

<b>1. Course Codes</b> F2Z7-ARI F2Z5-ARI F2Z0-ARI	<b>2. Course Title</b> Artificial Intelligence	<b>3. School/Institute</b> Mathematical & Computer Sciences	<b>4. Type</b>	<b>5. Awards</b> MSc, PG Diploma, PG Certificate
<b>6. Course Accredited by</b>		<b>7. QAA Subject Benchmarking Group(s)</b> Computing		<b>8. Date of Production/Revision</b> 30 November 2007/version 1

9. Composition	10. Arrangement of Modules						11. Awards, Credits & Level
	Mandatory and Optional Modules						
9 modules (including a project/dissertation)  7 taught modules (4 mandatory & 3 optional)	Semester 1		Starting From Semester 2		Starting From Semester 2/3		180 SCQF credits for MSc; incl at least 150 credits at Level 11  120 SCQF credits for PG Dip; incl at least 90 credits at Level 11  60 SCQF credits for PG Cert; incl at least 40 credits at Level 11
	Module Code & Title	Effort Hours	Module Code & Title	Effort Hours	Module Code & Title	Effort Hours	
	F21RP Research Methods and Project Planning (M)	150	F21PE Project Requirements Analysis & Design (M)	150	F21MP MSc Project & Dissertation (M)	600	
	F21DL Data Mining & Machine Learning (M)	150	F21WI Web intelligence (M)	150			
	F21SF Software Engineering Foundations (O)	150	F21BC Biologically Inspired Computation (M)	150			
	F29AI Artificial Intelligence & Intelligent Agents (O)	150	F21VE Virtual Environments (O)	150			
	F21MA 3D Modelling & Animation (O)	150	F21GP Computer Games Programming (O)	150			
	F21AU Automated Software Engineering (O)	150	F21SM Software Engineering Masterclass (O)	150			

<b>12. Mode and Location of Study</b>		<b>13. Duration of Study (months)</b>																											
Full-time <input checked="" type="checkbox"/> Part-time <input type="checkbox"/> Home Campus <input checked="" type="checkbox"/> Other Campus <input type="checkbox"/> (specify) ..... Collaborative Partner <input type="checkbox"/> Approved Learning Partner <input type="checkbox"/>		<table border="1"> <thead> <tr> <th rowspan="2"></th> <th colspan="2">Standard</th> <th colspan="2">Maximum</th> </tr> <tr> <th>Full-time</th> <th>Part-time</th> <th>Full-time</th> <th>Part-time</th> </tr> </thead> <tbody> <tr> <td>Masters</td> <td>12</td> <td>24</td> <td>24</td> <td>84</td> </tr> <tr> <td>Diploma</td> <td>9</td> <td>21</td> <td>21</td> <td>48</td> </tr> <tr> <td>Certificate</td> <td>9</td> <td>21</td> <td>21</td> <td>48</td> </tr> </tbody> </table>					Standard		Maximum		Full-time	Part-time	Full-time	Part-time	Masters	12	24	24	84	Diploma	9	21	21	48	Certificate	9	21	21	48
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<b>14. Mode of Delivery</b>																													
Conventional <input checked="" type="checkbox"/> Blended <input type="checkbox"/> Independent <input type="checkbox"/>																													

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<b>15. Level of Modules</b>  Level 11 <input type="checkbox"/> Levels 7-10 (UG) <input type="checkbox"/> Mixed <input checked="" type="checkbox"/>  Modules not at Level 11 (codes): Artificial Intelligence & Intelligent Agents			<b>16. Collaborative/Approved Learning Partner Course</b> ( <i>Please specify details of partner institutions</i> )	

**Course Notes**

<b>1. Nominal Pass Mark/Grade</b>  <ul style="list-style-type: none"> <li>Masters: 50%</li> <li>Diploma: 40%</li> <li>Certificate: 40%</li> </ul>	<b>2. Summary of Assessment Methods</b>  Modules on the course may be assessed by coursework only, or by a mixture of coursework and examination. <ul style="list-style-type: none"> <li>For modules assessed by an examination, an explicit summative assessment is held at the end of the relevant Semester. This is weighted with any coursework mark (typically 80%-20%) to provide a final module mark. There is a nominal pass mark on a module basis. However, assessment marks are averaged for progression purposes.</li> <li>For modules assessed by coursework only (including the project modules), summative assessment within and at the end of the module will provide a mark and grade.</li> </ul>			
<b>3. Re-assessment Opportunities</b> Students are offered standard reassessment opportunities in a maximum of three modules where they have achieved a grade of less than D. This reassessment will take place at the next opportunity. The Exam Board may, in exceptional circumstances, choose to offer a student an opportunity to retake some or all of their assessments as first opportunities at the next opportunity.				
<b>4. Award Criteria</b>				
	Number of Module Passes	Overall Mark/Grade	Basis of Overall Mark/Grade	Other Requirements
• Master (Distinction):	9	70%	70% required both in taught modules (average) and in dissertation. Research Methods is treated as a taught module, while Semester2 Project mark is averaged in with dissertation (see attached)	
• Master:	9	50%	50% required in taught and dissertation, allowing 5% compensation between these.	
• Diploma (Distinction):	8	70%	70% average across all modules.	
• Diploma:	8	40%	40% average across all modules.	
• Certificate:	4	40%	40% average across all modules	

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**5. Module Choice/Dissertation**

Students must take the 5 mandatory modules in Semester 1 and Semester 2 (including a Semester 1 module on Research Methods, and a Semester 2 preliminary project module). They must also select 3 from the available optional modules, 2 in Semester 1 and 1 in Semester 2. This selection is made at the beginning of the relevant term with the possibility of changing the selection supported for a two-week period.

The Masters dissertation counts as 750 effort hours, starting in Semester 2 (1 module (150 effort hours)), and continuing into Semester 3 (4 modules (600 effort hours)). Students may only progress if they have met the progression requirements (taught module average of 45% or better). Students select a dissertation title at the end of Semester 1, either internally from a list generated by the academic staff, by personally generating a topic and agreeing this with an academic supervisor, or externally with an industrial placement agreed with their Course Director. Detailed guidelines on the conduct of the project and the production of the dissertation project are provided to the student, together with guidance on the level of support that they can expect to receive from their academic supervisor. Dissertation marks are awarded with 70% of the marks coming from the dissertation itself, 20% from the deliverable from the Semester 2 project module, and 10% of the marks coming from a poster presentation and demonstration of the work.

Dissertation marking is a two phase process – the academic supervisor provides a mark based predominantly on the project, in terms of technical quality, level of work undertaken, level of independence and responsibility of the student, with 25% of the marks being based on the quality of the dissertation document – the second reader concentrates primarily on the dissertation document, quality, style, accuracy, honesty, completeness, academic rigour, referencing, etc., with 25% of their marks being assigned to the technical quality of the project and level of work undertaken, as evidenced from the document. Once these marks have been produced, if they are within an acceptable range of one another (that range being determined by the Postgraduate Board of Studies and agreed with the External Examiner) then the marks are averaged to produce a single dissertation mark.

If the marks difference is outwith the range specified, and the academic markers state there is not enough flexibility in their marks to overcome this problem, or the mark thus generated would affect the level of award achieved by the student, then a third reader will be introduced. The third reader marks to the same criteria as the second reader, as the dissertation document is regarded as the major academic instrument of record, and the mark produced by the third reader will be averaged with the original marks to produce the single dissertation mark. In all situations where a third reader is introduced the details of the marking process will be presented to the External Examiner at the Exam Board and, especially where the level of award for the student is affected, the External Examiner will be given the opportunity to review the dissertation document and comment specifically on the marking process and the appropriateness of the outcome.

**6. Additional Information**

All additional information relating to the course can be found in the School Postgraduate Handbook and the Course handbook, both of which are available to students online through Information for Current Postgraduate students on the Computer Science website.

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#### 10. Educational Aims of the Course

As part of the Computer Science Postgraduate Taught Programme, the aims of this course reflect the aims of the programme as a whole (see the CS PGT Programme Proposal for more details). The aim of this MSc course is to impart the skills and understanding required to develop intelligent software applications especially those involving evolutionary computation and learning. Students will acquire critical skills and knowledge in Data Mining and Machine Learning, Biologically Inspired Computation, as well as applicable skills concerning applications of Artificial Intelligence to the world wide web and (optionally) computer games.

Therefore the aims are to enable the students to:

- ◆ Develop detailed knowledge and critical understanding of the main areas of artificial intelligence (including theories, principles and concepts).
- ◆ Develop and use a significant range of principal and specialist skills, techniques and practices in the domain.
- ◆ Critically review existing practice and develop original and creative solutions to problems within the domain.
- ◆ Communicate and work effectively with peers and academic staff in a variety of tasks, demonstrating appropriate levels of autonomy and responsibility.
- ◆ Plan and execute a significant project of research, investigation or development in a specialist area within artificial intelligence, demonstrating extensive, detailed and critical understanding of that specialism.

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**11. The Course provides opportunities for learners to achieve the following outcomes:**

<b>Subject Mastery</b>	<p><i>Understanding, Knowledge and Cognitive Skills</i></p> <ul style="list-style-type: none"> <li>◆ Critical understanding of the principal theories, principles and concepts relating to the domain of artificial intelligence.</li> <li>◆ Extensive, detailed and critical understanding of at least one specialist area within the domain of artificial intelligence.</li> <li>◆ Understanding and use of a significant range of the principal skills, techniques and practices in artificial intelligence, and a range of specialised skills, research and investigation techniques, and practices informed by leading-edge research within the domain.</li> <li>◆ A broad knowledge of the main areas of artificial intelligence, including terminology, conventions, underpinning theory, techniques and practices.</li> <li>◆ Application-based knowledge and skills relating to the broad range of activities within the domain, and specialist knowledge and skills in applications relating to a number of specialist areas within the domain.</li> <li>◆ Extensive and detailed knowledge of theories and algorithms relating to artificial intelligence, with specialist applicative skills appropriate to the subdisciplines.</li> <li>◆ Extensive and detailed knowledge and understanding of technologies relating to artificial intelligence, and their application, including the ability to critically analyse and review such technologies to support original and creative application development.</li> <li>◆ Specialist and critical knowledge, understanding and skills in a number of mainstream and specialist areas within the domain of artificial intelligence, including machine learning, web intelligence and biologically inspired models of computation.</li> <li>◆ Develop and apply skills in critical analysis, evaluation and synthesis in consideration of the range of theories, concepts and techniques in use within the domain of artificial intelligence, and in the design of projects and experimental models.</li> <li>◆ Develop and utilise advanced problem-solving skills and techniques in the development of original and creative solutions to general and specialist issues within the domain.</li> </ul>
	<p><i>Scholarship, Enquiry and Research</i></p> <ul style="list-style-type: none"> <li>◆ Research skills, and the capability of critical analysis, through review and analysis of current research literature.</li> <li>◆ An understanding of research ethics, and how to appropriately build on the work of others.</li> </ul>

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<b>Personal Abilities</b>	<i>Industrial, Commercial and Professional Practice</i>
	<ul style="list-style-type: none"> <li>◆ Demonstrate critical awareness of current legal, social, ethical and professional issues within the discipline.</li> <li>◆ Make informed judgements with incomplete or inconsistent data, or where there are no professional or ethical codes or practices for guidance.</li> </ul>
	<i>Autonomy, Accountability and Working with Others</i>
	<ul style="list-style-type: none"> <li>◆ Work autonomously and within teams, as appropriate, demonstrating a capability for both taking and critically reflecting on roles and responsibilities.</li> </ul>
	<i>Communication, Numeracy and ICT</i>
	<ul style="list-style-type: none"> <li>◆ Develop and demonstrate skills and techniques in communication with peers and academic/industrial staff, using a range of appropriate methods to suit different levels of knowledge and expertise within the audience.</li> <li>◆ Develop and demonstrate critical knowledge and skills in the planning and usage of software tools and numerical techniques to develop, present and communicate information on projects and processes.</li> </ul>

#### 12. Approaches to Teaching and Learning:

This course is offered in a traditional campus-based, cohort model, with a timetable devised to support full-time study. Within the timetable, modules offer traditional lecture-based materials, small group tutorials and a variety of laboratory-based practicals. Students are expected to complete coursework in groups, teams and pairs, as well as individually, and modules offer a range of types of coursework for assessment, from discursive essay-style assignments to code design and generation. In some modules, team teaching approaches are adopted to provide additional support and variety, and electronic support, in the form of email lists, newsgroups and bulletin boards are widely used to disseminate information and support student communication and practice.

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### 13. Assessment Policies:

Postgraduate courses consist of two phases:

- ◆ A *taught phase*, consisting of a set of 7 taught modules, some mandatory and some optional, defined in the course structure, of which the students will normally study seven over two semesters. Assessment of the taught phase is through a variety of methods including coursework and/or examination, students must submit all elements of assessment before being permitted to progress.
- ◆ A *dissertation phase*, consisting of three stages: a preliminary project module during semester 2, an appropriate technical research project and project dissertation report, and a poster and demonstration-based presentation
- ◆ Students will normally complete the taught phase and the first stage of the dissertation phase, at which point progression to the last two stages of the dissertation phase is dependent on assessed performance. To progress students must meet the criteria stipulated in point 9 below in the taught material and achieve at least a grade D in the first phase of the project.
- ◆ Students meeting the required standards for Masters in the taught phase (set out in point 9 below) will be permitted to progress to the final two stages of the dissertation phase.
- ◆ Students meeting the required standards for Postgraduate Diploma and Postgraduate Certificate (set out in point 9 below) in the taught phase, but not meeting the Masters standard, will not be permitted to progress to the final two stages of the dissertation phase. Subject to performance in the first stage of the dissertation phase, students may be recommended to graduate with a Postgraduate Diploma or a Postgraduate Certificate at this point.
- ◆ Students failing to meet the required standards for Postgraduate Diploma and Postgraduate Certificate (set out in point 9 below) in coursework and examination in the taught phase will not be permitted to progress to the final two stages of the dissertation phase, nor will they be eligible for any award.
- ◆ Any student will be able to retake the assessment of up to a maximum of 3 modules at the next opportunity, subject to payment of the appropriate fees to the University, and may be required to do so to obtain the necessary credits for completion of their course or for progression. Students may only resit modules for which their examination grade is E or F. The method of reassessment for each module is specified in the appropriate module descriptor.
- ◆ In any circumstance which it deems to be exceptional the Exam Board has the discretion to permit student progress or award, irrespective of student performance against required standards and policies.

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1. To obtain an MSc Degree, candidates must gain 180 credits and must satisfy the examiners by achieving the required standards (set out in point 9 below) in two components:
  - Assessed taught material
  - A Dissertation comprising three stages (set out in point 9 below)
2. To obtain a Postgraduate Diploma candidates must gain 120 credits and must satisfy the examiners by achieving the required standards (set out in point 9 below) in two components:
  - Assessed taught material
  - The first stage of the Dissertation(set out in point 9 below)
3. To obtain a Postgraduate Certificate candidates must gain 60 credits and must satisfy the examiners by achieving the required standards (set out in point 9 below) in one component:
  - Assessed taught material
  - The Examiners may specify certain modules as mandatory to achieve the award of Postgraduate Certificate, to properly reflect the nature of the course.
4. Taught modules will be assessed by a variety of techniques appropriate to the learning outcomes of the specific module. Where a module is assessed by more than one component (for example examination and coursework or more than one item of coursework) students must complete each element of the assessment to a satisfactory level (Grade E or higher) to be permitted to proceed.
5. All course work must be submitted before the due date. Late submissions will only be accepted with the prior permission of the Course Director.
6. In exceptional personal or medical circumstances students may be granted leave by the examiners to resit part or all of the assessment on one occasion only and at a date decided by the examiners, as stated in university regulations 4 and 5. This provision is in addition to the provision that students may retake assessment for modules in which they have achieved a grade less than D.
7. Dissertations must be submitted on or before the publicised submission date; dissertations submitted after that date and without the prior consent of the Course Director may be assessed at a penalty.
8. Allowance for poor performance in or non-submission of a component on medical grounds is normally made only where supported by written testimony from a professional health practitioner. Such testimony must be lodged with the Course Director prior to the Examination Board meeting.
9. The level of achievement expected in each component is an average of:
  - 40% for the Postgraduate Diploma and Certificate
  - 50% for the MSc Degree
  - Candidates displaying exceptional merit by obtaining an average of 70% or more in each component may be recommended for the award of MSc with Distinction, the award being subject to the discretion of the Exam Board.

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**Required Standards:**

Candidates must achieve the following minimum levels of performance in :

*Assessed Taught Material*

- An average across the 7 modules of 50% or better for Masters, with no module returning a result of less than E
- An average across the 7 modules of 40% or better for Postgraduate Diploma (120 credits) or Certificate (60 credits), with no module returning a result of less than E
- All elements of assessment for each module must be completed to a satisfactory level (Grade E)
- Performance in the assessed taught material may be compensated for Masters, within a 5% range, at the discretion of the Exam Board, by dissertation performance

*Dissertation*

- An average of 50% or better for Masters
- Dissertation performance may be compensated for Masters, within a 5% range, at the discretion of the Exam Board, by performance in the assessed taught material
- The Dissertation is conducted in three stages, these being:
  - Stage 1: Project Phase 1, assessed through a portfolio of work (20%)
  - Stage 2: Project Phase 2, written up in a dissertation report (70%)
  - Stage 3: A Poster presentation and demonstration of the project work and results (10%)