Course Specification

Course Summary Information		
1	**Course Title**	MSc Medical Engineering Applications for Healthcare
2	**Course Code**	PT1543
3	**Awarding Institution**	Birmingham City University
4	**Teaching Institution(s)** (if different from point 3)	
5	**Professional Statutory or Regulatory Body (PSRB) accreditation** (if applicable)	

6	**Course Description**
	Course Overview Medical engineers support improving healthcare delivery and medical practice by combining the design and problem-solving skills of engineering with medical and biological science to close the gap between engineering and medicine. This MSc Medical Engineering Applications for Healthcare course combines fundamental concepts and knowledge in engineering, biology, and medicine to develop innovative technologies, material, processes, and systems, with the aim of improving healthcare. The course will enable students from a diverse background such as from engineering, biomedical engineering, medical / surgical, or life sciences, to gain the knowledge and skills to launch or develop their career as medical engineers in this demanding sector of healthcare. **What's covered in this course?** Medical Engineering is a discipline of engineering that interacts with the human body. The course will provide you with a thorough grounding across the whole field of medical engineering and to enable you to integrate and apply this knowledge to clinical problems. Industrial-led practical workshops and labs will help enhance your technical skills. This will enable you to relate 'real-life' commercial innovations to the underpinning academic theory learnt in the lectures. Birmingham City University attracts a diverse range of students from across the world. Our state-of-the-art facilities will allow you to explore a variety of biomedical applications including: sensing and measuring on micro and nano scales, personal health tracking, remote diagnosis and monitoring, biomaterials to name a few. The knowledge acquired will then enable you to engage in exciting projects such as designing prostheses or devising new medical technology for physicians and medical professionals to be used in the prognosis, diagnosis and treatment of patients. Throughout the course you will complete your Professional Project – an independent piece of research on a topic within medical engineering that allows you to demonstrate your knowledge and skills in this exciting field of Medical Engineering Applications for healthcare.

	Throughout the course you will gain a range of transferable skills allowing you to undertake a career in a number of sectors, alongside developing an in-depth understanding of your subject. We build employability into every aspect of our course. The course offers you the opportunity to undertake an optional summer placement and work independently or as a team to solve medical engineering problems, by interacting very closely with a range of professionals. Such professionals may vary from medical engineers to medical practitioners, from private medical device industries or local healthcare trusts (such as; NHS), who are in partnership with the Faculty of Health, Education and Life Sciences. The course is currently in the process of seeking accreditation from the Institute of Physics and Engineering in Medicine (IPEM), such a professional recognition aims to ensure that graduates of accredited programmes are equipped with the knowledge and skills for working in medical engineering workface in industry, healthcare or academic environments. Accreditation enables fast-track career progression as a professional medical engineer. **Where and how will I study?** You will learn within our recently extended City South Campus, located in Edgbaston just five minutes from Birmingham City Centre. Our campus has been recently re-developed and provides access to cutting-edge facilities that will enhance and support your learning during your time here. You will experience a mixture of face-to-face and virtual teaching, self-directed study, practice-based lab activities and optional summer break placements. **Why choose us?** - You will learn from and collaborate with world-renowned educators and researchers across many disciplines. The course combines mechanical, mechatronic, electronic, chemical and materials engineering, allowing you to specialise in the areas that best suit your interests and aspirations. - You will develop your expertise, communication and team working skills as well as skills in fields of research whilst increasing their employability and professional accreditation. - You will have the opportunity to work with others through partnership working with medical technology SME's / NHS Trust partners. - You will have the opportunity to undertake selective summer projects with a Medical Engineering placement provider, such that you can gain valuable work based employment skills. With the support of the course team, you will need to source your specialised projects. - You will gain the knowledge allowing you to contribute to innovative discoveries within fields such as biomedical technology, orthopaedic or tissue engineering, bioelectronics and the computational simulation of biomedical systems. - You will have numerous opportunities to undertake HELS go abroad opportunities, etc. with ongoing collaborations with partners around the globe. - This degree is in the process of seeking accreditation from the Institute of Physics and Engineering in Medicine (IPEM).

7	Course Awards		
7a	**Name of Final Award**	**Level**	**Credits Awarded**
	MSc Medical Engineering Applications for Healthcare	Level 7	180
7b	**Exit Awards and Credits Awarded**		
	Postgraduate Certificate Engineering Practice and Technical Decision Making for Healthcare	Level 7	60
	Postgraduate Diploma Medical Engineering Applications for Healthcare	Level 7	120

8	Derogation from the University Regulations
	NA

9	Delivery Patterns		
Mode(s) of Study	**Location(s) of Study**	**Duration of Study**	**Code(s)**
Full Time	City South	15 months	PT1543

10	Entry Requirements	
	Home:	The admission requirements for this course are stated on the course page of the BCU website at https://www.bcu.ac.uk/ (to be updated). Applications will be through UCAS or direct application to the University. Opportunities for Recognition of Prior Learning (RPL) will be identified during the admissions process and will be on an individual basis before enrolment. The admissions criteria is as follows: Applicants need to hold at least a Second-Class Honours degree or equivalent in an engineering, technical, life sciences, medicine or medical aligned qualification. *Or*: Applicants without standard entry qualifications who can demonstrate and provide evidence of the necessary knowledge and skills and experience (of minimum three years) to successfully complete the course will also be considered.
	EU:	Those who meet residency/academic requirements of UK learners but whose language is not English will need to hold IELTS with an overall score of at least 6.0 with no element below 5.5.
	International:	Those who meet residency/academic requirements of UK learners but whose language is not English will need to hold IELTS with an overall score of at least 6.0 with no element below 5.5.
	Access:	N/A

11	Course Aims
	The course aims to enable students from a diverse background to gain the knowledge and skills to launch or develop their career in the demanding sector of engineering for healthcare.

12	Course Learning Outcomes
1	Critically apply robust ethical practices in medical engineering and imaging technology to design and justify chosen experimental and analytical approaches to optimise statistical power.
2	Critically apply STEMM principles and practices for technical decision making and problem solving in the field of medical engineering and imaging technology for applications in healthcare.
3	Critically adopt an autonomous approach to one's own learning and continuing professional development.
4	Demonstrate self-direction and originality in tackling and solving problems, and act autonomously in planning and implementing tasks at a professional level.
5	Demonstrate a critical awareness of safety principles, risk management and legislative requirements governing best practice in areas of medical engineering and imaging technology for healthcare
6	Critically apply a range of information and communications technology skills to relevant scientific tasks in medical engineering.
7	Demonstrate a high level of knowledge and systematic understanding of the engineering and scientific principles underpinning medical engineering, and a critical awareness of current problems and new insights in the field of medical engineering and its applications for healthcare.
8	Critically evaluate, interpret and or model the experimental data, plan a research programme of work, conduct corresponding experimental and theoretical work with minimum guidance and report the findings.
9	Plan, design, execute and communicate a sustained piece of independent work using appropriate media to communicate the findings.

13	Level Learning Outcomes
	Upon completion of the Postgraduate Certificate in Engineering Practice and Technical Decision Making for Healthcare, students will be able to meet:
	Course Learning Outcomes 1-5
	Upon completion of the Postgraduate Diploma in Medical Engineering Applications for Healthcare, students will be able to meet:
	Course Learning Outcomes 1-7
	Upon completion of the MSc in Medical Engineering Applications for Healthcare, students will be able to meet:
	Course Learning Outcomes 1-9

14	Course Learning, Teaching and Assessment Strategy
	The learning, teaching and assessment methods that you will encounter on this course are designed to respect the diversity of the learner, enable participation and encourage 100% engagement throughout the course to enhance your experience and employability. **Learning and teaching** A variety of teaching and learning methods will be utilised across all three semesters to allow you to fulfil your potential and learn theoretical aspects of medical engineering alongside

	practical skills. Such methods will include for example a blend of formal lectures (face-to-face and virtual), seminars, group work, key-note lectures, inquiry-based learning and self-directed study. These are accompanied by tutor-led tutorials, laboratory-based practical sessions, and seminars by nationally and internationally known scientists or engineers or clinicians, workshops, problem-solving scenarios, dedicated research project supervision and site-visits. Self-directed learning is also a major component during full-time studies. You will have an opportunity to undertake elective summer projects with a Medical Engineering placement provider such that you gain valuable work-based employment skills. There is potential for you to extend your selective projects into research internships where appropriate. It is your responsibility to source any placement, but you will be supported by the academic team to ensure it is suitable. Teaching and learning is also supported by the use of and engagement with the Birmingham City University virtual learning environment, MOODLE as well as secure online communication platforms such as Big Blue Button and MS Teams. An additional online learning package prior to the actual commencement of semester 1 modules will be provided to students from non-traditional backgrounds, in particular those students coming from non-mathematics or non-physics background. The package will be mandatory for these students. Subsequently, on completion of the online learning package, subject knowledge will be formatively assessed via an online diagnostic test. Students who need further support will be directed to the relevant supporting materials and encouraged to book tutorials with relevant staff through the university online tutorial booking system. These pre-course materials will be based on the necessary prior knowledge and skills required to successfully complete the course modules. As an ongoing action plan this approach will be periodically reviewed and will be adopted as and when appropriate. **Assessment** Assessments have been designed to be inclusive and varied. Your work will be assessed using a mix of methods depending on the module or area of study and will include assessments such as coursework, examinations and in-person assessment, in additional to a final student led research project. Formative learning allows for feedback as part of a continuous process and you will be provided with opportunities for formative learning through for example, seminars, micro teach sessions, Moodle quizzes and action learning sets. Whilst studying this course, you will receive regular feedback and support. Feedback may take the form of live, in class feedback, in addition to feedback on assessment. All postgraduate level modules are assessed using the postgraduate regulations with a pass mark set at 50%.

15	**Course Requirements**

15a **Postgraduate Certificate**

PgCert Engineering Practice and Technical Decision Making for Healthcare (60 credits):

In order to be awarded the Postgraduate Certificate, a student must successfully complete all the following CORE modules (totalling 60 credits):

Module Code	Module Name	Credit Value
TBC	Principles of Experimental Design and Ethical Practices in Engineering and Technology for Medicine	20
TBC	Introduction to STEMM Principles and Practices for Technical Decision Making	40

* STEMM = Science, Technology, Engineering, Mathematics and Medicine.

Postgraduate Diploma

PgDip Medical Engineering Applications for Healthcare (120 credits):

In order to be awarded the Postgraduate Diploma, a student must successfully complete all the following CORE modules (totalling 100 credits):

Module Code	Module Name		Credit Value
TBC	Principles of Experimental Design and Ethical Practices in Engineering and Technology for Medicine		20
TBC	Introduction to STEMM Principles and Practices for Technical Decision Making		40
TBC	Introduction to Principles and Approaches of Data Science for Healthcare Applications		20
TBC/ENG7209	Selection of ONE of these CORE modules		20
	Fundamental Principles of Physiological Signal Measurement, Synthesis and Processing	Applied Digital Signal Processing	

A student must have completed one 20 credit module to be chosen from modules running in either Semester 2 or 3 below:

Module Code	Module Name	Credit Value
ENG7161	Health Care Technology Management	20
LBR7399	Leadership and Project Management for Health and Healthcare	20
ENG7210	Internet of Things for Healthcare Applications	20

***A student also has the option to complete the elective no-credit baring summer placement*:**

TBC	Summer Break Placement	0

Master of Science

MSc Medical Engineering Applications for Healthcare (180 credits):

***In order to be awarded the Master of Science, a student must successfully complete all the following CORE modules (totalling 160 credits*)**

Module Code	Module Name		Credit Value
TBC	Principles of Experimental Design and Ethical Practices in Engineering and Technology for Medicine		20
TBC	Introduction to STEMM Principles and Practices for Technical Decision Making		40
TBC/ENG7209	Selection of **ONE** of these **CORE** modules		20
	Fundamental Principles of Physiological Signal Measurement, Synthesis and Processing	Applied Digital Signal Processing	
TBC	Introduction to Principles and Approaches of Data Science for Healthcare Applications		20
TBC	Masters Research Project in Medical Engineering & Imaging Technologies		60

A student must have completed one 20 credit module to be chosen from modules running in either Semester 2 or 3 below:

Module Code	Module Name	Credit Value
ENG7161	Health Care Technology Management	20
LBR7399	Leadership and Project Management for Health and Healthcare	20
ENG7210	Internet of Things for Healthcare Applications	20

A student also has the option to complete the elective no-credit baring summer placement:

TBC	Summer Break Placement	0

15b	Structure Diagram

Level 7

SEMESTER ONE (January)	SUMMER BREAK PLACEMENT
Core Principles of Experimental Design and Ethical Practices in Engineering and Technology for Medicine (20 credits) Introduction to STEMM Principles and Practices for Technical Decision Making (40 credits)	Core N/A
Optional N/A	Optional Summer break placement (0 credits)

SEMESTER TWO (September)	SEMESTER THREE (January)
Core Introduction to Principles and Approaches of Data Science for Healthcare Applications (20 credits) ***And*** Fundamental Principles of Physiological Signal Measurement, Synthesis and Processing (20 credits) ***or*** Applied Digital Signal Processing (20 credits)	
Masters Research Project in Medical Engineering & Imaging Technologies (60 credits)	
Optional Modules (One 20 credit module to be chosen from modules running in either Semester 2 or 3) Health Care Technology Management (20 credits)	**Optional** Internet of Things for Healthcare Applications (20 Credits) Leadership and Project Management for Health and Healthcare (20 credits)

16	Overall Student Workload and Balance of Assessment

Level 7
Workload

14% time spent in timetabled teaching and learning activity

Activity	Number of Hours
Scheduled Learning	255
Directed Learning	155
Private Study	1390
Total Hours	1800

Balance of Assessment

Assessment Mode	Percentage
Coursework	57%
Exam	14%
In-Person	29%