

Programme Specification: Post Graduate Taught

For students starting in Academic Year 2023/24

1. Course Summary

Names of programme and award title(s)	MSc Cell and Tissue Engineering
Award type	Taught Masters
Mode of study	Full-time Part-time
Framework of Higher Education Qualification (FHEQ) level of final award	Level 7
Normal length of the programme	1 year full-time or 2 years part-time
Maximum period of registration	The normal length as specified above plus 3 years
Location of study	Guy Hilton Research Centre Keele Campus
Accreditation (if applicable)	n/a
Regulator	Office for Students (OfS)
Tuition Fees	<p>UK students:</p> <p>Full-time fee for 2023/24 is £11,500</p> <p>Part-time fee for 2023/24 is £6,400 per year*</p> <p>International students:</p> <p>Full-time fee for 2023/24 is £21,900</p>

How this information might change: Please read the important information at <http://www.keele.ac.uk/student-agreement/>. This explains how and why we may need to make changes to the information provided in this document and to help you understand how we will communicate with you if this happens.

* We reserve the right to increase fees in subsequent years of study by an inflationary amount. Please refer to the accompanying Student Terms & Conditions for full details. Further information on fees can be found at <http://www.keele.ac.uk/studentfunding/tuitionfees/>

2. Overview of the Programme

The aim of the programme is to provide multi-disciplinary Masters level postgraduate training in Cell and Tissue Engineering and improve the students' career prospects. These involve building on existing undergraduate knowledge in basic sciences and applying them to regenerative medicine and biomedical engineering relevant to the healthcare sector.

The course runs alongside an MSc course in Biomedical Engineering, giving students unique access to modules in that field, as well as more traditional topics in biomedical engineering such as physiological and functional measurement, medical device design and applications, and medical equipment management.

3. Aims of the programme

The overall objectives are:

- To provide a postgraduate level training leading to professional careers in Cell and Tissue Engineering in a wide range of healthcare establishments such as medical organisations, medical research institutions, NHS Trust hospitals, life science and medical related industry
- To provide an opportunity for in-depth research into specialist and novel areas of regenerative medicine
- To expose students to practical work in a hospital environment with hands-on knowledge of patient care
- To introduce students to exciting new fields such as stem cell therapy, new implants, bioengineering of tissue and organs, biomaterials and novel technologies for physiological monitoring (latter if the elective physiological measurement is selected)

The goal of the programme is to provide multi-disciplinary Masters level postgraduate training in Cell & Tissue Engineering to prepare students for future employment across a range of technical and healthcare environments including medical organisations, medical research institutions, NHS Trust hospitals, medical related industry (pharmacies, life sciences, medical devices), and other healthcare environments.

4. What you will learn

The intended learning outcomes of the programme (what students should know, understand and be able to do at the end of the programme), can be described under the following headings:

- Subject knowledge and understanding
- Subject specific skills
- Key or transferable skills (including employability skills)

Subject knowledge and understanding

Successful students will be able to:

The broad aims of the programme are to enable you to:

- Demonstrate a comprehensive understanding of the core biology and engineering principles associated with Cell and Tissue Engineering.
- Display a systematic understanding of physiological and/or biomedical measurement and quality control issues.
- Acquire solid knowledge of the core generic principles in regenerative medicine including stem cell, cell and gene therapies.

Subject specific skills

Successful students will be able to:

- Demonstrate the critical awareness of advanced technologies in associated cell culture environments, biomimetic materials and new techniques in regenerative medicine.
- Display the independent working and problem-solving capacity in the research projects alongside critical literature review and data interpretation.

Key or transferable skills (including employability skills)

Successful students will be able to:

- Develop the capacity to transfer scientific knowledge into practical application in current and subsequent career choice.

Keele Graduate attributes

Engagement with this programme will enable you to develop your intellectual, personal and professional capabilities. At Keele, we call these our ten Graduate Attributes and they include independent thinking, synthesizing information, creative problem solving, communicating clearly, and appreciating the social, environmental and global implications of your studies and activities. Our educational programme and learning environment is designed to help you to become a well-rounded postgraduate who is capable of making a positive and valued contribution in a complex and rapidly changing world, whichever spheres of life you engage in after your studies are completed.

Further information about the Keele Graduate Attributes can be found here: <http://www.keele.ac.uk/journey/>

5. How is the programme taught?

Teaching is delivered primarily through lectures, interactive-styled conference and seminars, and associated web-based Virtual Learning Environment materials. These are accompanied by tutorials, laboratory-based practical sessions, and research seminars by internationally and nationally known scientists, engineers and clinicians. In addition, students attend workshops and site visits, participate in problem-solving scenarios, and receive dedicated research project supervision. The programme also integrates development and execution of entrepreneurial skills for the field of Regenerative Medicine. Reflective of postgraduate education, self-directed learning is also a major component during both full-time and part-time studies.

The diversity of learning and teaching methods encountered by students supports development of independent learning skills and critical thinking as well as the acquisition of subject specific knowledge, relevant to the field of Regenerative Medicine. This enables students to meet the range of intended learning outcomes covering specific bioengineering and scientific principles and demonstration of independent research and problem solving.

6. Teaching Staff

Teaching for the modules for the programme are undertaken by academics who are research experts in the field, with many key staff being qualified Fellows of the Higher Education Academy (FHEA).

The University will attempt to minimise changes to our core teaching teams, however, delivery of the programme depends on having a sufficient number of staff with the relevant expertise to ensure that the programme is taught to the appropriate academic standard.

Staff turnover, for example where key members of staff leave, fall ill or go on research leave, may result in changes to the programme's content. The University will endeavour to ensure that any impact on students is limited if such changes occur.

7. What is the structure of the programme?

The programme consists of seven compulsory modules supplemented by a choice of two optional modules. The student must gain at least 120 credits from these taught modules. The students have to undertake a research project and submit a dissertation. If successfully completed, the project module provides the additional 60 credits. Altogether, 180 credits are required for the Master's qualification.

For January intake (students starting from Semester 2 in January), students will proceed as per the module and assessment schedule in the respective semesters of a standard September start, except that for these students the course runs from January to December (with the exception of the MTE-40055 assessment outlined below).

Note of module prerequisites:

- MTE-40023 Biomechanics: Basic knowledge of trigonometry and (vector) calculus
- MTE-40026 Physiological Measurement: Basic knowledge of physics or electronics. In addition completion of undergraduate module in human physiology and anatomy (Level 6).
- MTE-40031 Biomedical Signal Processing and Modelling: Knowledge of basic mathematics including algebra, trigonometry, differentiation and integration

Year	Compulsory	Optional		Electives	
		Min	Max	Min	Max
Level 7	150	30	30	0	0

Module Lists

Level 7

Compulsory modules	Module Code	Credits	Period
Stem Cells: Types, Characteristics & Applications	MTE-40028	15	Semester 1
Cell and Tissue Engineering	MTE-40033	15	Semester 1
Experimental Research Methodology	MTE-40039	15	Semester 1-2
Disease Modelling & Therapy for Regenerative Medicine	MTE-40055	15	Semester 1-2
Bioreactors and Growth Environments	MTE-40022	15	Semester 2
Biomaterials	MTE-40036	15	Semester 2
Project - medical technology	MTE-40015	60	Semester 3

Optional modules	Module Code	Credits	Period
Human Physiology and Anatomy	MTE-30001	15	Semester 1
Engineering for Medical Applications	MTE-30003	15	Semester 1
Biomechanics	MTE-40023	15	Semester 1
Human Physiology and Anatomy	MTE-40024	15	Semester 1
Physiological Measurements	MTE-40026	15	Semester 1
Medical Equipment and Technology Services Management	MTE-40029	15	Semester 1
Biotechnology and Omics	PHA-40236	15	Semester 1
Nanomagnetics in Nanomedicine	MTE-40030	15	Semester 2
Biomedical Signal Processing and Analysing	MTE-40031	15	Semester 2
Cell Biomechanics	MTE-40034	15	Semester 2
Medical Device Design Principles	MTE-40038	15	Semester 2
Development of Biopharmaceuticals	PHA-40190	15	Semester 2

Learning Outcomes

The table below sets out what students learn in the programme and the modules in which that learning takes place. Details of how learning outcomes are assessed through these modules can be found in module specifications.

Level 7

Subject Knowledge and Understanding	
Learning Outcome	Module in which this is delivered
Demonstrate a comprehensive understanding of the core biology and engineering principles associated with Cell and Tissue Engineering	Human Physiology and Anatomy - MTE-40024 Bioreactors and Growth Environments - MTE-40022 Project - medical technology - MTE-40015 Human Physiology and Anatomy - MTE-30001 Biotechnology and Omics - PHA-40236 Stem Cells: Types, Characteristics & Applications - MTE-40028 Disease Modelling & Therapy for Regenerative Medicine - MTE-40055 Biomaterials - MTE-40036 Cell Biomechanics - MTE-40034 Cell and Tissue Engineering - MTE-40033 Development of Biopharmaceuticals - PHA-40190
Display a systematic understanding of physiological and/or biomedical measurement and quality control issues.	Bioreactors and Growth Environments - MTE-40022 Project - medical technology - MTE-40015 Engineering for Medical Applications - MTE-30003 Human Physiology and Anatomy - MTE-30001 Development of Biopharmaceuticals - PHA-40190 Human Physiology and Anatomy - MTE-40024 Physiological Measurements - MTE-40026 Medical Equipment and Technology Services Management - MTE-40029 Biomechanics - MTE-40023 Experimental Research Methodology - MTE-40039 Biomedical Signal Processing and Analysing - MTE-40031
Acquire solid knowledge of the core generic principles in regenerative medicine including stem cell, cell and gene therapies	Disease Modelling & Therapy for Regenerative Medicine - MTE-40055 Biomaterials - MTE-40036 Cell and Tissue Engineering - MTE-40033 Stem Cells: Types, Characteristics & Applications - MTE-40028 Project - medical technology - MTE-40015 Bioreactors and Growth Environments - MTE-40022

Subject Specific Skills	
Learning Outcome	Module in which this is delivered
Demonstrate the critical awareness of advanced technologies in associated cell culture environments, biomimetic materials and new techniques in regenerative medicine	Development of Biopharmaceuticals - PHA-40190 Disease Modelling & Therapy for Regenerative Medicine - MTE-40055 Biotechnology and Omics - PHA-40236 Project - medical technology - MTE-40015 Bioreactors and Growth Environments - MTE-40022 Experimental Research Methodology - MTE-40039 Nanomagnetics in Nanomedicine - MTE-40030 Cell and Tissue Engineering - MTE-40033 Cell Biomechanics - MTE-40034 Biomaterials - MTE-40036 Medical Device Design Principles - MTE-40038 Stem Cells: Types, Characteristics & Applications - MTE-40028
Display the independent working and problem-solving capacity in the research projects alongside critical literature review and data interpretation	Disease Modelling & Therapy for Regenerative Medicine - MTE-40055 Project - medical technology - MTE-40015 Experimental Research Methodology - MTE-40039

Key or Transferable Skills (graduate attributes)	
Learning Outcome	Module in which this is delivered
Develop the capacity to transfer scientific knowledge into practical application in current and subsequent career choice	Project - medical technology - MTE-40015 Experimental Research Methodology - MTE-40039 Disease Modelling & Therapy for Regenerative Medicine - MTE-40055

8. Final and intermediate awards

Master's Degree	180 credits	You will require at least 150 credits at Level 7
Postgraduate Diploma	120 credits	You will require at least 90 credits at Level 7
Postgraduate Certificate	60 credits	You will require at least 40 credits at Level 7

9. How is the Programme Assessed?

A variety of assessment methods are used across the programme. These include coursework-based essays, written examinations, reports on laboratory-based practicals, essay-based examination, interactive oral presentations, and a dissertation based on the student research project. Most of the modules include two or three assessment methods, e.g. unseen exam plus practical report or an essay. Clear marking guidelines accompany each mode of assessment where a mark of 50% or above is required to achieve a pass. Through adoption of the above assessment methods students are given an opportunity to display achievements

spanning knowledge and problem-solving abilities, communication and research skills, development of practical skills, and critical thinking. The students have an opportunity to take one re-sit when the mark is below 50%.

Formative assessment occurs in a continuous process driven by lecturer-led discussion sessions, one-on-one mentoring, and practice presentations and posters. Elements of peer feedback are also used in a formative way.

For January intake (students starting from Semester 2 in January), students taking MTE-40055 will have their assessments in final semester.

Marks are awarded for summative assessments designed to assess your achievement of learning outcomes. You will also be assessed formatively to enable you to monitor your own progress and to assist staff in identifying and addressing any specific learning needs. Feedback, including guidance on how you can improve the quality of your work, is also provided on all summative assessments within three working weeks of submission, unless there are compelling circumstances that make this impossible, and more informally in the course of tutorial and seminar discussions.

10. Accreditation

This programme does not have accreditation from an external body.

11. University Regulations

The University Regulations form the framework for learning, teaching and assessment and other aspects of the student experience. Further information about the University Regulations can be found at:

<http://www.keele.ac.uk/student-agreement/>

If this programme has any exemptions, variations or additions to the University Regulations these will be detailed in an Annex at the end of this document titled 'Programme-specific regulations'.

12. What are the typical admission requirements for the Programme?

See the relevant course page on the website for the admission requirements relevant to this programme:

<https://www.keele.ac.uk/study/>

Undergraduates with a first or upper second-class degree (or equivalent) in biology, life sciences, medicine, engineering, physical or professions allied to medicine are eligible to apply. The applicants with other professional qualifications acceptable to the University are eligible to apply. For international applicants, an English language IELTS score of 6.5 or above is required. The admission of 3+1+1 programme students will follow the additional agreement between Keele and the partner university.

Recognition of Prior Learning (RPL) is considered on a case-by-case basis and those interested should contact the Programme Director. The University's guidelines on this can be found here:

<https://www.keele.ac.uk/qa/programmesandmodules/recognitionofpriorlearning/>

13. How are students supported on the programme?

Support is provided throughout the study period with a broad range of student-centred activities. Initial support is provided during the Induction Week where orientation, study skills introductions, and welcoming events are held, led by the course and the university. Accompanying these events the course handbook, which students receive on their first day, details key course information, module structure, module content, assessment formats, and relevant University regulations.

All students are allocated an academic mentor at the beginning of the course. This offers an individual resource for assistance with both academic and personal issues where detrimental impacts on academic outputs can develop. Students are invited to meet with academic mentors at least four times a year unless special needs require a greater frequency. More information is available in the University's Academic Mentoring Policy document. Students for whom English is not their first language are offered language classes, facilities and services by the University's Language Centre. In addition to credit-bearing postgraduate modules on English for academic study, students also have access to one-to-one tutorials for individual help and advice, and to a wealth of resources for self-study and practice. Incoming non-native English speaking students take a diagnostic English language assessment during their first week at Keele, after which personalised recommendations for modules or other forms of support are made. Regular mentoring will also be provided as part of the business skill development in the 'Disease Modelling & Therapy for Regenerative Medicine' (MTE-40055) module.

14. Learning Resources

This programme is based within the School of Pharmacy & Bioengineering. The administration team are based on Keele's main campus. Teaching delivery will be predominately held at the Guy Hilton Research Centre (GHRC), Hartshill Campus.

Students have access to all the facilities in main campus and the UHNM Hospital campus. In particular students have access to a Computer Room at the Guy Hilton Research Centre and extensive IT facilities on the main campus; the Health Library on the hospital campus, and the University library located on the main campus. The main library, for example, houses study spaces that can be used for group work. On-line, physical and electronic data sources area available through Keele University Library. GHRC provides photocopy and printing facility to the students.

15. Other Learning Opportunities

Opportunities exist for research projects to be performed at other institutions either by prior arrangement or through regular offerings at the Robert Jones and Agnes Hunt Hospital, Oswestry and the Royal Stoke University Hospital.

16. Additional Costs

As to be expected there will be additional costs for inter-library loans and potential overdue library fines, print and graduation. We do not anticipate any further costs for this programme.

17. Quality management and enhancement

The quality and standards of learning in this programme are subject to a continuous process of monitoring, review and enhancement.

- The School Education Committee is responsible for reviewing and monitoring quality management and enhancement procedures and activities across the School.
- Individual modules and the programme as a whole are reviewed and enhanced every year in the annual programme review which takes place at the end of the academic year.
- The programmes are run in accordance with the University's Quality Assurance procedures and are subject to periodic reviews under the Revalidation process.

Student evaluation of, and feedback on, the quality of learning on every module takes place every year using a variety of different methods:

- The results of student evaluations of all modules are reported to module leaders and reviewed by the Programme Committee as part of annual programme review.
- Findings related to the programme from the annual Postgraduate Taught Experience Survey (PTES), and from regular surveys of the student experience conducted by the University, are subjected to careful analysis and a planned response at programme and School level.
- Feedback received from representatives of students on the programme is considered and acted on at regular meetings of the Student Staff Voice Committee.

The University appoints senior members of academic staff from other universities to act as external examiners on all programmes. They are responsible for:

- Approving examination questions
- Confirming all marks which contribute to a student's degree
- Reviewing and giving advice on the structure and content of the programme and assessment procedures

Information about current external examiner(s) can be found here:

<http://www.keele.ac.uk/qa/externalexaminers/currentexternalexaminers/>

18. The principles of programme design

The programme described in this document has been drawn up with reference to, and in accordance with the guidance set out in, the following documents:

a. UK Quality Code for Higher Education, Quality Assurance Agency for Higher Education:

<http://www.qaa.ac.uk/quality-code>

b. Keele University Regulations and Guidance for Students and Staff: <http://www.keele.ac.uk/regulations>

19. Annex - Programme-specific regulations

Programme Regulations: Biomedical Engineering

Final Award and Award Titles	MSc Cell and Tissue Engineering
Intermediate Award(s)	Postgraduate Diploma Postgraduate Certificate
Last modified	June 2023
Programme Specification	https://www.keele.ac.uk/qa/programmespecifications

The University's Academic Regulations which can be found on the Keele University website (<https://www.keele.ac.uk/regulations/>)[1] apply to and regulate the programme, other than in instances where the specific programme regulations listed below over-ride them. These programme regulations list:

- *Exemptions* which are characterised by the omission of the relevant regulation.
- *Variations* which are characterised by the replacement of part of the regulation with alternative wording.
- *Additional Requirements* which set out what additional rules that apply to students in relation to this programme.

The following **exemptions, variations** and **additional requirements** to the University regulations have been checked by Academic Services and have been approved by the Faculty Education Committee.

A) EXEMPTIONS

The clause(s) listed below describe where an exemption from the University's Academic Regulations exists:

For the whole duration of their studies, students on this Programme are exempt from the following regulations:

- **No exemptions apply.**

B) VARIATIONS

The clause(s) listed below describe where a variation from the University's Academic Regulations exists:

Variation 1: module compensation

This programme varies from Regulation D5.4.

A variation of Regulation D5.4 Module Compensation on Taught Postgraduate Programmes and Regulation C7.11.4 will be run on these courses, in which compensation will be applied to modules, which, after all assessment attempts have been taken, have a mark above 45% (i.e. not limited to 45-49%).

On IPEM accredited courses, this will apply to a maximum of 20 credits, provided that a mark of at least 55% in one or more modules at least equivalent to the credit value of the failed module/s being compensated, is attained. Dissertation modules or equivalent final project modules cannot be compensated.

The intention of the variation is to enable students who have not reached the pass mark in all qualifying components, thereby resulting in a Qualified Fail, to be compensated in the above scenario.

As such, in accordance with Regulation D1.12 Reassessment, where a student achieves a fail a Qualifying Component, hence resulting in a Qualified Fail for a module, the student will be allowed reassessment procedures as defined in the regulations.

[1] References to University Regulations in this document apply to the content of the University's Regulatory Framework as set out on the University website here <https://www.keele.ac.uk/regulations/>.

Version History

This document

Date Approved: 27 June 2023

Previous documents

Version No	Year	Owner	Date Approved	Summary of and rationale for changes
1	2022/23	VINOJ GEORGE	02 September 2022	