1	**Awarding Institution**	University of Newcastle upon Tyne
2	**Teaching Institution**	University of Newcastle upon Tyne
3	**Final Award**	BSc (Hons)
4	**Programme title**	Biochemistry, Biochemistry with Biotechnology Biochemistry with Immunology, Molecular Biology
5	**Programme Accredited by**:	N/A
6	**UCAS Code**	C700, C7C9, C7C5, C720
7	**QAA Subject Benchmarking Group(s)**	Bioscience
8	**Date of production/revision**	November 2004

9. Programme Aims:

The academic aims of the programme are as follows:

- To produce graduates who have a core knowledge and understanding in the subject areas of Physiology, Biochemistry, Molecular Genetics, Immunology, Microbiology and Pharmacology
- To produce graduates who have a sound knowledge and understanding of their subject specialism.
- To develop student's intellectual and general transferable (key) skills including the ability to communicate effectively, to use IT and library resources appropriately, to prioritise work and to meet deadlines, to work alone and with others, to use initiative and solve problems, to use critical and analytical skills to analyse problems, propose solutions and critically to assess alternatives
- To produce graduates who have well developed practical skills in relation to the biosciences, have an awareness of good practice in laboratory work and health and safety, and are able to apply quantitative and qualitative analysis to biological investigations and presentational skills including data analysis and statistics
- To produce Honours graduates who are capable of carrying out research.
- To provide a flexible programme which leads to a qualification which meets the criteria for an Honours degree laid down in the QAA's National Qualifications Framework and which fully meets the Quality Assurance Agency Benchmarking Statement in Biosciences
- To produce graduates capable of working in a wide variety of careers, including careers in biomedical and related sciences in research, development and education, careers in which there is greater emphasis on non-subject specific skills, and for more advanced study.

Aims in relation to the needs of stakeholders:

The programme aims to ensure that our graduates are equipped with up to date knowledge and skills in relation to their degree subjects, in line with the needs of employers of bioscientists. The emphasis on development of intellectual and transferable skills ensures that our graduates are also well equipped for the broader non-specialist graduate job market. The inclusion of vocationally-related components and emphasis on career development throughout the programme also ensures the employability of our students

10(a) Programme Intended Learning Outcomes:

A Knowledge and understanding

Graduates will have
1. Gained a core knowledge and understanding of their subject specialism and a variety of related disciplines.
2. Gained knowledge of the scope of the subject specialism.
3. Gained an in-depth knowledge of selected areas of their disciplines up to the current research level and developed an understanding of the experimental basis of this knowledge.

B Subject-specific/professional skills

Graduates will have
1. Mastered essentials of basic laboratory skills, safe working practices and the ability to carry out experiments accurately and responsibly.
2. The ability to obtain, record, collate, analyse and interpret data from experiments.
3. The ability to summarise and present such data according to scientific conventions.
4. Developed the ability to use primary literature and bibliographic databases.
5. Developed the ability to evaluate critically scientific information.
6. Developed the ability to undertake in-depth research in relation their subject specialism.

C Cognitive skills

Graduates will have
1. An ability to read and use scientific literature with a full and critical understanding, addressing content, context, aims, objectives quality of information and its interpretation and application.
2. An ability to critically evaluate information and data from a variety of sources, to interpret quantitatively and qualitatively scientific information, and to explain complex scientific ideas in written, visual and oral form.
3. An ability to assess the value and limitations of existing knowledge and experimental techniques.
4. An ability to use and integrate several lines of evidence to formulate key hypotheses, to test hypotheses using logical and consistent quantitative and qualitative arguments, and to identify key data in these processes.
5. Developed skills of independent learning.

D Key (transferable) skills

Graduates will have
1. Study skills of reading, noting, recall and essay/report writing.
2. Gained competence in the use of IT skills including e-mail, word processing, spreadsheets, presentation software, use of the Internet and on-line library facilities.
3. Developed the ability to work independently.
4. Developed interpersonal skills, including team-working.
5. Developed the ability to plan, organise and prioritise work activities.
6. Developed skills of written, oral and visual presentation.
7. Developed the ability to develop and work towards targets for personal, academic and career development.

10(b) Programme Intended Learning Outcomes: **Teaching and Learning Methods and Strategies**

A Knowledge and Understanding

The programme provides opportunities for students progressively to develop their knowledge and understanding such that graduates will have:

1. Gained a core knowledge and understanding of their subject specialism and a variety of related disciplines.
2. Gained knowledge of the scope of the subject specialism.
3. Gained an in-depth knowledge of selected areas of their disciplines up to the current research level and developed an understanding of the experimental basis of this knowledge.

Teaching Strategy

The teaching and learning strategy is designed to encourage a progressive acquisition of knowledge and understanding. The first three semesters of the programme are concerned with providing core knowledge and understanding of the subject specialism. The second half of the programme aims to develop students' knowledge of the breadth and scope of their subject specialism and an in depth knowledge of selected areas of their disciplines and of the experimental basis of this knowledge up to the current research level (A2, A3).There is a gradual change of emphasis over the three years from strongly supported teaching, such as lectures which provide the core themes, the scope of the knowledge and understanding required, and explanation of concepts to a greater use of study groups and more independent self-directed learning from the scientific literature. Knowledge and understanding are further promoted by seminars, tutorials and coursework (A1, A2, A3), which allow students to explore material in more depth and to exchange ideas with staff and fellow students. Practical classes reinforce the taught curriculum (A1, A2). A3 is promoted through individual student projects and in-depth analysis of current research literature.

Learning Strategy

Students are provided with extensive, prioritised reading lists and Internet sites and they are expected to use these to supplement the taught material, and to prepare for seminars and tutorials. Seminars allow for students to check their knowledge and understanding, and to develop their ability to apply this to novel situations. Study groups are used to reinforce the learning process and develop students as independent learners. Regular MCQ tests and feedback on laboratory reports and essays enable students to monitor the progress of their learning and understanding.

B Subject-specific/professional skills

The programme provides opportunities for students progressively to develop their knowledge and understanding such that graduates will have:

1. Mastered essentials of basic laboratory skills, safe working practices and the ability to carry out experiments accurately and responsibly.
2. The ability to obtain, record, collate, analyse and interpret data from experiments.
3. The ability to summarise and present such data according to scientific conventions.
4. Developed the ability to use primary literature and bibliographic databases.
5. Developed the ability to evaluate critically scientific information.
6. Developed the ability to undertake in-depth research in relation their subject specialism.

Teaching Strategy

The core experimental skills of laboratory work and data handling (B1, B2 and B3) are progressively developed throughout the programme through a series of practical classes. Students are introduced at Stage 1 to a Laboratory Code of Practice, where safety and responsibility in the laboratory are outlined. Students who so wish are provided with an opportunity to develop these skills further and design and execute their own experiments through an individual laboratory research project in final year. Students are provided in their second year with training in the

use of bibliographic databases including Medline. Laboratory practical classes and seminars throughout the programme encourage students to evaluate critically scientific information in a range of forms (data from their own experiments, published papers and problem-solving tasks). The ability to undertake research in relation to the subject specialism is developed progressively from group-based tasks early in the programme to individual in depth research projects in the final year.

Learning Strategy

Attendance at laboratory practical classes is compulsory and feedback on laboratory work and practical reports reinforces students' acquisition of basic experimental skills (B1, B2 and B3). All submitted practical work must be presented according to scientific conventions. Practical classes are supported by postgraduate demonstrators who undergo compulsory training. Feedback on assessed course work requiring the student to search bibliographic databases reinforces this skill (B4). Study Group tasks and seminars are used to encourage students to develop the confidence to evaluate critically scientific information and students are provided with feedback on these activities (B5). Feedback on study group-based and individual assignments enables students to improve their research skills and this is further reinforced at an advanced level by one-to-one supervision of research projects by academic staff who are experienced researchers.

C Cognitive skills

The programme provides opportunities for students to develop their cognitive skills such that graduates will have:

1. An ability to read and use scientific literature with a full and critical understanding, addressing content, context, aims, objectives quality of information and its interpretation and application.
2. An ability to critically evaluate information and data from a variety of sources, to interpret quantitatively and qualitatively scientific information, and to explain complex scientific ideas in written, visual and oral form.
3. An ability to assess the value and limitations of existing knowledge and experimental techniques.
4. An ability to use and integrate several lines of evidence to formulate key hypotheses, to test hypotheses using logical and consistent quantitative and qualitative arguments, and to identify key data in these processes.
5. Developed skills of independent learning.

Teaching Strategy

Cognitive skills (C1-5) are progressively developed throughout the programme by practical work, study group tasks, seminar work and the research project.

Learning Strategy

At all stages students are encouraged to consider critically and evaluate information and experimental data from a wide variety of sources, including textbooks, the internet, and primary sources of scientific literature (C1-C5). In Stage 3 students undertake a research project which requires them to analyse experimental data or alternative forms of information, and one-to-one supervision and feedback supports learning throughout the project. In seminar discussions students are supported in critically interpreting and discussing some of the latest scientific developments in relation to their subject with experts in the various fields of research (C1-C5).

D Key (transferable) skills

The programme provides opportunities for students to develop their key (transferable) skills such that graduates will have:

1. Study skills of reading, noting, recall and essay/report writing.
2. Gained competence in the use of IT skills including e-mail, word processing, spreadsheets, presentation software, use of the Internet and on-line library facilities.
3. Developed the ability to work independently.
4. Developed interpersonal skills, including team-working.

5. Developed the ability to plan, organise and prioritise work activities.
6. Developed skills of written, oral and visual presentation.
7. Developed the ability to develop and work towards targets for personal, academic and career development.

Teaching Strategy

Skills of reading, noting, recall and essay/report writing (D1) are developed through study skills support sessions, and tasks included directed reading and essays on which formative assessment is provided. Skills in the use of IT (D2) are developed through classes at various stages throughout the course and practised in a wide range of coursework. Skills of independent working (D3) are progressively developed by assignments throughout the programme. Students are initially encouraged to learn through group-based tasks and then through individual assignments culminating in the research project. Planning, organising and prioritising (D5) are developed through study skills support sessions and the project. The skills of written, oral and visual communication are developed in seminars and in the research project (D6). Interpersonal skills (D4) are developed through study group work, teamworking exercises, seminars and the research project. The ability to develop and work towards targets for personal, academic and career development is developed through a programme of Career Management sessions.

Learning Strategy

Students are encouraged to explore with their personal tutor the development of their study skills (D1) and, where appropriate, additional counselling with the Faculty Study Skills Adviser is arranged. Students are provided with feedback on tasks requiring the use of IT skills (D2). Students are encouraged to reflect on their team-working skills and feedback on these are provided by peer-assessment of group tasks. Skills of panning, organising and prioritising are developed by a progressively more complex series of assignments, culminating in the research project. Students are encouraged to reflect of these skills and individual support is available from personal tutors and the research project supervisor. Students are enabled to monitor the development of their written, oral and visual presentational skills by feedback from peer and teachers on various assignments. Students are encouraged to discuss their personal goals with their tutors. All students are required to prepare and obtain feedback on a curriculum vitae in their second year. Students are encouraged to undertake appropriate work placements to explore further their career goals.

10(c) Programme Intended Learning Outcomes: **Assessment Strategy and Methods**

A Knowledge and understanding

For all modules, knowledge and understanding are assessed via both an unseen written examination and coursework. The weighting of examination and coursework varies as appropriate to the module and most modules include some aspect of formative assessment (including the use of Blackboard and interactive computer packages created in house).

The format of the unseen examination also varies as appropriate to the module and the level of study but can include, Extended Matching Item (EMI) and multiple choice questions (MCQ), essays, problem solving, literature and data analysis.

The coursework element can include, practical write ups/laboratory reports, study group tasks, oral presentations, posters, in course tests (normally EMI or MCQ), extended essays, timed essays.

Peer review is sometimes employed in the assessment of study group tasks and presentations.
At stage 3 students are required to complete a research project which can be laboratory or library based. The project is assessed via a written dissertation, oral presentation, viva and poster presentation.

Some stage 3 students will be given a viva by the External Examiner(s).

B Subject-specific/professional skills

Practical reports require students to demonstrate the skills associated with experimental work (B1-3), and these are further assessed at advanced level by the project supervisor's assessment of the student's competence, and the project report, poster and oral presentation. Written assignments throughout the course will assess students' ability to undertake research and to use bibliographic databases (B4, B6) and this is further assessed in the project report. The ability to evaluate critically scientific information (B5) is assessed by various written assignments and seminar presentations, by the project report and by unseen examination.

C Cognitive skills

Cognitive skills are assessed via a range of coursework assignments including written exercises, seminar presentations and study group tasks. Unseen examinations further test the students' cognitive skills. The research project has an important role in assessing all of the cognitive skills, including the ability to use scientific literature in a critical manner (C1), the ability to evaluate, interpret and explain complex information from a range of sources (C2), assessing the limitations of existing knowledge (C3), integrating several lines of evidence and testing hypotheses (C4) and the skills of independent learning (C5).

D Key (transferable) skills

D1 to D7 are all assessed via coursework e.g. study group tasks, posters, oral presentations, and essays. An assessment schedule including deadlines is set for all modules and students are penalised for late submission of work (D5). The project has a key role is assessment of all of these skills including report-writing (D1), oral and poster presentation (D5) and IT skills including advanced word processing and the use of PowerPoint (D2). The project supervisor is asked to assess students' inter-personal skills (D4) and skills of planning and organisation (D5).

11 Programme Features:

Duration of course: 3 years full time based on 30 weeks attendance per annum.
Number of stages: 3
Total credits: 360
Module credits: range from 10 to 30; each 10 credits represents 100 hours of study
Requirements for progression: passing all compulsory modules and gaining appropriate overall number of credits.

Stage 1 provides a multi-disciplinary foundation covering a range of related biosciences, including Biochemistry, Cell Biology, Genetics, Immunology, Microbiology, Physiology, and Pharmacology. At this stage students gain an appreciation of each of these specialisms and at the end of Stage 1 students may opt to transfer to another Bioscience programme if they so wish. At stage 1 students are also introduced to laboratory skills and information and communications technologies.

Stage 2 semester 1 builds on stage 1 and provides a students with a deeper knowledge of Molecular Medicine and Cell and Molecular Biosciences. The course focuses on the technologies that underpin our current understanding in these areas, and provides students with hands-on experience of a range of modern molecular techniques. The course also explores how bioinformatics helps make sense of the ever-increasing amount of biological data. Cell Biology is studied in greater depth, particularly in relation to membrane transport and signalling and the cell and molecular biology of the immune system. Emphasis throughout is on how knowledge of these areas can help in the understanding of human biology and disease.

Stage 2 semester 2 provides greater specialisation. All four degree courses focus on protein structure and folding, interactions between enzymes and substrates, the role of molecular chaperones in protein trafficking, post-translational modifications in cellular trafficking, DNA replication, repair and recombination.
Biochemistry, Biochemistry with Biotechnology, and Biochemistry with Immunology also covers the kinetic parameters of enzyme catalysis.
Biochemistry and Biochemistry with Biotechnology also covers xenobiotic metabolism. The course describes how foreign compounds (xenobiotics) are handled in the body, the factors that influence this process and how xenobiotic metabolism is studied experimentally.
Biochemistry with Immunology also covers the immune system in human disease. The course describes the causes and consequences of immunodeficiency, the mechanisms by which self-tolerance is achieved and how autoimmune diseases might arise, explains how qualitative regulation of immune responses is important in determining the outcome in infectious, describes allergic and autoimmune diseases, describes the role of the immune system in cancer, tissue transplantation and in pregnancy. describes the way in which the immune responses can be modulated to the benefit of the host in a range of disease situations and the various ways in which immune function can be assessed.
Molecular Biology also covers phylogeny and human evolution, the genetics of the cell cycle. The course provides an overview of how DNA and protein sequences are used to infer relationships between organisms and students are shown how this methodology has been used to improve our understanding of modern human origins, the evolution of the human genome, and the evolution of human pathogens including the AIDS virus. The course provides a basic introduction to genetic studies of yeast and in particular shows how this has been applied to the analyses of the cell division cycle. The course provides the opportunity for practical experience in common techniques for the manipulation of yeast.

At stage 2 students are introduced to research skills, and other important skills including data handling, presentation skills and team-working.

At **Stage 3** students further develop their research skills as they undertake a research project linked to a research group. In all four degrees there is as an optional vocational module relating either to Research, or Education and Communication. In Biochemistry, Biochemistry with Immunology and Molecular Biology there is a third optional module in Business for the bioscientist which is compulsory to Biochemistry with Biotechnology.
Biochemistry, Biochemistry with Biotechnology and Molecular Biology cover protein DNA interactions, molecular and animal biotechnology.
Biochemistry, Biochemistry with Immunology and Molecular Biology examine the biochemistry of chronic diseases, cancer and gene therapy and protein engineering.
Biochemistry with Biotechnology specifically covers microbial production of proteins and industrial applications of micro-organisms.
Biochemistry with Immunology specifically covers immunity and infection.

They also further develop their skills of experimental design and critical analysis of scientific data, as well as presentation and CIT skills.

Special features of the course:
A major strength of the programme is the close linkage between teaching and research. Virtually all teaching staff are also research active and teach in areas relating to their particular expertise. Final year research projects provide an important opportunity for students to experience at first hand working in a research environment.

The programme also places a strong emphasis on employability of its graduates. Students are encouraged to undertake a 4-week work placement in the vacation at the end of stage 2. This may involve either laboratory work or other areas of interest (e.g. science communication). Students who are interested in management careers are encouraged to attend the CRAC Insight into Management Course. The School provides financial support to help students undertake these activities. Students are encouraged to choose a final year project in accordance with their particular vocational aspirations, and may either do a laboratory-based research project in one of our top-rated research laboratories, a literature-based research project on a

subject of their choosing, or a project designed to develop other skills e.g. an IT based project or a project involving working with teachers in schools. A final year option Business for the Bioscientist (compulsory for the Biochemistry with Biotechnology) allows students to gain an understanding of business issues relating to the pharmaceutical and biotechnology industries..

Within the final year programme the regulations allow for flexibility so that students may, by agreement of the degree Programme Director, undertake a research project outside of the university with an approved partner either in this country of abroad.

Links between learning outcomes, curriculum and structure of the programme

Section 11 (b) shows the modules that comprise this degree programme. Further detail can be seen in the module outline forms, which also show how the modules contribute to development of skills throughout the programme. Superimposed on the modules, there is a key skills strand running throughout the three Stages of the programme that introduces students to library skills, CIT, communication and presentation skills and careers management.

The curriculum is designed to allow systematic progression of students towards the programme's learning outcomes. Knowledge and understanding is progressively developed as students move from a broad overview of their subjects at stage 1 to a much more specialised and detailed understanding at stages 2 and 3. Practical techniques are also progressively developed through the course as students progress from competence in basic laboratory skills to the use of sophisticated laboratory techniques. Cognitive and intellectual skills also develop from simple problem-solving exercises at stage 1 to more complex data handling and experimental design and data analysis at stage 2, culminating in the Integrated module and research project at stage 3 that requires students to develop a highly critical approach to the scientific literature. Key skills are also progressively developed, being first introduced to the students (e.g. in a formal lecture or workshop session) and then practised and assessed in subsequent modules.

Thus, stage 1 provides a firm grounding in the basic sciences underpinning the disciplines. By the end of this Stage the students will have:

- gained basic knowledge and understanding of subject specialisms within Biochemistry, Biochemistry with Biotechnology, Biochemistry with Immunology and Molecular Biology and a variety of related disciplines (A1)
- been introduced to basic laboratory skills, safe working practices and recording and interpretation of experimental results (B1-3)
- developed skills of independent learning (C5)
- developed study skills of reading, noting and recall (D1)
- been introduced to e-mail, word processing, library facilities and use of the Internet (D2)

At stage 2 the course gives a broad overview of subject material considered essential to the subject of Biochemistry, Biochemistry with Biotechnology, Biochemistry with Immunology and Molecular Biology and starts to introduce the research basis of the acquired knowledge. By the end of this Stage students will have:

- developed further, at the level presented in undergraduate text books, knowledge and understanding of the major areas that are the ‘core’ of their disciplines (A2)
- experienced use of primary literature (B4)
- mastered essential elements of relevant laboratory techniques and safe laboratory practice and developed the ability to write laboratory reports (B1-3)
- started to develop the ability to evaluate critically scientific information (B5) and to undertake research (B6)
- continued the development of transferable (key) skills, including the ability to use computers for information retrieval and data handling (D2, B4)
- been introduced to skills of scientific essay writing (D1) and oral and visual communication (D6)
- improved cognitive skills of reasoning, analysis of scientific literature, critical evaluation and the

ability to apply their knowledge in problem-solving (C1-4)
- developed further skills of independent learning (C5)
- developed inter-personal and team-working skills through collaborative work (D4)

At stage 3 a higher level of specialisation is achieved with students being able to choose between different areas of interest in relation to their project (40 credits) and 10 credit option module. By the end of this Stage the students will have:

- through core and optional modules, extended their knowledge and understanding of the curriculum up to the current research level and developed an understanding of the experimental basis of this knowledge (A3)
- had the opportunity either to learn the principles of experimental design and execution using current research methods in the environment of an active research laboratory or have acquired research and analysis skills through a non-laboratory-based project (B6)
- be fully competent in the use of primary literature and bibliographic databases, and have an improved ability to evaluate critically scientific information (B4-5)
- the ability to make oral and visual presentation of scientific data and knowledge (D3)
- developed skills of critical evaluation of scientific information (B3)
- had further opportunities to practise a variety of transferable (key) skills that will be valuable for a range of employment opportunities.
- produced project work that demonstrates a range of skills including report-writing (D1), IT skills (D2), independent working (D3), inter-personal skills (D4), planning, organising and prioritising (D5), presentation skills (D6), in-depth knowledge of selected areas (A3), the ability to use primary literature, to evaluate critically scientific information and the ability to undertake in-depth research (B4-6), and cognitive skills C1-4

The fact that virtually all teachers on the course are research active and teach in areas closely related to their specialism ensures that the curriculum content is kept up-to-date and the links between scholarship and research are explicit. This is given further emphasis in the final year research project. Furthermore, the continued participation of teaching staff in professional development programmes ensures that delivery of teaching is informed by up-to-date practice. The strong research base in the School (RAE 2001 : 5*/5) ensures that the most modern equipment is available to undergraduate students for their practical work. Involvement of teaching staff for the programme on committees of national professional bodies helps to ensure that the programme continues to be informed by external developments.

11(b) Curriculum and Structure

Biochemistry

				Intended Learning outcomes			
	Module title	**Credits**	**Type**	**A**	**B**	**C**	**D**
Stage 1							
BGM101	Biochemistry	20	Core	1	1,2.3	5	1,2,3
CMB100	Cell Biology	20	Com	1	1,2.3	5	1,2,3
BGM103	Genetics	20	Com	1	1,2.3	5	1,2,3
PED102	Pharmacology	20	Com	1	1,2.3	5	1,2,3
PSC101	Physiology	20	Com	1	1,2.3	5	1,2,3
CMB101	Microbiology &Immunology	20	Com	1	1,2.3	5	1,2,3
Stage 2							
CMB200	Molecular Medicine	30	Com	1	1,2,3	1,2,3,4,5	1,2,3,4
CMB201	Cell&Molecular Biosciences	30	Com	1	1,2,3	1,2,3,4,5	1,2,3,4
BGM255	Proteins:Form, Function and Trafficking	30	Com	1,2,3	1,2,3,4,5,6	1,2,3,4,5	1,3,5,6
BGM237	Biochemistry & Drug Targets	30	Com	1,2	1,2,3	1,2,3,5	1,2,3,5,6
Stage 3							
CMB300	Project	40	Com	3	1,2,3,4,5,6	1,2,3,4,5	1,2,3,4,5,6,7
BGM301	Biochemistry of Chronic Diseases	10	Com	1,2,3	4,5,6	1,2,3,4,5	1,3,5,6,7
BGM305	Protein Engineering	10	Com	3	4	2,3,4,5	1,2,6
BGM309	Protein DNA Interactions	10	Com	2,3	4,5,6	1,2,3,4,5	1,2,3,4,5,6
BGM324	Cancer & Gene Therapy	10	Com	2,3	4,5,6	1,2,3,4,5	1,2,3,4,5,6
BGM337	Molecular Biotechnology	10	Com	1,2,3		1,5	1,2,3
BGM338	Animal Biotechnology	10	Com	2,3	4,5,6	1,2,3,4,5	1,2,3,4,5,6
BGM346	Research in Biochemistry and Genetics	10	Opt	1,3	2,4,5	2,4,5	1,2,3,7
BGM347	Integrated Biochemistry and Genetics	30	Com	2,3	4,5,6	1,2,3,4,5	1,2,3,4,5,6
EDU930	Student Tutoring (Students into Schools)	10	Opt				3,4,5,6,7

**Candidates must select one 10 credit optional module*

11(b) Curriculum and Structure

Biochemistry with Biotechnology

				Intended Learning outcomes			
	Module title	**Credits**	**Type**	**A**	**B**	**C**	**D**
Stage 1							
BGM101	Biochemistry	20	Core	1	1,2.3	5	1,2,3
CMB100	Cell Biology	20	Com	1	1,2.3	5	1,2,3
BGM103	Genetics	20	Com	1	1,2.3	5	1,2,3
PED102	Pharmacology	20	Com	1	1,2.3	5	1,2,3
PSC101	Physiology	20	Com	1	1,2.3	5	1,2,3
CMB101	Microbiology &Immunology	20	Com	1	1,2.3	5	1,2,3
Stage 2							
CMB200	Molecular Medicine	30	Com	1	1,2,3	1,2,3,4,5	1,2,3,4
CMB201	Cell&Molecular Biosciences	30	Com	1	1,2,3	1,2,3,4,5	1,2,3,4
BGM255	Proteins:Form, Function and Trafficking	30	Com	1,2,3	1,2,3,4,5,6	1,2,3,4,5	1,3,5,6
BGM237	Biochemistry & Drug Targets	30	Com	1,2	1,2,3	1,2,3,5	1,2,3,5,6
Stage 3							
CMB300	Project	40	Com	3	1,2,3,4,5,6	1,2,3,4,5	1,2,3,4,5,6,7
BGM309	Protein DNA Interactions	10	Com	2,3	4,5,6	1,2,3,4,5	1,2,3,4,5,6
BGM337	Molecular Biotechnology	10	Com	1,2,3		1,5	1,2,3
BGM338	Animal Biotechnology	10	Com	2,3	4,5,6	1,2,3,4,5	1,2,3,4,5,6
BGM346	Research in Biochemistry and Genetics	10	Opt	1,3	2,4,5	2,4,5	1,2,3,7
BGM347	Integrated Biochemistry and Genetics	30	Com	2,3	4,5,6	1,2,3,4,5	1,2,3,4,5,6
BMS303	Business for the Bioscientist	10	Com	3	4,5	1,2,3,4,	6
MIC337	Microbial production of proteins	10	Com	2,3	4,5,6	1,2,3,5	1,3,6
MIC338	Industrial applications of micro-organisms	10	Com	2,3	4,5,6	1,2,3,5	1,3,6
EDU930	Student Tutoring (Students into Schools)	10	Opt				3,4,5,6,7

**Candidates must select one 10 credit optional module*

11(b) Curriculum and Structure

Biochemistry with Immunology

				Intended Learning outcomes			
	Module title	**Credits**	**Type**	**A**	**B**	**C**	**D**
Stage 1							
BGM101	Biochemistry	20	Core	1	1,2.3	5	1,2,3
CMB100	Cell Biology	20	Com	1	1,2.3	5	1,2,3
BGM103	Genetics	20	Com	1	1,2.3	5	1,2,3
PED102	Pharmacology	20	Com	1	1,2.3	5	1,2,3
PSC101	Physiology	20	Com	1	1,2.3	5	1,2,3
CMB101	Microbiology &Immunology	20	Core	1	1,2.3	5	1,2,3
Stage 2							
CMB200	Molecular Medicine	30	Com	1	1,2,3	1,2,3,4,5	1,2,3,4
CMB201	Cell&Molecular Biosciences	30	Com	1	1,2,3	1,2,3,4,5	1,2,3,4
BGM255	Proteins:Form, Function and Trafficking	30	Com	1,2,3	1,2,3,4,5,6	1,2,3,4,5	1,3,5,6
BGM238	Biochemistry & Immunology	30	Com	1,3	1,4,5	2,3,5	1,3,4,5,6
Stage 3							
CMB300	Project	40	Com	3	1,2,3,4,5,6	1,2,3,4,5	1,2,3,4,5,6,7
BGM301	Biochemistry of Chronic Diseases	10	Com	1,2,3	4,5,6	1,2,3,4,5	1,3,5,6,7
BGM305	Protein Engineering	10	Com	3	4	2,3,4,5	1,2,6
BGM324	Cancer & Gene Therapy	10	Com	2,3	4,5,6	1,2,3,4,5	1,2,3,4,5,6
BGM346	Research in Biochemistry and Genetics	10	Opt	1,3	2,4,5	2,4,5	1,2,3,7
BGM347	Integrated Biochemistry and Genetics	30	Com	2,3	4,5,6	1,2,3,4,5	1,2,3,4,5,6
MIC331	Immunity and Infection	30	Com	3	4,5,6	1,2,3,4,5	1,3,5,6,7
EDU930	Student Tutoring (Students into Schools)	10	Opt				3,4,5,6,7

**Candidates must select one 10 credit optional module*

11(b) Curriculum and Structure

Molecular Biology

				Intended Learning outcomes			
	Module title	**Credits**	**Type**	**A**	**B**	**C**	**D**
Stage 1							
BGM101	Biochemistry	20	Core	1	1,2.3	5	1,2,3
CMB100	Cell Biology	20	Com	1	1,2.3	5	1,2,3
BGM103	Genetics	20	Core	1	1,2.3	5	1,2,3
PED102	Pharmacology	20	Com	1	1,2.3	5	1,2,3
PSC101	Physiology	20	Com	1	1,2.3	5	1,2,3
CMB101	Microbiology &Immunology	20	Com	1	1,2.3	5	1,2,3
Stage 2							
CMB200	Molecular Medicine	30	Com	1	1,2,3	1,2,3,4,5	1,2,3,4
CMB201	Cell&Molecular Biosciences	30	Com	1	1,2,3	1,2,3,4,5	1,2,3,4
BGM255	Proteins:Form, Function and Trafficking	30	Com	1,2,3	1,2,3,4,5,6	1,2,3,4,5	1,3,5,6
BGM239	Molecular Biology	30	Com	1,2	1,2,3	1,2,3,5	1,2,3,5,6
Stage 3							
CMB300	Project	40	Com	3	1,2,3,4,5,6	1,2,3,4,5	1,2,3,4,5,6,7
BGM301	Biochemistry of Chronic Diseases	10	Com	1,2,3	4,5,6	1,2,3,4,5	1,3,5,6,7
BGM305	Protein Engineering	10	Com	3	4	2,3,4,5	1,2,6
BGM309	Protein DNA Interactions	10	Com	2,3	4,5,6	1,2,3,4,5	1,2,3,4,5,6
BGM324	Cancer & Gene Therapy	10	Com	2,3,	4,5,6	1,2,3,4,5	1,2,3,4,5,6
BGM337	Molecular Biotechnology	10	Com	1,2,3		1,5	1,2,3
BGM338	Animal Biotechnology	10	Com	2,3	4,5,6	1,2,3,4,5	1,2,3,4,5,6
BGM346	Research in Biochemistry and Genetics	10	Opt	1,3	2,4,5	2,4,5	1,2,3,7
BGM347	Integrated Biochemistry and Genetics	30	Com	2,3	4,5,6	1,2,3,4,5	1,2,3,4,5,6
EDU930	Student Tutoring (Students into Schools)	10	Opt				3,4,5,6,7

**Candidates must select one 10 credit optional module*

12 Support for Students and their Learning:

Induction
Each academic year commences with a comprehensive induction programme which includes an overview of the Stage, a Careers Service talk, CIT skills sessions and a meeting with personal tutors. Additionally at Stage I induction includes advice on study skills, an introduction to the Library and an introduction to Student Support Services within the University

Support for skills development
There is a comprehensive key skills programme. At Stage 2 students receive training in CIT, teamwork, writing, data handling and presentation skills in addition to receiving talks from the Careers Service. The Stage 3 key skills programme builds on this, providing students with training in time and project management and further practice in CIT, writing and presentation skills. There are also sessions from the Careers Service at all stages. Students develop appropriate laboratory skills at stages 1 and 2. For students planning a laboratory based career there is an opportunity to develop these further through a laboratory-based project at stage 3. The project also provides the flexibility to allow students to develop other skills in line with their career aspirations (e.g. more advanced IT skills or inter-personal skills). A Faculty Study Skills Advisor provides specialist advice on an individual basis as required to students.

Academic support
Each student is allocated a member of academic staff as a personal tutor who provides academic and pastoral support. Students are expected to meet regularly with their tutor throughout the year and appointments are made in order to facilitate these meetings. Tutors are provided with details of the UCAS form where appropriate. Tutors also have student record cards for their tutees and duplicate records are held centrally in the School office. The School also maintains records of additional activities undertaken by students, e.g. placements, acting as student representatives. Tutors receive examination marks for their tutees and provide feedback on academic performance. They also advise on progression. In addition to the tutor there is also a Senior Tutor to oversee pastoral support within the School and to provide additional guidance. There is also a Phase 2 adviser who can offer academic advice in relation to the second half of the degree programme

Pastoral support
As well as providing academic support the tutor has an important pastoral role. The Student Counselling Service, International Office, Student Advice Centre and Language Centre are all sources of support for tutors and tutees. The tutor also has available to him/her the computerised Student Support and Tutoring system. A good relationship between tutor and tutee is an important part of the pastoral support system. If for any reason a tutee indicates that s/he wishes to change tutor this can be arranged by the Senior Tutor. Some students may prefer to be allocated a tutor of the same gender and students are notified via the Degree Programme Handbook that the this can be arranged. Again the Senior Tutor and Phase 2 adviser are available to provide an alternative source of support should students require this.

Support for Special Needs
The Admissions Sub-Dean reviews all applications and is able to identify at an early stage applicants who have special needs. Such students are referred to the University Disability Service, which assesses indvidual needs and advises the school on how these can be addressed. Funds are available to provide additional resources required to facilitate learning by students with special needs. Students with dyslexia may be assessed by the dyslexia support team in the Disability Support Service, and are allowed additional time in examinations.

Learning resources

Teaching accommodation
In the Faculty of Medical Sciences lecture theatre facilities are on the ground floor of the Dental School and on the first and fourth floors of the Cookson Building. All are equipped with modern data-projection facilities. Various seminar rooms are located throughout the Medical and Dental Schools and in the Ridley Building. Many have data projection facilities. The current teaching accommodation provides 1x500, 1 x 400-seat, 4 x 220-seat and 3 x 100-seat lecture theatres, and several smaller seminar/class rooms. Practical classes are held in the three well-equipped Teaching Laboratories on either the 1st Floor, Cookson (Labs A and B) or 2nd Floor, William Leech Building (Lab C). These are equipped with data projection and/or TV camera systems. Students are exposed to state of the art technology including specialist research equipment in practical classes and, to an even greater extent, when they undertake laboratory-based research projects. Bioscience students have access to two Undergraduate Resource Rooms adjacent to the teaching laboratories. These are equipped with work stations and are available for individual or group study. There is also a cafeteria, a gymnasium and a student common room available on the Ground Floor of this building.

Library facilities
The Walton Library, which is part of the University Library, is located on the 5th floor of the Medical School and carries an extensive stock of books and journals relating to all the taught modules and the research of the Faculty. It provides 350 reader places and eight group discussion rooms. The Medical Librarian works with the School in up-dating the Degree Programme Handbook and Module Study Guides, ensuring that recommended reading information is accurate and that the Library can anticipate demand. Information skills training is integrated into the degree programmes and the Walton Library provides access to key Biomedical databases e.g. Medline, Web of Knowledge etc.

The Walton Library is the main library for all Biosciences Students.The term-time hours are:

Monday to Thursday	9.00 am to 10.00 pm (desk service closes at 8.45 pm)
Friday	9.00 am to 9.00 pm (desk service closes at 8.45 pm)
Saturday	9.00 am to 4.30 pm (desk service closes at 4.15 pm)
Sunday	11.00 am to 5.30 pm (desk service closes at 5.15 pm)

Copies of some journal articles listed in the module study guides are kept at the Library desk.

The library has self-service photocopying facilities. It also has a range of electronic databases and holds subscriptions to a large range of electronic journals. The Robinson Library, which is the main University Library, is situated behind the University Administration buildings. Occasionally references will be given to general science periodicals and books located in this library. The library was awarded a charter mark in 1995, 1998 and 2001 for continuing user-led development of its services for staff and students with disabilities, and close involvement in the University's widening participation initiative.

Computing facilities
Communication and information technology support in the Faculty of Medical Sciences is provided mainly by Faculty of Medical Sciences Computing, based in the School of Medical Education Development. Faculty computing facilities are based on the infrastructure of the University Computing Service (UCS) campus-wide network of computer 'clusters', which give students access to the Windows 2000 network, campus intranet and the Internet. Faculty of Medical Sciences computing facilities are available primarily on the ground (Fell. Pass and Pool clusters) and fifth (Dene and Linn clusters) floors of the Cookson Building. (NB The Dene cluster will be unavailable during the 2003/2004 academic year whilst redevelopment work is undertaken in the Walton Library.) The clusters are open between 09:00 and 17:00; in addition, Fell and Pass clusters are open the same hours as the Walton Library. It is planned to extend the opening hours of the Fell and Pass clusters in the near future. Networked PC workstations with printing facilities are located in the computer clusters:

- *Fell* ground floor Cookson Building – 50 PCs;
- *Pass* ground floor Cookson Building – 45 PCs (at time of writing);
- *Pool* ground floor Leech Building – 50 PCs;
- *Linn* fifth floor Cookson Building – 20 PCs, plus 10 PCs in the Walton Library (at time of writing);
- *Dene* fifth floor Cookson Building – 30 PCs – NB this cluster will be unavailable during the 2003/2004 academic year whilst redevelopment work is undertaken in the Walton Library.

A small charge, per page, is made by the UCS for laser printing services. Students are given an initial allocation to their personal printing account. Scanning facilities are also available.
There is an adequate stock of up-to-date software and hardware. A wide range of up-to-date software applications (word processing, spreadsheet, graphics, presentation, statistics, database, bibliographic databases, subject-specific teaching packages, email and other Internet applications) is available. Documentation relating to the software is available in the clusters.
Students can also register to use the University dial-up service from a computer modem at home, or the virtual private network (VPN). The e-mail service is web-based and can be accessed from any computer with an Internet connection.
Comprehensive documentation is provided by the University Computing Service and the Robinson and Walton libraries. Day-to-day assistance is provided by cluster Duty Advisors and by staff in Faculty of Medical Sciences Computing (FMSC), who are available to advise students on the effective use of the IT facilities.
Students are introduced to these facilities at the beginning of their course and have access thereafter. FMSC staff provide computer induction courses and support the use of learning materials and standard IT applications. The aim is to familiarise students with the computer networks and a range of basic software applications, with emphasis on making efficient use of the software applications and developing the skills to manage information.
In addition to the Faculty of Medical Sciences, other UCS PC workstation clusters are located on campus near the Cookson Building, and in some Halls of Residence. Throughout the campus, UCS provides approximately 1200 PCs in about 30 cluster rooms. The operating system is Windows XP; the desktop on the clusters comprises campus core software (including MS Office XP) plus a collection of application software that is site licensed.
The cluster support office is located on the ground floor of the Cookson Building (room MG 003) in the corner of the Fell/Pass cluster. Day-to-day assistance is provided by cluster Duty Advisors and staff in the FMSC. Further details are published in the cluster. FMSC staff offices are located in 16-17 Framlington Place (opposite the School of Dental Sciences Lecture Theatre block).
The Blackboard virtual learning environment is used to facilitate student learning.

Language Centre
The Language Centre provides courses in a range of foreign languages, which are available to staff and students on payment of a fee. For those who cannot attend classes, or in addition to classes, there is an Open Access Centre where students can pursue the study of languages in their own time. Materials are available in over 40 different languages and there is access to live satellite broadcasts.

13 Criteria for Admission:

GCSEs required
GCSE Chemistry (or Dual Award Science), and Mathematics are required if not offered at A or AS level.

A-Level Subjects and Grades
Typically BBB from 18 units *preferably* including grade B in Biology A level, and *preferably* including Chemistry at A or AS level. A minimum of 12 units from 6- or 12-unit qualifications.

Alternative entry qualifications
Scottish qualifications - AABB at Higher Grade normally including Biology and Chemistry and one other science. Mathematics at Standard level if not offered at Higher level. Combinations of Highers and Advanced Highers accepted.

BTEC National Certificate / Diploma - in a science-related subject at overall Merit grade, to include Biological Sciences and Chemical Sciences units.

Access to HE Courses – modules in Biological Sciences and Chemistry essential at Distinction/Credit level.

International Baccalaureate – 32 points with Higher Level Biology and Chemistry at Grade 5 or above. Mathematics at Standard level if not offered at Higher level.

Overseas Students – appropriate overseas qualifications will be considered. Evidence of English language skills sufficient to complete the programme successfully is required. IELTS 6.5

Admissions policy
This is consistent with the University's equal opportunities policy as detailed in the Prospectus. All applications are considered on merit and offers will take into account personal circumstances and relevant experience of the subject area. All candidates receiving an offer are invited to attend an Open Day.

Arrangements for non-standard entrants
Mature Students – applications are considered on merit, although evidence of recent study is normally required. Relevant work experience is also useful.

14 Methods for evaluating and improving the quality and standards of teaching and learning:

Module reviews

Each module leader must ensure that the assessment for her/his module is appropriate to the learning outcomes. The workload for each module allows time for completion of the various assignments and for exam revision.

The student feedback from the module questionnaire (see student evaluations below) is considered by the module leader, the Staff Student committee, the relevant Curriculum Committee and the Board of Studies, and changes introduced where appropriate.

Programme reviews

The Board of Studies ensures that the modular assessments together are appropriate to the learning outcome for the programmes. Assessments encompass not only students' knowledge, but also practical skills, cognitive skills and other key skills. Many of the assessments are formative, with comprehensive feedback being made available to students. Assessment criteria for written assignments clearly delineate what is expected at each level of achievement and these criteria are published in the degree programme handbook.

The Board of Studies and Curriculum Committees (which include students representative from each Stage) consider feedback from the Stage and Programme questionnaires and take action where appropriate. The Board of Studies also reviews the examination performance and progression data for students on the programme.

External examiner reports

External Examiners' reports are considered by the Board of Studies. The Boards' response to these reports is considered by FTLC and subsequently sent to the External Examiners. External Examiners' reports have consistently praised the standard of the degree, the quality of our graduates and the high standards of teaching.

Accreditation reports

Not applicable.

Student evaluations

The views of students are sought through regular questionnaires which evaluate the curriculum and quality of teaching. In addition to the module questionnaire student feedback on each stage and the programme as a whole are also elicited.

Feedback Mechanisms

Summaries of module evaluation responses and proposed actions are discussed at Staff Student Committees, Curriculum Committees and Board of Studies. Students representatives attend Boards of Studies meetings. A report on each module is published which outlines any issues raised in questionnaires or staff student committee about the module and what action has been taken.

Faculty and University Review Mechanisms

All major changes to existing programmes must be approved by Faculty Teaching and Learning Committee and University Teaching and Learning Committee. The University also operates a Degree Programme Review and Internal Subject Review to monitor the quality of teaching provision. The Board of Studies is involved in both review processes.

15 Regulation of Assessment

Pass Marks

The pass mark is 40 %

Course Requirements

Students are required to pass all examinations at Stage 1 before they can proceed to Stage 2 and all examinations at Stage 2 to proceed to Stage 3. At Stage 1 students may pass by compensation in up to 40 credits except BGM101 which is a core module for all courses, CMB101 which is a core module for Biochemistry with Immunology and BGM103 which is a core module for Molecular Biology. At Stages 2 students may pass by compensation in up to 30 credits to proceed to Stage 3.

Weighting of Stages

Only work undertaken at Stages 2 and 3 counts towards the final award. Stage 2 contributes 30% towards the overall degree award.

Weighting of Modules

Marks are weighted according to the credit weighting and level of the module. The weighting of marks contributing to the degrees for years 1, 2 and 3 is 0:3:7.

Common Marking Scheme

The University's common marking scheme is used :

≥70	First class
60-69	Second class, Upper Division
50-59	Second class, Lower Division
40-49	Third
Less than 40	Fail

Role of the External Examiner

The external examiner is nominated by members of the Board of Studies and is approved by the Faculty Teaching and Learning Committee. The external examiner approves examination questions, acts as moderator, attends the end of year Board of Examiner meetings, comments on the appropriateness of assessment procedures and on the comparability of standards with other institutions and may provide recommendations on curriculum content, resources and departmental arrangements where appropriate.

16 Indicators of Quality and Standards:

The QAA Subject Reviews in 1999 resulted in the Physiological Sciences and the Molecular Biosciences and Pharmacology provision being awarded the maximum of 24 points. Quotes from these reports indicate some of the perceived strengths that resulted in this these maximum scores:
'thorough and comprehensive systems for the maintenance of quality',

'the provision is successful in attracting large numbers of applicants',
'very commendable progression rates', and 'the exceptionally low attrition rates'
'some lecturers possessed inspirational qualities'
'seminars were of particularly high quality and students demonstrated an outstanding level of confidence, analytical ability, teamwork and presentational skills'
'the structure of degree programmes is well designed, up to date, coherently structured',
'students are introduced to the latest ideas and information', 'consequently they motivate the students, who display interest and enthusiasm for the subject'
'the Deferred Choice scheme offers considerable flexibility to students and contributes to the exceptionally low attrition rates',
'the value added to good entrants who achieve good degrees and progress to further study or employment'

'an impressive feature of Stage 3 is the project', 'such projects are required to demonstrate critical analysis of relevant literature and academic rigour'

The programme is delivered by staff within the Faculty of Medical Sciences which was rated 5/5* in the 2001 RAE.

Our subjects were also rated extremely highly in 2003 league tables: 1st and 4th in the Guardian and 3rd, 4th and 8th in the Times.

Other indicators of quality include low drop out rates for the programme and high graduate employment.

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. It should be noted that there may be variation in the range of learning opportunities reflecting the availability of staff to teach them. While every effort will be made to ensure that the module or modules described in the programme specification are available, this cannot be guaranteed.

The accuracy of the information contained is reviewed by the University and may be checked by the Quality Assurance Agency for Higher Education.

In addition, information relating to the course is provided in:

The University Prospectus

The Cell and Molecular Biosciences brochure and web site

The University and Degree Programme Regulations

The Degree Programme Handbook

QAA Subject Review Report