University of Sheffield

Programme Specification

This specification provides a summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if they take full advantage of the learning opportunities that are provided.

The content of our courses is reviewed annually to make sure it's up-to-date and relevant. Individual modules are occasionally updated or withdrawn. This is in response to discoveries through our world-leading research; funding changes; professional accreditation requirements; student or employer feedback; outcomes of reviews; and variations in staff or student numbers. In the event of any change we will inform students and take reasonable steps to minimise disruption.

Programme Details

1. Programme title	Biomedical Engineering		
2. Award type	Master of Engineering		
3. Programme details	**FHEQ Level:** 7	**Mode of Study:** Full time Full time	**Duration:** 4 years 5 years (Foundation)
4. Faculty	Faculty of Engineering		
5. School	**Owning:** School of Chemical, Materials and Biological Engineering		
6. Accrediting Professional or Statutory Body	Institution of Engineering and Technology (IET) Institute of Physics and Engineering in Medicine (IPEM)		
7. HECoS code *Select between one and three codes from the HECoS vocabulary.*	**Code:** 100127 **Percentage:** 100	**Code:** **Percentage:**	**Code:** **Percentage:**
Programme code (internal use)	CMBU001 (Full time) CMBU018 (Foundation)		

9. Programme aims

The programme aims to:	
A1	Providing teaching that is informed and invigorated by the research and scholarship of its staff and alert to the benefits of student-centred learning.
A2	Providing broad-based training in engineering principles applied to human biology.
A3	Providing a comprehensive knowledge and understanding of engineering, materials science, human anatomy, and physiology, together with a more detailed and critical understanding in a selected area of biomedical engineering.
A4	Developing independence of thought, intellectual curiosity, ethical awareness and the business and management skills necessary for a professional engineer in biomedical engineering or a related field.
A5	Developing an extensive and diverse range of subject-specific and generic skills appropriate to graduate employment both within and outside biomedical engineering.
A6	Enabling students to maximise their potential in all aspects of their degree and imparting in students a commitment to life-long learning.
A7	Satisfying the academic and practical requirements for the award of Chartered Engineer status by aiming to meet the latest accreditation requirements of the Engineering Council Accreditation of Higher Education Programmes (AHEP) in Engineering.

10. Programme learning outcomes

Knowledge and understanding (K) On successful completion of the programme, students will be able to demonstrate knowledge and understanding of:	
K1	A comprehensive knowledge and understanding of the diverse range of engineering principles, science, mathematics and skills that are employed in biomedical engineering, and how these are applied together to solve healthcare problems.
K2	A sound knowledge and understanding of human anatomy, physiology and basic cellular biology.
K3	A wide knowledge and understanding of the regulatory, social, ethical, legal and financial issues relevant to a professional biomedical engineer.
K4	An understanding of the analytical and design methods and costing of novel research methods used in biomedical engineering.
K5	A broad knowledge and understanding of management techniques and the different roles in a team and the application of these in a biomedical engineering context.
K6	An understanding of the use of information technology for analysis, design and management.
K7	A broad knowledge and understanding of management techniques and the different roles in a team and the application of these in a bioengineering context.

K8	An understanding of the use of information technology for analysis, design and management.
K9	A broad knowledge and understanding of the processes involved in the design and costing of novel research and development programmes.
Skills and other attributes (S) *When considering the skills and attributes developed in this programme, please refer to the Sheffield Graduate attributes (SGAs). SGAs can be found here* On successful completion of the programme, students will be able to:	
S1	Synthesise, interpret, communicate and use knowledge from a diverse range of engineering and scientific disciplines to analyse and solve both familiar and unfamiliar problems in human healthcare.
S2	Demonstrate skills in the experimental design, acquisition, use, analysis and critical evaluation of experimental and other subject-related data.
S3	Design and undertake experimental and literature-based projects, both individually and in a collaborative team, taking account of technical, social, ethical, legal and commercial considerations.
S4	Display creativity and innovation in solving unfamiliar problems.
S5	Exercise independent thought and judgement.
S6	Design and conduct protocol-based experimental investigations and analyse and report the results.
S7	Prepare technical reports and presentations and convey essential aspects of biomedical engineering using a variety of media.
S8	Use appropriate computer aids and IT effectively for analysis and design in order to solve biomedical engineering problems and be aware of their limitations.
S9	Develop a design-and-build proposal for a biomedical engineering project, from initial concept to built prototype.
S10	Communicate at a professional level to an interdisciplinary audience, orally, in writing and through visual presentations.
S11	Manage both group projects and their own time effectively.
S12	Find information and learn independently.
S13	Establish and develop skills for lifelong learning.
S14	Communicate at a professional level to an interdisciplinary audience, orally, in writing and through visual presentations.
S15	Work in collaboration with others to produce a significant engineering outcome.
S16	Manage both group projects and their own time effectively.

S17	Find information and learn independently.

11. Learning and teaching methods *(this should include a summary of methods used throughout the programme, including any unique features and should be written with a student focus as this information will display to current students and applicants i.e. prospectus)*

Year 1: The biomedical engineering programme begins with a core year, where all students are introduced to the basic concepts and language of biomedical engineering and will understand how engineering is currently applied to medicine and biology. They learn the language of human biology, anatomy and physiology, alongside a range of basic engineering principles. Students are introduced to a variety of skills including ethical and social aspects of engineering, employability skills, plagiarism, innovation and creativity, group working and presentation skills.

Year 2: Students can choose to follow one of 2 pathways that will introduce more advanced topics in the area of interest to their future study and career. Once a pathway choice has been made there are no further options in each pathway. Students will study more advanced topics in biomedical engineering, gaining a more extensive knowledge and understanding of the broad subject areas. They will apply their learning to more advanced laboratory work, design activities and the solution of specific biomedical engineering problems. They will continue to develop their independent learning, communication and scientific writing skills, and their ability to work in teams.

Year 3: Students will refine their choice of specialism by selecting one of two routes available from their chosen pathway. Once the route choice has been made there are no further options available in year 3. Students will develop an in-depth understanding of how specific fields of engineering are combined and applied in biomedical engineering. They also learn engineering management techniques to enhance the application of their core engineering skills.

Year 4: Students will continue their specialism, with core and optional modules appropriate to the student's chosen elective available to them. Many of these modules are at the cutting edge of their discipline.

Research projects: Students will also carry out an individual project and a group project in years 3 and 4. The individual investigative project takes place over two semesters, in which they can demonstrate the full range of personal, communication and academic skills they have developed. These should include an ability to design and carry out independent research, critically evaluate the results and discuss them in the context of current literature. The project is assessed through a report, the professional engineering skills displayed by the student during the project, and a poster presentation at which students are questioned on their research. By this stage students are expected to have become self-motivated, efficient and organized independent learners. In the group project students will also engage in a group research, design and build activity requiring innovative, conceptual thinking, enterprise and the application of management, design and technical skills.

Lectures: The principal means of transmitting academic material and analysis techniques. Most lecture courses provide tutorial sheets to enable students to develop their understanding of the subject matter and methods during their private study.

Laboratory Classes: These introduce experimental methods, develop analytical and reporting skills and provide a good opportunity for enhancing skills in teamwork and communication.

Coursework Assignments, Oral and Poster Presentations: Several modules have coursework assignments that require students to seek additional information and work either on their own, or in small groups. They are designed to enable students to develop and show their understanding of the content of the module. Oral and poster presentations are included as part of some coursework assignments to provide opportunities for developing essential presentation and communication skills.

Tutorials and Example Classes: These may be small group or up to class sized tutorials and are a main source of providing help to students to embed learning, develop understanding, obtain feedback and resolve problems in their understanding of course material.

Design Classes: These enable students to work on 'open-ended' and often loosely-defined problems related to real engineering situations. They also provide good opportunities for developing team-working and communication skills as well as individual skills.

Industrial and research seminars – seminars led by visiting industrialists, hospital and research academic staff take place throughout the degree. They enable students to develop their understanding of the industrial application of concepts they are learning in class, and of the role and responsibilities of a professional bioengineer.

Individual Investigative Project: This is an individual research and/or industrial project at the frontiers of biomedical engineering. It is completed under the supervision of a member of academic staff and provides an excellent opportunity for a student to pull together their learning.

Group Research Project: This involves groups of typically 5-6 students working on the development of a fully planned design-and-build proposal for a biomedical engineering project. It enables students to apply the academic and technical knowledge and skills acquired during the degree, and to gain insights into the regulatory, social, ethical, legal and commercial factors affecting project development in industry and academia. It also develops project management, time management, budget management, creative and critical thinking, team-working and communication skills.

12. Assessment and feedback methods *(this should include the range of types of methods used and should be written with a student focus as this information will display to current students and applicants i.e. prospectus)*

Written Examinations: These are typically 2 hours in duration; many modules use this as the only or major assessment method.

Coursework Assignments, Oral and Poster Presentations: Coursework assignments are widely used in design studies, computational exercises, laboratory reports, essays or other work designed to assess the understanding of the module. Assignments are mainly undertaken on an individual basis but are sometimes carried out in small groups. Some assignments use oral and poster presentations in order to assess the development of presentation and communication skills. Some modules use coursework assignments as the only or main method of assessment whilst others have this as a minor part with a written examination forming the major part of the overall assessment.

Class Tests: These are small tests conducted during the main teaching periods to assess progress and understanding; they supplement formal examinations and may take the form of online exercises or quizzes completed before and/or during a lecture, laboratory class or tutorial/example class.

Individual Investigative Project: The project is assessed on the student's commitment and progress throughout the project, a written report, and poster presentation. The project is expected to be at a professional level.

Group Design Activity: This is assessed through individual and group submissions. The individual submissions include a) an interim essay, b) a personal reflection and c) peer/group evaluations. The group submissions comprise of a) an oral presentation, b) a system demonstration and pitch and c) a portfolio of work related to the design and build process and use of the system that has been produced. The project is expected to be at a professional level.

Version Number:	Purpose / Change:	Cohort affected: (academic year and level)	Date change approved:
1			June 2023
2	Programme Simplification	26/27 - Year 1	June 2025

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