

Programme Specification for Postgraduate Programme

Leading to:

MRes Bioengineering

Applicable for all postgraduate students starting on or after 1st September 2017

<u>Version No.</u>	<u>Date</u>	<u>Notes - Q&S USE ONLY</u>	<u>AO</u>
1.0	August 2017	Programme specification for entrants in 2017/18	JP

1. Awarding institution	Brunel University London
2. Teaching institution(s)	Brunel University London
3. Home college/department/division	College of Engineering, Design and Physical Sciences/ Department of Mechanical, Aerospace and Civil Engineering/
4. Contributing college/department/division /associated institution	Brunel Institute for Bioengineering
5. Programme accredited by	N/A
6. Final award(s) and FHEQ Level of Award	MRes Bioengineering - FHEQ Level 7
7. Programme title	MRes Bioengineering
8. Programme type (Single honours/joint)	N/A
9. Normal length of programme (in months) for each mode of study	12 months for FT or 24 months for PT
10. Maximum period of registration for each mode of study	Normal length of programme (as defined above in 9) + 2 years up to a maximum of 5 years.
11. Variation(s) to September start	N/A
12. Modes of study	FT/PT
13. Modes of delivery	On-campus, standard
14. Intermediate awards, titles and FHEQ Level of Award	PGCert in Bioengineering - FHEQ level 7.
15. UCAS Code	N/A
16. JACS Code	B100, H160, H162, H165, H168, H660, H810, H890, G140, G311, X210
17. Route Code	H673PBIOENG
18. Relevant subject benchmark statements and other external and internal reference points used to inform programme design	<p>QAA UK Quality Code for Higher Education which includes the English Framework for Higher Education Qualifications within Part A on Setting and Maintaining Academic Standards</p> <p>QAA Subject Benchmark Statement (Engineering)</p> <p>Brunel 2030</p> <p>Brunel Placement Learning Policy, as published under the 'Placements' section of the Managing Higher Education Provision with Others page.</p>
19. Admission Requirements	<p>Details of entry requirements are provided on the University's and College website.</p> <p>Levels of English for non-native speakers are outlined on Brunel International's language requirements pages</p>
20. Other relevant information (e.g. study abroad, additional information on placements)	N/A
21. Programme regulations not specified in Senate Regulation 3. Any departure from regulations specified in Senate Regulation 3 must be stated here and approved by Senate.	N/A

22. Further information about the programme is available from:	Course webpage
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23. EDUCATIONAL AIMS OF THE PROGRAMME

- To provide education at postgraduate level. It gives engineering, chemical and physical science, biological science and clinical graduates the general knowledge of research, which is required for a career in the Bioengineering Industry, Healthcare, in Research or in related fields.
- To develop the expertise, understanding and objectivity, which is required to distinguish between accurate and spurious data, to plan and manage research activity, to identify project objectives, to accomplish programmes of investigation and analysis, and to report and conclude on the results.
- To augment the analytical and research skills, which are required to obtain detailed awareness of the latest developments in Bioengineering.
- To create Master's degree graduates who have the understanding and expertise required to manage and to engage in extended programmes involving research.

The MRes course in Bioengineering provides a programme of study for engineers, clinicians and researchers who wish to advance and update their knowledge of Bioengineering research. It is aimed to generate experienced biomedical engineers, bioengineering researchers and clinicians with a detailed insight into the nature of bioengineering research and will equip the students with a range of research skills to enable them to successfully complete research of this kind. The focus of this course is on creating Master's degree graduates who are capable of undertaking advanced research in bioengineering disciplines.

24. PROGRAMME AND INTERMEDIATE LEARNING OUTCOMES

The programme provides opportunities for students to develop and demonstrate knowledge and understanding (K) cognitive (thinking) skills (C) and other skills and attributes (S) in the following areas:

Level	Category	Learning Outcome	Master's Only	Associated Assessment Blocks Code(s)	Associated Study Blocks Code(s)	Associated Modular Blocks Code(s)
5	K1	The specific theoretical basis underlying the disciplines involved in bioengineering (PGcert), (E, B, M, S, N)				All modules
5	K2	Knowledge and understanding of different research methods				GS5532, ME5560 GS5537 for all streams.
5	K3	Knowledge and understanding general experiment set up on bioengineering laboratory (PGcert), (E)				GS5532 for all streams Stream A: GS5539 Stream B: GS5536, Stream C: GS5535, Stream D: GS5533,
5	K4	Knowledge of experimental design on specific research problem (PGcert), (M, N)				GS5532 for all streams Stream A: GS5539 Stream B: GS5536, Stream C: GS5535, Stream D: GS5533
5	K5	The demands of legislation, codes of practice and ethics in the practice of biomedical engineering, (PGcert), (M, N)				ME5560, GS5532 for all streams
5	K6	Communication processes in a multidisciplinary environment (PGcert), (E, S)				GS5532, GS5537 for all Streams

5	K7	The principles of project and research management in a bioengineering context (PGcert), (M, S)				ME5560, GS5532, GS5537 for all streams
5	K8	Data management and interpretation In bioengineering Research applications. (E, B, S)				GS5538, GS5537, GS5532 for all streams
5	C1	Apply the appropriate skills in managing interdisciplinary projects (M, S)				GS5537, ME5560 for all streams
5	C2	perform literature review and critical review on the research subjects. (PGcert), (E, B, S)				GS5537, GS5532 ME5560 for all streams
5	C3	Communicate information in a multidisciplinary environment (PGcert), (E, B, M)				GS5537, ME5560, GS5532 for all streams
5	C4	Synthesize the research results to improve general understanding of the research subject. (E, B, S)				GS5537, GS5538 for all streams
5	S1	Select and use appropriate investigative techniques and methods (PGCert) (E, B, S)				GS5537, ME5560, GS5532 for all streams
5	S2	Define and organise a substantial investigation. (PGcert), (E, B, S)				GS5537, GS5532, GS5538 for all streams
5	S3	Organise technical information into a concise, coherent document, (S, M)				GS5537, GS5538 for all streams
5	S4	Develop a thesis by following a coherent argument, (S, M)				GS5537 for all streams

Learning/teaching strategies and methods to enable learning outcomes to be achieved, including formative assessments

The nature of the course is to develop students' research ability in the relevant disciplines. Each student will be assigned a supervisory panel and a specific research area according to their background and discipline desire at the beginning of the course to help them adapting to the course study and the new environment. A dissertation project list will also be provided to the student early in the first term (end of September). With the interaction of the specific supervisor group for the research area, the student will explore more opportunities to get to know the subject area and choose their dissertation project title from the list at the middle of the first term and starts working with the supervisor(s) throughout the year. The supervisory panel for each discipline (a group of supervisors in the individual research area) will be responsible to monitor the progress of research projects. The project progress will be assessed at few development stages. Due to the specific taught module arrangement (as below), student will have more time available to work on their project from the beginning of the spring term towards end of September.

In order to improve students' understanding in relevant disciplines, students are required to undertake a total of 6 taught modules, which are specified by the standard programme or by a particular theme. All taught modules are presented in "Standard Format". Out of the 6 taught modules, four will be compulsory with 15 credits each to be taken by every student covering common areas of bioengineering research, and two are chosen from 8 master degree modules (15 credit each) for the four different streams according to the student background and the dissertation discipline.

Stream A: ME5548 Biomedical imaging and image processing +GS5539: Control theory for bioengineering for students with bioelectronics background;

Stream B: ME5524 Biofluid mechanics; + GS5536 Advanced Biofluid Mechanical research for students with a mechanical engineering background;

Stream C: ME5525 Biomechanics and biomaterial + GS5535 Tissue engineering and regenerative medicine for students with a biological science background;

Stream D: GS5534 Advanced separation science and industrial case studies + GS5533 Process instrumentation and practice for students with a chemical engineering background.

The module with a name starts with ME**** are existing modules in SED's Biomedical Engineering MSc course, while the rests are developed in BIB. A full time student is required to complete four modules in the autumn term which will be assessed at the end of the term (mid-December) and two modules in the spring term with the exam being held after the Easter break. A part-time student will be required to complete at least three modules in the first year and three modules in the second year. Module grade calculation, for a module which has multi assessment elements, will be determined by calculating a particular weighted combination of the element grades, unless any element is graded F in which case the overall module grade is forced to grade F as indicated in the university regulation SR3. Also according to RS3, a student who fails to achieve the taught part grade profile required for the award of a Master's degree (CCDD) may, as of right, retrieve up to a maximum of 40 credits of

assessment and may, at the discretion of the Board of Examiners, be permitted to retrieve a further 20 credits of assessment. A exam resit for the modules which have requirement of resit from student will be taken place at the end of August. A student who fails the dissertation may be permitted to revise and resubmit the dissertation on one occasion only.

(K) Knowledge and understanding

Lecturing is the main teaching method for students to gain knowledge and understanding of the subject. The core modules are focused on the knowledge of research method and principles of bioengineering. The two technical modules are designed in the way that one will be more focused on the introduction of theories of the specific subject area while the other module will provide the opportunity for students to develop practical skills of the research in the area.

The assessment for the taught modules will be an exam at the end of term and assignments. For the technical module of more practical content, course work, experiment reports and assignments will carry more weight than the exams.

(C) Cognitive skills

Skills C1-C4 are developed, using a combination of lectures, seminars, tutorials and practical sessions to assess existing concepts and develop new ideas. Cognitive skills are acquired through the examination of case studies, the completion of practical work in technical modules and assignments, including the preparation and production of written reports.

The development of effective management and communication skills are key features of the programme. Communication skills are developed through the interaction between academic, industrial staff. This takes place in the form of verbal interaction, written reports and a programme of assessed oral presentations, and more importantly during day-to-day research project study. A self-learning approach is also adopted for these components. Members of academic staff give guidance through the supervision of the project work and assignments undertaken throughout the course.

Learning outcome C1-C4 will be generally assessed by exams, assignments, the dissertation and is to be further assessed through oral presentations.

(S) Practical and Transferable skills

Practical and transferable skills S1–S4 will be developed by the study in the research group in both practical modules and student's dissertation work throughout the year. The core modules on research methods will also help the student on developing these skills. The testing of skills S1-S4 occurs through a combination of written examinations oral presentations and assessed coursework given throughout the course. A specific allowance for transferable skills is made in the marking schemes for individual assignments, presentations and reports. The research dissertation tests all these transferable skills and represents the culmination of assessment for the course.

Summative assessment strategies and methods to enable learning outcomes to be demonstrated.

Any examination associated with the taught modules will be held at the end of the teaching period of each module. Unconfirmed results for each module, and the cumulative average for all modules taken, are given to students in grade form as soon as possible after each module has been completed.

The forms of assessment and the assessment criteria will be carefully selected to reflect the defined intended learning outcomes for each module. Our strategy throughout the course is to form a strong, coherent connection between learning outcomes, teaching and learning activities and assessment.

Conventional assessment methods such as assignments, written exams will be used for most of the modules to assess the development of subject knowledge and understanding. Since the course has a heavy weighting on the development of research skills, other assessment methods such as laboratory reports (suitable for one of the optional modules), computer simulations, project reports and oral presentations with/without peer assessment will also be used to assess certain elements of the modules. A short version of a Viva Voce examination will be used for the final dissertation assessment (carrying 15% of the dissertation mark) to make the whole student experience complete.

In term of assessment time, exams will take place in the final week of the first term (mid-December) for the modules taught in the first term, and in the early summer term for the modules taught in the second term. Assignments for each taught module will be provided to the student at early or middle of the teaching term and will be required to hand in at the end of the teaching term or early of next team. The lab report descriptions will be issued to student after every specific lab sessions, and hand in deadline should be three weeks after. The feedback of assignment and lab report will be provided to the student with their grade three weeks after the submission deadline. The later hand in penalty will be applied according SR3 regulation.

25. Programme Structure, progression and award requirements

Programme structures and features: levels, assessment blocks, credit and progression and award requirements

- **Compulsory block:** one which all students registered for the award are required to take as part of their programme of study. These will be listed in the left hand column;
- **Optional block:** one which students choose from an 'option range'. These will be listed in the right hand column;
- A **core assessment** is an assessment identified within an assessment block or modular block (either compulsory or optional) which must be passed (at grade C- or better) in order to be eligible to progress and to be eligible for the final award. All core assessments must be specified on the programme specification next to the appropriate assessment or modular block:

Where students are expected to pass the block at C- or better, but not necessarily all elements, then the block itself is core.

e.g. AB5500 Project (40)
Core: Block

Where only some elements of assessments are required to be passed at C- or better, these will be identified by listing each element that is core

e.g. ABXXX1 Title (XX credits)
Core: 1 & 4

Where students are expected to pass all assessments in a block then this will be identified. By setting the assessment this way, students are also required to pass the block by default. This will be identified thus:

e.g. ABXXXX Title (XX credits)
Core: All, Block

- A **non-core assessment** does not have to be passed at grade C- or better, but must D- or better in order to be eligible for the final award.

Level 5

Compulsory assessment block codes, titles and credit	Optional assessment block codes, titles and credits
Compulsory study block codes, titles and credit volume	Optional Study block codes, titles and credit volume
<p>Compulsory modular block codes, titles and credits</p> <p>ME5560 Innovation, Management and Research Methods² (15 credits)</p> <p>GS5532 Bioengineering Research Method¹ (15 credits)</p> <p>ME5526 Biomedical Engineering Principles¹ (15 credits)</p> <p>GS5538 Biomedical statistics² (15 credits)</p> <p>GS5537 Dissertation (90 credits)</p>	<p>Optional modular block codes, titles and credits (all 15 credits)</p> <p>Students must take both modules from their preferred stream</p> <p>Stream A</p> <p>ME5548 Biomedical imaging and Image Processing¹</p> <p>GS5539 01: Control theory for bioengineering²</p> <p>Stream B</p> <p>ME5524 Biofluid Mechanics¹</p> <p>GS5536 Advanced Biofluid Mechanical research²</p> <p>Stream C</p> <p>ME5525 Biomechanics and Biomaterials¹</p> <p>GS5535 Tissue engineering and regenerative medicine²</p> <p>Stream D</p> <p>GS5534 Advanced Separation Science and Industrial Case Studies¹</p> <p>GS5533 Process Instrumentation and Practice²</p>

Level 5 Progression and Award Requirements

[As per Senate Regulation 3](#)

PGDip may not be awarded by substitution of the dissertation (GS5537) for modular/assessment blocks in the taught part of the programme.

Please note: this specification provides a concise summary of the main features of the programme and the learning outcomes that a student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. More detailed information on the learning outcomes, content and teaching, learning and assessment methods can be found in the modular block, assessment and study block outlines and other programme and block information. The accuracy of the information contained in this document is reviewed by the University from time to time and whenever a modification occurs.