Course Specification

Course Summary Information				
1	**Course Titles**		MEng Biomedical Engineering BEng (Hons) Biomedical Engineering	
2	**BCU Course Codes**	**UCAS Codes**	MEng UM0019 BEng (Hons) US0900 SEP	H160 H16A
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**
	Overview Are you interested in engineering that interacts with the human body? Our practice-led Biomedical Engineering degree explores mathematics, anatomy, physiology and computing to meet the rapid advancement in technology which is becoming a vital part of healthcare. Throughout this course, you will have the option to carry out exciting work placements in the UK and abroad. If this sounds like the degree for you then find out more about our university entry requirements. **What's covered in the course?** Our unique Biomedical Engineering degree course will provide you with the skills and expertise needed to work in specialist areas such as assistive technology, rehabilitation, medical imaging and robotics, physiology monitoring, cardiopulmonary engineering, m-health and e-health, orthopaedic implants and regenerative medicine/ tissue engineering. Biomedical Engineering (also known as bioengineering) is a discipline of engineering that interacts with the human body. You will be developing and applying innovative skills in the design, manufacturing and maintenance of medical equipment and devices covering all spectrums from the new born to assistive living for the elderly. 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. 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. Along with these technical skills, as an engineer you will also gain a diverse range of transferrable skills, including effective communication, leadership, the ability to critically assess gaps in target healthcare markets, and the tools required to provide solutions to bridge those gaps.

	The course is currently in progression of accreditation by the Institute of Physics and Engineering in Medicine (IPEM), the Institution of Engineering and Technology (IET) and the Institution of Mechanical Engineers (IMechE). **Where will I study?** You will learn within our recently extended £71 million 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.

7	**Course Awards**		
7a	**Possible Final Awards for the Biomedical Engineering course**	**Level**	**Credits Awarded**
	For BEng (Hons): Bachelor of Engineering with Honours Biomedical Engineering	6	360
	For MEng: Integrated Masters of Engineering Biomedical Engineering	7	480
7b	**Possible Exit Awards and Credits Awarded for the Biomedical Engineering course**		
	For BEng (Hons): Certificate of Higher Education Biomedical Engineering Diploma of Higher Education Biomedical Engineering Bachelor of Engineering Biomedical Engineering	 4 5 6	 120 240 300
	For MEng: Certificate of Higher Education Biomedical Engineering Diploma of Higher Education Biomedical Engineering Bachelor of Engineering Biomedical Engineering Bachelor of Engineering with Honours Biomedical Engineering	 4 5 6 6	 120 240 300 360

8	**Derogation from the University Regulations**
	1. For modules with more than one item of assessment, students must achieve a minimum of 30% (undergraduate) or 40% (postgraduate) in each item of assessment in order to pass the module 2. Compensation of marginal failure in up to 20 credits is permitted at each level 3. Condonement of failed modules is not permitted 4. Students must achieve an overall average of 50% or above at the end of Level 6 in order to remain on the Integrated Masters course.

9	**Delivery Patterns**		
Mode(s) of Study	**Location**	**Duration of Study**	**Code**
BEng (Hons) Full Time	City South and City Centre	3 years	US0900
MEng Full Time	City South and City Centre	4 years	UM0019

10	Entry Requirements
The admission requirements for this course are stated on the course page of the BCU website at https://www.bcu.ac.uk/ or may be found by searching for the course entry profile located on the UCAS website.	

11	Course Learning Outcomes
Knowledge and Understanding: Underpinning Science and Mathematics and Associated Engineering Discipline	
1	Understand the scientific principles underpinning Biology, medicine and associated engineering discipline.
2	Understand the mathematical models relevant to Biology, medicine and related engineering disciplines, and an appreciation of their limitations.
3	Understand various concepts from a range of areas including some outside engineering, and the ability to apply them effectively in biomedical engineering applications and projects.
4	Develop an awareness of emerging Information and communications technologies (ICT) and apply your comprehensive knowledge and understanding of the role and limitations of ICT.
Intellectual Skills: Engineering Analysis	
5	Extract data pertinent to an unfamiliar problem, and apply its solution using computer based engineering tools as and when appropriate.
6	Apply a systems approach to Biomedical engineering problems.
7	Use essential knowledge to investigate new and emerging health care or medical technologies.
8	Understand the capabilities of computer based models for solving problems in Biomedical engineering, and the ability to assess the limitations of specific scenarios.
9	Identify cost drivers essential for the sustainability and management of health care / medical technologies.
10	Lead and manage the technical design team and the development process and evaluate the essential outcomes.
11	Widen knowledge and comprehensive understanding of health care / medical technology design processes and methodologies and the ability to apply and adapt them in unfamiliar situations.
12	Understand service user needs and the importance of considerations such as aesthetics.
13	Apply initiative, creativity and innovation to design, construct and test a system, component or process to meet specifications.
14	Adapt to new technologies and their implementation in the hospital/clinical environment.
Engineering Practice Skills	
15	Understand the current practice and its limitations and some appreciation of new developments likely to occur in the field of Biomedical Engineering.
16	Exhibit an extensive knowledge and understanding of a wide range of biomedical engineering materials and components.
17	Understand the contexts in which engineering knowledge can be applied (e.g. management, technology, development, etc.).
18	Appreciate, adopt and apply the use of technical literature and other information sources.

19	Gain awareness of nature of regulatory and contractual issues governing the health care / medical technologies.
20	Understand the appropriate codes of practice and medical industry standards.
21	Develop an awareness of quality control issues.
22	Apply biomedical engineering techniques taking into account of a range of commercial and industrial constraints in the design, development and management of health care / medical technologies.
Professional Skills – Economic, Social and Environmental	
23	Undertake evaluations of risks through some understanding of the basis of such risks pertaining to health care / medical technology.
24	Apply extensive knowledge and understanding of management and business practices, and their limitations, and how these may be applied appropriately to strategic and tactical issues.
25	Illustrate an understanding of the requirement for relevant engineering activities to promote sustainable technological development in the field of biomedical engineering.
26	Exhibit an awareness of the framework of relevant legal requirements governing biomedical engineering activities, including health, safety, and risk (including environmental risk) issues in the clinical context for patient use and management of medical equipment.
27	Understand the need for a high level of professional and ethical conduct in the field of biomedical engineering.

12	**Course Requirements: BEng (Hons) / MEng**

12a

Level 4:

In order to complete this course a student must successfully complete all the following CORE modules (totalling 120 credits):

Module Code	Module Name	Credit Value
ENG4091	Engineering Principles 1	20
ENG4124	Mathematical Modelling 1	20
ENG4094	Engineering Principles 2	20
ENG4093	Engineering Practice	20
ENG4125	Mathematical Modelling 2	20
ENG4097	Human Anatomy and Physiology for Biomedical Engineering	20

Level 5:

In order to complete this course a student must successfully complete all the following CORE modules (totalling 120 credits):

Module Code	Module Name	Credit Value
ENG5093	Mathematics for Signals and Systems	20
ENG5092	Analogue and Digital Electronics	20
ENG5094	Engineering Electronic Systems	20
ENG5108	Research Methods in Science and Engineering	20
ENG5106	Introduction to Medical Physics in Biomedical Engineering	20
ENG5107	Medical Instrumentation and Measurements	20

Level 6:

In order to complete this course a student must successfully complete at least 120 credits from the following list of CORE modules.

Module Code	Module Name	Credit Value
ENG6081	Individual Research Project	40
ENG6080	Biomechanics for Biomedical Engineers	20
ENG6082	Biomaterials and Tissue Engineering	20
ENG6086	Medical Devices and Equipment Life Cycle	20
ENG6083	Medical Image Processing	20

Level 7:

In order to complete this course a student must successfully complete all the following CORE modules (totalling 120 credits):

Module Code	Module Name	Credit Value
ENG7162	Group Research Project	40
ENG7209	Applied Digital Signal Processing	20
ENG7161	Health Care Technology Management	20
ENG7210	Internet of Things for Healthcare Applications	20
LBR7399	Leadership and Project Management for Health and Healthcare	20

12b Structure Diagram

Level 4

SEMESTER ONE	SEMESTER TWO
Core ENG4124: Mathematical Modelling 1 (20 Credits) ENG4091: Engineering Principles I (20 Credits) ENG4093: Engineering Practice (20 Credits)	**Core** ENG4125: Mathematical Modelling 2 (20 Credits) ENG4094: Engineering Principles II (20 Credits) ENG4097: Human Anatomy and Physiology for Biomedical Engineering (20 credits)

Level 5

SEMESTER ONE	SEMESTER TWO
Core ENG5092: Analogue and Digital Electronics (20 Credits) ENG5093: Mathematics for Signals and Systems (20 Credits) ENG5094: Engineering Electronic Systems (20 Credits)	**Core** ENG5108: Research Methods in science and engineering (20 Credits) ENG5107: Medical Instrumentation and Measurements (20 Credits) ENG5106: Introduction to Medical Physics in Biomedical Engineering (20 Credits)
Potential elective placement or semester Exchange / study abroad opportunities (encouraged to be undertaken both nationally or internationally) at Level 5	

Level 6

SEMESTER ONE	SEMESTER TWO
Core ENG6080: Biomechanics for Biomedical Engineers (20 Credits) ENG6086: Medical Devices and Equipment Life Cycle (20 Credits)	**Core** ENG6049: Biomaterials and Tissue Engineering (20 Credits) ENG6083: Medical Image Processing (20 Credits)
ENG6081: Individual Research Project (40) Credits	

Level 7

SEMESTER ONE	SEMESTER TWO
Core ENG7209: Applied Digital Signal Processing (20 Credits) ENG7161: Healthcare Technology Management (20 credits) ENG7162: Group Research Project (40 Credits)	**Core** ENG7210: Internet of Things for Healthcare Applications (20 Credits) LBR7399: Leadership and Project Management (20 Credits)*

*Shared module with Public Health

13 Overall Student Workload and Balance of Assessment

Overall student *workload* consists of class contact hours, independent learning and assessment activity, with each credit taken equating to a total study time of around 10 hours. While actual contact hours may depend on the optional modules selected, the following information gives an indication of how much time students will need to allocate to different activities at each level of the course.

- *Scheduled Learning* includes lectures, practical classes and workshops, contact time specified in timetable
- *Directed Learning* includes placements, work-based learning, external visits, on-line activity, Graduate+, peer learning
- *Private Study* includes preparation for exams

The *balance of assessment* by mode of assessment (e.g. coursework, exam and in-person) depends to some extent on the optional modules chosen by students. The approximate percentage of the course assessed by coursework, exam and in-person is shown below.

Level 4

Workload

27 % time spent in timetabled teaching and learning activity

Activity	Number of Hours
Scheduled Learning	324
Directed Learning	0
Private Study	876
Total Hours	1200

Balance of Assessment

Assessment Mode	Percentage
Coursework	16.6%
Exam	66.7%
In-Person	16.6%

Level 5

Workload

17.3 % time spent in timetabled teaching and learning activity

Activity	Number of Hours
Scheduled Learning	208
Directed Learning	0
Private Study	992
Total Hours	1200

Balance of Assessment

Assessment Mode	Percentage
Coursework	50%
Exam	50%
In-Person	0

Level 6

Workload

13.8% time spent in timetabled teaching and learning activity

Activity	Number of Hours
Scheduled Learning	166
Directed Learning	0
Private Study	1034
Total Hours	1200

Balance of Assessment

Assessment Mode	Percentage
Coursework	50%
Exam	16.6%
In-Person	33.3%

Level 7

Workload

11% time spent in timetabled teaching and learning activity

Activity	Number of Hours
Scheduled Learning	132
Directed Learning	0
Private Study	1068
Total Hours	1200

Balance of Assessment

Assessment Mode	Percentage
Coursework	66.7%
Exam	16.6%
In-Person	16.6%