

**Masters, Postgraduate Diploma, Postgraduate Certificate in Biomedical Engineering (2018-19 onwards)**

**Programme Specification: Postgraduate**

Information for students: the programme specification is the definitive document summarising the structure and content of your degree programme. It is reviewed and updated every year as part of Keele’s Curriculum Annual Review and Development process. The document aims to clarify to potential and current students what you can expect from the study of the subject over the course of your programme.

<b>Names of programme(s) and award title(s)</b>	MSc Biomedical Engineering PGDip Biomedical Engineering PGCert Biomedical Engineering
<b>Mode of study</b>	Full time / part time
<b>Framework of Higher Education Qualification (FHEQ) level of final award</b>	Level 7
<b>Duration:</b>	One year full time / two years part time

Details of professional, statutory and regulatory body (PSRB) (If appropriate):

MSc is accredited by the Institute for Physics and Engineering in Medicine.

<http://www.keele.ac.uk/qa/professionalstatutoryregulatorybodies/>

External Examiner(s) names: <http://www.keele.ac.uk/qa/externalexaminers/>

**1. What is the philosophy of the Programme?**

The Master of Science degree (MSc) in Biomedical Engineering at Keele University was established in 1999 in partnership with Biomedical Engineering and Medical Physics at the University Hospital of North Staffordshire originally named, now UHNM. Restructuring since then has seen the course brought under the auspices of School of Pharmacy and Bioengineering within the Faculty of Medicine and Health Sciences at Keele University. Current teaching takes place in the Guy Hilton Research Centre and, combined with the strong clinical background and history of the departmental research, learners are exposed to a working research environment throughout the program delivery.

The aim of the course is to provide multi-disciplinary MSc level postgraduate training in Biomedical Engineering to prepare students for future employment across a range of technical and healthcare environments including academic research, medical devices manufacturing, and clinical and other healthcare environments. This philosophy underpins the professional accreditation of the course by the Institute for Physics and Engineering in Medicine.

The objectives of the programme are to:

- provide postgraduate-level education leading to professional careers in biomedical engineering in industry, academia and a wide range of healthcare establishments such as medical organisations, medical research institutions and hospitals;
- provide an opportunity for in-depth research into specialist and novel areas of biomedical and clinical engineering;
- expose students to practical work in a hospital environment with hands-on knowledge of patient care involving technological developments at the forefront of the field;
- introduce students to exciting new fields such as regenerative medicine and novel technologies for physiological monitoring and diagnostics.

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

On successful completion of the programme, students can expect to be able to:

1. Apply core engineering and physical principles to solve clinically-relevant problems at the forefront of Biomedical Engineering;
2. Display a systematic understanding of physiological and biomedical measurement and related quality management issues;
3. Use a range of ICT tools such as spreadsheets and programming languages to interpret and analyse data, including the use of modelling and statistics;
4. Display a systematic understanding of the working principles behind the maintenance and management of medical equipment and associated safety procedures;
5. Carry out a research project, including planning, implementation, and documentation of methods, findings and implications.
6. Challenge, evaluate, modify, and develop the theory and practices surrounding Biomedical Engineering including social and ethical aspects.
7. Demonstrate skills associated with self-management and an ability to synthesize and evaluate information obtained from diverse sources and settings.

Engagement with this programme will provide the opportunity to further develop 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. Whilst these skills will undoubtedly have already been developed to varying degrees, such existing capabilities can always be deepened and enriched. Our educational programme and learning environment is designed to empower learners to develop further as 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 during and after your studies at Keele.

Please refer to the programme webpages for a statement of how you can achieve the Keele Graduate Attributes through full engagement in the programme and other educational opportunities at Keele. Further information about the Keele Graduate Attributes can be found here: <http://www.keele.ac.uk/journey/>

## **2. How is the Programme taught?**

Teaching is delivered primarily through lectures 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. 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. This enables students to meet the range of intended learning outcomes covering specific engineering and scientific principles and demonstration of independent research and problem solving.

All teaching is managed and delivered by academic staff, with Doctorate-level training, as well as key clinical practitioners. Many staff members are Fellows of the Higher Education Academy ensuring a high standard of teaching.

### 3. What is the Structure of the Programme?

The programme consists of two entry-level (level 6) conversion modules of 15 credits each (Engineering for Medical Applications for those without an engineering background, and Human Anatomy and Physiology for those without a medical science background), five 15 credit core modules in areas of medical engineering, and 2 elective 15 credit modules. Finally, there is a 60-credit dissertation project in the third semester. Level 6 module credits are included towards the total 180 credit requirement for the MSc degree but do not contribute to the numerical classification of the degree (e.g. 70+% distinction or 60-69% merit).

Module code	Module title	FHEQ Level	Credit value	Compulsory (C) or optional (O)	Prerequisites	Learning Outcome
MTE-40022	Bioreactor & Growth Environment	7	15	O	Bachelor's degree (or equivalent proof of training) in an approved discipline	1,6,7
MTE-40023	Biomechanics	7	15	O	Basic knowledge of trigonometry and (vector) calculus	1,3,6
MTE-30001	Human Physiology and Anatomy	6	15	C	Compulsory for students entering the Biomedical Engineering course who cannot demonstrate previous knowledge of anatomy	3,6
MTE-30003	Engineering for Medical Applications	6	15	C	Compulsory for students entering the Biomedical Engineering course who cannot demonstrate previous knowledge of engineering	1,3,5
MTE-40236	Biotechnology and Omics	7	15	O	Bachelor's degree (or equivalent proof of training) in an approved discipline	2,6
MTE-40026	Physiological Measurement	7	15	C	Basic knowledge of physics or electronics. In addition, completion of undergraduate module in human physiology and anatomy. If not, the student will be required to attend the module on Physiology and Anatomy which will run parallel with the module.	1,2
MTE-40028	Stem Cells: Types, Characteristics and Applications	7	15	O	Bachelor's degree (or equivalent proof of training) in an approved discipline	1,6,7
MTE-40029	Medical Equipment and Technology	7	15	C	Appropriate competence in mathematics, including algebra (e.g. elementary determinants, matrices and vectors), simple	4,7

	Services Management				differential and integral calculus and trigonometry	
MTE-40030	Nanomagnetics in Nanomedicine	7	15	O	Bachelor's degree in Physics, Engineering, Biomedical Science, Materials Science or related discipline	1,6
MTE-40031	Biomedical Signal Processing and Modelling	7	15	C	Knowledge of basic mathematics including algebra, trigonometry, differentiation, and integration	1,2,3
MTE-40033	Cell and Tissue Engineering	7	15	O	Bachelor's degree (or equivalent proof of training) in an approved discipline	1,7
MTE-40034	Cell Biomechanics	7	15	O	Bachelor's degree (or equivalent proof of training) in an approved discipline	1,6,7
MTE-40036	Biomaterials	7	15	O	Bachelor's degree (or equivalent proof of training) in an approved discipline	1,2,6
MTE-40038	Medical Device Design Principles	7	15	C	Appropriate mathematical competence, including algebra (e.g. elementary determinants, matrices and vectors), elementary differential and integral calculus and trigonometry	1,6,7
MTE-40039	Experimental Research Methodology	7	15	C		6,7
MTE-40015	Project – Medical Technology (dissertation)	7	60	C		5,6,7
MTE-40055	Disease Modelling & Therapy for Regenerative Medicine	7	15	O	Bachelors degree (or equivalent proof of training) in an approved discipline	1,3,5,6

MSc Biomedical Engineering *180 credits*

PGDip Biomedical Engineering *120 credits*

PGCert Biomedical Engineering *60 credits*

#### **4. 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 sessions, essay-based examination, interactive oral presentations, and a dissertation based on the student research project. 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.

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.

### **5. What are the typical admission requirements for the programme?**

We welcome applications from people with a first or second-class degree (or equivalent) in engineering, physical or life sciences, medicine, or professions allied to medicine. We also welcome enquiries from people with other professional qualifications acceptable to the University. 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.

### **6. 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 a personal tutor 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 personal tutors twice a semester unless special needs require a greater frequency. More information is available in the University's Personal Tutoring 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.

### **7. Learning Resources**

This course and teaching are based at the Guy Hilton Research Centre, School of Pharmacy and Bioengineering. The administration team are based on Keele's main campus. Some teaching delivery will be held on Keele Campus, and sites in University Hospitals of North Midlands (UHNM).

Students on this award are Keele students and have access to all the facilities that title conveys. 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 site, 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.

### **8. 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 University Hospital of North Midlands.

### **9. Quality management and enhancement**



FLTC approval	October 2017	
---------------	--------------	--