Faculty of Engineering and Informatics

Programme Specification

Programme title: MSc/PGDip Civil and Structural Engineering

<table>
<thead>
<tr>
<th>Academic Year:</th>
<th>2017-18</th>
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</thead>
<tbody>
<tr>
<td>Degree Awarding Body:</td>
<td>University of Bradford</td>
</tr>
<tr>
<td>Partner(s), delivery organisation or support provider (if appropriate):</td>
<td></td>
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<tr>
<td>Final and interim award(s):</td>
<td>[Framework for Higher Education Qualifications (FHEQ) level 7] MSc Postgraduate Diploma Postgraduate Certificate</td>
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<tr>
<td>Programme accredited by (if appropriate):</td>
<td>Joint Board of Moderators (JBM)</td>
</tr>
<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</td>
</tr>
<tr>
<td>Date of Senate Approval:</td>
<td>July 2014</td>
</tr>
<tr>
<td>Date last confirmed and/or minor modification approved by Faculty Board</td>
<td>February 2017</td>
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</table>

Introduction

Civil engineering is a strategically important profession for both developed and developing countries. With creativity and technical skills, civil engineers plan, design construct, maintain and operate infrastructure facilities essential to modern life, ranging from bridges and highways to water and wastewater treatment facilities and buildings. Civil engineering is a broad field that spans a number of branches including subjects such as Structural Engineering, Water Resources Engineering, Environmental Engineering, Transportation Engineering and Geotechnical Engineering. As countries develop, and their population’s increase, and as environmental concerns mount, civil engineering skills will be increasingly needed throughout the world. Meeting the challenges of providing housing and buildings, infrastructure to control pollution, transportation links, drinking water and energy needs, urban redevelopment and community planning are few examples of the
problems civil engineers solve. Civil engineering offers wide career choices, ranging from design, construction, research, planning, teaching, to management. The branch of structural engineering is concerned with the structural design and analysis of buildings, bridges, and other structures. This involves calculating the stresses and forces that act upon or arise within a structure, and designing the structure to successfully resist those forces and stresses. Resistance to wind and seismic loadings, especially performance near resonant frequencies, which affect the overall stability of a structure are major design concerns. Other factors such as durability and cost are also considered. In addition to design of new buildings, structural engineers may design a seismic retrofit for an existing structure to mitigate undesirable performance during earthquakes. Most civil and structural engineers today deal with power plants, bridges, roads, railways, structures, water supply, irrigation, the natural environment, sewer, flood control, transportation and traffic. Civil and structural engineering aims to improve and maintain the built and natural environment with best use of resources to enhance the quality of life for present and future generations. They contribute with their knowledge to designing, building, maintaining, repair or refurbishing sustainable developments. Those entering the civil engineering field are increasingly required to continue their education long after bachelor’s graduation and are required to increase their knowledge base to remain competitive. Thus this MSc programme at the University of Bradford is designed to provide advanced civil and structural engineering education to meet the aspirations of students’ needs. The programme is designed in a way to address a balanced curriculum between advanced technical and design skills, and research skills with a strong sustainability thread. Optional modules are also included to offer students more choices and meet their interests and needs in civil and structural engineering. The programme is accredited by the Joint Board of Moderators (JBM) as meeting the requirements for Further Learning for a Chartered Engineer, and as a technical MSc for holders of an IEng degree.

The Faculty of Engineering and Informatics places emphasis on both teaching and research, believing them to be mutually dependent. We have particular research strengths in Structural Engineering; Geotechnics; Sustainability; Water Engineering; Acoustics; and Computer Modelling and Design. We conduct this research jointly with many companies including Bersche-rolt, Transport Research Laboratory, AngloFelt Industries, Incommunities, Yorkshire Water, Thames Water, Lime Technology, Castle Cement, Ibstock Bricks and many others. The industrial input of our partners like Arup, is one of the strength the course has.

With reference to teaching and learning, the School of Engineering 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. It achieves this aim 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 advanced study, or to move directly into responsible employment.

Programme Aims

The programme is intended to:

- Provide students with the advanced theoretical knowledge, concepts and skills necessary for original thought and problem analysis related to civil and structural engineering.
- Provide students with deepened academic and technical skills necessary to integrate their knowledge and understanding to solve a range of complex engineering problems.
- Enable students to carry out independently, but under supervision, a specific research project in civil and structural engineering.
- Provide those possessing an accredited undergraduate degree, the Further Learning educational requirements (in compliance with UK-SPEC) to permit progression to Chartered Membership of the Institution of Civil Engineers and/or the Institution of Structural Engineers and/or the Institution of Highways and Transportation, and registration with the Engineering Council (UK) as a Chartered Engineer.

Programme Learning Outcomes

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

1. Demonstrate advanced understanding of, and ability to apply, the main theories, principles and techniques of advanced geotechnics, earthquake engineering and civil and structural engineering;
2. Model and evaluate elastic and elastic-plastic structures and predict the effects of changes in operational parameters on structural behaviour.
3. Deploy advanced level design optimization skills to formulate and solve optimization problems, selecting and implementing solutions, related to engineering design;
4. Demonstrate analysis and synthesis of information relating to a specified engineering/technology and environmental management problem, and an ability to generate practical solutions.

At Masters Level, and including all of the above, you will be able to:

5. Select, design, plan and manage a self-directed research-informed civil engineering 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.
Additionally, to be eligible for the award of Degree of Master at FHEQ level 7, students will be able to:

LO1 Apply engineering principles and inter-personal skills to the critical analysis of multi-disciplinary complex problems in order to create innovative solutions to these problems;

LO2 Integrate engineering understanding and apply insight to the solution of real problems;

LO3 Approach, construct, analyse and solve design problems;

LO4 Demonstrate intellectual capabilities of formulation, conceptualisation and reflection of complex non-routine problems;

LO5 Develop abilities to plan a research programme of work, conduct corresponding experimental and theoretical work and report findings in a critical thesis;

LO6 Demonstrate self-direction and originality in problem solving.

LO7 Exercise initiative and personal responsibility in professional practice;

LO8 Design or develop new skills or procedures for new situations;

LO9 Develop a range of laboratory skills from their individual research project;

LO10 Use software packages in the advanced analysis, design and evaluation of complex engineering systems.

LO11 Use critical thinking for evaluation and integration of scientific and technological information from a variety of sources.

LO12 Demonstrate the ability to learn in a structured but broad programme and manage accordingly their time and effort and the resources available to them.

LO13 Demonstrate the ability to develop, monitor and update a research plan, taking into account changes that may affect the plan.

LO14 Work effectively with a group as leader or member, make appropriate use of the capacity of group members, negotiate and handle conflict with confidence.

Curriculum

<table>
<thead>
<tr>
<th>FHEQ Level</th>
<th>Module Title</th>
<th>Type (Core/ Option/ Elective)</th>
<th>Credits</th>
<th>Semesters</th>
<th>Module Code</th>
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</thead>
<tbody>
<tr>
<td>7</td>
<td>Advanced Geotechnics</td>
<td>C</td>
<td>20</td>
<td>1</td>
<td>CSE7009-B</td>
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<tr>
<td>7</td>
<td>Construction Management</td>
<td>C</td>
<td>20</td>
<td>1</td>
<td>CSE7008-B</td>
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<tr>
<td>7</td>
<td>Advanced Structural Design</td>
<td>C</td>
<td>20</td>
<td>1,2</td>
<td>CSE7005-B</td>
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<td>7</td>
<td>Computational Fluid Dynamics</td>
<td>O</td>
<td>10</td>
<td>1</td>
<td>CSE7004-A</td>
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<tr>
<td>7</td>
<td>Design Optimisation</td>
<td>O</td>
<td>10</td>
<td>1</td>
<td>ENM7002-A</td>
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<tr>
<td>7</td>
<td>Structural Dynamics and Earthquake Engineering</td>
<td>C</td>
<td>20</td>
<td>2</td>
<td>CSE7003-A</td>
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<tr>
<td>7</td>
<td>Research Skills</td>
<td>C</td>
<td>10</td>
<td>2</td>
<td>ENG4311M</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.

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.

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 and Teaching Strategy**

The teaching and learning strategy takes into consideration the learning outcomes, the nature of the subject, 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 work. The method of assessment is by written examination and both analytical and experimental coursework.

- The methods implemented in developing your intellectual skills include engaging with you 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 and PG/Dip final report.

- The methods implemented in developing your practical skills include demonstrations and practicals linked with the taught modules. You will also design and operate equipment and use control and measuring instruments under supervision during 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 and the PG/Dip will be attributed to the Experimental Method and Equipment and the Presentation & Discussion of Results.

- The methods implemented in developing your transferable skills are implicit in the programme. The University of Bradford is well known for attracting students from a wide variety of backgrounds, experiences and countries. This and the learning
facilities available to all students provide the conditions for students to develop and manage their learning. The University of Bradford modus operandi, Making Knowledge Work, is imbedded in the philosophy of this programme, particularly in the area of Engineering, Design and Technology, which is well equipped with practical and computational facilities. 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 Strategy

The method of assessment is by formal written examinations, class tests analytical and experimental coursework. The methods of assessment of intellectual skills are implicit in the written examinations, analytical and experimental coursework and more particularly in your ‘Design Project’ work. Practical skills are assessed via individual and group technical reports with the laboratory work linked with the taught modules. The methods of assessment of transferable skills are built in the structure of the examinations, case studies, laboratory demonstrations and the ‘Design Project’ work.

Assessment Regulations

Whilst this Programme conforms to the general principles set out in the standard University Assessment Regulations which are available at the link below, [http://www.bradford.ac.uk/agpo/ordinances-and-regulations/](http://www.bradford.ac.uk/agpo/ordinances-and-regulations/), the following exception(s) apply to these regulations:

1. The MSc project must be passed at 1st attempt

2. To gain an accredited MSc award, 160 credits must have a minimum mark of 50% with the remaining 20 credits with marks at a minimum of 40%.

This requirement can be met with supplementary assessment in any number of taught subjects. You may therefore re-sit a module that has a mark in the 40% to 50% range for the purpose of remaining on the accredited award.

If the above requirements are not met, but the University’s postgraduate regulations are complied with, then a non-accredited MSc 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:
In addition to satisfying the general admissions requirements of the University of Bradford, you must have a first degree in relevant discipline; normally a Second-class Honours degree or equivalent in Science, Engineering, or Technology. Candidates who do not fulfil the normal entry requirements but have extensive industrial experience in Civil and Structural Engineering are considered on an individual basis. Those applicants seeking to use this MSc, accredited by the JBM, as Further Learning to satisfy the educational base requirements for chartership must also be in possession of an appropriate UG accredited degree.

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>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>New approved curriculum, waivers</td>
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