



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	2. Programme Code	3. JACS Code
Biochemistry and Genetics	MBBU09 (BSc); MBBU18 (MBiolSci)	CC74 (BSc); CC7C (MBiolSci)
Biochemistry and Microbiology	MBBU10 (BSc); MBBU19 (MBiolSci)	CC75 (BSc); CC79 (MBiolSci)
Genetics and Microbiology	MBBU08 (BSc); MBBU21 (MBiolSci)	CC45 (BSc); CC4C (MBiolSci)
4	Level of Study	Undergraduate
5a	Final Qualification	Bachelor of Science with Honours (BSc Hons); Master of Biological Sciences (MBiolSci)
5b	QAA FHEQ Level	Honours (BSc); Masters (MBiolSci)
6	Intermediate Qualification(s)	None
7	Teaching Institution (if not Sheffield)	Not applicable
8	Faculty	Science
9	Department	Molecular Biology and Biotechnology
10	Other Department(s) involved in teaching the programme	Biomedical Science
11	Mode(s) of Attendance	Full time
12	Duration of the Programme	3 years (BSc); 4 years (MBiolSci)
13	Accrediting Professional or Statutory Body (if applicable)	Not applicable
14	Date of production/revision	April 2012

15. Background to the programme and subject area

Biochemistry, genetics and microbiology are complementary members of the modern molecular biosciences. The aim of our programmes in Biochemistry and Genetics, Biochemistry and Microbiology, and Genetics and Microbiology is to allow students to study advanced aspects of any two of the three subjects. Students may choose to emphasise the areas of overlap between subject areas, or may choose advanced modules across the full range of both disciplines. This is possible because of the sound basis provided by the first two years of each programme, which are spent studying a broad molecular biosciences curriculum.

Students graduating after three years with a BSc in one of these two-subject degrees are equipped with a wide range of skills, both subject-specific and generic. These provide a sound basis for a wide variety of careers in the molecular biosciences, and many graduates go on to research careers in industry or universities, often after obtaining a PhD qualification. Our graduates are also well qualified to enter non-research careers, such as teaching or management.

The first three years of each MBiolSci degree are identical to the BSc programme. The MBiolSci programmes include a fourth year of study, which provides further training specifically for students who are considering a career in research.

The Department of Molecular Biology and Biotechnology was awarded a maximum score of 24 out of 24 in the national Teaching Quality Audit Subject Review in 1999, and our continuing excellence in teaching was confirmed in 2008 by an outstanding performance in the Independent Evaluation of Teaching carried out by an external panel. We also have an international reputation for research; in 2008, in a joint submission with the other departments in Sheffield's School of Biological Sciences, we were ranked third in the national Research

Assessment Exercise for Biological Sciences. This means that students are exposed to a stimulating learning environment, in which the experience of staff as researchers contributes directly to their ability to teach the latest developments in the field. The Department's accommodation has recently been completely refurbished to a very high standard at a cost of more than £23M.

Further information about the Department, our staff, programmes and admissions may be found on the web at: <http://www.shef.ac.uk/mbb/index.html>

16. Programme aims

All degree programmes offered by the Department of Molecular Biology and Biotechnology have the following general aims consonant with the University of Sheffield's Mission Statement:

1. to provide teaching in the molecular biosciences that is informed and inspired by the research and scholarship of the staff, and is stimulating, useful and enjoyable to students;
2. to provide a broad understanding of the molecular biosciences together with more detailed and critical knowledge in selected areas;
3. to equip graduates with well-developed practical, analytical, communication, IT and problem-solving skills;
4. to provide all students with the opportunity to carry out laboratory-based project work, to develop their practical skills and to allow them to assess their ability and interest in laboratory work;
5. to provide a stimulating educational experience that prepares students for future employment and is orientated towards a professional career in the molecular biosciences;
6. to assess students over a range of skills and identify and encourage academic excellence;
7. to give students the opportunity to obtain feedback on their progress;
8. to provide a supportive environment for students;
9. to provide for diverse and developing student interests and aspirations by offering a choice of modules and project work within programmes and allowing transfers between the various programmes in the molecular biosciences offered by the Department;
10. to engender in students a desire for continuing professional development;
11. to encourage students to become informed citizens and understand the place of the molecular biosciences in society.

The specific aims of the BSc and MBiolSci programmes in Biochemistry and Genetics, Biochemistry and Microbiology, and Genetics and Microbiology are:

12. to provide a broad understanding of both subjects together with more detailed and critical knowledge in selected areas of each subject;

Each MBiolSci extends and enhances the BSc, aiming:

13. to provide an extended laboratory-based research project in a university or industrial environment;
14. to provide additional training in research skills.

17. Programme learning outcomes

Knowledge and understanding: by the end of the course, students will have acquired

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| K1 | a broad-based core knowledge and understanding of the molecular biosciences, including biochemistry, genetics, microbiology, molecular biology and cell biology; |
| K2 | detailed and critical knowledge, including knowledge of the most recent advances, in selected areas relevant to each subject; |
| K3 | practical understanding of the nature of scientific knowledge, and of techniques and tools for searching the scientific literature; |
| K4 | familiarity with laboratory equipment and methods used in the molecular biosciences, including knowledge of safe working practices; |
| K5 | knowledge of numerical, graphical, statistical and other methods for analysing experimental data; |

K6	familiarity with a range of presentation techniques;
K7	an understanding of whether or not they have the ability, motivation and interest to pursue postgraduate training.

In addition, students achieving the award of MBiolSci will have acquired

K8	additional knowledge of recent research developments through attendance at the departmental research seminar programme;
K9	experience of carrying out an extended, laboratory-based research project.

Skills and other attributes: by the end of the course, students will have acquired

- S1** the ability to plan and manage their own learning, including time management skills and the ability to learn effectively from a range of resources, including lectures, textbooks, websites and the scientific literature;
- S2** competence in the use of relevant laboratory equipment and the ability to master, with appropriate training, new experimental techniques;
- S3** the ability to analyse and critically evaluate experimental data;
- S4** the ability to formulate hypotheses and design experiments to test these hypotheses effectively, including the design of appropriate controls;
- S5** skills in oral, written, numerical, graphical and visual presentations, such that essential aspects of both subjects can be effectively conveyed;
- S6** skills in searching for primary and secondary scientific literature relevant to a specific topic;
- S7** the ability to read and critically understand primary and secondary scientific literature relevant to both subjects;
- S8** the ability to work effectively as a member of a team.

In addition, students achieving the award of MBiolSci will have acquired

S9	the ability to organise and manage independent practical and literary project work to a professional standard.
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18. Teaching, learning and assessment

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

1. Lectures

Students in the molecular biosciences must acquire and critically understand a substantial body of knowledge (**K1**, **K2**). Much of this is conveyed through lectures, with lecture-based modules of 10 or 20 credits usually comprising 18 or 44 formal lectures, respectively, associated with 1-2 data analysis sessions (see 'Practical classes' below). Level 1 lectures are focussed on the development of a broad knowledge of the molecular biosciences (**K1**). This continues at Level 2, but students also acquire progressively more detailed and critical knowledge during Levels 2 and 3 (**K2**). MBiolSci students acquire additional advanced, research-led knowledge at Level 4 through attending departmental research seminars and a 'journal club' (**K8**). Students at all levels are expected to supplement each lecture with directed independent study (**S1**; see below). All lecture-based modules include optional questions designed to allow students to assess the development of their knowledge and understanding (programme aim 7).

2. Practical classes

At Levels 1 and 2, students take practical modules to the value of 30 and 20 credits, respectively, each year. These involve two 3-hour laboratory sessions each week. In addition, a 3-hour data analysis session each week is associated either with a practical module or with one of the lecture-based modules. The laboratory sessions develop students' knowledge of equipment and methods (**K4**, **K5**, **K6**), and their skills in laboratory work (**S2**), data analysis (**S3**), experimental design (**S4**) and the preparation of reports (**S5**). Laboratory work is typically carried out in pairs or small groups (**S8**). The data analysis sessions associated with practical and lecture-based modules provide further development of skills through a combination of instruction, discussion

and practice (**K5, S3**; also **S7** at Level 2). Laboratory and data analysis sessions are assessed, and feedback is provided on each session (programme aim 7).

At Level 3, students take a 10-credit data handling module, which develops data interpretation skills using a format similar to that of the data analysis sessions at Levels 1 and 2 (**K5, S3, S7**).

3. Project work

At Level 3, each student carries out a 20-credit practical project supervised by a member of staff. Students select their preferred options from a list of potential topics, and are then allocated one of their choices. A wide range of projects is offered, reflecting diverse career options, and including: laboratory work in one of the research groups in the Department or the School of Medicine; analysis of complex data sets gathered from large-scale research projects; development and delivery of science lessons in a local school; setting up and running a 'virtual' biotechnology enterprise; or development of computer-based teaching materials (**K4-7, S1-8**).

Students following the MBiolSci programme carry out a more extensive, laboratory-based research project at Level 4, either in one of the research groups in the Department or in industry. Both types of project allow more advanced and extensive understanding of research work (**K7, K9**) and development of the relevant skills (**S9**).

4. Literature reviews

At Level 3, each student takes a 10-credit module involving a search for scientific literature relevant to a specified topic (**K3, S6**) and the preparation of a critical review (**K6, S5, S7**). Students select several topics from a list of titles offered by potential supervisors, and are then allocated one of their choices. This exercise builds on skills in literature searching introduced in tutorials at Levels 1 and 2, and skills in the reading and understanding of scientific literature introduced in a practical module at Level 2 and particularly in the Level 3 data handling module.

Students following the MBiolSci programme use the same skills at Level 4 in the preparation of a literature relevant to the topic of the extended research project.

5. Tutorials

Small-group tutorials at Levels 1 and 2 develop students' ability to seek out subject-related information and present it orally or in handwritten or word-processed reports (**K3, K6, S5, S6**). Oral and written feedback is provided by tutors. Work prepared for some tutorials is assessed and contributes to the marks for practical modules (programme aim 7).

6. Independent study

In all modules and at all Levels, students are expected to carry out substantial amounts of independent study (**S1**). This includes directed reading, problem solving, and the completion of self-assessment questions (**K1, K2, K3, K5, K6, S1, S3, S6, S7**).

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

1. Formal examinations

Lecture-based modules are assessed by formal examinations (2 hours for 20-credit modules at Level 1, 1.5 hours or 2 hours for 10-credit modules at Levels 2 and 3, respectively). Formal examinations at all levels provide effective tests of knowledge (**K1, K2, S1, S5**; also **S7** at levels 2 and 3) and problem-solving skills (**S3, S4, S5**). Examination papers at levels 2 and 3 test students' critical understanding by challenging them to evaluate their knowledge and synthesise answers that reflect the specific ways in which questions have been framed (**K2**). Multiple-choice examinations are used at Level 1. Level 2 examinations combine compulsory, short-answer questions with a choice of essays, and Level 3 examinations provide a choice of essays.

Formal examinations are also used in the assessment of practical modules at levels 1 and 2, where they provide 40-50% of the overall assessment. A 1.5-hour multiple-choice examination is set for the 30-credit practical module at Level 1, and a 1.5-hour short-answer examination for each 10-credit practical module at Level 2.

The data handling module is assessed by a combination of formal examinations and coursework questions. Feedback is provided on the coursework.

2. Continuous assessment

50-60% of the overall assessment of each practical module is based upon laboratory records, answers to questions, formal laboratory reports, and written tutorial work (**K5, K6, S3, S4, S5, S8**). Up to 50% (but typically 0-20%) of the overall assessment in each lecture-based module comes from data analysis sessions and other

coursework. Laboratory and data analysis sessions are assessed, and feedback is given (programme aim 7).

3. Project assessment

Assessment of projects is based upon the student's performance in the practical work and upon oral and written reports (**K4, K5, K6, S1, S2, S3, S4, S5**). Literature reviews are assessed entirely on the basis of the report (**K3, K6, S6, S7**).

4. Level 4 research skills assessment

For students following the MBiolSci programme, attainment of the learning outcomes of the extended laboratory project and literature review at Level 4 is assessed according to criteria similar to those used for the Level 3 laboratory project and literature review (**K9, S9**). Assessment of the advanced, research-led knowledge acquired from departmental research seminars and 'journal club' sessions is based upon a series of short reports and abstracts (**K8**).

19. Reference points

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

The QAA subject benchmark statement for the biosciences (2007):

<http://www.qaa.ac.uk/Publications/InformationAndGuidance/Documents/Biosciences07.pdf>

The QAA framework document for higher education qualifications in England, Wales and Northern Ireland (2008):

<http://www.qaa.ac.uk/Publications/InformationAndGuidance/Documents/FHEQ08.pdf>

The learning and teaching strategy of the University of Sheffield (2011-2016):

<http://www.shef.ac.uk/lets/staff/lts>

20. Programme structure and regulations

The programme is modular and offered as full-time study only. Students register for modules to a total of 120 credits in each year of study.

Level 1

Modules to the value of 110 credits are core (compulsory), comprising four 20-credit lecture-based modules and one 30-credit practical module. In addition, students may choose between a 10-credit integrated science module and any other 10-credit module offered within the University. At the end of Level 1, students are free to transfer to any other undergraduate degree programme within the Department.

Level 2

All modules are core (compulsory), comprising ten 10-credit lecture-based modules and two 10-credit practical modules.

Level 3

Core modules comprise the 20-credit project and 10-credit literature review. An approved, 10-credit data handling module must be chosen in one of the subjects. Eight approved, 10-credit, lecture-based modules must be chosen, four in each subject from a wide range of options.

Level 4 (MBiolSci programme only)

Core modules comprise an 80-credit laboratory project, a 20-credit literature review and two 10-credit modules in research-related skills. Students may carry out the laboratory project in industry if they are successful in the competitive application procedure for one of the participating companies.

For the BSc, final degree classifications are based on aggregate marks of 33% for Level 2 and 67% for Level 3. For the MBiolSci, final degree classifications are based on aggregate marks of 20% for Level 2, 40% for Level 3 and 40% for Level 4.

Progression to Levels 3 and 4 of the MBiolSci programme is normally subject to a minimum overall mean grade of 60 at Level 2 and 65 in the Autumn of Level 3. MBiolSci students who fail to achieve these scores will normally transfer to the BSc programme.

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

21. Student development over the course of study

Level 1

This Level is designed to provide a broad theoretical and practical grounding in the molecular biosciences. By the end of this year, students will have:

- knowledge of relevant concepts, principles, equipment and methodologies;
- the ability to evaluate and interpret relevant data, both qualitative and quantitative;
- the ability to use a variety of methods to communicate relevant information cogently and analytically;
- the study skills to undertake further training at Level 2.

Level 2

This Level is designed to allow students to develop a more advanced appreciation of specific areas of the molecular biosciences. By the end of this year, students will have:

- deeper and more critical knowledge and understanding in specific areas;
- more advanced laboratory skills and knowledge of complex research equipment;
- the ability to identify and use primary and secondary literature relevant to a specific topic;
- more advanced skills in data interpretation and analysis;
- more advanced communication skills;
- the study skills to undertake further training at Level 3.

Level 3

This Level is designed to allow students to carry out critical, in depth study of selected areas of the molecular biosciences relevant to each subject, and to carry out practical project work, usually as a member of a group. By the end of this year, students will have:

- deep and critical knowledge and understanding of the latest developments in selected areas;
- skills in the planning, execution, evaluation and reporting of a practical project;
- well-developed skills in interpreting, evaluating and explaining relevant primary literature;
- well-developed communication skills;
- the study skills to undertake further training and life-long learning.

Level 4 (MBioSci only)

This Level is designed to provide further training specifically for students who intend to pursue a career in research. By the end of this year, students will have:

- understanding of some of the latest developments through research seminars and participation in a 'journal club';
- experience of an extended, individual laboratory project as a member of an active research group;
- a comprehensive understanding of the literature, approaches and techniques relevant to the project;
- a practical understanding of the role of creativity, originality and judgement in the execution of laboratory research;
- the skills necessary to undertake a career in research.

22. Criteria for admission to the programme

Detailed information regarding admission to the programme is available at <http://www.shef.ac.uk/prospective/>

23. Additional information

Further information about the Department, our staff, courses and admissions may be found on the web at: <http://www.shef.ac.uk/mbb/index.html>

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>.