the module AES835, or a tour of University field stations and/or farms.
- Formal introduction to the use of computers and/or skills audit is provided during Induction Week. Students will register for access to the computer system, and receive a personal e-mail address, at the start of the academic year, during Induction Week.

Study skills support
- The Robinson Library houses the major book and journal collection in the University and has a large section dedicated to the biological sciences.   These books are located on the fourth floor of the library and the liaison librarian is available on the fourth floor to provide help if necessary. A library card will be issued at the beginning of the academic year. The library has a wide range of library material from 'study skills', 'speed reading', through 'exams' to 'writing essays and dissertations'. These are available on a self study basis and are located on Level 2. There is a range of leaflets describing usage of the library, either as hard copy or through the Library's Web pages. In addition there are private study rooms, general

- work space and clusters of PCs. A series of Library and information skills workshops will be arranged for the MSc programmes during September and October and will be introduced in a special session during Induction Week (see timetable).
- The University Computing Service provides a large number of 'Common User' computers located in clusters in various buildings around the University. The largest of these clusters is in the Old Library User Area (OLUA) where there is also a member of computing staff available to provide help if required but there are also clusters in the Robinson Library and elsewhere on campus. Access to a machine is *via* a booking sheet located in the cluster room. For PCs, attempts are being made to standardise word processing and spreadsheet software across all Computing Service machines to Word for Windows and Excel but a range of other software is also available for use, e.g. graphics packages, reference managers with some available on the Apple-Mac system. The Computing Service provides help sheets in the use of this software and these can be obtained from the OLUA or from the Computing Service Office in the basement of Claremont Tower. Before using the machines students must register with the Computing Service at the Computing Service Office and obtain a unique identifier and password. The Faculty runs two computing facilities of workstations that are linked to the University Network. One facility, containing 82 workstations, is located in the Centre Block of the 2nd Floor of the King George VI Building and the other, containing 25 workstations, is located in Room 472 of the Ridley Building.
- The Language Centre is in the Old Library and provides facilities for learning English and a wide variety of other languages. Overseas students on arrival in Newcastle will be required to take an English language test in the Centre. The results of this test will be used to assess whether further English language training is required. The Language Centre provides this in-sessional training at specific times of year, however, remedial English classes can be arranged as and when required.
- Some students will already be in jobs, taking secondment to undertake the MSc programme. For others the University provides a Careers Service which is located on the 2nd Floor of the Armstrong Building where advice on all aspects of careers is available. There is a good reference section giving detailed information about potential employers, pamphlets to help you produce good CVs and letters of application, lists of potential vacation employment, etc. In addition, there are a number of Careers Advisors who are available to provide advice, help and guidance throughout your time in Newcastle. Although one Careers Advisor has particular responsibility for the students in the Schools of Biology and of Agriculture, Food and Rural Development, any immediate help required can be obtained throughout the day from whichever Advisor is on Duty and if necessary an appointment can be made to have a longer interview. Full details of all services are available on the University web site. The computer-aided careers guidance system, PROSPECTS PLANNER, is available on open access at reception.

Students will learn a range of Personal Transferable Skills, including Study Skills, as outlined in the Programme Specification.

Academic support

The initial point of contact for a student is with a lecturer or module leader, or their tutor (see below) for more generic issues. Thereafter the Degree Programme Director or Head of School may be consulted. Issues relating to the programme may be raised at the MSc Staff/Student Committee, and/or at the Board of Studies.

Pastoral support

All students are assigned a personal tutor whose responsibility is to monitor the academic performance and overall well-being of their tutees. Details of the personal tutor system can be found at http://www.ncl.ac.uk/undergraduate/support/tutor.phtml. In addition the University offers a range of support services, including the Student Advice Centre, the Student Counselling Service, the Mature Student Support Service, and a Childcare Support Officer, see
 http://www.ncl.ac.uk/undergraduate/support/welfare.phtml.

Support for Special Needs

Support for students with special needs is provided as required and the University's Disability Support Service can be consulted where appropriate. For further details see
http://www.ncl.ac.uk/undergraduate/support/disability.phtml.

Learning resources
The University's main learning resources are provided by the Robinson and Walton Libraries (for books, journals, online resources), and Information Systems and Services, which supports campus-wide computing facilities, see http://www.ncl.ac.uk/undergraduate/support/acfacilities.phtml.
All new students whose first language is not English are required to take an English Language test in the Language Centre. Where appropriate, in-sessional language training can be provided. The Language Centre houses a range of resources for learning other languages which may be particularly appropriate for those interested in an Erasmus exchanges. See
 http://www.ncl.ac.uk/undergraduate/support/langcen.phtml.

14	Methods for Evaluating and Improving the Quality and standards of Teaching and Learning:

Meetings with the Degree Programme Advisor
A system of regular meetings with the Degree Programme Advisor, allows regular monitoring of comment/feedback from students. This may relate to: the course structure; individual modules; teaching techniques; administration of modules; administration of degree programmes; timetables; and efficiency of centralised facilities (such as the library or computing provision).

Reviews of Individual Modules and the MSc Programme
Both individual modules and the MSc programme are periodically reviewed in the light of the following:
- Student evaluation data
- Feedback from past graduates
- Feedback from the external examiner
- Feedback from the University Annual Monitoring Review
- Feedback from the Internal Subject review
- Feedback from independent Institutional Audit (QAA, HEFCE)
- Relevance of the programme in relation to key issues
- Relevance of programme in relation to employability of graduates
- Relevance of the programme in relation to funding sources

Module reviews
All modules are subject to review by questionnaires which are considered by the Board of Studies. Changes to, or the introduction of new, modules are considered at the School Teaching and Learning Committee and at the Board of Studies. Student opinion is sought at the Staff/Student Committee and/or the Board of Studies. New modules and major changes to existing modules are subject to approval by the Faculty Teaching and learning Committee.

Programme reviews
The Board of Studies conducts an Annual Monitoring and Review of the degree programme and reports to Faculty Teaching and Learning Committee.

External examiner reports
External Examiner reports are considered by the Board of Studies under Reserved Business, in the absence of the student representatives. The Board responds to these reports through Faculty Teaching and Learning Committee.

Accreditation reports

There is no suitable professional body accrediting programmes of this nature.

Committees Responsible for Monitoring and Evaluating Quality and Standards
- Staff/Student Committee

This meets once a term and provides a forum for raising any academic-related concerns. All degree programmes run by the Department are considered. It is also an opportunity for staff to consult students about course developments. Students will need to elect a representative for their degree programme, this person task will be to consult student colleagues and then represent their views at meetings.
- Board of Studies

There is a Joint Board of Studies for the MSc and Diploma degrees taught by the Schools of Agriculture, Food & Rural Development, Biology and Civil Engineering & Geosciences.. It oversees the academic content of the course. The Degree Programme Director chairs this Board and the membership includes those involved in the teaching. It meets approximately once a term. There is student representation on the Board.
- Board of Examiners. It is the responsibility of the Board of Examiners to assess students' progress and to recommend the successful award of degrees. There are internal and external examiners for the course.
- School Teaching and Learning Committee
- Faculty Teaching and Learning Committee
- University Teaching Committee

Student evaluations
All modules, and the degree programme, are subject to review by student questionnaires. Informal student evaluation is also obtained at the Staff/Student Committee, and the Board of Studies.

Feedback mechanisms
 Feedback to students is effected via the Staff/Student Committee and the Board of Studies.

Faculty and University Review Mechanisms
The Programme is subject to the University's Internal Subject Review programme, see
http://www.ncl.ac.uk/internal/academic-quality/qualityhome.htm#2.

15	Regulation of Assessment:

Regulation of Assessment
Progress in the taught parts of the course is assessed by continuous assessment and/or by in-course examinations held in January during MSc Phase 1. The Board of Examiners considers progress at the end of Phase 1, after which students will be advised of their progress. The Board of Examiners advises progress in most of the other taught modules after the end of Phase 2. Individual modules vary in the relative weighting of examination and continuous assessment of course work, which may include practical classes, case studies, seminars or essays. Details are given in the module outlines. Feedback on the quality of submitted coursework will vary according to the type of assignment and is the responsibility of the individual module leaders. It may take the form of written comments or verbal feedback during seminars or tutorials. The MSc project is be assessed by examination of the final MSc consultancy project report (AES 892) at the end of the course in August. MSc candidates are normally required to attend an oral examination that covers both their course work and their project work. For further details see *Regulations for Taught Postgraduate Masters Degrees* under Faculty Regulations for Higher Degrees on the University's Web site http//:www.ncl.ac.uk/calendar/university.regs/

Written Examinations
Candidates will normally be examined by means of two hour examination papers for each of the taught modules taken in phase 1. Titles of the examinations will be the same as module titles and examination

numbers will be the same as module codes. Each examination script submitted is assessed independently by one internal and one external examiner. A second internal examiner may moderate marks. The contribution of the continuous assessment marks to the overall module mark will vary according to each module (see Module Outlines). Examination Timetables will be published by the Examinations Office.

The pass mark for the MSc degree shall be 50% (Table 1) on all papers or their equivalent. Normally there is opportunity to resit failed modules. In the case of failed modules, marks in the range 40-49 shall be condoned in accordance with the Faculty Regulations 6 (i), (ii) and (iii) (*see relevant section of University Calendar 2004-2005; this can be accessed on the University Website given above*). That is, the Board of Examiners may permit a candidate to qualify for the award of MSc provided that modules with a total value of no more than 40 credits have a mark between 40-49, and the average mark for all modules, including the project report, is at least 50%. Candidates who fail to satisfy the Board in the written modular examinations may be awarded a Diploma in accordance with Faculty Regulations 8 (a), (b) or (c). Past examination papers, for the last two years, can be viewed on The School of Biology website: http://www.ncl.ac.uk/biol/

MSc Project Report Examination
Assessment is undertaken by at least two internal examiners, the principal of which is the candidate's supervisor, and the external examiner and considered by the Board of Examiners meeting in September. To satisfy the examiners in the project report, candidates must normally achieve an MSc Pass mark of 50%.

MSc Oral Examination
The oral examination covers all aspects of the course and may be held at the completion of the course (end of phase 3) or earlier in phase 3. The Examiners will wish to raise the major questions they have identified in their examination of the project report preparation and engage with the candidate in discussion of them.

Consequences of Failure of MSc Project
In accordance with Faculty Regulations, a candidate who achieves a mark of 40-49 for the assessment of the project report may, at the discretion of the examiners, be permitted to re-submit the report in a revised form for assessment. This must be by such a date as the Board of Examiners shall specify and within 12 months of the date of the original submission. Where a student fails to meet the criteria for the award of a MSc degree in sections 4-7 of the University regulations for Master of Science in the Agriculture and Biological Sciences, the student will be entitled as of right to the award of a Diploma provided that they meet the criteria specified in *Diploma Regulations in Agriculture and Biological Sciences.*

MSc with Merit
MSc degrees may be awarded with merit if, in the opinion of the Examiners, the candidate has achieved an average mark of 60-69 for both written papers and the project report.

MSc with Distinction
MSc degrees may be awarded with distinction if, in the opinion of the Examiners, the candidate has achieved excellence in all components prescribed for the award of the degree, with an average mark of ≥ 70 for both written papers and the project report.

Assessment Criteria

All postgraduate work is marked on a University scale ranging from 0-100, as explained in the Postgraduate Marking Guide (Table 1), which sets out the criteria to be used to assign marks. Most postgraduate work will be in three broad categories (Distinction, Merit and Pass) corresponding to First,

Upper Second and Lower Second Class work at undergraduate level.

Assessments are made in one of three ways, as is appropriate to the teaching technique:
- marks given to papers sat during the January examination period in Phase 1. Unless stated otherwise on the paper, each answer will be given equal weight.
- marks given to submitted work from laboratory and field classes.
- marks given to assigned work such as projects, case studies, essays or problem solving exercises.

The module description and Module Leader will explain to students what form the assessment will take and the weighting of each separate element.

University General Regulations state that:

'Candidates are responsible for retaining all forms of assessed work returned to them after marking by examiners. Assessed work so retained may be recalled from candidates, if required by external examiners, or for examination review purposes, or for Quality Assessment or Audit purposes.' For MSc examination candidates will submit a dossier of coursework, after marking, for consideration by the external examiner.

Role of the External Examiner

Within the modular structure of the cross-school suite of taught course some modules are common to a number of taught MSc degrees. Therefore, FTC appoints external examiners to both the MSc degree programme and a set of modules, according to the relevant subject expertise and workload of the External Examiner. The appointment to the degree programme will be to assure the quality of the programme as well as the performance of the students on the programme. The Board of Examiners undertakes the initial allocation of modules to Externals, with FTC acting as an arbiter if required.

The external examiner is a distinguished member of the scientific community whose knowledge covers the range of activities covered by the course. The external examiner is a moderator and to do this he/she:
- Sees and approves examination questions
- Sees examination scripts and comments upon standards of marking
- Sees coursework and comments upon standards of marking
- Examines projects
- Performs *viva voce* examinations of some or all students
- Attends a meeting of the Board of Examiners
- Reports to the University regarding standards and comparability of standards

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16   Indicators of Quality and Standards:

Professional Accreditation Reports

Not applicable

Internal Review Reports
This programme is due for Internal Subject Review in <Month, year of upcoming Review>. <See the timetable at http://www.ncl.ac.uk/internal/academic-quality/schdlisr.doc>

Previous QAA Reports
The details will be subject specific, but the following template should be used:
This programme received a QAA Subject Review in <Month, year of review> and achieved a score of 22/24.

This specification provides a concise summary of the main features of the programme and of the learning outcomes that a typical student might reasonably be expected to achieve if she/he takes full advantage of the learning opportunities provided. The accuracy of the information contained is reviewed by the University and may be checked by the Quality Assurance Agency for Higher Education.

17   Other Sources of Information:

The University Prospectus (see http://www.ncl.ac.uk/undergraduate/)

The Departmental Prospectus (see http://www.ncl.ac.uk/undergraduate/subjects/xxx)

The School of Biology web page: http://www.ncl.ac.uk/biol/

The University and Degree Programme Regulations (see http://www.ncl.ac.uk/calendar/pdf/uniregs.pdf and http://www.ncl.ac.uk/calendar/sae/)

The Degree Programme Handbook

QAA Subject Review Report