Programme Specification

Section 1: Basic Data

Awarding institution/body	University of the West of England
Teaching institution	University of the West of England
School responsible for programme	School of Life Sciences
Programme accredited by	
Highest award title	BSc(Hons) Genetics
Default award title	
Interim award title	Cert.HE Genetics Dip.HE Genetics
Modular Scheme title (if different)	
UCAS code (or other coding system if relevant)	C410
Relevant QAA subject benchmarking group(s)	Biosciences
On-going/valid until* (*delete as appropriate/insert end date)	
Valid from (insert date if appropriate)	

Authorised by… **Date:…**

Version Code **2.0**

Section 2: Educational aims of the programme

The BSc (Hons) Applied Genetics degree is designed for those interested in taking a hands-on approach to studying the theoretical basis, implication and application of modern genetics – the fastest-growing and potentially most important area of modern biology, particularly in terms of human health and disease, but also one that has far-reaching ethical and social implications. Our emphasis is on the application of genetics in this context and provision of a relevant education that affords employment opportunities.

The programme provides:

- opportunities for students from a wide range of backgrounds to develop and realise their potential in a supportive and responsive teaching and learning environment
- appropriate curriculum content providing added value for learners in their subject-specific knowledge and the acquisition of transferable skills
- a coherent and flexible programme of study with a variety of attendance modes within the University modular scheme
- understanding of the context of applied genetics and its application to practical problems
- a programme responsive to feedback from students, external examiners and other stakeholders as part of quality programme management and enhancement
- appropriate facilities and resources to deliver a quality teaching and learning experience

The programme is concerned with the integration of a wide range of subjects to the fuller understanding of applied genetics. The combination of modules offered enables students to understand the science behind modern genetics while working at the cutting edge of applied genetics using state-of-the-art equipment and learning support material.

Section 3: Learning outcomes of the programme

The award route provides opportunities for students to develop and demonstrate knowledge and understanding, qualities, skills and other attributes in the following areas:

A Knowledge and understanding

Learning outcomes	Teaching, Learning and Assessment Strategies
A Knowledge and understanding of: 1. demonstrate a broad knowledge base with specific areas of deeper understanding relevant to modern genetics 2. understand the context of genetics and its application to practical problems 3. demonstate an understanding of the contribution of research and scholarship in within applied genetics	**Teaching/learning methods and strategies:** Acquisition of knowledge is achieved through a variety of methods including lectures, practicals, seminars, tutorials, case studies and project work. Additional support is provided through E-learning including the Learning Resources Web, First Class Conferencing and Blackboard. Throughout, the learner is encouraged to undertake independent reading both to supplement and consolidate what is being taught/learnt and to broaden their individual knowledge and understanding of the subject. **Assessment:** Testing of the knowledge base is through assessed coursework and through tasks undertaken under examination conditions. Methods are specified in each module guide and are varied and designed to test the learning outcomes

B Intellectual Skills

B Intellectual Skills	**Teaching/learning methods and strategies**
The ability to… 1. Actively question and seek information 2. Compare and contrast information from different sources 3. Critically evaluate information against hypotheses in a range of research scenarios 4. Actively analyse and apply problem-solving strategies 5. Demonstrate independent and self-directed learning	Intellectual skills are developed through student-centred learning, written assignments, practical work, data handling and interpretation, tutorial and seminar work. The research project is designed to permit students to demonstrate achievement of all the learning outcomes 1-5. **Assessment** A variety of assessment methods are employed. Some/all test a learner's ability to demonstrate skills 1-5 through examinations but assessment of coursework and practical project work including student oral presentation is the main vehicle for assessment of higher order skills.

C Subject, Professional and Practical Skills

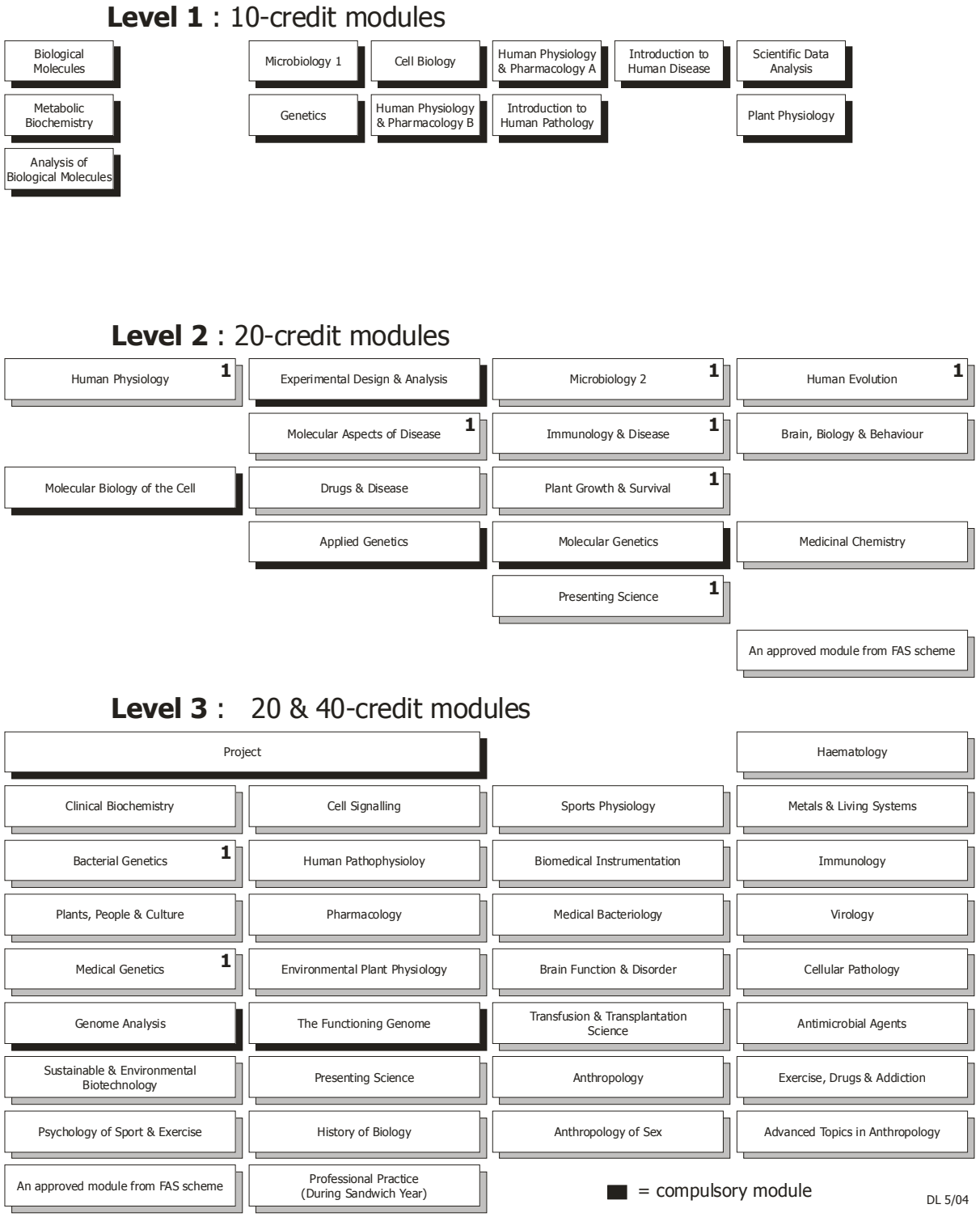
C Subject/Professional/Practical Skills	**Teaching/learning methods and strategies**
The ability to… 1. Critically observe, analyses and evaluate information arising from a wide range of sources 2. Apply practical approaches to the study of selective aspects of genetics and demonstrate an awareness of safety and good laboratory practice. 3. Communicate effectively scientifc data and concepts 4. Develop discipline-specific interests by specialising within the programme in relation to subject and/or career aspiration 5. Demonstrate an understanding of the research process through the execution of a research project	Skills 1-4 are acquired and developed in a coordinated and progressive throughout the levels of the programme through lectures, tutorials, case studies, practical and project work. At level 1 attention is focussed on the acquisition of basic skills and safe working practices through prescribed exercises, while at level 2 more advanced techniques and open ended practical work are introduced. At level 3 the research project is pivotal to the acquisition and consolidation of skills 1-5. **Assessment** Skills 1, 2, 3 and 4 are primarily assessed through practical reports, coursework and research projects – proposal, oral presentation and report. Additionally, skill 5 is assessed in the research project.

D Transferable Skills and other attributes

D Transferable skills and other attributes	**Teaching/learning methods and strategies**
The ability to… 1. Communicate effectively and appropriately using a variety of methods 2. Critically analyse data arising from various means of biological inquiry 3. Undertake active learning and development 4. Apply information management skills 5. Practice effective time management 6. Evaluate performance of self and others	Skills are developed throughout all the compulsory and core modules and in particular the spine of experimental design, data analysis and research project modules. The skills are further developed throughout the programme via case studies, practicals, tutorials and coursework assignments. **Assessment** A range of assessment strategies are utilised including essay, practical report, group work, case study, oral presentation, literature review and critique as well as the research project

Section 4: Programme structure

BSc (Hons) Applied Genetics



level 1

Compulsory modules

- USSJ3L-10-1 Plant Physiology
- USSJ3M-10-1 Biological Molecules
- USSJ3Q-10-1 Microbiology 1
- USSJ43-10-1 Cell Biology
- USSJ46-10-1 Human Physiology & Pharmacology A
- USSJ4A-10-1 Introduction to Human Disease
- USSJ8W-10-1 Scientific Data Analysis
- USSJ3N-10-1 Metabolic Biochemistry
- USSJ3Y-10-1 Genetics
- USSJ47-10-1 Human Physiology & Pharmacology B
- USSJ45-10-1 Introduction to Human Pathology
- USSJ3P-10-1 Analysis of Biological Molecules

Core modules

Optional modules

Interim Awards:

Certificate of Higher Education: Applied Genetics

Credit requirements: 120 (of which 100 are level 1 or above)

level 2

Compulsory modules

- USSJ4Y-20-2 Applied Genetics
- USSJ4D-20-2 Experimental Design & Analysis
- USSJ4B-20-2 Molecular Biology of the Cell
- USSJ4C-20-2 Molecular Genetics

Core modules

Minimum of 1 from…

- USSJBU-20-2 Presenting Science
- USSJ4E-20-2 Immunology & Disease
- USSJ9Y-20-2 Plant Growth & Survival
- USSJ4G-20-2 Microbiology 2
- USSJ4W-20-2 Molecular Aspects of Disease
- USSJ4F-20-2 Human Physiology
- USSJ6T-20-2 Human Evolution

Optional modules

- USSJ4V-20-2 Drugs & Disease
- USSJ8A-20-2 Medicinal Chemistry
- USSJFU-20-2 Brain, Biology & Behaviour
- Approved module from the Faculty scheme

Interim Awards:

Diploma of Higher Education: Applied Genetics

Credit requirements: 240 (of which not less than 100 are level 2 or above and 120 are at level 1 or above)

Year out

The Undergraduate Programmes in Biosciences sandwich placement year is considered an integral part of the programme, with the expectation that students will undertake a placement in an industrial or academic organisation in a research and development environment. Students may opt to take the Professional Practice Module whilst on placement, and successful completion of 40 weeks of appropriate employment in biosciences qualifies the student for a Sandwich Award on graduation. The Faculty has a Placements Support Team, comprising the Faculty Placements Tutor, specific BMS training and Environmental tutors, and the Placements co-ordinator to provide administrative support. The Undergraduate Programmes in Biosciences has 30 years experience in arranging placements for up to 100 students per annum; placements include a number in major pharmaceutical companies around the world, within North American universities and also European organisations. In many instances, students are successful in obtaining placements through competitive interview, often with students from other Universities. Further research/development style placements are currently being sought in the pharmaceutical and nutriceutical industries.

Optional modules

- USSJFL-20-3 Professional Practice Module

level 3

Compulsory modules

- USSJFY-20-3 Genome Analysis
- USSJFG-20-3 The Functioning Genome
- USSJ73-40-3 Project

Core modules

Minimum of 1 from…

- USSJ5V-20-3 Medical Genetics
- USSJ53-20-3 Bacterial Genetics

Optional modules

- USSJ5C-20-3 Cell Signalling
- USSJ5E-20-3 Clinical Biochemistry
- USSJ57-20-3 Sports Physiology
- USSJ56-20-3 Human Pathophysiology
- USSJ59-20-3 Brain Function & Disorder
- USSJ6Y-20-3 Anthropology
- USSJAS-20-3 Environmental Plant Physiology
- USSJAH-20-3 Sustainable & Environmental Biotechnology
- USPJF7-20-3 Psychology of Sport & Exercise
- USSJ58-20-3 Pharmacology
- USSJFL-20-3 Professional Practice Module
- USSJGP-20-3 Metals and Living Systems
- USSJ8J-20-3 Biomedical Instrumentation
- USSJ55-20-3 Virology
- USSJ5S-20-3 Antimicrobial Agents
- USSJ5G-20-3 Haematology
- USSJ5D-20-3 Immunology
- USSJ54-20-3 Medical Bacteriology
- USSJ5F-20-3 Cellular Pathology
- USSJ5M-20-3 Transfusion & Transplantation Science
- USSJFM-20-3 Plants, People & Culture
- USSJFX-20-3 Anthropology of Sex (2007)
- USSJFW-20-3 Advanced Topics in Anthropology (2007)
- USSJBU-20-2 Presenting Science
- USSJ5T-20-3 Exercise, Drugs & Addiction
- USSJFV-20-3 History of Biology (2007)
- Approved module from the Faculty scheme

Award/s:

Degree with Honours

Credit requirements:
360 (of which not less than 100 are level 3 or above, and 100 are at level 2 or above, and 140 are level 1 or above)

Degree

Credit requirements:
300 (of which not less than 60 are level 3 or above, and 100 are at level 2 or above, and 120 are level 1 or above)

Section 5: Entry requirements

Admission into the Applied Genetics Programme will be administered within the Undergraduate Programmes in Biosciences. Standard offers for entry to the Programme are in the range 180-220 tariff points.

Successful application to the Programme must meet one of the following minimum requirements:

- GCE A level in two science subjects to include Chemistry or a Biology subject, plus grade C or above in three GCSE subjects, to include Maths and English unless compensated for elsewhere
- National Certificate or Diploma in an appropriate subject such as biological sciences
- Pass in a recognised Access or Foundation course.

Additionally, applicants may be admitted to the Programme provided they meet one of the following requirements and can demonstrate to the Faculty attainment equivalent to the GCE A level and GCSE subject areas specified above:

- The Advanced General National Vocational Qualification (AGNVQ) or Advanced General Scottish Vocational Qualification (AGSVQ)
- The Irish Leaving Certificate with Grade C or above in two subjects at Higher level and three subjects at Ordinary level
- The Scottish Leaving Certificate of Education with grade C in three subjects at Higher and grade 3 or above in two subjects at Standard grade or Intermediate 12
- National Vocational Qualifications or Scottish Vocational Qualifications at level 111
- The European Baccalaureate
- The International Baccalaureate
- Compensation through experiential learning
- Other European or International qualifications that the University considers to be of equivalence to the above.

Section 6: Assessment Regulations

MAR 3.1

Section 7: Student learning: distinctive features and support

A Student Handbook is provided during Induction to year 1 that includes information on the Faculty, the University, its regulations and procedures. Subsequently at each level, a structured induction is provided and to enable students to plan their study of modules as effectively as possible a patterned calendar of assessments across the academic year is produced. Detailed information is distributed in guides at the commencement of each module. Students are supported during their time at UWE by academic tutors and their student adviser. For those students who elect to undertake a placement, the sandwich tutor or other members of academic staff makes regular, planned visits to provide support and to liase with supervisors and assessors. Students on placement may take an optional Professional Practice Module which is managed through an innovative web-based interface designed to support, capture and reward placement learning. The Placements Support Team will oversee the optional placement year, as described in section 4. For all students, access to academic staff and the student advisor is by student e-mail or by personal access, and central University Centre for Student Affairs (CSA) provides support and guidance to students on a wide range of issues. The library at Frenchay campus provides an extensive range of literature for the programme. Students have 24-hour access to computers, and IT support services are available within the Faculty of Applied Sciences and from the University's Computing Helpdesk. The Faculty, via its Learning Resource Web, has a longstanding investment in web-based support for teaching and learning Learning Resource Web; this provision of supplementary material and access to diagnostic testing of understanding and knowledge will be transferred to UWE's new VLE, Blackboard. The Faculty has a well-equipped range of general laboratories, specialised scientific equipment and specialist facilities appropriate for teaching and research in biosciences, biomedicine, psychology and chemical and physical sciences. Support for laboratory-based scientific inquiry enabled by this provision is enhanced by the core research methods modules that occur within each year. Within this spine, students develop a range of key skills required of a scientist, including literature searches, critical review, research methodology, problem-solving, and IT and communication skills.

Section 8 Reference points/benchmarks

The BSc (Hons) Applied Genetics degree is an important part of the Faculty's Biosciences suite of programmes, within which student specialisation is reflected in the award title and the provision of subject-specific modules. The main objective of the Applied Genetics degree is to provide a coherent yet flexible programme of study for students entering tertiary education with interests in the biological sciences who wish to use this discipline to understand applied genetics in terms of its fundamental principles, techniques, as well as ethical and social implications. The programme of study encourages a synergistic viewpoint with combinations of modules throughout the programme to produce a cross-disciplinary scientist with wide employment opportunities. The academic, and practical skills acquired during the programme enable the graduate to apply a problem-solving approach to scientific work. The programme also provides for the development of the important key, transferable skills such as mathematical, IT and communication skills that are essential in today's global market (Biosciences 3.4). Furthermore, the BSc (Hons) Applied Genetics is offered on an optional one-year sandwich basis to enhance graduate employability by providing additional experience, learning opportunities and the ability to contextualise and extend their existing subject-specific knowledge and generic skills. As such, the Biosciences programmes enjoy a high reputation amongst employers because graduates from these programmes possess a comprehensive balance of subject-specific knowledge and practical skills as well as essential mathematical, IT, data analysis and communication skills. The aims of this programme are fully consistent with the mission statement of the University of the West of England to "*advance an inclusive, civilised and democratic society and its enrichment through education, consultancy and public service*". Thus, the BSc (Hons) Applied Genetics degree, which is concerned with equipping students with both skills and subject-specific knowledge, promotes an educational opportunity that is fully consistent with the University's mission and strategy.

In its totality, and also by means of specific learning objectives within individual modules, the BSc (Hons) Applied Genetics degree maps consistently against a wide range of entries within the Subject Benchmark Statements for Biosciences.

Through the majority of the modules available to our bioscience students, the BSc (Hons) Applied Genetics degree addresses much of the *"study of life at all levels of complexity"* (Biosciences 2.1) and recognises that *"complexity and the relationship between form and function are intrinsic"* (Biosciences 2.2). Modules such as Metabolic Biochemistry, Molecular Aspects of Disease, Genome Analysis, The Functioning Genome, Immunology & Disease, Cell Pathology, Cell Signalling, Human Physiology, Human Pathophysiology and Human Evolution provide "*studies at a variety of levels from molecules to populations*" (Biosciences 2.3).

From the second year, but particularly in the final year, increasing emphasis is placed on the recognition by the student that much of what is taught is "*contested and provisional, particularly in the light of continuing scientific advances*" (Biosciences 3.3) and that "*the biosciences exist in an environment of current hypotheses rather than certainty, where natural variation occurs and can confuse empirical data*" (Biosciences 2.5). There are a number of ways in which we provide the student with the intellectual and practical tools required to deal not only with the consequences of this paradigm within the complexity of cutting-edge biosciences but also those that stem from the pace of scientific advances in terms of "*continuing their self-education and development after graduation*" (Biosciences 2.6).
In the first, second and final years a strand of compulsory modules develops and reinforces the theoretical underpinnings as well as the laboratory practice of scientific investigation beyond that offered in the context of subject-specific modules; Scientific Data Handling is taught in the first year, and Experimental Design and Analysis in the second year. This culminates in the final year with a double project module in which a student works with a member of staff on an original piece of research. This strand addresses Biosciences 2.5 by helping students "*develop competence in comparing the merits of alternative hypotheses and receive guidance in terms of how to construct experiments or to make observations to challenge them*", for the *"appreciation of hypothesis formation and testing"* (Biosciences 2.7), for "*competence in team and individual working and in numeracy (often including IT and statistics…), as well as proficiency in preparing reports in a written format for many different purposes*" (Biosciences 2.8) and "*knowledge of a range of practical and presentational techniques and methodologies relevant to the particular discipline, including data analysis and the use of statistics (where appropriate)*" (Biosciences 3.2).
We fully recognise that the practise of bioscience occurs primarily in the laboratory, and we have a strong tradition of providing students with a solid training in the laboratory techniques that permit the contextualisation of existing knowledge in genetics and provide the means for its extension. In addition to the practical experience to be gained from the sandwich year, and given that the final year project is primarily laboratory-based, the students spend approximately half their contact time within the teaching/research laboratories; we, therefore, offer "*appropriate opportunities to participate in collecting data by undertaking experiments and practical investigations*" (Biosciences 2.7).

The teaching and learning strategies adopted by modules offered within the genetics degree cover the greater majority of those listed in Biosciences 4.2. With particular reference to lectures (Biosciences 4.3), many staff use *"computer-based or other audio-visual aids"* and place their material on the University's Virtual Learning Environment as a learning resource to consolidate learning. For laboratory work (Biosciences 4.4) within modules as diverse as Analysis of Biological Molecules and Human Physiology & Pharmacology, students experience practicals "*carried out on material at a variety of levels from molecules to whole organisms*". For "*personal experience of the approach, practice and evaluation of scientific research*" (Biosciences 4.6), both Experimental Design & Analysis in the second year and the Research Project double module in the final year offer such opportunities, the assessment of which includes an oral examination component (Biosciences 4.8). For all modules, students are expected to spend a period of time equivalent to the timetabled sessions on "*set assignments and self-directed study, individually and within groups… [entailing] information seeking and the use of learning resources available in electronic or other format, reading, report writing and problem solving*" (Biosciences 4.7). Assessment

strategies map well against Biosciences 4.9 and include unseen examinations, computer-based assessments, self and peer assessment, laboratory reports, essays, summaries and assignments, data interpretation exercises, case studies, poster, audio-visual/electronic presentations, a project report, and a work experience report.

The compulsory and optional modules offered within Applied Genetics provide the opportunity to meet a range of generic Bioscience benchmark standards, including…

- be able to access and evaluate bioscience information from a variety of sources and to communicate the principles both orally and in writing (eg essays, laboratory reports) in a way that is well-organised, topical and recognises the limits of current hypotheses;
All first and second year modules (threshold) and all final year modules (good).

- demonstrated ability in a range of appropriate practical techniques and skills relevant to research in biosciences. This will include the ability to place the work in context and to suggest lines of further investigation;
Second year Human Physiology, Experimental Design & Analysis, Microbiology 2, Molecular Aspects of Disease, Immunology & Disease, Molecular Biology of the Cell, Drugs & Disease, Plant Growth & Survival, Applied Genetics, Molecular Genetics, Human Nutrition, Human Evolution, and final year Research Project double module.

- be able to plan, execute and present an independent piece of work (eg a project), in which qualities such as time management, problem solving and independence are evident, as well interpretation and critical awareness of the quality of evidence;
Final year Research Project double module.

- be able to apply relevant advanced numerical skills (including statistical analysis where appropriate) to biological data;
First year Scientific Data Analysis/Scientific Inquiry, second year Experimental Design & Analysis/Statistics & Experimental Design, and the majority of Final year projects.

- have well-developed strategies for updating, maintaining and enhancing their knowledge of the biosciences.
Implicit in all subject-specific modules and the Final year project.

Staff in the Faculty are research active and consequently, programme development, formal teaching and project work is underpinned and informed by current research. Thus, all staff contributing to the Applied Genetics degree have an established record in supervising final year research-based projects. Furthermore, there is ongoing and developing research in the Bioscience, Biomedical Science, Human Biology, Forensic Science and Psychology disciplines which is encouraged and maintained by Faculty Research Centres such as CRIB (Research in Biomedicine), CRIPS (Research in Plant Sciences) and CADR (Appearance & Disfigurement Research). There is active collaboration between bioscientists, physicists and chemists within the Faculty of Applied Sciences, and also between these staff and those in other Faculties such as Computing, Engineering and Mathematical Sciences. These multidisciplinary groups reflect the developments alluded to in Biosciences 2.3, and are likely to inform teaching within the Biosciences programme.

Overall, Applied Genetics Honours graduates will have understanding of the key aspects of this vitally important field and will be able effectively to deploy established analytical techniques and enquiry in support of this. Furthermore, they will be able to devise and sustain arguments, solve problems, critically review aspects of current research, appreciate the uncertainty and limits of knowledge, and make use of reviews and primary sources. They will be able to apply their learning to consolidate, extend or apply their knowledge, develop new techniques and concepts, critically evaluate ideas and published material and communicate effectively to both specialist and non-specialist audiences. They will also have the qualities and transferable skills necessary for successful employment including the exercise of initiative and personal responsibility as well as the learning ability to undertake appropriate further professional training.

This specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. More detailed information on the learning outcomes, content and teaching, learning and assessment methods of individual modules can be found in module specifications. These are available on the University Intranet.

Programme monitoring and review may lead to changes to approved programmes. There may be a time lag between approval of such changes/modifications and their incorporation into an authorised programme specification. Enquiries about any recent changes to the programme made since this specification was authorised should be made to the relevant Faculty Administrator.