

Programme Specification for MENG / BENG BIOMEDICAL ENGINEERING



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| 1. Programme title | MEng/BEng in Biomedical Engineering |
| 2. Awarding institution | Middlesex University |
| 3. Teaching institution | Middlesex University |
| 4. Programme accredited by | Application will be made to appropriate engineering institutions after one full cohort |
| 5. Final qualification | MEng / BEng |
| 6. Academic year | 2020/21 |
| 7. Language of study | English |
| 8. Mode of study | Full Time / Part Time / Sandwich |

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| <p>9. Criteria for admission to the programme</p> <p>Applicants from a range of educational experience will be considered. Acceptable qualifications include: GCE A/AS, AVCE, BTEC National Diploma, Access Certificates, Scottish Higher, Irish Leaving Certificates at higher level, International Baccalaureate and equivalent home and overseas qualifications.</p> <p>Applicants are expected to have achieved passes in five GCSE subjects including mathematics and English language at grade C or higher. Equivalent qualifications are also considered.</p> <p>Applicants are also expected to have achieved GCE A level or equivalent in a minimum of two subjects including mathematics or physics and biology or chemistry. Qualifications are assessed using the UCAS Tariff point system. Typically, this will be a minimum of 120.</p> <p>Alternatively, successful completion of a relevant Foundation Year or Access Course deemed by the University to be equivalent is acceptable. Mature applicants with suitable life skills and experience will be considered.</p> |
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| <p>10. Aims of the programme</p> <p>The programme aims to: develop students' analytical, technical and professional skills to such a level that they can begin a career in biomedical engineering and, after a period of appropriate professional practice and additional learning, attain the professional status of Chartered Engineer.</p> |
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| 11. Programme outcomes | |
| <p>A. Knowledge and understanding</p> <p>On completion of this programme the successful student will have knowledge and understanding of:</p> <p>Engineering mathematics and science both specific to biomedical engineering and more generally to other engineering disciplines. At MEng level this is developed more comprehensively to enable critical analysis, effective application to new situations and understanding of its limitations.</p> | <p>Teaching/learning methods</p> <p>Students gain knowledge and understanding through either online or on campus lectures and seminars, and personal research</p> <p>Assessment Method</p> <p>Students' knowledge and understanding is assessed by written examination, in-class tests, written reports and essays</p> |

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| <p>Current and emergent technologies in biomedical engineering</p> <p>Normal and abnormal human anatomy and physiology</p> <p>Laboratory and workshop techniques, health & safety procedures</p> <p>The design process and relevant standards. At MEng level, this is extended such that they can be adapted and applied to unfamiliar situations.</p> <p>Research methods and at MEng level their use in investigating new and emerging technologies</p> <p>Socio-economic aspects of engineering and biomedical science to include evaluation of commercial risk at MEng level</p> | |
| <p>B. Cognitive (thinking) skills</p> <p>On completion of this programme the successful student will be able to:</p> <p>Apply quantitative methods to problem solving and at MEng level to develop novel approaches to solving engineering problems</p> <p>Interpret, analyse and critically evaluate experimental results to solve problems and apply and improve technology</p> <p>Develop ideas through critical appraisal and integration of appropriate literature, concepts and principles</p> <p>Apply creativity and innovation extended to a wider range of systems that fulfil new needs at MEng level</p> <p>Assess the risk factors relevant to health and safety associated with working in laboratories, workshops and/or the clinical environment</p> | <p>Teaching/learning methods</p> <p>Students learn cognitive skills through coursework exercises and projects</p> <p>Assessment Method</p> <p>Students' cognitive skills are assessed by assignment submissions, design portfolios, presentations, demonstrations, written reports</p> |
| <p>C. Practical skills</p> <p>On completion of the programme the successful student will be able to:</p> <p>Use, apply and design specialised computer software</p> <p>Safely and effectively use of materials, laboratory techniques, equipment and workshop tools</p> | <p>Teaching/learning methods</p> <p>Students learn practical skills through laboratory sessions, workshop training and project work</p> <p>Assessment Method</p> <p>Students' practical skills are assessed by laboratory reports, project reports and physical artefacts</p> |

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| <p>Apply appropriate protocols, codes of practice and industry guidelines relating to biomedical engineering practice and quality assurance.</p> <p>Project management. At MEng leadership skills are further developed</p> | |
| <p>D. Graduate Skills</p> <p>On completion of this programme the successful student will be able to:</p> <ul style="list-style-type: none"> • Communicate knowledge and ideas using a variety of media • Organise, analyse and present data in support of an idea, proposal or argument • Apply cognitive and practical skills to a range of non-engineering activities • Demonstrate literacy • Formulate a career development plan • Demonstrate an autonomous and reflective approach to lifelong learning • Work as a member of leader of a team | <p>Teaching/learning methods</p> <p>Students acquire graduate skills through laboratory sessions, either online or on campus lectures and seminars, project work</p> <p>Assessment method</p> <p>Students' graduate skills are assessed by presentations, written work and design portfolios.</p> |

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| 12. Programme structure |
| 12. 1 Overall structure of the programme |
| <p>The BEng (Hons) Biomedical Engineering can be studied over three years full-time, or four years if the optional placement year is taken or part-time over a minimum of four years; the optional placement is not taken on the part-time programme. It is a modular programme – each module has a credit value of 30 credits, with the exception of the placement year module, which is worth 120 credits and the final year project worth 60 credits. Five modules are taken at level 4, four at level 5 and three at level 6, giving total credits of 120 for successful completion of a single level, and 360 credits for successful completion of the programme.</p> <p>Students who achieve an academic profile equivalent to upper second class or better after level 5 will be eligible to continue their studies from level 6 onwards to complete the MEng award. The MEng in Biomedical Engineering can be studied over four years full-time, or five years if the optional placement year is taken or part-time over a minimum of six years. Levels 4, 5 and 6 of the MEng award are similar to that of the BEng. Three modules are taken at level 7, two at 30 credits and the Team Project, worth 60 credits, giving total of 120 credits and 480 credits for successful completion of the award. The placement module is optionally taken between levels 5 and 6 for both awards and does not contribute to the final degree classification but successful completion will lead to the additional award of <i>Diploma of Employability Studies</i>.</p> |

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| 12.2 Levels and modules | | |
| Level 4 | | |
| COMPULSORY | OPTIONAL | PROGRESSION REQUIREMENTS |
| <p>Students must take all of the following:</p> <p>BMS1514 PDE1234 PDE1215 PDE1216 MSO1210</p> | There are no optional modules | Successful completion of all Level 4 compulsory modules |

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| Level 5 | | |
| COMPULSORY | OPTIONAL | PROGRESSION REQUIREMENTS |
| Students must take all of the following: PDE2400 PDE2975 PDE2985 BMS2975 | There are no optional modules | Successful completion of all Level 5 compulsory modules |
| Level 6 (optional placement year) | | |
| COMPULSORY | OPTIONAL | PROGRESSION REQUIREMENTS |
| | Students may choose to take the year-long placement module: BMS3006 | |
| Level 6 | | |
| COMPULSORY | OPTIONAL | PROGRESSION REQUIREMENTS |
| Students must take all of the following: PDE3696 BMS3676 BMS3686 | There are no optional modules | Successful completion of all Level 6 modules |
| Level 7 | | |
| COMPULSORY | OPTIONAL | PROGRESSION REQUIREMENTS |
| Students must take all of the following for the award of MEng: PDE4400 BMS4677 PDE4767 | There are no optional modules | |

| 12.3 Non-compensatable modules | |
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| Module level | Module code |
| 5 | All Modules |
| 6 | All Modules |
| 7 | All Modules |

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| 13. Curriculum map |
| See attached. |
| 14. Information about assessment regulations |
| The assessment regulations are the general university regulations. |

15. Placement opportunities, requirements and support (if applicable)

A work placement opportunity is an optional part of the programme and students are encouraged to take full advantage of this. Placement opportunities are managed by the University's Employability Centre and students can register and seek placements on the website mdxjobs.com. The centre is open from 10 am to 5 pm daily and students can drop in to explore vacancies and receive advice. They can also have their CVs checked by email.

16. Future careers (if applicable)

Biomedical engineering graduates can gain employment in a wide variety of settings, particularly in research, laboratory-based work and in industry within biomedical product design companies. Graduates could be employed in the National Health Service or university laboratories; others may obtain posts in education at all levels.

17. Particular support for learning (if applicable)

Specialist laboratory facilities available on site to learn and develop practical skills
Online support for all modules in the programme available on UniHub
Learning resource facilities at the University including computing suites and internet access
Access to English Language and Learning Support on campus

18. JACS code (or other relevant coding system)**19. Relevant QAA subject benchmark group(s)** Engineering, Biomedical Science**20. Reference points**

The following references points were used in designing the programme:

- Middlesex University Learning Framework document (2006)
- QAA Subject benchmarks for engineering (2010)
- QAA Subject benchmarks for biomedical science (2007)
- UK Standard for Professional Engineering Competence (EC, UKSPEC: 2008)
- The Accreditation of Higher Education Programmes (EC: 2011)
- Middlesex University Learning, Teaching and Assessment Policies and Strategies (2005)

21. Other information

Please note programme specifications provide a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve if s/he takes full advantage of the learning opportunities that are provided. More detailed information about the programme can be found in the rest of your programme handbook and the University Regulations.

Curriculum Map MEng / BEng Biomedical Engineering

This section shows the highest level at which programme outcomes are to be achieved by all graduates, and maps programme learning outcomes against the modules in which they are assessed.

Programme learning outcomes

| Knowledge and understanding | | Practical skills | |
|-----------------------------|--|------------------|--|
| A1 | Engineering mathematics and science both specific to biomedical engineering and more generally to other engineering disciplines | C1 | Use, application and design of specialised computer software |
| A2 | Current and emergent technologies in biomedical engineering | C2 | Safe and effective use of materials, laboratory techniques, equipment and workshop tools |
| A3 | Normal and abnormal human anatomy and physiology | C3 | Apply appropriate protocols, codes of practice and industry guidelines relating to biomedical engineering practice and quality assurance |
| A4 | Laboratory and workshop techniques, health & safety procedures | C4 | Project management |
| A5 | The design process and relevant standards | | |
| A6 | Research methods | | |
| A7 | Socio-economic aspects of engineering and biomedical science | | |
| Cognitive skills | | Graduate Skills | |
| B1 | Application of quantitative methods to problem solving | D1 | Communicate knowledge and ideas using a variety of media |
| B2 | Interpret, analyse and critically evaluate experimental results to solve problems and apply and improve technology | D2 | Organise, analyse and present data in support of an idea, proposal or argument |
| B3 | Develop ideas through critical appraisal and integration of appropriate literature, concepts and principles | D3 | Apply cognitive and practical skills to a range of non-engineering activities |
| B4 | Apply creativity and innovation | D4 | Demonstrate literacy |
| B5 | Assess the risk factors relevant to health and safety associated with working in laboratories, workshops and/or the clinical environment | D5 | Formulate a career development plan |
| | | D6 | Demonstrate an autonomous and reflective approach to lifelong learning |

| Programme outcomes | | | | | | | | | | | | | | | | | | | | | |
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| A1 | A2 | A3 | A4 | A5 | A6 | A7 | B1 | B2 | B3 | B4 | B5 | C1 | C2 | C3 | C4 | D1 | D2 | D3 | D4 | D5 | D6 |
| Highest level achieved by BEng graduates | | | | | | | | | | | | | | | | | | | | | |
| 6 | 6 | 6 | 6 | 5 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 5 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| Highest level achieved by MEng graduates | | | | | | | | | | | | | | | | | | | | | |
| 7 | 7 | 6 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 |

Curriculum Map

| Module Title | Module Code by Level | Programme outcomes | | | | | | | | | | | | | | | | | | | | | |
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| | | A1 | A2 | A3 | A4 | A5 | A6 | A7 | B1 | B2 | B3 | B4 | B5 | C1 | C2 | C3 | C4 | D1 | D2 | D3 | D4 | D5 | D6 |
| Human Sciences | BMS1514 | X | | X | | | X | | | X | X | | | X | | | | X | X | X | X | | |
| Design Practice for BMEs | PDE1234 | | X | | X | X | | | X | | X | X | X | X | X | | X | X | | | | | X |
| Computing... | PDE1215 | X | | | | | | | X | | | | X | X | X | | | X | X | | | | |
| Electronics | PDE1216 | X | | | | | | | X | | | | | X | X | | | | | | | | |
| Mathematics and Mechanics... | MSO1210 | X | | | | | | | X | | | | | X | | | | X | X | X | | | |
| Design Engineering Projects 2 | PDE2401 | | X | | X | X | X | | | X | X | X | X | X | X | | X | X | | | | | |

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| Physiological Measurements | BMS2975 | X | X | X | X | | | | | X | | | X | X | X | X | | X | | X | X | | | |
| Design of Medical Devices | PDE2975 | X | X | | | X | X | X | X | | X | | X | | | X | | | | | | | | |
| Medical Equipment Life Cycle | PDE2985 | | | | | X | | X | | | X | | X | | X | | | | | | | | | |
| Placement | BMS3006 | | X | | X | | | X | | X | | X | X | | X | | X | X | | X | X | X | X | X |
| BME Major Project | PDE3696 | | X | | | | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Principles of Medical Eng. | BMS3676 | X | X | X | X | | | | X | | | | X | X | | X | | X | X | X | X | X | X | X |
| Principles of Rehab. Eng. | BMS3686 | X | X | X | X | | | | X | | | | X | X | | X | | X | X | X | X | X | X | X |
| Team Project | PDE4400 | | X | | X | X | X | X | | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Modelling and Simulation... | BMS4767 | X | X | | | | X | | X | X | X | | | X | | | | X | X | X | X | X | X | X |
| Advanced Rehabilitation Eng. | PDE4677 | X | X | | X | | X | | X | X | X | | X | X | X | X | | X | X | X | X | X | X | X |