UNIVERSITY OF BRADFORD
Faculty of Engineering and Informatics
School of Electrical Engineering and Computer Science
Programme title: MSc Electrical and Electronic Engineering

<table>
<thead>
<tr>
<th>Awarding and teaching institution:</th>
<th>University of Bradford</th>
</tr>
</thead>
<tbody>
<tr>
<td>Final award and interim awards:</td>
<td>MSc, Postgraduate Diploma (PgDip), Postgraduate Certificate (PgCert) [Framework for Higher Education Qualifications level 7]</td>
</tr>
<tr>
<td>Programme titles:</td>
<td>Electrical and Electronic Engineering (EEE) Non-accredited fall-back award: Engineering (Electronic)</td>
</tr>
<tr>
<td>Programme accredited by:</td>
<td>Institution of Engineering &amp; Technology (IET)</td>
</tr>
<tr>
<td>Relevant subject benchmark statement(s):</td>
<td>UK-Standards for Professional Engineering Competence (UK-SPEC)</td>
</tr>
<tr>
<td>Duration:</td>
<td>1 year full time, part-time route available</td>
</tr>
<tr>
<td>UCAS code:</td>
<td>N/A</td>
</tr>
<tr>
<td>Date produced:</td>
<td>25 July 2008</td>
</tr>
<tr>
<td>Last updated:</td>
<td>1 June 2015</td>
</tr>
</tbody>
</table>

Introduction

Engineering is fundamental to economic and social prosperity globally. It is a “people serving” profession whose activities not only manage humankind’s environment but also create that environment itself. Your studies at Bradford will be a foundation for life aimed at developing your knowledge in areas of advanced applied engineering and of improving your technical competence in their application using a wide range of personal and professional skills.

Taught postgraduate programmes cover a broad spectrum of specialist topics, leading to a variety of qualifications up to Master's degree. Typically, a taught Master's programme lasts for twelve months of full-time study. Two semesters of instruction are followed by a dissertation written over the summer. The January start variant of the EEE programme requires the bulk of the dissertation work to be carried out over the summer and completed during the final semester (semester 1). In addition the programme may be studied part-time (one or two days per week) over two or more years.

The primary purpose of this popular programme is to provide a flexible MSc programme with a few core modules and many option modules. The core modules consist of fundamentals, professional skills and project work. The option modules
give the ability to tailor the remainder of the programme with a series of modules in a variety of areas including telecommunications, electronics and signal processing. This programme builds on the strength of the School in electronics and telecommunications and is also available for January start.

**Teaching and Research**

The School places emphasis on both teaching and research, believing them to be mutually dependent. With reference to teaching and learning, the School aims to produce graduates who aspire to challenging careers in industry, commerce and the public sector or to developing their own enterprises in the potentially lucrative global electronic markets. Graduates 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 further study, or to move directly into responsible employment.
- Promoting educational opportunities for ethnic minority, mature and alternatively qualified students, as well as for traditionally qualified students.

**Programme Aims**

The programme is intended to develop your:

- **Knowledge and understanding** of specialist engineering and design skills required to enhance your professional Electrical and Electronic Engineering potential and to enable you to pursue a career grounded in the electrical and electronic engineering industries;
- **Personal transferable skills** to enable you to work co-operatively, constructively and effectively;
- **Competence**, when building on an accredited BEng degree, to provide the accredited further learning requirements (in compliance with UK-SPEC) to permit progression to Chartered Membership of the IET and registration with EC UK as a Chartered Engineer.
- **Reflective skills** to enable you to reflect on your own performance and the impact of your actions in order to manage your own professional development.

**Programme Learning Outcomes**

Learning outcomes indicate what a graduate should know and understand upon successful completion a programme.

When you have completed the programme you will be able to:

At Postgraduate Certificate (PgCert) Level:

L01. Integrate engineering understanding and apply insight to the solution of real problems.

L02. Identify and critically evaluate the key issues in your subject area.
L03. Effectively communicate complex ideas clearly, both orally and in writing to a broad range of recipients

L04. Demonstrate the independent learning ability required for continuing professional development.

At Postgraduate Diploma (PgDip) Level, all of the above and:

L05. Demonstrate a comprehensive understanding of advanced concepts, principles and theories underpinning electrical and electronic engineering.

L06. Apply engineering principles to the critical analysis of specialised problems in order to create innovative solutions to non-routine problems.

L07. Demonstrate in-depth knowledge of the principles and practice of advanced engineering design; planning and management in your selected specialist area.

L08. Identify an area for further detailed investigation, design and experimental programme, utilise research skills to critically evaluate and interpret newly developed data.

At MSc Level, all of the above and:

L09. Demonstrate an in-depth and rigorous understanding of the subject of your project.

L10. Demonstrate the organising and project management skills to manage a large, complex task.

L11. Ability to design; specify, plan, undertake and report an investigation and associated methodologies via exposure to research activities.

L12. Identify and collect relevant data, analyse them rigorously and communicate findings effectively.


Curriculum

The programme’s core modules must be studied. Optional modules are chosen were appropriate to make a total of 60 credits per semester. Those underlined represent the default programme if no option choice form is submitted. The 60 credit Dissertation is undertaken during the summer period.

Note: The maximum number of modules that can be taken at Level 6 is limited to 20 credits.

Note: Codes ending in L denote linked modules having 10 credits in each semester.

Postgraduate Certificate [FHEQ Level 7]

In order to qualify for PgCert in Electrical and Electronic Engineering, you must pass modules totalling 60 credits or more but less than 120 credits in Electrical and Electronic Engineering.
Postgraduate Diploma [FHEQ Level 7]

To be awarded PgDip in Electrical and Electronic Engineering you must pass modules totalling 120 credits in Electrical and Electronic Engineering.

<table>
<thead>
<tr>
<th>FHEQ Level</th>
<th>Module Title</th>
<th>Type</th>
<th>Credits</th>
<th>Semester(s)</th>
<th>Module Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Power Devices and Applications</td>
<td>Option</td>
<td>10</td>
<td>1</td>
<td>ENG3022M</td>
</tr>
<tr>
<td>6</td>
<td>Antennas and Mobile Propagation</td>
<td>Option</td>
<td>10</td>
<td>1</td>
<td>ENG3023M</td>
</tr>
<tr>
<td>6</td>
<td>Signals and Systems Theory</td>
<td>Core¹</td>
<td>10</td>
<td>1</td>
<td>ENG3067M</td>
</tr>
<tr>
<td>7</td>
<td>Digital Signal Processing</td>
<td>Option²</td>
<td>10</td>
<td>1</td>
<td>ENG4007M</td>
</tr>
<tr>
<td>7</td>
<td>Mobile Robotics &amp; Wireless Sensors</td>
<td>Option</td>
<td>20</td>
<td>1</td>
<td>ENG4051D</td>
</tr>
<tr>
<td>7</td>
<td>Cryptography and Network Security</td>
<td>Option</td>
<td>20</td>
<td>1</td>
<td>ENG4061D</td>
</tr>
<tr>
<td>7</td>
<td>Mobile Applications Technologies</td>
<td>Option</td>
<td>10</td>
<td>1</td>
<td>ENG4100M</td>
</tr>
<tr>
<td>7</td>
<td>Mobile &amp; Wireless Communications Networks</td>
<td>Option</td>
<td>10</td>
<td>1</td>
<td>ENG4109M</td>
</tr>
<tr>
<td>7</td>
<td>Control System Design</td>
<td>Option²</td>
<td>10+10</td>
<td>1&amp;2</td>
<td>ENG4049L</td>
</tr>
<tr>
<td>6</td>
<td>Advanced Mobile &amp; Satellite Communications</td>
<td>Option</td>
<td>10</td>
<td>2</td>
<td>ENG3026M</td>
</tr>
<tr>
<td>6</td>
<td>Digital Design using HDL</td>
<td>Option</td>
<td>10</td>
<td>2</td>
<td>ENG3051M</td>
</tr>
<tr>
<td>7</td>
<td>Digital Communication Principles</td>
<td>Option</td>
<td>10</td>
<td>2</td>
<td>ENG4006M</td>
</tr>
<tr>
<td>7</td>
<td>Terminal Technologies</td>
<td>Option</td>
<td>10</td>
<td>2</td>
<td>ENG4018M</td>
</tr>
<tr>
<td>7</td>
<td>Research Seminar Series</td>
<td>Core</td>
<td>10</td>
<td>2</td>
<td>ENG4019M</td>
</tr>
<tr>
<td>7</td>
<td>Sustainable Energy</td>
<td>Option</td>
<td>10</td>
<td>2</td>
<td>ENG4064M</td>
</tr>
<tr>
<td>7</td>
<td>Risk Management</td>
<td>Option</td>
<td>10</td>
<td>2</td>
<td>ENG4072M</td>
</tr>
<tr>
<td>7</td>
<td>Advanced Networking Protocols</td>
<td>Option</td>
<td>10</td>
<td>2</td>
<td>ENG4108M</td>
</tr>
<tr>
<td>7</td>
<td>Wireless Embedded Technology in Healthcare</td>
<td>Option</td>
<td>10</td>
<td>2</td>
<td>ENG4115M</td>
</tr>
<tr>
<td>7</td>
<td>Advanced Project Skills</td>
<td>Core</td>
<td>20</td>
<td>2</td>
<td>ENG4122D</td>
</tr>
</tbody>
</table>

* The modules in the table below are substitution modules. These are only available to students graduating from the University of Bradford (UoB) BEng programmes, where they have already studied the modules shown in the table above. The final selection of modules (i.e. programme) for a student would be made on an individual basis in consultation with the programme tutor. The superscript number indicates the default substitution.
Not available to January starters.

<table>
<thead>
<tr>
<th>FHEQ Level</th>
<th>Module Title</th>
<th>Type</th>
<th>Credits</th>
<th>Semester</th>
<th>Module Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Advanced Numerical Methods</td>
<td>Option</td>
<td>10</td>
<td>1</td>
<td>ENG4031M</td>
</tr>
<tr>
<td>6</td>
<td>Computer Applications of Numerical Methods</td>
<td>Option</td>
<td>10</td>
<td>1</td>
<td>ENG4037M</td>
</tr>
</tbody>
</table>

**Masters [FHEQ Level 7]**

To be awarded MSc in Electrical and Electronic Engineering you must pass modules totaling 180 credits, to include all the core modules in the table above and the module in the following table.

<table>
<thead>
<tr>
<th>FHEQ Level</th>
<th>Module Title</th>
<th>Type</th>
<th>Credits</th>
<th>Semester</th>
<th>Module Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Dissertation</td>
<td>Core</td>
<td>60</td>
<td>3</td>
<td>CM-0424Z</td>
</tr>
</tbody>
</table>

The curriculum may change, subject to the University's programme approval, monitoring and review procedures.

**Programme Routes**

**January Start programmes**

For the January start programme, the semester numbers correspond to the position in the academic year, not the order of which they are taken. So January-start students will take “Semester 2” modules first, followed by “Semester 1” modules.

**Part-time study**

All the programmes may be studied part-time (one or two days per week), over two or more years.
The curriculum may change, subject to the University’s programme approval, monitoring and review procedures

Teaching and Assessment Strategies

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 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 their MSc dissertations.

- The methods implemented in developing your practical skills include demonstrations and practicals linked with the taught modules. The MSc students will also design and operate equipment and use control and measuring instruments under supervision during the initial phase of their research project. You will operate analytical 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 & 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 you to develop and manage your learning. The University of Bradford modus operandi, Making Knowledge Work, is imbedded in the philosophy. 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

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/aqpo/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 (on one occasion only) 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.

Fall-back award MSc Engineering (Electronic) is available to students who do not meet the requirements for the accredited MSc awards specified in the University Regulations as modified by a waiver; there is no direct recruitment to this award.

**Admission Requirements**

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.

We are continually reviewing and developing our practices and policies to make the University more inclusive, but if you are disabled we may need to make some adjustments to make sure that you are not disadvantaged. We would advise you to contact the programme leader before you apply to discuss these.

All our PgDip and MSc programmes have similar entry conditions, the minimum requirement being a lower second-class Honours degree in Electrical/ Electronic/ Telecommunication Engineering. Equivalent qualifications (for example, from overseas) and applications from mature students with relevant experience will be considered on their individual merits.

If you have a degree or a Higher Diploma in an appropriate subject, or have considerable relevant experience, but are unable to meet the requirements for direct entry to an MSc programme, you may undertake a two/three year programme, as described below.

Applicants whose native language is not English will normally be expected to have passed an approved test in English, for example the International English Language Testing Service Test (IELTS) before admission.

**Two/Three Year MSc Programmes**

In exceptional circumstances, any of the taught postgraduate MSc programmes in Electronics and Telecommunications may be taken over a two/three year period. Applicants can be considered with sub-Honours degree qualifications in Electrical/ Electronics/Communications Engineering. They would normally complete the final year of the BEng EEE/ETIE, and have to obtain a good Honours classification to progress to the MSc. Applicants with non-degree qualifications in the aforementioned...
fields, would be considered on their merits. However, they would probably be required to do the second and final years of the BEng in order to progress to MSc.

Students will be allowed to progress to the second (or third) year of study if they satisfy the assessment requirements, specifically:

- Meet the normal undergraduate ‘Honours Route’ progression requirements i.e. 100 credits at 40% with 20 credits at 35%. (Supplementary work would be allowed in order to meet the above requirements).

Learning Resources

The JB Priestley Library on the city campus provides a wide range of printed and electronic resources to support your studies. We offer quiet study space if you want to work on your own, and group study areas for the times when you need to discuss work with fellow students. Subject librarians for each School provide training sessions and individual guidance in finding the information you need for your assignment, and will help you organise your references properly.

Student PC clusters can be found in both our libraries and elsewhere on the campus. Many of these are open 24/7. You can also use the University's wireless network to access the internet from your own laptop. Most of our journals are available online (both on and off campus), and you can also access your University email account, personal information and programme-related materials this way.

Staff are on hand during the daytime to help you if you get stuck, and there is a 24/7 IT helpline available.

The Faculty of Engineering and Informatics also provides a number of well-resourced computer suites with access to a wide range of specialist software tools as well as a large number of well-equipped, general and specialist laboratories for teaching and research supported by a team of helpful computer officers and technicians.

Student Support and Guidance

Programme Team

Support for you personally and in your programme of study, will be provided both by the University and the Programme Team. You will be provided with a comprehensive series of handbooks that you can consult on a range of learning issues and your programme tutors will be available to consult on subject specific queries.

Students' Union

We value the feedback provided by students and collaborate with the Students’ Union, through a system of student representatives and formal staff student liaison committees, so that any issues you wish to raise are addressed rapidly.

The Students’ Union provides professional academic representation and advice. The Students’ Union and the University of Bradford work in partnership to provide confidential counselling and welfare services where you can get help with any aspect of your personal or academic life. Student Financial and Information Services (part of the Hub) will provide you with information about a diverse range of issues such as
council tax, personal safety and tourist information. International Students can access a range of additional advice and support services through the Student’s Union.

**Employability and Career Development**

The University is committed to helping students develop and enhance their employability profile, commitment towards a career pathway(s) and to implementing a career plan.

Professional career guidance and development support is available throughout your time as a student and as a graduate from Career Development Services. The support available from Career Development Services includes a wide range of information resources, one to one appointments, a weekly workshop programme, a mentoring programme, graduate recruitment and careers fairs, plus information and help to you find part time work, summer work placements, internship programmes and graduate/postgraduate entry vacancies. In addition, some students will receive seminars and workshops delivered by Career Development Services as part of their programme of study. All students are encouraged to access Career Development Services at an early stage during their studies and to use the extensive resources available on their web site [www.careers.brad.ac.uk](http://www.careers.brad.ac.uk).

Career Development Services annually undertakes a survey of all postgraduates to find out their destination six months after graduation. The survey gathers data on the employment and further study routes graduates have entered and a range of other information including job roles, name and location of employers, salary details etc. The survey findings for each programme of study are presented on the programme information pages on the University website and via Career Development Services’ website [www.careers.brad.ac.uk](http://www.careers.brad.ac.uk).

All Electronics and Telecommunications MSc programmes are accredited by the Institution of Engineering and Technology (IET) as providing a programme of further learning, which, when taken together with an accredited first degree, provide the full academic requirements for professional registration as a Chartered Engineer.

For further information, visit: [http://www.theiet.org/membership/profreg/ceng/requirements/](http://www.theiet.org/membership/profreg/ceng/requirements/)

This means that your MSc degree provides evidence of meeting requirements of professional engineering competence outlined in the UK Standards for Professional Engineering Competence (UK-SPEC), which have employability at their heart.

[http://www.engc.org.uk/professional-registration/standards/uk-spec](http://www.engc.org.uk/professional-registration/standards/uk-spec)

Because the programmes are accredited by the Engineering Council, UK through the IET, the awards are widely recognised around the world under the Washington Accord, EUR-ACE.

Students are encouraged to become student members of IET, their professional institution and to pursue professional registration. Student membership confers a number of benefits that enhance prospects for employability, including access to local associations around the world, job websites and mentoring schemes.
Academic Skills Advice

For postgraduate students on taught programmes who are looking to improve their marks during their time at university, study skills and maths advice is available to all regardless of degree discipline. Students can access a programme of interactive workshops and clinics which is delivered throughout the year. This is in addition to our extremely popular face-to-face guidance from Academic Skills Advisers, who also offer a wide range of online and paper based materials for self-study.

Disability

Disabled students will find a supportive environment at Bradford where we are committed to ensuring that all aspects of student life are accessible to everyone. The Disability Service can help by providing support, advice and equipment to help you get the most out of your time at Bradford. It is a place where you can discuss any concerns you may have about adjustments that you may need, whether these relate to study, personal care or other issues.

For more information contact the Disability Service by phoning: 01274 233739 or via email: disabilities@bradford.ac.uk

University policies and initiatives

Ecoversity

Ecoversity is a strategic project of the University which aims to embed the principles of sustainable development into our decision-making, learning and teaching, research activities campus operations and lives of our staff and students. We do not claim to be a beacon for sustainable development but we aspire to become a leading University in this area. The facilities we create for teaching and learning, including teaching spaces, laboratories, IT labs and social spaces, will increasingly reflect our commitments to sustainable development. Staff and student participation in this initiative is crucial to its success and its inclusion in the programme specification is a clear signal that it is at the forefront of our thinking in programme development, delivery, monitoring and review.

For more details see www.bradford.ac.uk/ecoversity/

Further Information:

For further information, please check the University prospectus or contact Admissions.

The Admissions Office
The University of Bradford
Richmond Road
Bradford, BD7 1DP, UK
+44 (0)1274 233054
http://www.brad.ac.uk/programmes/

The Admissions Office
Faculty of Engineering and Informatics
The University of Bradford
Richmond Road
Bradford, BD7 1DP, UK
+44 (0)1274 234543
http://www.bradford.ac.uk/postgraduate/programmes/edt/engineering-electronics-and-telecommunications/
The contents of this programme specification may change, subject to the University's regulations and programme approval, enhancement and review procedures.