

Programme Specification

MSc in Medical Genetics and Genomics

| Date amended* | Nature of amendment** | Reason for amendment** |
|---------------|------------------------------|------------------------|
| 11/07/2019 | Update course & module codes | New SRS codes |
| | | |

Valid from: September 2015

Faculty of Health and Life Sciences

SECTION 1: GENERAL INFORMATION

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| Awarding body: | Oxford Brookes University |
| Teaching institution and location: | Oxford Brookes University |
| Final award: | Master of Science MSc PG Certificate PG Diploma |
| Programme title: | Medical Genetics and Genomics |
| Interim exit awards and award titles: | PG Certificate: Medical Genetics and Genomics PG Diploma: Medical Genetics and Genomics |
| Brookes course code: | MSC-MGG (previously HL67) |
| UCAS/UKPASS code: | |
| JACS code: | C451 |
| Mode of delivery: | On Campus |
| Mode/s and duration of study: | FT over 1 year or PT over at least two years |
| Language of study: | English |
| Relevant QAA subject benchmark statement/s: | This course follows the QAA reference point Masters degree Characteristics (2010) |
| External accreditation/recognition: <i>(applicable to programmes with professional body approval)</i> | N/A |
| Faculty managing the programme: | Faculty of Health and Life Sciences |
| Date of production (or most recent revision) of specification: | February 2015 Updated April 2018 |

SECTION 2: OVERVIEW AND PROGRAMME AIMS**2.1 Rationale for and/or Distinctive features of the programme**

Currently we are in a period of rapid transition in medicine: the era of medical genetics and genomic medicine has been entered. From a historic developmental phase of studying single genes or small regions of interest within a genome, the advent of the Human Genome Project and the linked technological developments e.g. Big Data, IT, massively parallel DNA sequencing and genome-wide microarrays, has enable genome-centred analysis thus transforming research and clinical applications. Clinical and Public Health genomics is developing with a focus on areas such as chromosomal abnormalities, monogenetic disorders, genes, pharmacogenomics, immunogenomics, genome-wide analysis of genetic variance and starting to link the genome with the phenome. Medical genetics and genomics are being adopted for patient care e.g. cancer genomics and treatment within the NHS and for clinical research The aim of this programme is to equip students with an in-depth understanding of the medical 'omics' discipline so that they understand and develop the skills to deploy current

technologies, analysis, diagnostics and understand genetics approaches for careers within genomic medicine such as clinical research, within the Healthcare Industry or as a Healthcare professional.

2.2 Aim/s of the programme:

This programme aims to train and develop scientists and Health Professionals to undertake careers within Genomic Medicine. It will :

- Provide a wide education in Medical Genetics and Genomics
- Develop an understanding of the 'omic technologies' and their current and future applications
- Develop the skills to conduct genomic research and genetic diagnosis
- Develop and Understanding of and an ability to discuss the ethics and social impact of Genomic Medicine

SECTION 3: PROGRAMME LEARNING OUTCOMES

Postgraduate attributes are developed throughout the programme across all of the taught modules. The skills and abilities needed to apply genomic medicine in healthcare settings and for clinical research are taught and practised within the curriculum such as critically evaluating research papers, analysing genomic data and presenting resulting clinical diagnoses, and imparting knowledge, however it is during the research project that students will begin to really apply the theoretical knowledge and refine the skills gained in genomic medicine as they conduct independent original research with supervisory guidance or as a literature based project.

On successful completion of the programme, graduates will demonstrate the following Brookes Attributes:

3.1 Academic literacy

- Demonstrate originality in the application of knowledge, and understanding of how the boundaries of knowledge are advanced through research
- Integrate information from a variety of sources to construct a coherent thesis on a scientific topic
- Critically appraise and analyse the scientific literature on Medical Genetics and Genomics and the ability to judge and interpret findings ^{C1}
- Evaluate the significance of experimental results in the context of previous work
- Critically evaluate the published literature with respect to the perspective of genomic medicine ^C
- Apply a detailed understanding of the application of 'omics' to the theory and practice of genome analysis. Demonstrate knowledge and understanding of recombinant DNA techniques, bioinformatics and high throughput technology
- Demonstrate knowledge and understanding of development of databases and their use as tools in genomic analysis

3.2 Research literacy

- Apply analytical and synthetic skills to investigate and test new hypotheses in genomics
- Construct hypotheses pertinent to the experimental exploration of topical questions in the field of human genomics
- Undertake with independent analysis, a sustained piece of original research on a topic of relevance to Genomic Medicine^{**2}
- Critically evaluate the use of different approaches and genomic platforms in providing an

¹ C Indicates attributes for students graduating with a Postgraduate Certificate

² ** Indicates attribute of graduates of the MSc award only.

evidence based genetic diagnosis [◊]

- Apply key concepts learned in the course to arising problems in subsequent research settings. synthesise relevant information from a range of appropriate sources to construct and support a rational argument
- Critically evaluate evidence using analytical methods and argument rationally to produce or judge the validity of conclusions [◊]
- Interpret data in a meaningful way, by the application of 'good science' in experimental design and data collection.
- Identify research questions, design the approach and conduct experiments to solve them.

3.3 Critical self-awareness and personal literacy

- Exercise initiative and personal responsibility
- Learn independently as part of a commitment to continuing professional development.
- Communicate effectively with other scientists and the broader community of health professionals, including the presentation of the results of genomic analyses, through written reports and oral presentations [◊]
- Self-management, through setting personal goals for assignments and the dissertation and through management of time, tasks and resources [◊]
- Reflect upon learning experiences and apply learned experience to guide personal development and workplace practice
- Use a variety of forms of written communication according to context, including writing full research proposals, abstracts, and thesis**
- Adopt a strategic, analytical and a creative approach to problem solving
- Understand the ethical and societal issues of genetic testing and genetic approaches to disease treatment and engage in complex ethical debate within the discipline [◊]

3.4 Digital and information literacy

- Utilise specialist IT systems in the professional environment
- Access and utilise databases and understand the significance and limitations of their data [◊]
- Use a range of professional packages to perform advanced analysis techniques in genomic research**
- Select appropriate study designs and IT approaches to address complex questions**
- Organise and analyse genomic data and present it in a clear, logical and concise manner

3.5 Active citizenship

- Learn independently as part of a commitment to continuing professional development.
- Understand and promote the importance of global data sharing through its submission and access of public databases for the benefit of all.
- Demonstrate knowledge of and interact with international genomic initiatives and projects.
- Consider and debate the ethics of and impact of responsible genetic data storage and ownership and its medical interpretation [◊]
- Be able to discuss the Impact of genome data in specific sub populations of the world and the ethical and social issues [◊]

SECTION 4: PROGRAMME STRUCTURE AND CURRICULUM

4.1 Programme structure and requirements:

The MSc in Medical Genomics and Genetics is a modular subject programme. In total, seven modules will be taken and assessed for a total of 180 Master's-level (level 7) credits. Full time students will be expected to complete the programme in 12 months while part time students are expected to complete in 24 months (but within a maximum permitted period of five years after initial registration) . One of the course modules comprises a research project (60 credits). Students who do not do the research project will be awarded a Post-Graduate Diploma (PGDip) upon successful completion of the other modules.

Structure: Master of Science in Medical Genetics and Genomics.

Students must successfully complete all modules listed in the table below. For part-time students, progression to the P10199 Research Project (60 Credits) requires successful completion of the taught modules (120 credits)

| Module Name | Module Number | Status | Credits * (CATS) | Semester of delivery |
|--|-------------------|------------|------------------|----------------------|
| Advanced Molecular Techniques | BIOS7001 (P10101) | Compulsory | 20 | 1 |
| Genome Science | BIOS7002 (P10102) | Compulsory | 20 | 2 |
| Molecular Basis of Human Genetic Disease | BIOS7004 (P10112) | Compulsory | 20 | 1 |
| Functional Genomics and Research Methods | BIOS7005 (P10113) | Compulsory | 20 | 1 |
| Clinical Genetics and Diagnostics | BIOS7006 (P10114) | Compulsory | 20 | 2 |
| Advances in Medical Genetics | BIOS7007 (P10115) | Compulsory | 20 | 2 |
| Research Project | BIOS7009 (P10199) | Compulsory | 60 | 2+3 |

* A single module (20 credits) is considered to demand 200 hours of student effort, which includes lectures, reading, seminars, laboratory work, private study and preparation for assignments. Accordingly, a treble (60) credit module requires 600 hundred hours of student effort.

Structure: Postgraduate Diploma in Medical Genetics and Genomics.

Students must successfully complete all of the modules listed below:

| Module Name | Module Number | Status | Credits (CATS) | Semester of delivery |
|--|-------------------|------------|----------------|----------------------|
| Advanced Molecular Techniques | BIOS7001 (P10101) | Compulsory | 20 | 1 |
| Genome Science | BIOS7002 (P10102) | Compulsory | 20 | 2 |
| Molecular Basis of Human Genetic Disease | BIOS7004 (P10112) | Compulsory | 20 | 1 |
| Functional Genomics and Research Methods | BIOS7005 (P10113) | Compulsory | 20 | 1 |
| Clinical Genetics and Diagnostics | BIOS7006 (P10114) | Compulsory | 20 | 2 |
| Advances in Medical Genetics | BIOS7007 (P10115) | Compulsory | 20 | 2 |

Structure: Postgraduate Certificate in Medical Genetics and Genomics.

Students must successfully complete the compulsory module Molecular Basis of Human Genetic Disease (BIOS7004), along with **two** other modules from those listed in the table below:

| Module Name | Module Number | Status | Credits (CATS) | Semester of delivery |
|--|-------------------|------------|----------------|----------------------|
| Advanced Molecular Techniques | BIOS7001 (P10101) | Acceptable | 20 | 1 |
| Genome Science | BIOS7002 (P10102) | Acceptable | 20 | 2 |
| Molecular Basis of Human Genetic Disease | BIOS7004 (P10112) | Compulsory | 20 | 1 |
| Functional Genomics and Research Methods | BIOS7005 (P10113) | Acceptable | 20 | 1 |
| Clinical Genetics and Diagnostics | BIOS7006 (P10114) | Acceptable | 20 | 2 |
| Advances in Medical Genetics | BIOS7007 (P10115) | Acceptable | 20 | 2 |

Awards

Successful completion of all the compulsory modules (180 credits) is required for the award of MSc. A Postgraduate Diploma will be awarded for completion of 120 credits (taught modules without the Research Project BIOS7009 / P10199). A PGCert will be awarded to a student attaining between 60 - 100 credits, to include the compulsory module Molecular Basis of Human Genetic Disease (BIOS7004 / P10112).

Students achieving a mark average (across successfully completed modules) of 50-59% will receive a Pass award. A mark average of 60-69% will receive a Merit award. The award of Distinction requires a mark average of above 70% including, for MSc awards, a mark of 70% or above in the Research Project. Students who do not achieve 70% in the Research Project, but who have an overall average of 70% or above will receive a Merit award at MSc.

4.2 Professional requirements

Non applicable

SECTION 5: PROGRAMME DELIVERY

5.1 Teaching, Learning and Assessment

The programme is designed to develop strong theoretical and laboratory skills in modern genetics and genomic medicine through lectures, assignments and practical work which will equip students with the ability to develop and apply methodologies or be decisive in solving research questions in any professional situation. The in-depth study of this genomic medicine will also develop the skills needed for a successful research project outcome and discuss the impact of its findings, scientifically and ethically.

The Faculty of Health and Life Sciences has a very strong cluster of research in the biosciences with particular focus on genome science, molecular biology, computational biology, bioimaging, cell biology and commercial applications. The course is research-lead. We have excellent facilities for teaching and research. As the first semester progresses, students will have the opportunity to develop their project with the Course Lead and tutors.

Ultimately, the course seeks to teach an understanding of the ways of genome science research and, to this end, a module entitled Functional Genomic Analysis is presented. Students will be instructed in basic research skills and will within this module and others be encouraged to think of their research in contextual terms, i.e. in terms of the bigger picture. Scientists on a career path need to be innovative and, in large part, the ability to incorporate new technologies into research depends on good general knowledge of an array of techniques.

Knowledge and understanding in many areas of genome science are advancing rapidly. Staff ensure teaching is kept up-to-date by integrating the latest research findings in lectures and practical classes. Articles from primary research journals are featured in student reading lists, and students are encouraged to use primary research journals in preparing assignments. The students are also exposed to the latest research findings from guest lecturers selected for particular expertise. The standards that are expected in research are also widely taught and practised. The Research project module, in particular, provides an opportunity for students to undertake substantial research specific activities.

Discussions between programme staff teams have ensured that programmes are characterised by an appropriate breadth and depth of content that includes the latest research, and a variety of teaching, learning and assessment methods. Co-ordinated implementation of the Brookes Assessment Compact is designed to ensure student progression towards meeting programme outcomes while experiencing diversity and balance in assessment practice within and between modules and equity in module workloads.

The teaching and learning methods used in the course reflect the wide variety of topics and techniques associated with medical genetics and genomics. Lectures, laboratory sessions, coursework assignments and workshops provide the framework, essential background and knowledge base for each module and students are encouraged to probe more deeply by reading widely. Analysis, synthesis and application of material introduced in lectures is achieved through practice and syndicate work with tutors and peer review.

The teaching and learning methods include:

- lectures and seminars led by individual members of staff and visiting specialists.
- workshops for teaching a range of research skills including appropriate research methodologies and on-line research skills.
- hands-on experience with tuition for development of proficiency of database interrogation .
- student led seminar activities facilitated by academic staff.

The quality of academic provision for students is assessed regularly by the programme team, principally through student evaluation of each module, and through critical evaluation of the annual External Examiner reports. Dissemination and encouragement of good practice is facilitated through staff sharing, reflection and discussion of the course at Annual Review. All tutors are required to complete the Postgraduate Certificate for Teaching in Higher Education or an equivalent qualification, and to continue ongoing development through short courses where appropriate.

Each module is worth a number of Level 7 credits, collectively contributing to the sum of 180 for the whole MSc. The amount of time each student will take to achieve the learning outcomes for a module will vary according to the needs and ability of the individual. However, the modules are designed so that each credit equates to approximately 10 hours of learning. Therefore a module worth 20 credits is expected to require 200 hours of learning. Some of these hours will be through class contact and laboratory or computer practical time and others will be through independent study and time spent working towards or preparing for assessments.

Reflective independent learning is encouraged through the use of:

- a teaching approach that encourages interdisciplinary thinking and integration of knowledge and understanding across traditional subject boundaries;

- assignments that require a reflective element (e.g., extended project work, group work assignments);
- assessment methods that provide students with staff or peer feedback either during the course of preparing an assignment or on its completion;
- module and course evaluation by students.

5.2 Assessment regulations

The programme conforms to the University PGT Regulations available at:
www.brookes.ac.uk/students/graduate-office/current-students/taught-postgraduate-students/regulations/

All assessment strategies will be in line with the Oxford Brookes Assessment Compact.

The Assessment Compact can be found at:-

<http://www.brookes.ac.uk/aske/documents/BrookesAssessmentCompact09.pdf>

SECTION 6: ADMISSIONS

6.1 Entry criteria

Normally hold at least a lower second class UK honours degree or equivalent overseas degree in the Life Sciences from a recognised institution.

Applicants whose home language is not English must demonstrate that their level of English is appropriate for study at postgraduate level with appropriate writing skills. In addition to the academic entry qualifications, applicants must have the following or an equivalent qualification acceptable to the University as set out in the list produced by the International Centre for English Language Studies (ICELS).

The English Language requirement is IELTS: level 6.5 or above. For details please contact the Programme Administrator: genomics@brookes.ac.uk

It is possible for a student to enter the programme with prior credit for previous studies undertaken at Oxford Brookes University, or other institutions or with accreditation or prior (experiential) learning (AP(E)L), providing this meets the requirements and practices established by the Faculty of Health and Life Sciences, Oxford Brookes University for AP(E)L credits.

6.2 DBS checks

Not applicable for entry onto the course. May be required for individual research projects.

SECTION 7: STUDENT SUPPORT AND GUIDANCE

On arrival the students undergo a welcoming induction to the University and on to the course introducing them to the key staff and their course tutors. All students are given access to programme handbooks, module handbooks and a personal timetable. International students are invited onto a Faculty wide course to assist with the transition to the UK HE system. Each student is assigned an academic adviser but in the first few weeks of the semester the course tutors are proactive in developing study skills and supporting students. In addition to the course based academic support, the Student support coordinator takes a proactive role in supporting the cohort.

The academic staff monitor student progress regularly to check that they are maximising their potential. If they experience academic difficulties we can arrange for them to receive academic mentoring support.

If students are faced with challenges that affect their ability to study, such as illness, bereavement, depression, financial difficulties or accommodation issues, the University has specialist staff to work with them in finding a way forward. Many of the students on the course are international students and they access the international students advisory services to discuss visa issues and other international student specific issues.

There are also a number of general support services including learning and personal support services. These range from academic advisers and support co-ordinators to specialist subject librarians, career advisers and other learning support staff all designed to ensure that students get the best out of their studies. Most of these services are located within Student Central in the John Henry Brookes Building on the Headington Campus.

SECTION 8: GRADUATE EMPLOYABILITY

The course aims to develop professionals in genome science who develop careers as scientists, health professionals and leaders within the sector. It will provide you with the essential knowledge and skills to pursue a research career, either in a clinical or scientific setting, and contribute to the growing need for scientists and clinicians to translate advances in genomic science into medical interventions within healthcare e.g. personalised medicine. To date graduates from this course have gone on to a wide range of jobs including clinical trials coordinator, molecular biologist, and several have gone on to study for PhD's in this and other universities. During the course you will be able to interact with professionals working in clinical, research and commercial settings and visit Genomic Centres to develop your understanding of careers within this sector.

SECTION 9: LINKS WITH EMPLOYERS

Close links with bioscience employers and research collaborators have developed over several years, and these can support student development through learning events such as guest lecturers or externally-hosted research projects. Our graduates also go on to take up jobs with these employers, including local bioscience employers such as local hospitals, Oxford Expression Technologies and companies linked with the Department via the BioInnovation Hub. In addition, the students are encouraged to attend weekly departmental seminars, Open lectures and the annual Postgraduate Symposium, where our own and visiting researchers present a range of relevant research topics.

SECTION 10: QUALITY MANAGEMENT

Indicators of quality/methods for evaluating the quality of provision

The Faculty of Health and Life Sciences programmes benefit from rigorous quality assurance procedures and regularly receive excellent feedback from external examiners, employers, and students. Quality assurance of the Programme is addressed in a number of ways:

- Subject Committee meetings held once a semester to enable staff and students to feedback on the programme.
- A rigorous annual and periodic review process to ensure the currency of the programme.
- An external examining process that follows the university guidelines to ensure fairness and consistency of assessment, and comparability with other HE institutions.
- Systematic end of module and end of programme monitoring and evaluation.
- Employer/other stakeholder engagement.