School of Life and Medical Sciences

Title of Programme: MSc Biosciences Programme

Programme Code: LMBIOM

Course Code: LMMOLBIO

MSc Molecular Biotechnology

Programme Specification

This programme specification is relevant to students entering: 21 September 2020

Associate Dean of School (Academic Quality Assurance):
Stefanie Schmeer

Signature

A programme specification is a collection of key information about a programme of study (or course). It identifies the aims and learning outcomes of the programme, lists the modules that make up each stage (or year) of the programme, and the teaching, learning and assessment methods used by teaching staff. It also describes the structure of the programme, its progression requirements and any programme-specific regulations. This information is therefore useful to potential students to help them choose the right programme of study, to current students on the programme, and to staff teaching and administering the programme.

<table>
<thead>
<tr>
<th>Date</th>
<th>Section</th>
<th>Amendment</th>
</tr>
</thead>
<tbody>
<tr>
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</table>

If you have any queries regarding the changes please email AQO@herts.ac.uk
Programme Specification  MSc Molecular Biotechnology

This programme specification (PS) is designed for prospective students, enrolled students, academic staff and potential employers. It provides a concise summary of the main features of the programme and the intended 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 teaching, learning and assessment methods, learning outcomes and content for each module can be found in Definitive Module Documents (DMDs) and Module Guides.

Section 1

A. Programme Rationale

The programme is designed to provide a postgraduate education in Molecular Biotechnology for graduates in the Biosciences or Biological Chemistry. A strong practical foundation is provided in the first semester with the study of modules that concentrate on the basic principles and techniques used in modern molecular biology investigations, and on aspects of cellular molecular biology, immunology and development. In the second semester there is a progression to problem-based learning (PBL) to develop an in-depth understanding and high-level critical analysis skills of molecular biological approaches to the application of genome technology and production of industrial and medicinal proteins, the characterisation of selected diseases and the design of new biological drugs for their treatment. During the final semester, the research project carried out in the state-of-the-art multimillion science facility may include aspects of molecular biology, bioinformatics, vaccine, general cellular molecular biology, plant and animal biotechnology. This course will provide students with the skills they need to have for future opportunities in the fast-growing biotechnology industry.

The use of problem-based learning approaches is a key feature of the programme and will promote development of investigative skills, the ability to work in a group and confidence in the investigation of new research areas. Another key feature of the programme is the research project which gives training in research methods and hands-on experience of laboratory and bioinformatics techniques including next generation sequencing. Throughout the programme the students will be provided academic and personal support by their personal tutors, programme leader and academic support unit. Where required, students will be further supported to improve their skills in academic English writing through English language classes.

B. Educational Aims of the Programme

The programme has been devised in accordance with the University's graduate attributes of programmes of study as set out in UPR TL03.

Additionally this programme aims to:

• engender a continuing and independent approach to learning, encouraging initiative and self-discipline such that students will be able to comprehend, contribute to, and harness advances in molecular biology;

• build and improve on students’ cognitive skills, including the ability to think logically and independently; to be reflective and critical of scientific hypotheses, to analyse, synthesise and be creative;
enable students to develop a systematic understanding and a critical awareness of associated issues, some of which are at the forefront of molecular biology;

provide a framework for the acquisition of a comprehensive understanding of molecular biology techniques applicable to research, equivalent advanced scholarship and commercial situations;

develop an ability to apply the techniques described above and an understanding of how the results may be used to inform judgements, and develop and advance ideas;

provide opportunities for the continuing development of transferable skills including communication, mathematical analysis, use of information technology, problem solving both as part of a team and as an individual.

C. Intended Learning Outcomes

The programme provides opportunities for students to develop and demonstrate knowledge and understanding, skills and other attributes in the following areas. The programme outcomes are referenced the Frameworks for Higher Education Qualifications of UK Degree-Awarding Bodies (2014), and relate to the typical student. Additionally, the SEEC Credit Level Descriptors for Further and Higher Education (2016) have been used as a guiding framework for curriculum design.

<table>
<thead>
<tr>
<th>Knowledge and Understanding</th>
<th>Teaching/learning methods &amp; strategies</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1 relate gene expression to the phenotype of an organism via an understanding of gene and protein structure and function, developmental biology and the influence of the environment on gene expression</td>
<td>Acquisition of A1 and A2 is through a combination of lectures, laboratory classes, tutorials and guided reading in Molecular Cell Biology and Immunology and Genetics and Protein Biology. These outcomes will also be reinforced and developed in the problem-based learning (PBL) exercises in semester B.</td>
<td>Knowledge and understanding are assessed through a combination of unseen tests (A1-A4) data interpretation exercises (A1-A4), oral presentations (A1-A2), laboratory records (A1-A2), viva voce examinations (A3, A4), PBL assignments (A3, A4), bioinformatics exercise (A2), and the design, execution and reporting of a research project (A2-A4).</td>
</tr>
<tr>
<td>A2 critically evaluate the methodologies of gene mapping, recombinant DNA technology and introductory bioinformatics and apply them to the investigation and deconstruction of biological systems.</td>
<td>A3 is achieved through the lecture programme, and problem-based learning (PBL) exercises in Contemporary Topics in Plant and Animal Biotechnology.</td>
<td></td>
</tr>
<tr>
<td>A3 appreciate the nature and application of biopharmaceuticals and understand the molecular mechanisms underlying protein engineering, production and purification, thus enabling the design of such processes.</td>
<td>A4 is achieved through the lecture programme, and problem-based learning (PBL) exercises in Genome Science.</td>
<td></td>
</tr>
<tr>
<td>A4 evaluate the molecular mechanisms that underpin selected inherited, non-inherited and infectious</td>
<td>Throughout, the learner is encouraged to undertake independent study both to supplement and consolidate what is being taught/learnt and to broaden their individual knowledge and understanding of the subject.</td>
<td></td>
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</tbody>
</table>
human diseases and understand the molecular strategies in developing therapeutics.

<table>
<thead>
<tr>
<th>Intellectual skills:</th>
<th>Teaching/learning methods &amp; strategies</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1 evaluate the applications of molecular methods in fundamental research and industry.</td>
<td>Acquisition of B1 is through the laboratory classes, <em>Research Project with Research Methods</em> and PBL exercises.</td>
<td>Intellectual skills are assessed through using laboratory reports, <em>viva voce</em> examinations, the project and PBL assignments.</td>
</tr>
<tr>
<td>B2 demonstrate a critical approach in enquiry and hypothesis testing and critically evaluate scientific literature and experimental data.</td>
<td>Acquisition of B2 is through <em>Research Project with Research Methods</em>, PBL exercises and in <em>Genetics and Protein Biology</em>. Throughout, the learner is encouraged to develop intellectual skills further by independent study.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Practical skills:</th>
<th>Teaching/learning methods &amp; strategies</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1-design, execute, interpret and report investigations (practical and theoretical) of molecular biology problems and molecular genetics of disease, critically evaluate the contribution made to current knowledge and propose avenues for future study.</td>
<td>Practical skills are developed through laboratory classes, the PBL exercises, <em>Research Project with Research Methods</em>.</td>
<td>Practical skills are assessed through laboratory reports <em>viva voce</em> examinations the PBL assignments, the project proposal and project.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Transferable skills:</th>
<th>Teaching/learning methods &amp; strategies</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>D1 effectively communicate analyses of case studies in both the written and spoken word and defend the findings of their work.</td>
<td>Transferable skills are developed throughout the programme: Acquisition of D1 is achieved in the PBL modules and <em>Research Project with Research Methods</em>.</td>
<td>Transferable skills are assessed through laboratory reports (D1,4); <em>viva voce</em> examinations (D1 and D2); seminars (D1) PBL reports (D1, D3, D4, D5) and the project (D1, D2, D4, D5).</td>
</tr>
<tr>
<td>D2 demonstrate self-direction and originality in tackling and solving problems and act autonomously in planning and executing tasks.</td>
<td>Acquisition of D2 is through the <em>Project</em>, PBL and the supporting mentoring programme operated in Semester A.</td>
<td></td>
</tr>
<tr>
<td>D3 contribute effectively to the functioning of a group and reflect on the learning experience.</td>
<td>Acquisition of D3 is achieved through the PBL modules</td>
<td></td>
</tr>
<tr>
<td>D4 demonstrate numeracy and manipulate, analyse and present data.</td>
<td>Acquisition of D4 and D5 is achieved in the PBL exercises, bioinformatics practicals in <em>Molecular Cell Biology and Immunology</em> and the <em>Research Project with Research Methods</em> module.</td>
<td></td>
</tr>
</tbody>
</table>
D. Programme Structures, Features, Levels, Modules, and Credits

The programme is offered in full-time mode (Semester A intake) and leads to the award of an MSc in Molecular Biotechnology. Entry is normally at level 7.

The programme is also offered as a part-time 2 year course. Part-time students will study the 30 CP Molecular Cell Biology and Immunology (MCBI) module in semester A of year 1 and then Molecular Medicine in Sem B. In year 2 students will study Translational Medical Science in Sem A and Contemporary Topics in Cancer Immunotherapy in Sem B. In semester C, the Research Project will be completed either in the work place (supervised by industrial supervisor and university supervisor) or at UH supervised by a UH supervisor. Students will also study Research Methods in year 2 as an integral part of the research project (60CP).

Professional and Statutory Regulatory Bodies
None

Work-Based Learning, including Sandwich Programmes
Not Applicable

Programme Structure
The programme structure and progression information below (Table 1a and 1b) is provided for the award. Any interim awards are identified in Table 1b. The Programme Learning Outcomes detailed above are developed and assessed through the constituent modules. Table 2 identifies where each learning outcome is assessed.

Table 1a Outline Programme Structure

<table>
<thead>
<tr>
<th>Compulsory Modules</th>
<th>Module Code</th>
<th>Credit Points</th>
<th>Language of Delivery</th>
<th>% Examination</th>
<th>% Coursework</th>
<th>% Practical</th>
<th>Semesters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Molecular Cellular Biology &amp; Immunology</td>
<td>7LMS0279</td>
<td>30</td>
<td>English</td>
<td>0</td>
<td>100</td>
<td>0</td>
<td>A</td>
</tr>
<tr>
<td>Genetics and Protein Biology</td>
<td>7LMS0269</td>
<td>30</td>
<td>English</td>
<td>0</td>
<td>100</td>
<td>0</td>
<td>A</td>
</tr>
<tr>
<td>Applied Biotechnology</td>
<td>7LMS0273</td>
<td>30</td>
<td>English</td>
<td>0</td>
<td>100</td>
<td>0</td>
<td>B</td>
</tr>
<tr>
<td>Genome Science</td>
<td>7LMS0276</td>
<td>30</td>
<td>English</td>
<td>0</td>
<td>100</td>
<td>0</td>
<td>B</td>
</tr>
<tr>
<td>Research Project with Research Methods</td>
<td>7LMS0278</td>
<td>60</td>
<td>English</td>
<td>0</td>
<td>100</td>
<td>0</td>
<td>ABC</td>
</tr>
</tbody>
</table>

The award of an MSc requires 180 credit points passed at level 7. Although the modules are assessed by coursework, this will also include some in-class tests.

D5 apply appropriate information technology to the recovery, analysis and reporting of data.

Throughout, the learner is encouraged to develop transferable skills by maintaining a record of evidence and completing a personal development plan.
The programme provides the following final and interim awards:

<table>
<thead>
<tr>
<th>Final Award</th>
<th>Award Title</th>
<th>Minimum requirements</th>
<th>Available at end of (normally):</th>
<th>Programme Learning Outcomes developed (see above)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Masters</td>
<td>Molecular Biotechnology</td>
<td>180 credit points including at least 150 at level 7</td>
<td>3 Semesters</td>
<td>All programme learning outcomes (see Table 2)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Interim Award</th>
<th>Award Title</th>
<th>Minimum requirements</th>
<th>Available at end of Level</th>
<th>Programme Learning Outcomes developed (see above)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Postgraduate Diploma</td>
<td>Molecular Biotechnology</td>
<td>120 credit points, including at least 90 at level 7</td>
<td>2, 3 Semesters</td>
<td>A1, A2, A3, A4, B1, B2, C1, D1, D2, D3, D4, D5</td>
</tr>
<tr>
<td>Postgraduate Certificate</td>
<td></td>
<td>60 credit points, including at least 45 at level 7</td>
<td>1-2 Semesters</td>
<td>For untitled awards: See UPR AS11, section 13: <a href="http://sitem.herts.ac.uk/secreg/upr/AS11.htm">http://sitem.herts.ac.uk/secreg/upr/AS11.htm</a></td>
</tr>
</tbody>
</table>

Masters and Diploma awards can be made "with Distinction" or "with Commendation" where criteria as described in UPR AS14, Section D and the students' handbook are met.

Programme-specific assessment regulations

The programme is compliant with the University's academic regulations (in particular, UPR AS11, UPR AS12/UPR AS13 (delete as applicable) and UPR AS14) with the exception of those listed below, which have been specifically approved by the University:

- None

Further points of clarification and interpretation relevant to this specific programme are given below:

- For the award of Postgraduate Certificate and Postgraduate Diploma in Molecular Biotechnology the 60 or 120 credit points must include either 7LMS0269 Genetics and Protein Biology (30 credit points) or 7LMS0273 Applied Biotechnology (30 credit points)
- You are expected to attend all classes including lectures, workshops and practicals and attendance will be monitored for each module.

E. Management of Programme & Support for student learning

Management

The programme is managed and administered through:

- Dean of School
- Associate Deans (Academic Quality Assurance and Education)
A Programme Leader who is responsible for the day to day management of the programme and admissions tutor who is responsible for the admissions
A designated Programme Administrator to deal with day to day administration associated with the programme
Module Co-ordinators who are responsible for individual modules
A Programme Committee with the following membership: Programme Leader (chair), a Programme Administrator, Module Co-ordinators, School Learning Information Services Consultant, lecturing staff who have a substantial input into the programme, and student representatives.

Support
Students are supported by:
• An induction period at the beginning of the academic session
• An extensive Learning Resources Centre, incorporating a library and computer centre
• A Programme Leader to give advice on programme regulations
• Personal tutors to provide pastoral and academic support
• A mentor to support the acquisition of study skills and report writing
• Project tutors
• Module guides providing module information and study guidance
• On-line module information provided via the University’s managed learning environment “Studynet”, a University-wide system for study support
• A student handbook
• Comprehensive feedback on assessed assignments
• Student representatives on the Programme Committee
• An English Language Teaching Centre
• A substantial Student Centre that provides advice on issues such as finance, University regulations, legal matters etc
• An Accommodation Office
• An Overseas Student Orientation course
• A Mathematics Drop-in Centre
• A Disabled Student Co-ordinator
• An Equal Opportunities Officer
• The Students’ Union
• Careers, Enterprise and Employment Service

F. Other sources of information
In addition to this Programme Specification, the University publishes guidance to registered students on the programme and its constituent modules:
• A Programme (or Student) Handbook;
• A Definitive Module Document (DMD) for each constituent module;
• A Module Guide for each constituent module.
• University of Hertfordshire Course website: http://www.herts.ac.uk/courses/
• Information on Programme and Module External Examiners http://www.studynet1.herts.ac.uk/ptl/common/studentcentre.nsf/Teaching+Documents/184A221E5EECA6B780257A5C00250BA9?OpenDocument

The Ask Herts website provides information on a wide range of resources and services available at the University of Hertfordshire including academic support, accommodation, fees, funding, visas, wellbeing services and student societies.

As a condition of registration, all students of the University of Hertfordshire are required to comply with the University’s rules, regulations and procedures. These are published in a series of documents called ‘University
Policies and Regulations’ (UPRs). The University requires that all students consult these documents which are available on-line, on the UPR web site at: http://www.herts.ac.uk/secereg/upr/. In particular, UPR SA07 ‘Regulations and Advice for Students’ Particular Attention - Index’ provides information on the UPRs that contain the academic regulations of particular relevance for undergraduate and taught postgraduate students.

In accordance with section 4(5) of the Higher Education and Research Act 2017 (HERA), the UK Office for Students (OfS) has registered the University of Hertfordshire in the register of English higher education providers. The Register can be viewed at: https://www.officeforstudents.org.uk/advice-and-guidance/the-register/the-ofs-register/. Furthermore, the OfS has judged that the University of Hertfordshire delivers consistently outstanding teaching, learning and outcomes for its students. It is of the highest quality found in the UK. Consequently, the University received a Gold award in the 2018 Teaching Excellence and Student Outcomes (TEF) exercise. This award was made in June 2018 and is valid for up to 3 years. The TEF panel’s report and conclusions can be accessed at: https://www.officeforstudents.org.uk/advice-and-guidance/teaching/tef-outcomes/#/provider/10007147

**G. Entry requirements**

“For current entry tariff point requirements, please refer to the relevant page for the Course on the University website or on the online prospectus”.

The normal entry requirements for the programme are:

i. a first or second class Honours Degree in Biosciences or Biological Chemistry with a final classification grade of a minimum of 55%; or

ii. a professional qualification accepted as equivalent to the above; or

iii. a qualification in veterinary science, medicine or dentistry or

iv. a first or second class Honours Degree in disciplines other than those described above with a final classification grade of minimum of 55% but where the applicant, in the opinion of the Programme Leader, would benefit from, and succeed on, the programme.

In addition, all international students are required to demonstrate an English Language capability of IELTS 6.5 (with no less than 6.0 in any band) or equivalent qualification.

**Non-Standard Entry**

Applicants not within the categories described above, but who can demonstrate by other means, as specified below, that they can succeed on the programme will be considered on an individual basis.

i. at least 5 years experience of working full-time in the biotechnology or pharmaceutical industry.

Applicants will be interviewed in order to establish their suitability based upon the criteria

The applicant will be rated on a 5 point scale for their ability to demonstrate:

1. an advanced knowledge in the field of Molecular Biology and Biotechnology and how this has been developed during employment.
2. critical awareness of current issues in Molecular Biology and Biotechnology, in particular the impact of these on recent developments in the discipline.
3. practical experience in a range of laboratory techniques relevant to the biosciences.

The programme is subject to the University’s Principles, Policies and Regulations for the Admission of Students to Undergraduate and Taught Postgraduate Programmes (in UPR SA03), along with associated procedures. These will take account of University policy and guidelines for assessing accredited prior certificated learning (APCL) and accredited prior experiential learning (APEL).

If you would like this information in an alternative format please contact: Amy Grogan, Student Administrator: a.grogan@herts.ac.uk
If you wish to receive a copy of the latest Programme Annual Monitoring and Evaluation Report (AMER) and/or the External Examiner’s Report for the programme, please email a request to ago@herts.ac.uk
### MSc Molecular Biotechnology

#### Table 2: Development of Intended Programme Learning Outcomes in the Constituent Modules

This map identifies where the programme learning outcomes are assessed in the constituent modules. It provides (i) an aid to academic staff in understanding how individual modules contribute to the programme aims (ii) a checklist for quality control purposes and (iii) a means to help students monitor their own learning, personal and professional development as the programme progresses.

<table>
<thead>
<tr>
<th>Module Title</th>
<th>Module Code</th>
<th>A1</th>
<th>A2</th>
<th>A3</th>
<th>A4</th>
<th>B1</th>
<th>B2</th>
<th>C1</th>
<th>D1</th>
<th>D2</th>
<th>D3</th>
<th>D4</th>
<th>D5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Molecular Cell Biology and Immunology</td>
<td>7LMS0279</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
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</tr>
<tr>
<td>Genetics and Protein Biology</td>
<td>7LMS0269</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
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<td>X</td>
</tr>
<tr>
<td>Genome Science</td>
<td>7LMS0276</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
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</tr>
<tr>
<td>Applied Biotechnology</td>
<td>7LMS0273</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
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<tr>
<td>Research Project with Research Methods</td>
<td>7LMS0278</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
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</tbody>
</table>
KEY TO PROGRAMME LEARNING OUTCOMES

Knowledge and Understanding
A1. relate gene expression to the phenotype of an organism via an understanding of gene and protein structure and function, developmental biology and the influence of the environment on gene expression.

A2. critically evaluate the methodologies of gene mapping, recombinant DNA technology and introductory bioinformatics and apply them to the investigation and deconstruction of biological systems.

A3. appreciate the nature and application of biopharmaceuticals and understand the molecular mechanisms underlying protein engineering, production and purification thus enabling the design of such processes.

A4. evaluate the molecular mechanisms that underpin selected inherited, non-inherited and infectious human diseases and understand the molecular strategies in developing therapeutics.

Practical Skills
C1. design, execute, interpret and report investigations (practical and theoretical) of molecular biology problems and molecular genetics of disease, critically evaluate the contribution made to current knowledge and propose avenues for future study.

Intellectual Skills
B1. evaluate the applications of molecular methods in fundamental research and industry.

B2. critically evaluate scientific literature and experimental data.

Transferable Skills
D1. effectively communicate analyses of case studies in both the written and spoken word and defend the findings of their work.

D2. demonstrate self-direction and originality in tackling and solving problems and act autonomously in planning and executing tasks.

D3. contribute effectively to the functioning of a group and reflect on the learning experience.

D4. demonstrate numeracy and manipulate, analyse and present data.

D5. apply appropriate information technology to the recovery, analysis and reporting of data.
Section 2

Programme management

Relevant QAA subject benchmarking statements
None

Type of programme
Taught postgraduate

Date of validation/last periodic review
February 20

Date of production/ last revision of PS
May 2018

Relevant to level/cohort
Level 7 entering September 2020

Administrative School
School of Life and Medical Sciences

Table 3 Course structure

<table>
<thead>
<tr>
<th>Course code</th>
<th>Course description</th>
<th>HECOS</th>
</tr>
</thead>
<tbody>
<tr>
<td>LMMOLBIO</td>
<td>MSc Molecular Biotechnology</td>
<td>100354, 100134</td>
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</tbody>
</table>