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

| Awarding and teaching institution: | University of Bradford |
| Final and interim awards:          | Master of Science (MSc) |
|                                   | Postgraduate Diploma (PG Dip) |
|                                   | Postgraduate Certificate (PG Cert) |
|                                   | [Framework for Higher Education Qualifications Level 7] |
| Programme title:                  | Computing |
| Programme approved/accredited by: | British Computer Society |
| Duration:                         | 1 year full-time, 2 years part-time |
| Subject benchmark statement:      | Computing |
| Date produced:                   | April 2003 |
| Last updated:                    | June 2014 |

Introduction

Computing is a subject that has experienced a tremendous increase in popularity in recent years. It is a subject that infiltrates almost all areas of modern-day life and, in many cases, actually underpins them. The micro-chips in our domestic devices; shopping and banking on-line from the comforts of home; electronic mail and the Internet; the mobile phone: No home or business can now function in the modern-day competitive world without computers which, in turn, are dependent on software that drives them. Computer hardware and software and their applications are a subject collectively known as “Computing” and are the subject area of the MSc Computing degree programme offered by the School of Electrical Engineering and Computer Science (SEECS), in the Faculty of Engineering and Informatics, University of Bradford. The rapid growth of computer related applications has resulted in a tremendous demand for highly trained graduates in Computing in all sectors of business, whether industrial, commercial, retail, leisure, catering or transport. However, there are many graduates who have some knowledge of Computing, but who have majored in some other area; for example, engineering graduates or Mathematicians. The programme caters for graduates of this type who might wish to obtain a good Computing qualification and expand and possibly re-orient their skills and in the process greatly extend their choice of career options to the vast application areas of Computing.

Academically, Computing is concerned with the understanding, design and exploitation of computation and computer technology. The School of Electrical Engineering and
Computer Science (SEECS) offers a number of undergraduate and postgraduate programmes covering this hugely diverse subject area. The portfolio of postgraduate programmes currently covers Computing, Software Engineering and Networks and Performance Engineering or Mobile Computing.

The School places great emphasis on both teaching and research and there are opportunities for students to join one of the research teams and progress to MPhil and PhD qualifications on successful completion of an MSc. Employment prospects for students having a postgraduate qualification in any computing related discipline are excellent.

Computing concentrates on the basic principles of computation and computer technology. It incorporates ideas from many other disciplines, including mathematics, engineering, psychology and graphical design and has a close affinity with electronic communications as illustrated by the Internet and World Wide Web. The term ‘convergence’ is often used to describe how these two disciplines are coming together.

**Programme Aims**

The aim of the programme is to provide you with a sound grounding in the fundamentals of computer software development (programming) and the tools and applications that modern computing professionals use. This aim will be achieved by:

- Providing you with a core of fundamental modules in semester 1 and allowing some degree of specialization in semester 2 by allowing subjects to be chosen from a limited number of options. An individual project of duration three months follows semester 2 which allows you to apply the techniques and disciplines that you have learned within a more practical context. You then submit a Dissertation based on this.

- Providing the support in the form of lectures, labs and tutorials that will enable you to develop your personal portfolio of skills. The School of Electrical Engineering and Computer Science is committed to providing a very high standard of up-to-date computing facilities to support the practical hardware and programming requirements of the programmes.

- Developing discipline skills and personal transferable skills so that on graduation you may move directly into responsible positions in industry or commerce, or may pursue further programmes of study.

- Promoting educational opportunities for ethnic minorities, women, mature and alternatively qualified students, as well as for school-leavers and traditionally qualified students.

**Programme Learning Outcomes**
On completion of this award you will be able to:

At PG Certificate and PG Diploma level:

LO1. Demonstrate an advanced understanding of some of the theories, principles and techniques of computing;
LO2. Apply statistical data analysis, statistical learning methods and data analytics techniques to information to generate and test hypotheses;
LO3. Select, adapt and apply project management skills to software and hardware projects;
LO4. Critically analyse and evaluate database technology and apply it to specific situations;
LO5. Identify and select underlying technical concepts of formal methods in software engineering, computer engineering and delivery of systems and apply them to practical prototype systems;
LO6. Deploy advanced level programming skills;
LO7. Explain and relate concepts and be able to apply appropriate practical techniques in the area of human-computer interaction;
LO8. Critically examine and appreciate review a range of AI approaches and their application to designing computerised game opponents;
LO9. Demonstrate an advanced understanding of, and ability to apply, concepts, principles and theories underpinning web technology and web production to differing situations;
LO10. Demonstrate a critical awareness of current and possible future opportunities and problems in computing; evaluating current developments and trends;
LO11. Demonstrate the ability to critically, apply data mining techniques;
LO12. Critically evaluate software and technology and apply it to specific situations;

At MSc level all the above and including:

LO13. 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.

Computing is a subject where current practices in the field are changing rapidly as technologies evolve and new programming languages emerge. However the underlying theory and principles do not change rapidly. You will study these fundamentals and learn how to apply them to the analysis of problems and how to plan, implement and evaluate the solutions. You will learn about new technologies and languages required to implement solutions.
In order to achieve the learning outcomes you will develop the following:

**Knowledge and understanding:** You will develop mastery of the fundamental concepts and theories of computer science including the concepts of hardware, computer architecture, information and communication technologies. You will have a working knowledge of the mathematical foundations of computing and how they underpin the formal specification and modelling of computer systems and will be able to communicate that knowledge to your peers.

**Discipline Specific Skills:** Creative and systematic problem solving. Ability to analyse problems and develop creative solutions; ability to develop computer programs using object oriented programming languages; ability to develop applications for the World Wide Web and to choose appropriate programming languages for specific applications; ability to manage and/or contribute to a team approach to software engineering projects.

**Personal and Transferable Skills:** Skills required for employment in information management, interpretation and presentation, information technology and communications skills; report writing and presentation skills; teamwork and leadership; project management; and personal time management skills.

**The Curriculum**

Typically for a taught Masters programme, the programme lasts for 12 months of full-time study (two semesters of instruction through a series of modules all of which are integrated to form a complete and coherent programme of study, followed by completion of a major dissertation project in the summer) or 24 months of part-time study following a similar pattern.

The MSc Computing covers a range of specialist topics, leading to the qualification of a Master's degree. The programme has two stages: the taught programmes stage which takes place during the first two semesters (or four semesters for the part-time route), and the project/dissertation stage. The taught programmes stage is organised on a modular basis. Students proceeding onto the Masters level undertake a project which the student has to agree with the School during the first taught semesters.

The map of your studies is detailed below showing core(C) and optional (O) modules. In each of semester 1 and semester 2 modules accounting for 60 credits are studied in the full-time version. A maximum of 20 level 6 credits is permitted overall. For each module, all of the teaching and assessment is undertaken in the same semester. From the end of semester 2, which is around the middle of June, project work lasting for three months is undertaken. This accounts for a further 60 credits in the assessment. The project is assessed by means of a viva voce examination and a dissertation which is submitted at the end of the summer period.
Masters [Level 7]

<table>
<thead>
<tr>
<th>Module Code</th>
<th>Credit</th>
<th>Sem</th>
<th>Level</th>
<th>Module Title</th>
<th>Core/Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>CM1003D</td>
<td>20</td>
<td>1</td>
<td>7</td>
<td>Software Development (PG)</td>
<td>C</td>
</tr>
<tr>
<td>CM1037D</td>
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<td>7</td>
<td>Formal Foundations (PG)</td>
<td>C</td>
</tr>
<tr>
<td>CM1035M</td>
<td>10</td>
<td>1</td>
<td>7</td>
<td>Computer Architecture and Systems</td>
<td>C</td>
</tr>
<tr>
<td>CM1039M*</td>
<td>10</td>
<td>1</td>
<td>7</td>
<td>Human Issues in Computing</td>
<td>C</td>
</tr>
<tr>
<td>CM1038D</td>
<td>20</td>
<td>2</td>
<td>7</td>
<td>Group Project</td>
<td>C</td>
</tr>
<tr>
<td>CM1006D</td>
<td>20</td>
<td>2</td>
<td>7</td>
<td>Database Systems (PG)</td>
<td>O</td>
</tr>
<tr>
<td>CM1010D</td>
<td>20</td>
<td>2</td>
<td>7</td>
<td>Software Engineering</td>
<td>O</td>
</tr>
<tr>
<td>CM0328D</td>
<td>20</td>
<td>2</td>
<td>6</td>
<td>AI for Games</td>
<td>O</td>
</tr>
<tr>
<td>CM1044D</td>
<td>20</td>
<td>2</td>
<td>7</td>
<td>AI with Applications **</td>
<td>O</td>
</tr>
<tr>
<td>CM1045D</td>
<td>20</td>
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<td>7</td>
<td>Web Technologies</td>
<td>O</td>
</tr>
<tr>
<td>CM1009D</td>
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<td>2</td>
<td>7</td>
<td>Real Time Systems (PG)</td>
<td>O</td>
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<tr>
<td>CM0428D</td>
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<td>7</td>
<td>Statistical Data Analysis</td>
<td>O</td>
</tr>
<tr>
<td>CM1072D</td>
<td>20</td>
<td>2</td>
<td>7</td>
<td>Data Mining **</td>
<td>O</td>
</tr>
<tr>
<td>CM0424Z</td>
<td>60</td>
<td>DISS</td>
<td>7</td>
<td>Dissertation</td>
<td>C</td>
</tr>
</tbody>
</table>

* With effect from 2013/2014 this core module will be substituted with EM4001M Design for Human Computer Interaction until further notification.

Students could choose EITHER ‘AI with Applications’ ** OR ‘Data Mining’ *** but NOT BOTH.

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

Assessment Regulations
This Programme conforms to the standard University Assessment Regulations for Postgraduate Programmes which are available at the following link: [http://www.bradford.ac.uk/aqpo/ordinances-and-regulations/](http://www.bradford.ac.uk/aqpo/ordinances-and-regulations/)

Teaching and Assessment Strategies
You will experience a wide range of teaching and learning environments. Concepts, principles and theories are generally explored in formal lectures, practiced in associated tutorials and seminars, and demonstrated in laboratory classes. Practical skills are developed in laboratory sessions and professional and personal skills are implicitly developed through the programme in both group work and presentations. The Group Project develops an appreciation of how to manage group dynamics while working on a substantial software engineering exercise. The individual project (Dissertation) brings various aspects of your programme together.
Each 10-credit module on the programme requires you to commit 100 hours of study or 200 hours of study for a 20 credit module. Some of these hours will be formally timetabled - lectures, laboratories, seminars and tutorials – and others will involve you in carrying out private study.

Methods of assessment are similarly varied and your progress will be assessed using a mix of formal examinations, presentations, reports, laboratory tests, essays, coursework assignments, and projects. The appropriate method is chosen so that you may demonstrate the particular learning outcomes of each module.

Admissions 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.

The procedures, criteria and regulations for admission to these programmes of study operate within the parameters defined by the University’s Ordinance for Postgraduate Programmes. However, with respect to the proposed programmes, we specifically require that:

- All applicants should hold at least a British second-class Honours degree or equivalent qualification in any discipline from an approved degree-awarding body. You are not expected to have previous computer programming experience, but those that do, will benefit considerably. Applicants with lesser qualifications, but with a minimum of 5 years substantial work experience in computing, will also be considered. This programme is not suitable for those already well qualified for computing but some basic computer literacy and mathematical/technical background is expected.

- International applicants for whom English is not their first language will be expected to provide proof of passing an approved test in English Language. If IELTS, a score of at least Band 6.0 is required. If TOEFL, a score of at least 88 in the IT-based test is required.
N.B. This MSc is not targeted at graduates from specialist Computing undergraduate programmes.

Learning Resources

The JB Priestley Library on the city campus and our specialist library in the School of Management provide 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.

Student Support and Guidance

Students admitted to the programme will have the School of Electrical Engineering and Computer Science (SEECS) as their “home” school. As such, you will go through a process of induction within Computing discipline and SEECS. Afterwards, ongoing support is provided in the form of one-stop facilities located at the SEECS Student Support Office (SSO) in Horton Building, open throughout the day during term, and in the mornings and afternoons outside term. Support for registered students also is provided 24/7 via the intranets of the School of Electrical Engineering and Computer Science, and the School's Technical Support. The School also uses the University’s Virtual Learning Environment (VLE) to support students via their individual modules.

All students on our MSc Computing will be allocated a Personal Tutor who provides support and guidance on matters relating to learning, teaching, and academic progress. There are tutors in the School who have specialist responsibilities, and are able to deal with specific issues relating to factors such as disability, equal opportunities and gender.

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 allocated a personal tutor who is someone with whom you will be able to talk about any academic or personal concerns. The School will ensure that there is someone available with whom you feel comfortable
to help and support you. 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.

In SEECS programme tutors currently act as personal tutors for individual students.

**Students’ Union**

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

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.

**The Hub, Student Support Centre**

The Hub, Student Support Centre provides a central reception where students can receive information, advice and guidance on a whole range of topics about their life at University. The Hub is located in the Richmond Building adjacent to the Atrium.

The teams located within The Hub:

- Accommodation
- Admissions
  - Education Liaison
  - Enquiries
- Student Administration and Support
  - Bursaries and Financial Support
  - Finance and Credit Control Group
  - Payzone
  - Records and Tuition Fees
- International Office
- Customer Service Team

[www.brad.ac.uk/hub](http://www.brad.ac.uk/hub)
+44 1274 232233

**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.

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.

The specific provision on this programme is designed to enable graduates to work in the fields of: film production; TV production (where applicable); training and teaching production.

Learner Development Unit for 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 our advisers, who also offer a wide range of online and paper based materials for self-study.

http://www.bradford.ac.uk/academic-skills/index.php

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 equipment and advice to help you get the most out of your time at Bradford and 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/courses/

The Recruitment and Marketing Office
Faculty of Engineering and Informatics
The University of Bradford
Horton Building, Richmond Road
Bradford, BD7 1DP, UK
+44 (0)1274 234286
masters@scim.brad.ac.uk
http://www.bradford.ac.uk/ei/electrical-engineering-and-computer-science/about/computing/courses/
http://www.brad.ac.uk/university/pgpros/informatics-apply.php

Disclaimer

The contents of this programme specification may change, subject to the University's regulations and programme approval, monitoring and review procedures.