F2D1-DSC Master of Science in Data Science

PROGRAMME DETAILS
Programme Code: F2D1-DSC
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 Y 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
F2D1-DSC MSC Master of Science in Data Science
F2D2-DSC PGDIP Postgraduate Diploma in Data Science

ACCREDITATION
The Edinburgh campus offering of this MSc programme was accredited by the Chartered Institute of IT or BCS in 2015 and we shall seek accreditation for the Dubai campus delivery of this MSc when the BCS next expect to visit us.

Accreditation of this MSc will be sought from the KHDA, the Knowledge and Human Development Authority for Dubai, once Heriot-Watt University has approved offering the MSc in Data Science in Dubai. The KHDA’s permission is necessary before it can run in Dubai.

LEARNING OUTCOMES – SUBJECT MASTERY
Understanding, Knowledge and Cognitive Skills

- 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, 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.

Scholarship, Enquiry and Research (Research Informed Learning)

- 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.

### 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

• Detailed knowledge and critical understanding of the big data management and visualization techniques needed to analyse modern academic, business and government information sources.
• Significant range of principal and specialist skills, techniques and practices in applying IT, information systems and big data management techniques to large scale, complex and heterogeneous information analysis problems.
• Ability to critically review existing practice and develop original and creative solutions to managing challenging amounts and diversities of digital information for scientific, administrative and competitive commercial applications.
• Experience of executing a significant project, investigation or development in the area of applying IT and big data management techniques to modern information analytic processes that demonstrates advanced skills.
and a critical understanding of the technologies required.

ASSESSMENT POLICIES

Postgraduate programmes consist of two phases:

- A *taught phase*, consisting of a set of 8 taught courses, some mandatory and some 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 an appropriate technical research project and project dissertation report.
- 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 the 8 taught courses, get a taught course average of 50% and pass F21RP with a mark of at least 45%.
- Any student will be able to 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 completion of their programme or for progression. Students may only resit courses for which their examination 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

### Mandatory Courses

<table>
<thead>
<tr>
<th>Edinburgh</th>
<th>SBC</th>
<th>Orkney</th>
<th>Dubai</th>
<th>HWUM</th>
<th>IDL</th>
<th>Coll. Partner</th>
<th>ALP</th>
<th>Other</th>
<th>Stage</th>
<th>Semester</th>
<th>Phase</th>
<th>Course Code</th>
<th>Course Title</th>
<th>SCQF Cr</th>
<th>SCQF Lvl</th>
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<td>F21DL</td>
<td>Data Mining and Machine Learning</td>
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<td>11</td>
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<td>F21SA</td>
<td>Statistical Modelling and Analysis</td>
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<td>F21BD</td>
<td>Big Data Management</td>
<td>15</td>
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<td>1</td>
<td>2</td>
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<td>F21RP</td>
<td>Research Methods and Project Planning</td>
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<td>11</td>
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<td>3</td>
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<td>F21MP</td>
<td>Masters Project and Dissertation</td>
<td>60</td>
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### Optional Courses
### COMPOSITION NOTES(PG)

8 taught courses (4 mandatory and 4 optional) plus an MSc dissertation

<table>
<thead>
<tr>
<th>Mandatory Credits</th>
<th>Optional Credits</th>
<th>Elective Credits</th>
<th>Dissertation Credits</th>
<th>Total</th>
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<td>60</td>
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### AWARDS, CREDITS AND CRITERIA(PG)

#### Awards, Credits and Levels

<table>
<thead>
<tr>
<th>Overall Credits</th>
<th>Specific Requirements</th>
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<tbody>
<tr>
<td>Masters Degree</td>
<td>180 SCQF credits including a minimum of 150 credit at Level 11</td>
</tr>
<tr>
<td>Postgraduate Diploma</td>
<td>120 SCQF credits including a minimum of 90 credit at Level 11</td>
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<tr>
<td>Postgraduate Certificate</td>
<td>60 SCQF credits including a minimum of 40 credit at Level 11</td>
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</table>

#### Award Requirements

<table>
<thead>
<tr>
<th>Award Requirements</th>
<th>Total Course Passes</th>
<th>Overall Mark</th>
<th>Overall Grade</th>
<th>Basis of Overall Mark/Grade</th>
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</thead>
<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 at grades A-C (at the 1st attempt) 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 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 at grades A-C (at the 1st attempt)</td>
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<tr>
<td>Diploma</td>
<td>8</td>
<td>40</td>
<td>D</td>
<td>Credit Weighted Average greater than or equal 40% over 8 courses at grades A-E</td>
</tr>
<tr>
<td>Certificate</td>
<td>4</td>
<td>40</td>
<td>D</td>
<td>Credit Weighted Average greater than or equal 40% over 4 courses at grades A-E</td>
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</tbody>
</table>

### DURATION OF STUDY

<table>
<thead>
<tr>
<th>IN MONTHS</th>
<th>Full-time</th>
<th>Part-time</th>
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</thead>
<tbody>
<tr>
<td>Masters</td>
<td>12</td>
<td>24</td>
</tr>
<tr>
<td>Diploma</td>
<td>9</td>
<td>15</td>
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</table>
RE-ASSESSMENT (PG)

1. A student who has been awarded a Grade E or F in a course may be re-assessed in that course. A student who has been awarded a Grade D in a course my 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. The opportunity for re-assessment in four or more taught courses 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.

PROGRESSION TO DISSERTATION/PROJECT

Students may progress to the Dissertation if they have met the progression requirements (taught course credit weighted average of 50% or better, all courses at Grade D or above and 45% or better in F21RP)