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

Programme Details

1. Programme title	Plant Sciences
2. Programme code	APSU05 (BSc); APSU16 (MBiolSci)
3. QAA FHEQ level	Honours
4. Faculty	Science
5. Department	School of Biosciences
6. Other departments providing credit bearing modules for the programme	Not applicable
7. Accrediting Professional or Statutory Body	None
8. Date of production/revision	March 2022, September 2023

Awards	Type of award	Duration
9. Final award	BSc, MBiolSci	3 years, 4 years
10. Intermediate awards	BSc from MBiolSci	

Programme Codes

11. JACS code(s) *Select between one and three codes from the HESA website.*	C200 (BSc)	C209 (MBiolSci)	
12. HECoS code(s) *Select between one and three codes from the HECoS vocabulary.*	100355		

Programme Delivery

13. Mode of study	Full-time
14. Mode of delivery	Face to Face

15. Background to the programme and subject area

Plant Science is a broad subject that seeks to understand how the constituent parts of plants are coordinated to form a functional whole and how whole plants interact with other living organisms and the physical environment. The study of Plant Science provides not only an understanding of the ways in which plants behave in natural situations but is essential to our ability to manage plant communities. This is important for conserving natural vegetation and for managing agricultural crops, their weeds, pests and diseases in such a way as to optimise both biodiversity and crop production.

Two main themes covered by the Plant Science programme at Sheffield are *plant physiology* and *plant ecology*. Plants, with their capacity to use light as a source of energy, are the primary producers of living material in the world, upon which nearly all other organisms depend for their nutrition. Plant physiology embraces the study of the ways in which plants harvest light energy and convert it into forms that sustain their integrated growth, together with their acquisition of mineral nutrients from the soil. Developmental physiology addresses the ways in which the pattern and timing of plant development is influenced by environmental controls. Plants characteristically live, in close association with other individuals of the same species (populations) or of different species (communities). Plant ecology is the study of the principles underlying the ways in which plants interact with each other and with their environment. In addition to plant physiology and plant ecology, the Plant Science programme also covers aspects of *fungal biology* because mutualistic fungi play an important role in the mineral nutrition of many plants, most plant diseases are caused by pathogenic fungi and a major part of nutrient cycling depends upon the activities of decomposer fungi.

Plant Science is becoming increasingly relevant to modern society as it seeks to address the important issues of the 21st century, including food security, resource degradation, loss of biodiversity, conservation, and the effects of climate change. Plant Science has an immediate impact on our daily lives.

Plant Science is a large subject that accommodates a wide variety of fields. Along with core modules in Plant Physiology, Reproduction and Growth, Molecular and Cell Biology, Climate Change and Sustainability, students can take modules in Biochemistry, Microbiology, Genetics, Ecology, Conservation, Ecological Identification and Evolution as well as in the Biomedical Sciences. The programme at Sheffield is designed to provide a broad-based and flexible approach to the study of plants. Students can organise their programme to maintain a broad overview, or they can focus on areas of specialisation towards the end of their degree.

Members of the School of Biosciences teach this programme. We are one of the largest in the UK devoted to the study of biology, and have been graded excellent in both teaching and research.

Sheffield graduates in Plant Sciences are qualified for a wide variety of careers since they will have developed a wide-range of subject-specific and generic skills that can be transferred to both plant science and non-plant science employment.

16. Programme aims

The BSc and MBiolSci Biology Programmes aim to:	
A1	Provide teaching that is informed and invigorated by the research and scholarship of its staff, is stimulating to and enjoyed by students.
A2	Develop in students an independence of thought, intellectual curiosity and critical approach to evidence, theories and concepts.
A3	Enable students to maximise their academic potential in all aspects of their programme.
A4	Assess students over a range of skills and identify, support and encourage academic excellence.
A5	Impart to students an awareness of the importance of commitment to and skills relevant for life-long learning.
A6	Provide a supportive environment for students with effective mechanisms for referral to specialist services when required.
A7	Develop a broad understanding of plant sciences together with a more detailed and critical understanding of selected areas in plant science.
A8	Develop in students a range of subject-specific and generic skills appropriate to employment both within and outside of biology.
A9	Prepare students for postgraduate work and a professional career in plant sciences.
In addition, the MBiolSci programme aims to:	
A10	Develop in students an ability to carry out independent research, to critically review biological manuscripts and to write grant proposals.

17. Programme learning outcomes

Knowledge and understanding On successful completion of the programme, students will be able to demonstrate knowledge and understanding of:		
		Links to Aim(s)
K1	A broad range of biological subjects of their choosing (including molecular and cell biology, molecular and cell biology, biochemistry, genetics, evolution, microbiology, plant sciences, zoology, ecology and conservation, physiology and pharmacology, pathobiology, development and neuroscience).	A1-A9
K2	A number of specific subject areas in depth (from a choice of *inter alia*: biodiversity, population and community ecology, organismal interactions, evolutionary genetics, climate science, plant biotechnology, environmental microbiology, food security).	A1-A9
K3	The social, economic and global impact and utility of biological understanding in a choice of areas of interest (including *inter alia* biotechnology, biodiversity, climate change, sustainability, conservation and management, pathogen control, food security).	A1-A9

K4	Essential plant science concepts and facts across a range of biological levels from sub-organismal organisation, through form and function, to interactions between individuals and within and between communities and ecosystems.	A1-A9
K5	The relationship between the information base in a subject area, the theory that arises from it and the genesis of empirical tests of the defining theory.	A1-A9
K6	Biostatistical techniques and their application.	A1-A9
K7	Biological terminology, nomenclature and classification.	A1-A9
K8	The ethical and philosophical issues related to biology and science.	A1-A9
K9	The applicability of biological skills and knowledge to careers.	A1-A9
In addition, MBiolSci Students will be able to demonstrate knowledge and understanding of:		
K10	Specialist research-led areas of either evolution and behaviour, environment and biodiversity or molecular and ecological physiology.	A1-A9
K11	Advanced biostatistics.	A1-A9
K12	The processes underpinning the securing of funding and the publishing of biological research.	A1-A9
K13	The role of leadership in research.	A1-A9
Skills and other attributes On successful completion of the programme, students will be able to:		
S1	Recognise and apply biological theories, concepts, principles and/or paradigms to their work.	A1-A9
S2	Execute basic lab and field techniques in a safe, effective and precise manner.	A1-A9
S3	Carry out health and safety risk assessments and devise safe systems of working.	A1-A9
S4	Use first principles in biology and factual knowledge of systems to identify novel problems in plant science.	A1-A9
S5	Use the scientific method to formulate hypotheses and testable predictions.	A1-A9
S6	Design observational and experimental studies that allow the testing of predictions.	A1-A9
S7	Collect, organise, analyse and interpret qualitative and quantitative empirical field and laboratory data to address questions in the plant sciences.	A1-A9
S8	Use commercial software and programming systems for the management, analysis and presentation of data.	A1-A9
S9	Assess theories, concepts and empirical evidence from the plant science literature and from observational and experimental studies in an objective and critical manner.	A1-A9
S10	Locate, critically evaluate, synthesise, summarise and cite printed and electronic information, including from the primary literature.	A1-A9

S11	Communicate effectively in writing and orally, identifying an appropriate method of communication depending on the material to be delivered and the audience.	A1-A9
S12	Produce a range of written materials (including *inter alia* scientific papers, literature reviews, essays, abstracts).	A1-A9
S13	Recognise the moral and ethical issues of a particular approach and appreciate the need for ethical standards and appropriate codes of conduct.	A1-A9
S14	Work effectively as part of a team, recognising and respecting the views and opinions of other team members, identifying collective goals and adjusting and applying appropriate approaches.	A1-A9
S15	Make informed / justifiable evidence-based decisions.	A1-A9
S16	Identify individual goals and responsibilities, exercise independent thought and judgement, act effectively, and reflect on ongoing individual performance.	A1-A9
S17	Implement the skills underpinning life-long learning and employment (time-management, independent learning, organisational skills).	A1-A9
S18	Identify and work towards targets for personal, academic and career development using an adaptable, effective and resilient approach to study and work.	A1-A9
In addition, MBiolSci Students will be able to:		
S19	Organise and manage practical and literary research projects to a high standard.	A1-A9
S20	Write grant proposals for scientific research projects.	A1-A9
S21	Apply advanced, practical and statistical techniques to research.	A1-A9
S22	Communicate their science to a public audience via written and oral media.	A1-A9

18. Learning and teaching methods

Students learn in a research-embedded framework, in which they use the scientific method to explore biological questions in a constructively critical manner. In the early years, lectures are the principal means of imparting knowledge and demonstrating critical analytical skills, while understanding is gained through a combination of tutorials, example classes, laboratory classes and formatively assessed assignments. Skills are acquired mainly through self-directed, assessed work conducted during tutorials, laboratory classes, online data sessions, and group projects. Field courses, with a strong emphasis on self-directed, autonomous use of acquired skills and the need to work efficiently in groups, develop field and transferable skills. In the later years, more emphasis is placed on student centred learning exercises, workshops, seminars and project work (small group and individual) as methods by which knowledge and understanding are gained, skills are acquired and improved and biological questions are rigorously explored.

19. Assessment and feedback methods

Students' knowledge, understanding and skills are assessed by end-of-semester examinations, coursework and continuous assessment throughout the module. Types of assessments are matched to the subject.

Lecture Modules

Most lecture modules at levels 1 and 2 are assessed by formal examinations, which provide effective tests of knowledge, problem solving skills and conceptual and synthetic thinking. At Level 1, lecture modules are examined by multiple-choice papers. Level 2 lecture modules are primarily assessed using a combination of essay or short answer questions, or a combination of these and multiple-choice questions; some L2 modules involve coursework assessments. At level 3 lecture modules are assessed either by formal examination and/or coursework. Coursework may take the form of essays, problem-based questions or POST notes. Subjected to deadlines, these forms of assessment encourage students to manage their workloads, learning schedules and time productively. Most Level 2 and Level 3 examination papers offer a choice of questions and are designed to enable students to demonstrate their knowledge of the subject matter and concepts as well as to integrate specific aspects of their knowledge and skills base. There are no formal written examinations at Level 4 but there are formal data handling examinations, oral presentations and coursework.

Skills Modules

The skills module at L1 is examined by continuous assessment throughout the year. Such assessment develops skills of self-motivation, organisation and self-discipline whilst indirectly stimulating the student's ability to harvest and collate information from the literature, whilst working to a deadline. Because a number of self-developed skills contribute to the standard of the assessed work, the assessment inevitably encapsulates these, as well as knowledge, logical and structured thinking and argument development. These assessments typically occur throughout the module and involve feedback. Formats include written work, oral and poster presentations, laboratory notebook assessment and data handling and analysis exercises. Most data collection and processing skills are assessed via this form of assessment.

Assessments, both formative and summative consider scientific content, logical structure, synthesis, level of critical evaluation, inclusion of literature, clarity of exposition, language and style. Selected modules at all levels have an element of formative assessment.

Field Courses, Projects, and Dissertations

Level 2 and Level 3 field courses are assessed by talks and written reports. Detailed formal feedback is given on field course assessments to prepare students for L3 and L4 projects. Level 1 practical projects and Level 3 and Level 4 research projects and dissertations are assessed on the basis of written reports in the style of formal scientific papers or reviews.

Feedback

Formative individual written and oral feedback will be provided in L1 and L2 tutorial exercises, and in L3 and L4 field course reports, dissertations and projects. Oral individual and group feedback will be provided in practicals and staff will be available in lecture modules for students to ask questions and receive feedback.

20. Programme structure and student development

The programme is modular and offered as full-time study only. Students gain subject knowledge and practical, communication and data skills. These are applied in later years in capstone research projects and literature reviews.

In Level 1 students are introduced to a broad range of zoological theory, phenomenology, foundation practical skills and data collection methods that build on and consolidate skills and knowledge previously acquired. Tutorial work develops information processing and data interpretation skills and builds a solid base for conceptual thinking, logical argument, professional judgement, the development of communication skills, teamwork and skills for life-long learning. By the end of level 1 students will have an appreciation of the complexity and diversity of biological processes.

In Level 2 students develop a wider knowledge and deeper understanding of generic areas of plant sciences as well as subject areas that build on Level 1 experience. Core work includes practical skills that emphasise objective design and execution of empirical practical investigation. This is integrated with the development of a core statistical skill-base that informs design and enables analysis. The development of teamwork and interpersonal skills, time-management, conceptual thinking, logical argument and communication is developed in tutorials. Optional modules available at this level permit students to broaden and deepen their interests in more specialised areas of plant science. Modules at this level employ a range of teaching and assessment techniques that are designed to foster and test the analytical and critical faculties of students and encourage autonomy in learning.

In Level 3 teaching and learning exploits the increasing sophistication our students are developing in their knowledge base and critical/analytical skills. The core modules are a research project and a literature review, both of which rely on, and further develop good transferable skills and a solid understanding of empirical plant sciences, information gathering, synthesis and critical evaluation. Students also choose from a wide range of optional modules in selected, research-led areas of plant science and field courses. These modules develop knowledge, understanding and a critical approach to evidence, theories and concepts and utilise a range of teaching and assessment methods appropriate to their learning aims.

Level 4 exploits and develops the self-confidence, knowledge base and capacity for autonomous study students have acquired during the preceding 3 years. During this year they acquire advanced subject-specific and generic transferable skills appropriate to employment within and outside of the plant sciences. The core modules in year four teach communicating science to the public, advanced biostatistics, and the processes underpinning successful fund-raising and publishing in biology. Students also conduct laboratory and library research that requires the application of technical and conceptual knowledge and understanding gained in the earlier years. Students work in active research groups and are expected to learn from, and contribute to, those groups, displaying appropriate levels of creativity, originality and judgement.

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

21. Criteria for admission to the programme

BSc - AAB including Biology and a second science.

MBiolSci - AAA including Biology and a second science.

Information obtained from http://www.shef.ac.uk/courses/.

22. Reference points

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

Subject Benchmark Statements
https://www.qaa.ac.uk/quality-code/subject-benchmark-statements

Framework for Higher Education Qualifications (2014)
https://www.qaa.ac.uk/docs/qaa/quality-code/qualifications-frameworks.pdf

University Vision and Strategic Plan
https://www.sheffield.ac.uk/vision

23. Additional information

Teaching facilities include modern teaching laboratories, lecture theatres and excellent IT systems. The departments are within walking distance of a vibrant 24-hour city centre and also within easy reach of the Peak District National Park, an area of outstanding natural beauty.

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 teaching department(s) 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.