PROGRAMME DETAILS
Programme Code: F2D4-TDS
Department: Computer Science
Main Award: MSC - Master of Science
Full Award Title: Master of Science in Data Science
Level: Postgraduate Taught

LOCATION OF STUDY
Edinburgh Y Scottish Borders N Orkney N
Dubai N Malaysia N Approved Learning Partner N
Independent Distance Learners N Collaborative Learning Partner N Other N

ASSOCIATED AWARDS
Programme Code Award Title
F2A3-ZZZ PGCERT Postgraduate Certificate in Computer Science
F2D2-DSC PGDIP Postgraduate Diploma in Data Science
F2D4-TDS MSC MSc Data Science (2 Years)

ACCREDITATION
The one-year Edinburgh campus offering of this MSc programme was accredited by the Chartered Institute of IT (BCS) in 2015 and we shall seek accreditation for the two-year MSc when the BCS next visit us in 2020 as part of their 5 year cycle of visits.

LEARNING OUTCOMES – SUBJECT MASTERY
Understanding, Knowledge and Cognitive Skills

On completion of the programme, students will be able to demonstrate:

Stage 1

• Extensive and detailed knowledge, and critical understanding, of central areas of advanced undergraduate computing, including computer programming and software engineering, data management, AI and intelligent agents, and web-based applications.
• Extensive and detailed knowledge of the principles of Research Preparation: exploring their research community, adopting a critical perspective, establishing a rationale for doing their research, management and communication skills as part of a research project;
• The acquisition of a range of new skills required in data science such as interaction design, operating systems, and knowledge management. These options will depend on the background of the student.
• Awareness and understanding of current issues in computing, through teaching informed by current developments in industry, government policy and in computing research;
• Extensive knowledge and critical understanding of many of the principal theories and
F2D4-TDS Master of Science in Data Science

• Expertise in applying many of the principal skills, methods and techniques of computing used in research and industry.

Stage 2

• Critical understanding of the main theories, principles and concepts relating to the domain of digital information management including terminology, conventions, standards and methodologies.
• Understanding and use of a significant range of the main skills, techniques and practices in big data processing, and a range of specialised skills, research and investigation techniques, and practices informed by current practices within the data science domain.
• Broad and deep knowledge of the main areas of information systems, databases, machine learning, statistical analysis, data visualization, application-based knowledge and skills relating to the broad range of handling information processes, and specialist knowledge and skills in applications relating to a number of specialist areas such as business analytics, data mining, data visualization, data warehousing and high-performance data processing.
• The ability to manage, research, assimilate knowledge in, critically assess, analyse, write and complete a high quality lengthy dissertation on a contemporary problem in research level Data Science over a period of approximately 10 weeks.

Scholarship, Enquiry and Research (Research Informed Learning)

On completion of the programme, students will be able to:

• Extensive, detailed and critical understanding of at least one specialist area within the domain of big data management application development obtained through researching the background to a substantial and challenging data analytics project by personal scholarship, design and development of a detailed information systems solution that incorporates significant proportions of software development or configuration to address the analysis issues at stake.
• Detailed knowledge and understanding of data sources relating to big information management application developments as well the practical skills in how to exploit them in support of original and creative data science application development.
• Specialist and critical knowledge, understanding and skills in a number of mainstream and specialist areas within the domain of digital information management application development including data analysis, data mining, parallel data processing, data visualization and data warehousing.
• Demonstrate that they have developed problem solving skills;
• Identify, analyse and solve problems, and discuss issues, at a professional level critically review existing practices and move on to research or professional careers with confidence.
LEARNING OUTCOMES – PERSONAL ABILITIES

Industrial, Commercial and Professional Practice

- Demonstrate critical awareness of current issues within big data management application development, and make informed judgements about them in the light of relevant professional standards.

- Demonstrate an awareness of professional and research issues in the data science discipline, and an ability to critique current techniques and practice.

Autonomy, Accountability and Working With Others

- Work autonomously and within teams, as appropriate, demonstrating a capability for both taking and critically reflecting on roles and responsibilities.

- Develop and utilise advanced problem-solving skills and techniques in the shared development of original and creative solutions to general and specialist data science analysis and management issues.

- 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.

Communication, Numeracy & Information and Communications Technology

- Develop and demonstrate the ability to communicate and present the main issues involved in data science application development to a literate audience with appropriate use of modern presentational tools and aids.

- Demonstrate appropriate use of methods of calculation and estimation involved in planning digital and information systems solutions and solving information management applications of big data processing.

APPROACHES TO TEACHING AND LEARNING

This programme is offered in a traditional campus-based, cohort model. Within the timetable, courses 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 courses offer a range of types of coursework for assessment, from discursive essay-style assignments to code design and generation. In some courses, 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.
EDUCATIONAL AIMS OF THE PROGRAMME

As part of the Computer Science Postgraduate Taught Programme, the aims of this programme reflect the aims of the programme as a whole. The aim of this MSc programme is to impart the skills and understanding required to perform large scale, repeatable, data analysis especially those involving statistical techniques and machine learning. Students will acquire critical skills and knowledge in Data Mining and Machine Learning, Big Data Management, and statistical modelling, as well as applicable skills concerning data visualisation, data security, and applications to the economy.

Therefore, the aims are to enable the students to:

- Develop detailed knowledge and critical understanding of the main areas of data science (including theories, principles and concepts).

- Develop and use a significant range of principal and specialist skills, techniques and practices in the domain of data science.

- Critically review existing practice and develop original and creative solutions to problems facing working data scientists.

- 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 data science, demonstrating extensive, detailed and critical understanding of that specialism

ASSESSMENT POLICIES

The two year MSc is a full-time programme comprising two stages in successive years.

Stage 1

This stage consists of 8 taught courses, 5 mandatory and 3 optional, defined in the programme structure, which the students will study 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.
• progression to stage 2 depends on passing 8 courses at grade D or better with an 8 course average of 50% plus getting a grade C or better on F21DF, F21SF and F29AI.

• students may retake the assessment of up to a maximum of 3 courses 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 progression or exit. Students may only resit courses for which their assessment grade is E or F (or a grade D but only if a grade C is required to progress to the next stage).

• students may exit at the end of this stage with a Graduate Diploma in Computer Science if they get credits for 8 courses at grade E or better with an 8 course average of 40%. They may exit with a Graduate Certificate in Computer Science after at least 1 semester of study if they get credits for 4 courses at grade E or better with a 4 course average of 40%.

• students not meeting either the requirements for progression or for a Graduate Diploma or Graduate Certificate will not be eligible for any award.

Stage 2

This stage consist of two phases:

• A taught phase, consisting of a set of 8 taught courses, 4 mandatory and 4 optional, defined in the programme structure, which the students will study 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 two stages: an appropriate technical research project and project dissertation report, and a poster and demonstration-based presentation.

• Students will normally complete the taught phase, at which point progression to the
dissertation phase is dependent on assessed performance as being of Masters level standard. To progress students must get grade D or better in 8 stage 2 courses, get an 8 course average of 50% and pass F21RP with a mark of at least 45%.

- Any student may be reassessed in up to a maximum of 3 courses 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 programme or for progression. Students may only resit courses for which their assessment grade is E or F (or a D but only if that is required for them to qualify for an MSc degree). The method of reassessment for each course is specified in the appropriate course descriptor.

- Students meeting the required standards for Postgraduate Diploma and Postgraduate Certificate in the taught phase, but not meeting the Masters standard, will not be permitted to progress to 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 in coursework and examination in the taught phase will not be permitted to progress to the dissertation phase, nor will they be eligible for any award.

### PROGRAMME STRUCTURE

<table>
<thead>
<tr>
<th>Mandatory Courses</th>
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<tbody>
<tr>
<td><strong>Course Code</strong></td>
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<tr>
<td>F21DF</td>
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<td>F21SF</td>
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<td>F29AI</td>
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<td>F20NA</td>
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<td>F21AS</td>
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</table>
### Stage 1: 8 taught courses (5 mandatory and 3 optional)

- **F21DL**: Data Mining and Machine Learning (15 SCQF Cr, SCQF Lvl 11)
- **F21SA**: Statistical Modelling and Analysis (15 SCQF Cr, SCQF Lvl 11)
- **F21BD**: Big Data Management (15 SCQF Cr, SCQF Lvl 11)
- **F21RP**: Research Methods and Project Planning (15 SCQF Cr, SCQF Lvl 11)
- **F21MP**: Masters Project and Dissertation (60 SCQF Cr, SCQF Lvl 11)

### Optional Courses

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<tr>
<th>Edinburgh</th>
<th>SBC</th>
<th>Orkney</th>
<th>Dubai</th>
<th>HVUM</th>
<th>IDL</th>
<th>Coll. Partner</th>
<th>ALP</th>
<th>Other</th>
<th>Stage</th>
<th>Semester</th>
<th>Phase</th>
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<th>Course Title</th>
<th>SCQF Cr</th>
<th>SCQF Lvl</th>
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<td>F29DC</td>
<td>Data Communications and Networking</td>
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<td>F21BC</td>
<td>Biologically Inspired Computation</td>
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<td>F21DV</td>
<td>Data Visualisation and Analytics</td>
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<td>F21DE</td>
<td>Digital and Knowledge Economy</td>
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<td>F21DP</td>
<td>Distributed &amp; Parallel Technologies</td>
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</tbody>
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### Stage 2: 8 taught courses (4 mandatory and 4 optional) plus an MSc dissertation

- **F21RP**: Research Methods and Project Planning (15 SCQF Cr, SCQF Lvl 11)
- **F21MP**: Masters Project and Dissertation (60 SCQF Cr, SCQF Lvl 11)
AWARDS, CREDITS AND CRITERIA (PG)

<table>
<thead>
<tr>
<th>Awards, Credits and Levels</th>
<th>Overall Credits</th>
<th>Specific Requirements</th>
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</thead>
<tbody>
<tr>
<td>Masters Degree</td>
<td>300</td>
<td>300 SCQF credits including a minimum of 150 credit at Level 11</td>
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<tr>
<td>Postgraduate Diploma</td>
<td>120</td>
<td>120 SCQF credits including a minimum of 90 credit at Level 11 gained in Stage 2</td>
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<tr>
<td>Postgraduate Certificate</td>
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<td>60 SCQF credits including a minimum of 40 credit at Level 11 gained in Stage 2</td>
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Award Requirements

<table>
<thead>
<tr>
<th></th>
<th>Total Course Passes</th>
<th>Overall Mark</th>
<th>Overall Grade</th>
<th>Basis of Overall Mark/Grade</th>
</tr>
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<tbody>
<tr>
<td>Master (Distinction)</td>
<td>8 + Dissertation</td>
<td>70</td>
<td>A</td>
<td>Credit Weighted Average greater than or equal 70% over 8 courses in Stage 2 at grades A-C plus a Dissertation at grade A.</td>
</tr>
<tr>
<td>Master</td>
<td>8 + Dissertation</td>
<td>50</td>
<td>C</td>
<td>Credit Weighted Average greater than or equal 50% over 8 courses in Stage 2 at grades A-D plus a Dissertation at minimum grade C.</td>
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<tr>
<td>Diploma (Distinction)</td>
<td>8</td>
<td>70</td>
<td>A</td>
<td>Credit Weighted Average greater than or equal 70% over 8 courses in Stage 2 at grades A-C</td>
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<tr>
<td>Diploma</td>
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<td>40</td>
<td>D</td>
<td>Credit Weighted Average greater than or equal 40% over 8 courses in Stage 2 at grades A-E</td>
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<tr>
<td>Certificate</td>
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<td>40</td>
<td>D</td>
<td>Credit Weighted Average greater than or equal 40% over 4 courses in Stage 2 at grades A-E</td>
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DURATION OF STUDY

<table>
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<tr>
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<th>Full-time</th>
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<td>Diploma</td>
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<td>Certificate</td>
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<tr>
<td>Masters</td>
<td>12</td>
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</table>

RE-ASSESSMENT (PG)

1. A student who has been awarded a Grade E or F in a course in stage 1 or 2 may be re-assessed in that course. A student who has been awarded a Grade D in a course in stage 2 may be re-assessed in that course in order to proceed to or be eligible to receive the award of Masters.

2. A student shall be permitted only one re-assessment opportunity in a maximum of three taught courses in each stage. The opportunity for re-assessment in four or more taught courses in each stage shall be at the discretion of the Progression Board.

3. Any further re-assessment opportunities in a course will require the approval of the Postgraduate Studies Committee.
4. A student may be permitted, at the discretion of the Progression Board, to be re-assessed in the dissertation, project or other supervised research component of the course of study.

<table>
<thead>
<tr>
<th>PROGRESSION TO DISSERTATION/PROJECT</th>
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<tbody>
<tr>
<td>In accordance with University Regulations, to progress to Masters level a minimum of Grade C is required</td>
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