The University Of Sheffield.

Programme Specification

A statement of the knowledge, understanding and skills that underpin a taught programme of study leading to an award from The University of Sheffield

1	**Programme Title**	Evolution and Behaviour
2	**Programme Code**	APST06
3	**JACS Code**	C182
4	**Level of Study**	Postgraduate
5a	**Final Qualification**	Masters' of Research (MRes)
5b	**QAA FHEQ Level**	Master's = 7
6a	**Intermediate Qualification(s)**	Postgraduate Certificate
6b	**QAA FHEQ Level**	7
7	**Teaching Institution** (if not Sheffield)	Not applicable
8	**Faculty**	Science
9	**Department**	School of Biosciences
10	**Other Departments providing credit bearing modules for the programme**	None
11	**Mode(s) of Attendance**	Full-time
12	**Duration of the Programme**	1 year
13	**Accrediting Professional or Statutory Body**	Not applicable
14	**Date of production/revision**	April 2019

15. Background to the programme and subject area

The one year Masters' of Research (MRes) programme is the ideal springboard for a career in evolutionary and behavioural research, including genomics and related technologies. The course provides an extensive research experience embedded in the world-leading laboratories that make up The School of Biosciences (http://www.sheffield.ac.uk/aps/research), with the titles of the MRes programmes reflecting the major research groupings within the School. This course allows participants to develop the conceptual and practical skills required of the next generation of research leaders. In addition to the provision of specialist skills training, the programme builds a wide range of transferable and lifelong learning skills in scientific investigation and communication to equip students for professional careers in science. The programme includes training in advanced statistics, research and literature skills, and communicating science to different audiences, including the general public.

The School of Biosciences at The University of Sheffield is one of the leading international centres of excellence for teaching and research in organismal biology, with expertise that spans from molecular-signalling to global-scale climate modelling. (http://www.sheffield.ac.uk/aps). We explore how organisms function, evolve, interact with each other, respond to their environment, and combine to generate complex ecosystems, and ecological processes, on which we all depend. We apply this understanding to critical environmental problems, such as food production, environmental restoration, conservation of biodiversity, and managing the effects of climate change

Students studying on this programme will work at the forefront of research on the evolutionary, genetic and functional bases of behaviour, adaptation and speciation. Research topics include sexual selection and sexual conflict, ecological immunity, cooperative behaviour, evolutionary genomics of adaptation and evolutionary developmental biology.

The programme will utilise a wide diversity of research approaches, including mathematical modelling, bioinformatics methods, fieldwork and laboratory experiments, with access to nationally important molecular genetics facilities. Study organisms include birds, insects, mammals, and microbes in a range of natural and laboratory systems.

The MRes programme is founded on the exceptional research and teaching expertise of APS staff working on many different aspects of organismal biology, and the outstanding research facilities and equipment in the

School. The titles of the MRes programmes reflect the 3 major research groupings within the department (http://www.sheffield.ac.uk/aps/research).The School has world-class plant growth facilities at the Arthur Willis Environment Centre and Sir David Read Controlled Environment Facility which houses state-of-the-art plant growth chambers that can simulate climatic conditions that range from arctic to tropical environments. It also houses the NERC Biomolecular Analysis Facility with multi-channel robotic DNA sequencers and a mass-spectrometry suite containing an advanced isotope ratio mass-spectrometer together three other mass spectrometers used for metabolite mapping in tissues and metabolomic studies.

16. Programme aims

1. This programme forms part of the flagship suite of taught postgraduate programme in The School of Animal & Plant Sciences, reflecting the international excellence of the School in research and teaching of organismal biology, which has been established over the past 4 decades.

2. The programme aims to provide the specialist skills, training and knowledge in organismal biology required to pursue a career in research – whether in an academic or commercial environment. It will equip students with state of the art knowledge, including rapidly developing areas such as 'omic technologies (metabolomics, genomics, proteomics).

3. We aim to provide a research training environment that is informed and invigorated by the research and scholarship of the staff, and which has direct societal relevance through applications to helping solve human problems such as food security, climate-change impacts, green energy, pollution, nature conservation, urbanization and sustainable cities.

4. The programme aims to provide training that is strategically aligned to, and informed by, national and international research priorities such as sustainability, reducing carbon emissions, and global food and energy security.

5. The programme aims to develop advanced skills in scientific communication through written assignments, oral presentations, poster presentations, web pages and project reports written in the style of scientific journal articles.

6. In addition, the programme aims to develop scientific rigour and independence of thought, by stimulating intellectual curiosity, and a critical approach to evidence, theories and concepts.

7. The programme aims to train students using a variety of teaching techniques from laboratory studies, experiments, workshops, seminars, poster sessions and research reports. Through these activities and their assessment and feedback, we aim to support and encourage academic excellence and enable students to maximise their academic potential and skills development to help them drive innovation.

8. We aim to provide a supportive environment for students with referrals to specialist support services when required, and effective mechanisms to review progress.

9. We aim for all our students to be model exemplars of the 'Sheffield Masters Graduate'.

17. Programme learning outcomes

Knowledge and understanding: **On successful completion of the programme, students will be able to demonstrate knowledge and understanding of:**	
K1	specialist research-led areas of organismal biology;
K2	the relationship between the information base in this subject area, the theories that arises from it and the genesis of empirical tests of the defining theories;
K3	the latest studies of organismal biology, research priorities and knowledge gaps, through reading scientific periodicals and attendance at research seminars and presentations by practitioners;
K4	the process of designing and planning research in organismal biology including experimental design; the roles of fieldwork, laboratory experiments and modelling; data analysis and error analysis; statistical and graphical presentation approaches;
K5	advanced biostatistics;
K6	the application of advanced analytical techniques in a research environment;
K7	the regulatory, policy and ethical issues in relation to the science of organismal biology;
K8	how to communicate science to other scientists and to a public audience via written and oral media;

K9	the processes underpinning the securing of funding and the publishing of biological research;
K10	entrepreneurship and the commercial utilization of biological systems.

Skills and other attributes: **On successful completion of the programme, students will be able to:**	
S1	synthesise information provided in workshops and seminars, together with reading of primary literature to concisely describe and explain the major causes and effects of a research area, consistent with current theory and understanding;
S2	communicate - particularly concerning research design and findings - through the development of oral, poster presentations and formal reports;
S3	apply established techniques to study organismal biology in field or laboratory-based investigations;
S4	An ability to gain knowledge for themselves, critically assess this knowledge and relate this knowledge to specific applications in their research;
S5	Work effectively in a research team;
S5	critically appraise, evaluate, and appropriately use techniques in a research environment;
S7	critically appraise, evaluate and synthesise information in primary literature to identify gaps in our current knowledge and understanding and make suggestions for the future development of the field;
S8	apply quantitative research methods;
S9	develop a research project which reflects an understanding of a problem, the context within which that problem is set and appropriate methodologies for generating and analysing relevant data;
S10	plan, conduct and write-up and report an independent piece of primary research in this subject, including appropriate modes of data analysis and presentation, and for the aims and findings of the work to be set in the context of previous studies conducted by others;
S11	demonstrate a working knowledge and practical experience of advanced, research-specific techniques that may include bio-analytical methods, or mathematical modelling, or both.

18. Teaching, learning and assessment

Development of the learning outcomes is promoted through the following teaching and learning methods:

Lectures/Seminars/Workshops will be used to provide training in essential laboratory health & safety and waste management systems required for laboratory and field based activity, and ethical and social policy issues (**K7, S6**).

Research Seminars, including some that are led by invited guest speakers, will be used to gain familiarity with the current research priorities and knowledge gaps in the subject (**K1, K3, S1**).

Poster sessions in which students visually and orally present information based on their research project (**K8, S1, S2, S10**).

Tutorials will be used to develop skills in report writing, data analysis and statistics, critical analysis of the literature, research planning, oral and visual presentation skills. Tutorials will also provide a focus for personal academic and career development. (**K1-5, K7, K8, K10, S1, S2, S4, S5, S7, S9**).

Computer-based learning will be used to provide training in data analysis, experimental design, and graphical presentation skills. Depending on the options chosen, teaching will be by interactive online self-teach exercises or workshops combined with self-directed practical exercises. (**K4-6, S2, S8, S11**).

Oral Presentations. Students are required to present project findings to peers and academic staff in a mini-symposium that celebrates the research discoveries of the students. Students will also gain experience of this in tutorials. This allows the assessment of the ability of students to communicate professionally, effectively and clearly, their ideas and findings of their research to other scientists. These presentations augment the aims of the research seminars in providing additional examples of current research priorities and knowledge gaps in the subject, and how to address them (**K3, K8, S2**).

For the **Literature Review** students will be self-directed, performing literature-based research to prepare a substantial piece of written work. They will meet regularly with their research supervisor to discuss the structure and aims of the literature review and will receive formative feedback on sections of their written work (**K1-3, S1, S2, S4, S7**).

Research Project. A major piece of independent research forms the focal point of the programme allowing students to apply the knowledge and skills they have developed to research an important issue or problem in organismal biology. Through this unit students apply their research, methodological and writing skills by independently designing and conducting a theoretically informed empirical research project. This will involve bibliographic searches, the use of qualitative and/or quantitative research techniques, handling and analysing data and writing up and reporting findings in an oral mini symposium (**K1-6, K8, K9, S1-S6, S8, S9-S11**).

Opportunities to demonstrate achievement of the learning outcomes are provided through the following assessment methods:

The programme uses a range of assessment methods, ranging from laboratory notebooks, essays, posters, oral presentations, scientific literature reviews, scientific reports, tutorial and workshop exercises, and computer-based assessments. As appropriate for a research orientated MRes programme, the emphasis is on assessment by widely used techniques of scientific communication including laboratory notebooks, oral presentations, and reports written in the style of scientific papers. Assessment and feedback provided through the programme is used to help guide and direct student attainment of the learning outcomes, and their suitability for progression through to undertake the MRes project.

Posters in which students visually present information based on their research project. This engenders a community of learning within the MRes cohort. (**K1, K2, K4, K8 S1, S2, S9**).

Data analysis Depending on the options chosen, assessment will be by interactive online assessments or completion of self-directed practical exercises (**K4-6; S8; S11**).

Oral Presentations. Students present the findings of their research projects to peers and academic staff in a mini-symposium that allows the assessment of the ability of students to communicate professionally, effectively and clearly, their ideas and findings of their research to other scientists. (**K8, S1-2**).

Literature Review. This takes the form of a detailed up-to-date review and synthesis of a research area in the style of a scientific review article and is assessed on ability to identify, explain and synthesise literature to highlight current knowledge and future research priorities (**K1-3, S4, S7**).

Research Project. This will be assessed primarily through a written project report presented in the style of a scientific paper. The student's performance in the lab or field over the course of their project will also be assessed. (**K1-6, S2-4, S6, S8-11**).

19. Reference points

The learning outcomes have been developed to reflect the following points of reference:

Subject Benchmark Statements
http://www.qaa.ac.uk/AssuringStandardsAndQuality/subject-guidance/Pages/Subject-benchmark-statements.aspx

Framework for Higher Education Qualifications (2008)
http://www.qaa.ac.uk/Publications/InformationAndGuidance/Pages/The-framework-for-higher-education-qualifications-in-England-Wales-and-Northern-Ireland.aspx

University Strategic Plan
http://www.sheffield.ac.uk/strategicplan

Learning and Teaching Strategy (2016-21)
https://www.sheffield.ac.uk/staff/learning-teaching/our-approach/strategy2016-21

The programme has been developed with the aim of attracting and retaining high quality students, from home and overseas, who wish to undertake a Masters level degree with a strong research component. The MRes students will be embedded within the School's research groupings allowing specialisation within Ecology and Environment, Evolution and Behaviour, and Plant and Microbial Biology. It provides the flexibility within the School to meet fluctuating student demand.

20. Programme structure and regulations

The MRes comprises 4 units that make up 180 credits of study.

APS6610 Literature Review (15 credits)

APS66xx Research Project (120 credits)

APS6617 Scientific Skills and Project Management (30 credits)

APS66xx Science Communication for Researchers (15 credits)

All units are compulsory.

These units provide essential knowledge, generic research skills training, technical skills training, and literature and laboratory or field based training in independent research.

Detailed information about the structure of programmes, regulations concerning assessment and progression and descriptions of individual modules are published in the University Calendar available on-line at http://www.sheffield.ac.uk/calendar/.

21. Student development over the course of study

The structure of the programme allows students to gain the skills needed to undertake an extended programme of independent research.

Students gain generic research skills including statistical skills and experimental design. They also undertake in semester 1 a literature review which will provide a knowledge base and define the aims and priorities for the extended research project. In semester 2 students the emphasis shifts to the development of advanced research techniques that underpin their chosen area of research. The extended research project commences towards the end of semester 1 and continues through semester 2 and the summer. The students will be embedded in research laboratories and undertake their projects in the wider community of active researchers within the School.

While specific learning objectives are associated with each stage of the programme, the development of knowledge and skills will be continuous throughout. For example the generic skills and foundational knowledge and techniques skills will be reinforced through conducting the research project, and through oral presentations and writing the final project report in the style of a scientific paper.

22. Criteria for admission to the programme

Entry requires a first class or upper second class BSc degree in biological sciences, environmental bioscience, ecology, or equivalent qualifications.

Overseas students whose first language is not English will require IELTS 6.5 with 6 in each component

https://www.sheffield.ac.uk/aps/prospectivepg/masters/mres-evolution-behaviour#tab01

23. Additional information

Further information can be found on the School web pages
https://www.sheffield.ac.uk/aps/prospectivepg/masters

This specification represents a concise statement about the main features of the programme and should be considered alongside other sources of information provided by the School and the University. In addition to programme specific information, further information about studying at The University of Sheffield can be accessed via our Student Services web site at http://www.shef.ac.uk/ssid.