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**	Biochemistry and Genetics with an Industrial Placement Year
2	**Programme Code**	MBBU109
3	**JACS Code**	C400
4	**Level of Study**	Undergraduate
5a	**Final Qualification**	Bachelor of Science with Honours (BSc Hons)
5b	**QAA FHEQ Level**	Level 6
6	**Intermediate Qualification(s)**	BSc
7	**Teaching Institution** (if not Sheffield)	Not applicable
8	**Faculty**	Science
9	**Department**	School of Biosciences
1 0	**Other Department(s) involved in teaching the programme**	Medical School
11	**Mode(s) of Attendance**	Full-time
12	**Duration of the Programme**	4 years
13	**Accrediting Professional or Statutory Body**	BSc: Accreditation from the Royal Society of Biology
14	**Date of production/revision**	July 2020, March 2023

15. Background to the programme and subject area

Biochemistry and Genetics are complementary members of the modern molecular biosciences. The aim of our programme in Biochemistry and Genetics is to allow students to study advanced aspects of both 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 four years with a BSc in Biochemistry and Genetics with an Industrial Placement Year 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.

External reviews of The Department of Molecular Biology and Biotechnology in 2008 and 2013 recognised our excellence in teaching, building on a maximum score of 24 out of 24 in the national Teaching Quality Audit Subject Review in 1999. We also have an international reputation for research; in 2014, in a joint submission with other bioscience departments in Sheffield, we were ranked first in the national Research Excellence Framework for Subjects Allied to Medicine, and fifth 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 been refurbished to a very high standard at a cost of more than £23M.

During Level 2 students are expected to find a placement, which involves spending a year between Levels 2 and 3 in paid work for a graduate-level employer. The completion of these degrees is conditional on students being accepted onto an appropriate placement. If they do not find such a placement, they will have to transfer onto a degree programme without a Placement Year (e.g. we expect BSc students typically to transfer to the MBBU01). They will be supported by the MBB department, faculty and the Careers Service to help them find a placement, but we cannot guarantee success.

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

Consonant with the University of Sheffield's Mission Statement, this programme aims to:

1. 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 and encourages academic excellence;
2. provide a broad understanding of the molecular biosciences together with more detailed and critical knowledge in selected areas;
3. equip graduates with well-developed practical, analytical, communication, IT and problem-solving skills;
4. 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. provide a stimulating educational experience that prepares students for future employment and is orientated towards a professional career in the molecular biosciences;
6. encourage students to become informed citizens and understand the place of the molecular biosciences in society;
7. provide a broad understanding of Biochemistry and Genetics together with more detailed and critical knowledge in selected areas of the subject;
8. provide a broad understanding of the chemistry that underpins the study of molecular biosciences;
9. to help students secure a placement, where they spend a year gaining valuable and relevant work experience, which will help them develop awareness of the workplace, develop key transferable skills and secure a rewarding career on graduation.

17. Programme learning outcomes

Knowledge and understanding: by the end of the course, students should be able to:	
K1	demonstrate a broad-based knowledge and understanding of the core facts, concepts, and terminology across the molecular biosciences.
K2	demonstrate detailed and critical knowledge (including of the most recent advances) in selected areas relevant to Biochemistry and Genetics.
K3	demonstrate a practical understanding of the nature of scientific knowledge and its development in the light of continuing scientific advances.
K4	experience completing an undergraduate level year long work placement.

Skills and other attributes: by the end of the course, students will have acquired:	
S1	investigate scientific questions by formulating hypotheses and designing experiments to test them effectively, including appropriate controls and drawing on an understanding of research ethics.
S2	competently and safely use relevant laboratory equipment; master, with appropriate training, new experimental techniques; demonstrate a theoretical knowledge of how some more advanced methods would be used; and keep accurate experimental records.
S3	analyse and critically evaluate experimental data, including the use of appropriate statistical methods.
S4	present scientific ideas in oral, written, numerical, graphical and visual presentations, to a specialist or a lay audience.
S5	search for, critically evaluate, and reference appropriate primary and secondary scientific literature relevant to Biochemistry and Genetics.
S6	plan and manage their own work, including managing their own time and using a range of resources (including lectures, textbooks, websites and the scientific literature) appropriately.
S7	work effectively and flexibly with a range of colleagues in a collaborative and reflective manner, making good use of feedback.
S8	consider scientific knowledge as it relates to wider society, and apply it creatively to a range of problems.
S9	reflect on and articulate their own skills and interests, and relate these to their career aspirations (including motivation for and interest in postgraduate study).

S10	develop and use appropriate IT skills in analysing data, accessing information and preparing all types of presentations.
S11	have demonstrated professionalism or commercial awareness within a workplace environment.
S12	be able to apply appropriate knowledge and skills from their course of study in a workplace environment.
S13	be able to identify factors influencing organisational practice in their workplace.

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, K3**). 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 at levels 1 and 2 (see 'Practical classes' below). Level 1 lectures are focussed on the development of a broad knowledge of the molecular biosciences. This continues at Level 2, but students also acquire progressively more detailed and critical knowledge during Levels 2 and 3. Students at all Levels are expected to supplement each lecture with directed independent study (**S5, S6**; see below). All lecture-based modules include optional questions designed to allow students to assess the development of their knowledge and understanding (**S6**).

2. Practical classes
At Levels 1 and 2, students take practical modules to the value of 30 credits 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 (**K1**), and their skills in laboratory work (**S2**), data analysis (**S3, S10**), experimental design (**K3**, **S1**) and the preparation of reports (**S4, S10**). Laboratory work is typically carried out in pairs or small groups (**S7**). The data analysis sessions associated with practical and lecture-based modules provide further development of skills through a combination of instruction, discussion and practice (**K1**, **K3, S1, S3**; also **S5, S10** at Level 2). Laboratory and data analysis sessions are assessed, and feedback is provided on each session (**S7**).

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 (**K2, K3, S1, S3, S5, S10**).

3. Project work
At Level 3, each student carries out a 30-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; clinical diagnostics; development and delivery of science lessons in a local school; or creation and evaluation of a portfolio on a biological topic of ethical and political significance. (**K1**,**K2, K3, S1-10**).

4. Literature reviews
At Level 3, each student takes a 10-credit module involving a search for scientific literature relevant to a specified topic (**K1**, **K2, K3, S5, S10**) and the preparation of a critical review (**S4**, **S5**, **S6, S10**). 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.

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 (**K1**, **K2, K3, S4**, **S5**, **S6, S8, S10**). Oral and written feedback is provided by tutors. Work prepared for some tutorials is assessed (**S6**) and contributes to the marks for practical modules. Personal development tutorials help students prepare for life after graduation including reflection on how their skills and interests relate to career aspirations (**S9**).

6. Independent study
In all modules and at all Levels, students are expected to carry out substantial amounts of independent study (**S5, S6, S9, S10**). This includes directed reading, problem solving, and the completion of self-assessment questions.

7. Industrial Placement
Year 3 is spent in industry. This provides students with workplace experience, consolidates the knowledge gained during their academic studies in Levels 1 and 2, and enhances their understanding of how to apply this in practice (**K4, S11-13**).

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 10-credit and 20-credit modules at Level 3 and Level 2, respectively; and an exam in each semester (1 hour Autumn, 1.5 hour, Spring) for 20-credit modules at Level 1). Formal examinations at all Levels provide effective tests of knowledge (**K1**, **K2, S5**) and problem-solving skills (**K3, S1**, **S3**). 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 (**S4, S10**). 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, with some modules combining compulsory short answer questions with a choice of essays.

Formal examinations also contribute to the assessment of practical modules at Levels 1 and 2 (**K1,K3, S1, S3, S10**), where they provide 40-50% of the overall assessment. A multiple-choice examination is set for the 30-credit practical module at Level 1, and a short-answer examination for the 30-credit practical module at Level 2.

The data handling module at Level 3 is assessed in two formal examinations, one of compulsory data handling questions (**K2, S1, S3, S5, S10**) and the other comprising a choice of synoptic essay questions (**K3, S4, S8, S9**).

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 (**K1,K2, K3, S1, S2, S3, S4**, **S5, S8, S9, S10**). Up to 50% (but typically 0-20%) of the overall assessment in each lecture-based module comes from data analysis sessions and other coursework. Some laboratory and data analysis sessions are assessed, and feedback is given (**S7).**

3. Project assessment
Assessment of projects is based upon the student's performance in the practical work and upon oral and written reports (**K1, K3, S1-S10**). Literature reviews are assessed entirely on the basis of the report (**K1**, **K2, K3, S1**, **S3, S4, S5, S6, S10**).

4. Placement Year Assessment
The placement year is assessed through submission of a report describing what they have learned and achieved throughout the year **(S10-13).**

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

Learning and Teaching Strategy (2016-21)
https://www.sheffield.ac.uk/polopoly_fs/1.661828!/file/FinalStrategy.pdf

Learned Society recommendations
https://www.rsb.org.uk/images/RSB_Subject_Specific_Learning_Outcomes.pdf
https://www.rsb.org.uk/images/Appendix_1_RSB_Additional_Subject_Specific_Guidance__Biochemistry.pdf

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 introductory maths module (where appropriate) 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
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 choose between a 10-credit enterprise module, a 10-credit module on the history and philosophy of molecular bioscience, and any other 10-credit module offered within the University. At the end of Level 2, students are free to transfer to any one of a small number of related degree programmes within the Department.

Year 3 – Placement Year

Students who fail to secure a Placement will have to transfer to one of the non-Placement programmes offered by MBB. Those who undertake the Placement will submit a Placement Report, which must demonstrate skills obtained during the Placement in order for the student to pass the year.

Level 3 (Year 4)
Core modules comprise the 30-credit project and 10-credit literature review. An approved, 10-credit data handling module must be chosen in one of the subjects. Seven approved, 10-credit, lecture-based modules must be chosen, four in one subject and three in the other, from a wide range of options.

The BSc final degree classifications are based on aggregate marks of 33% for Level 2 and 67% for Level 3.

A pass must be achieved in the Research Project module, MBB380, for an accredited degree to be awarded.

Students on the BSc programme may transfer at the end of L3 Semester 1 to the MBiolSci if they have achieved a mark of at least 59.5 at both Level 2 and in the Autumn of Level 3.

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

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.

Year 3 – Placement Year
During the Placement Year, students will gain key employability skills (S11-13), which they have to demonstrate in their Placement Report.

Level 3 (Year 4)
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.

22. Criteria for admission to the programme

Detailed information regarding admission to the programme is available at https://www.sheffield.ac.uk/study

23. Additional information

Further information about the Department, our staff, courses and admissions may be found on the web at: https://www.sheffield.ac.uk/mbb

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.