Faculty of Engineering & Informatics

Programme Specification

Programme title: MSc Mechanical Engineering

<table>
<thead>
<tr>
<th>Academic Year:</th>
<th>2016 - 2017</th>
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<tbody>
<tr>
<td>Degree Awarding Body:</td>
<td>University of Bradford</td>
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<tr>
<td>Partner(s), delivery organisation or support provider (if appropriate):</td>
<td>N/A</td>
</tr>
<tr>
<td>Final and interim award(s):</td>
<td>MSc [Framework for Higher Education Qualifications (FHEQ) level 7] MSc non accredited Postgraduate Diploma Postgraduate Certificate</td>
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<tr>
<td>Programme accredited by (if appropriate):</td>
<td>Institution of Mechanical Engineers</td>
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<tr>
<td>Programme duration:</td>
<td>1 year full time</td>
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<tr>
<td>QAA Subject benchmark statement(s):</td>
<td>Engineering (MEng)</td>
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<tr>
<td>Date of Senate Approval:</td>
<td>July 2014</td>
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<tr>
<td>Date last confirmed and/or minor modification approved by Faculty Board</td>
<td>July 2014</td>
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Introduction

Engineering is fundamental to the economic and social prosperity worldwide. It is a “people serving” profession whose activities not only manage humankind’s environment but also create that environment itself. It requires well-qualified and motivated students who seek to be the future leaders within their profession. Your studies at Bradford will be a foundation for life aimed at developing an appreciation of technical and managerial principles and competence in their application using a wide range of personal and professional skills.

The Master of Science (MSc) degree programme in Mechanical Engineering is designed to the needs of the 21st Century mechanical engineering related industries. The core modules will provide you with advanced understanding in solid mechanics, computer modelling and simulation, design analysis and design methodologies. The range of optional modules allows you to either develop a specialism in one of a number of thematic areas, (i) control
engineering, robotics/mechatronics, (ii) Manufacturing Engineering, (iii) quality, reliability and risk management or, alternatively, to select from across a selection of these themes to build up a portfolio of expertise across a number of these themes. The project modules will develop your research and project management skills whilst undertaking in-depth study of a particular topic. The major MSc dissertation project is usually linked with on-going research within the School of Engineering and Informatics. The School places emphasis on both teaching and research, believing them to be mutually dependent. We have particular research strengths in Mechanical Dynamics and Control (especially machine tool dynamics and control and vehicle dynamics and control); Automotive Engineering (especially engine mapping and calibration, turbo-charger testing, quality engineering in system and component design and manufacture); Materials Engineering (including the creation of tailored materials e.g. powder metallurgy, composites, and polymers, recycling); in-line monitoring and control of manufacturing processes; Computer Modelling and Design (creation, virtual testing and prototyping). We conduct this research jointly with many companies including Ford, Jaguar Land Rover, Cummins, and their supplier bases, Autodesk Moldflow, Netlon, Surgical Innovations.

The MSc will meet, in part, the exemplifying academic benchmark requirements for registration as a Chartered Engineer (CEng). Accredited MSc graduates who also have a BEng (Hons) accredited for CEng, will be able to show that they have satisfied the educational base for CEng registration.

With reference to teaching and learning, the School aims to produce postgraduates who aspire to challenging careers in industry, commerce and the public sector or to developing their own enterprises. Postgraduates will be able to move directly into responsible roles in employment with a minimum of additional training. These aims are achieved by

- Providing a supportive, structured environment in which students are encouraged to develop independent learning skills;
- Developing subject knowledge and understanding, developing discipline skills and developing personal transferable skills, to enable graduates to pursue programmes of further study, or to move directly into responsible employment.

Programme Aims

The programme is intended to:

- give technical depth across the discipline of Mechanical Engineering and its applications,
- provide breadth to encourage innovators of mechanical systems,
- facilitate exposure to other engineering disciplines,
- develop and enhance research skills. Upon graduation you will have the capacity for meaningful interdisciplinary interaction, a leadership role, and professional growth, which may include Chartered Mechanical Engineer (CEng) status.

Programme Learning Outcomes

To be eligible for the award of Postgraduate Certificate at FHEQ level 7, students will be able to:

LO1. Demonstrate the ability to apply advanced level knowledge and understanding of mechanical engineering to optimise the application of existing technology and to produce innovative uses for emerging technology to develop products / processes.

LO2. Provide technical expertise in theoretical, computational, and practical methods to the analysis and solution of mechanical engineering problems, particularly in
design, dynamics, material selections, solids, mechatronics, control, computer aided engineering.

LO3. Demonstrate leadership in meeting the technical and managerial requirements for effective project implementation.

LO4. Apply the tools and disciplines required in interdisciplinary competitive design.

LO5. Apply computational and simulation methods used to optimise designs and processes for reliability and robustness of mechanical systems.

LO6. Demonstrate an appreciation of business and management practices that are relevant to engineering and engineers.

Additionally, to be eligible for the award of Postgraduate Diploma at FHEQ level 7, students will be able to:

LO7. Apply engineering principles and inter-personal skills to the critical analysis of multidisciplinary problems in order to create innovative solutions to non-routine problems.

LO8. Identify an area for further detailed investigation, design and experimental programme, utilise research skills to critically evaluate and interpret newly developed data.

LO9. Plan, conduct and report a programme of original research.

LO10. Integrate and evaluate information from a variety of sources.

LO11. Take a holistic approach in solving problems and designing systems, applying professional judgements to balance risks, cost, benefits, safety, reliability and environmental impact.

LO12. Work in groups in order to meet shared objectives.

LO13. Use problem solving strategies to develop, monitor and update a plan for the solution of both technical and personnel contributions to meeting organisational need.

LO14. Learn independently in familiar and unfamiliar situations with open mindedness and in the spirit of critical enquiry.

LO15. Learn effectively for the purpose of continuing professional development and in a wider context throughout your career.

Additionally, to be eligible for the award of Degree of Master at FHEQ level 7, students will be able to:

LO16. Select, design, plan and manage a self-directed research-informed project, demonstrating a critical analysis and evaluation of relevant material and the ability to apply relevant skills and research methodologies in the production of an advanced report.

Curriculum

Postgraduate Certificate

<table>
<thead>
<tr>
<th>Module Code</th>
<th>Module Title</th>
<th>Type</th>
<th>Credits</th>
<th>Level</th>
<th>Semester</th>
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<tbody>
<tr>
<td>MAE7003-B</td>
<td>Interdisciplinary Competitive Design</td>
<td>C</td>
<td>10+10</td>
<td>7</td>
<td>1,2</td>
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</table>
Students will be eligible to exit with the award of Postgraduate Certificate if they have successfully completed 60 credits and achieved the award learning outcomes.

Postgraduate Diploma

<table>
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<tr>
<th>Module Code</th>
<th>Module Title</th>
<th>Type</th>
<th>Credits</th>
<th>Level</th>
<th>Semester</th>
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<tbody>
<tr>
<td>ENG7008-A</td>
<td>Research Skills</td>
<td>C</td>
<td>10</td>
<td>7</td>
<td>2</td>
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<tr>
<td>MAE7013-B</td>
<td>Advanced Solid Mechanics</td>
<td>C</td>
<td>20</td>
<td>7</td>
<td>2</td>
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<tr>
<td>MAE7005-B</td>
<td>Polymer Engineering</td>
<td>O</td>
<td>20</td>
<td>7</td>
<td>2</td>
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<tr>
<td>EAM7002-B</td>
<td>Supply Chain Management</td>
<td>O</td>
<td>20</td>
<td>7</td>
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<tr>
<td>ENG7007-A</td>
<td>Engineering Computational Methods</td>
<td>O</td>
<td>10</td>
<td>7</td>
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Students will be eligible to exit with the award of Postgraduate Diploma if they have successfully completed at least 120 credits and achieved the award learning outcomes.

Degree of Master

<table>
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<tr>
<th>Module Code</th>
<th>Module Title</th>
<th>Type</th>
<th>Credits</th>
<th>Level</th>
<th>Semester</th>
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<tbody>
<tr>
<td>ENG7002-E</td>
<td>MSc Project</td>
<td>C</td>
<td>60</td>
<td>7</td>
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Students will be eligible for the award of Degree of Master if they have successfully completed at least 180 credits and achieved the award learning outcomes.

Learning, Teaching and Assessment Strategy

The teaching and learning strategy takes into consideration the learning outcomes, progression through the levels of study, the nature of the subject and the student intake, and the need for you to take greater responsibility for your own learning as you progress through the programme. The strategies and methods implemented are:

- The teaching and learning methods implemented to engage you in developing your knowledge and understanding of the programme include formal lectures (including those from Visiting Lecturers), case studies, tutorial exercises, practical demonstrations, directed learning and individual and group work. Assessment is by means of written examination and by both analytical and experimental coursework.
The methods implemented in developing your intellectual skills include engaging with them during tutorial exercises, case studies, practical demonstration and supervised research or project work. The methods of assessment of intellectual skills are implicit in the written examinations, analytical and experimental coursework and more particularly in your MSc dissertation project.

The methods implemented in developing your practical skills include demonstrations and practical work linked to the taught modules. You will also design and operate equipment and use control and measuring instruments under supervision during the initial phase of your research project. The methods of assessment of practical skills include feedback on laboratory work linked with the taught modules. Also a large part of the mark of the MSc dissertation will be attributed to the Experimental Method and Equipment and the Presentation and Discussion of Results.

The methods implemented in developing the students’ transferable skills are implicit in the programme. The University of Bradford is well known for attracting students from a wide variety of background, experiences and countries. This, and the learning facilities available to all students, provides the conditions for students to develop and manage their learning. The University of Bradford modus operandi, Making Knowledge Work, is embedded in the philosophy of this programme, particularly in the area of Engineering and Informatics, which is well equipped with practical and computational facilities. Multi-disciplinary Group project work assists in the development of team working skills – these are essential skills skill sought by many employers. The methods of assessment of transferable skills are built in the structure of the examinations, case studies, laboratory demonstrations and research or project work.

Assessment Regulations

MSc

This Programme conforms to the standard University Taught Postgraduate Regulations, which are available at the link below http://www.bradford.ac.uk/aqpo/ordinances-and-regulations/

However, there is 1 exception to these regulations as listed below:

To gain an accredited MSc award, students must achieve 180 credits in total, comprising 160 credits at 50% or above and 20 credits at 40% or above.

If the above requirement is not met, but the University’s taught postgraduate regulations are complied with, then a non-accredited MSc Engineering (DISCIPLINE) will be awarded

Admission Requirements

The University welcomes applications from all potential students and most important in the decision to offer a place is our assessment of a candidate’s potential to benefit from their studies and of their ability to succeed on this particular programme. Consideration of applications will be based on a combination of formal academic qualifications and other relevant experience.

The standard entry requirements for the programme are as follows:

with respect to the proposed programme, we specifically require that all applicants have a second-class Honours degree or equivalent in relevant discipline. Candidates who do not
fulfil the normal entry requirements but have extensive industrial experience in a related area are considered on an individual basis.

The University welcomes applications from all potential students regardless of their previous academic experience; offers are made following detailed consideration of each individual application. Most important in the decision to offer a place is our assessment of a candidate’s potential to benefit from their studies and of their ability to succeed on this particular programme. Entrance requirements for each programme will vary but consideration of your application will be based on a combination of your formal academic qualifications and other relevant experience.

If you have prior certificated learning or professional experience which may be equivalent to parts of this programme, the University has procedures to evaluate this learning in order to provide you with exemptions from specified modules contained within the curriculum. Please talk to us if you do not fit the standard pattern of entry qualifications.

The University of Bradford has always welcomed applications from disabled students, and these will be considered on the same academic grounds as are applied to all applicants. If you have some form of disability you may wish to contact the programme leader before you apply.

Applications are welcome from students with non-standard qualifications or mature students (those over 21 years of age on entry) with significant relevant experience.

**Recognition of Prior Learning**

If applicants have prior certificated learning or professional experience which may be equivalent to parts of this programme, the University has procedures to evaluate and recognise this learning in order to provide applicants with exemptions from specified modules or parts of the programme.

**Minor Modification Schedule**

<table>
<thead>
<tr>
<th>Version Number</th>
<th>Brief description of Modification</th>
<th>Date of Approval (Faculty Board)</th>
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