Programme Specification

A statement of the knowledge, understanding and skills that underpin a taught programme of study leading to an award from The University of Sheffield

1	**Programme Title**	Data Science
2	**Programme Code**	INFT85 MSc Data Science (Full-time) INFT86 PG Dip Data Science (Full-time) INFT87 PG Cert Data Science (Full-time)
3	**JACS Code**	I260, I900
4	**Level of Study**	Postgraduate
5a	**Final Qualification**	Master of Science (MSc)
5b	**QAA FHEQ Level**	Masters
6a	**Intermediate Qualification(s)**	Postgraduate Diploma (PG Dip), Postgraduate Certificate (PG Cert)
6b	**QAA FHEQ Level**	
7	**Teaching Institution** (if not Sheffield)	Not applicable
8	**Faculty**	Social Sciences
9	**Department**	Information School
10	**Other Departments involved in teaching the programme**	Not applicable
11	**Mode(s) of Attendance**	Full-time
12	**Duration of the Programme**	1 year Full-time
13	**Accrediting Professional or Statutory Body**	None
14	**Date of production/revision**	November 2013

15. Background to the programme and subject area

Data science is an emerging field that seeks to discover and explore new ways of exploiting data to support decision-making for a range of domains and problem areas. Within different organisational contexts, including health care, the public sector, local government, retail and manufacturing, business and commerce, vast amounts of heterogeneous data are produced in real-time (i.e. 'Big Data'), and there is a greater demand than ever to manage, analyse and use data effectively. Estimates in 2011 suggested that 90% of the data in the world at that time had been created in the preceding two years (http://www-01.ibm.com/software/data/bigdata/); however, the shortage of trained staff to enable organisations to take advantage of Big Data is a widely recognised problem. As a discipline, Data Science encapsulates a number of existing areas of academic and commercial interest, including Business Intelligence, Data Analytics, Data Visualisation, Data Mining and Data Management.

The MSc Data Science provides an Information Science perspective on Data Science and Big Data and will equip students with knowledge and skills in the technologies, tools and processes involved to enable them to enter and develop professional careers as "data managers". The programme will enable students to develop a detailed understanding of the common concepts, themes and terminologies prevalent within the field of Data Science. They will develop fundamental skills and an appropriate knowledge base to enable them to engage with Data Analysts and Data Scientists in their future employment. Students will learn the activities involved in the broader data lifecycle, such as data generation, metadata, data modelling and storage, data presentation, data access, the use and re-use of data, data governance and the strategic implications of data-driven decision making. They will gain an understanding of what algorithms (e.g. for data mining or handling Big Data) can do and when to use them, and how to interpret and communicate results from analysing data in the context of the

organisation as a whole. There will also be a focus on how people interact with and use data to perform tasks and make decisions and how Data Science and Big Data fit into the broader contexts of organisational data management and decision-making. Students will have the opportunity to gain practical hands-on experience with a variety of tools used by Data Scientists, such as R and R Studio, SPSS/PASW, WEKA, Tableau/Spotfire and Oracle.

The Information School was awarded an "excellent" score for teaching quality in 2001 by the Quality Assurance Agency (QAA) Subject Review and also has an international reputation for research, having been awarded the highest possible rating in all Research Assessment Exercises carried out by the Higher Education Funding Council for England (including the top 5* rating in 2001). Students will therefore be exposed to the latest concepts and ideas in the information professions. The composition of research and teaching in the Information School is highly multi-disciplinary, with staff backgrounds in Computer Science, Information Science, Information Systems, Knowledge Management, Librarianship and Business. We also have expertise in dealing with multiple types of data, such as unstructured texts (e.g. web pages and newspaper texts), chemical structures, social media (e.g. Twitter and Flickr), multilingual data and multimedia data (e.g. images). This diversity enables us to offer multiple perspectives on Data Science and equip students with a range of technical, analytical, and business skills. Further information is available at the School website at: www.shef.ac.uk/is/

16. Programme aims

For all its programmes the Information School aims to:

1) Deliver a curriculum for each degree programme that develops in students a broad understanding of the subject area together with a detailed and critical understanding of selected areas;

2) Provide students with the knowledge and skills required to work as effective information professionals, managers of information or research workers in their chosen field;

3) Enable those already working in the information field to update and expand their professional understanding and competencies;

4) Prepare students for professional practice by providing programmes which meet the accreditation requirements of professional bodies and that meet the needs of employers;

5) Deliver teaching informed and inspired by professional expertise and by the research and scholarship of staff;

6) Encourage students to become informed citizens and to understand the place of information in society.

In addition, the MSc Data Science aims to:

A.1 Provide students with an understanding of the fundamental principles that support and guide the extraction of information and knowledge from data;

A.2 Provide students with a theoretical and practical understanding of the range of technical issues involved in storing, analysing and visualising data;

A.3 Equip students with the knowledge and skills required to interpret and communicate the results from analysing data to support proactive decision-making within organisations;

A.4 Demonstrate the potential benefits to organisations within different sectors of applying principles of Data Science to harness and exploit data;

A.5 Highlight to students the limitations, as well as wider societal issues, of using and interpreting data to make reliable and sound decisions;

A.6 Equip students with research and problem-solving skills relevant to the employment market.

17. Programme learning outcomes

	Knowledge and understanding. Students completing the programme will:
K1	Be able to demonstrate an understanding of the theory and practice of Data Science and its application within organisational contexts;
K2	Be able to explain the technologies commonly used to support data-intensive organisations and applications;
K3	Be able to use a broad range of techniques and tools (e.g. R and SPSS) to analyse datasets for a range of problems and domains (e.g. classification and numeric prediction);
K4	Be able to communicate the results of data analysis and data mining to non-specialist audiences to support problem solving and decision-making;
K5	Be able to apply appropriate methods and techniques to model, store and query structured and unstructured data sources;
K6	Be able to critically assess the outputs obtained from analysing and visualising data and explain the limitations of data-driven approaches to decision-making;

	Skills and other attributes. Students completing the programme will:
S1	Acquire practical skills in a variety of tools used by Data Scientists, such as R and R Studio, SPSS, WEKA, Tableau/Spotfire and Oracle;
S2	Be able to analyse datasets of various sizes to gain insights and extract information (and knowledge) following principled and structured methodologies;
S3	Develop a range of practical/professional skills relevant to their potential future employment, together with an understanding of how to apply these in an ethical manner;
S4	Acquire practical/professional skills in their chosen specialisms;
S5	Acquire research skills relevant to their chosen field of work;
S6	Develop communication and interpersonal skills that will complement their subject knowledge;
S7	Acquire transferable skills relevant to their studies and for lifelong learning and continuing professional development.

18. Teaching, learning and assessment

Development of the learning outcomes is promoted through the following teaching and learning methods:

Induction sessions and preparatory coursework during the first weeks of the programme are designed to introduce students to School procedures and standards related to the writing and presentation of coursework, and to provide early formative feedback on performance. (S5, S6, S7 above).

Lectures establish the direction of studies and present information, ideas, case examples and critical analysis. Multimedia resources are used in lectures and student participation is encouraged. Students are provided with handouts of slide presentations and other lecture notes and materials, either in paper format or via MOLE2, the University VLE. Visiting speakers are an important feature of the lecture programme on some modules. They are normally practitioners or researchers and provide real-life examples of data science practice and problems, and expose students to examples of good practice. (K1-K6 above).

Seminars, which may be staff-led or student-led, are designed to facilitate greater interactivity, allowing ideas to be discussed and challenged. Students are enabled to work through, analyse and respond to information and ideas imparted through lectures, for example through case study analysis. (K1- K6, S3-S6 above).

Tutorials are small-group or one-to-one sessions with academic staff and are used on some modules to support group project-work or independent study. Research supervision is also provided through regular one-to-one tutorials throughout the dissertation research process. The word tutorial is also used to describe meetings arranged between a tutor and an individual student in order to clarify a problem experienced by the student in the understanding of material or in the process of preparing assessed work. (S6).

Practical laboratory sessions are used on a variety of modules to provide students with hands-on experience of using data analysis and visualisation tools. (K3, S1 and S2 above).

Collaborative group-work is an important feature of some modules. It is designed to enable students to work on complex, multi-faceted problems in a way that reflects professional practice and provides opportunities for students to develop professional and interpersonal skills. (S3, S6 above).

Task-oriented projects, case studies: encourage students to contextualise theoretical and professional perspectives. (K3-K6 and S5 above).

Contributions by practitioners expose students to examples of best practice and provide real datasets for students to analyse. (K1-K6, S1 and S2 above).

The Web provides 24/7 access to School learning resources such as lecture slide presentations and handouts, and to administrative information relating to teaching. As mentioned above, a Web-based 'virtual learning environment' (MOLE2) is used on some modules to provide integrated access to both learning resources and computer-mediated communication facilities. (K1-K7 above).

Individual and Group Presentations with feedback: help students to develop presentational skills. (S6, S7 above).

Independent learning is essential to successful completion of the programme and is expected for each module. Independent study is generally geared towards assimilation and further clarification of material encountered in lectures, preparation for seminars, tutorials and practical sessions, preparation for written assessments, and broader development of knowledge of the field of study. Independent study contributes to the development of all the programme's learning outcomes, and encourages students to take responsibility for their own learning, to organise their time and develop effective learning skills. (S3, S6 above).

Dissertation work under the supervision of academic staff allows students to develop and practice research skills. (K1-K6, S1, S2, S5 and S6 above).

Opportunities to demonstrate achievement of the learning outcomes are provided through the following assessment methods:

Each taught module is assessed at the end of the semester in which it is taught. Assessment methods vary from module to module and are designed to measure attainment of intended learning outcomes to meet the aims and objectives of the module. All students experience a range of assessed individual and group assignments. There are no formal unseen examinations.

Knowledge and understanding are demonstrated through written assignments involving essays and reports and oral presentations. These require students to provide evidence of their ability to synthesise knowledge and learning, organise information and apply critical judgement to evidence. (K1-K7 above).

Professional/practical skills are demonstrated through the analysis of case studies, applying approaches from Data Science to support problem solving and decision-making, and the completion of problem solving exercises. (S1, S2, S6 above).

Transferable skills (e.g. intellectual, technical and professional skills) are demonstrated through exercises including case study analyses, problem-solving exercises, group presentations and the research project/dissertation. (S6 above).

Interpersonal skills are generally incorporated within modules and related to relevant assessments as appropriate. Examples include oral presentations, group exercises, student-led seminars, the use of research-based teaching materials and methods, and problem based case studies.

Research skills are assessed through the core module: Research Methods and Dissertation Preparation and the Research Project/Dissertation itself.

19. Reference points

The learning outcomes have been developed to reflect the following points of reference:

Internal

- Mission Statement of the University of Sheffield, as presented in its Corporate Plan;

- The Teaching, Learning and Assessment Strategy of the University of Sheffield;

- The Teaching Strategy of the Information School;

- Current and recent research and scholarship of School staff;

- Discussions with members of the Information School Advisory Panel (comprising senior members of the information professions) and formal/informal relationships with practitioners;

- Regular analysis of the employment market through the Advisory Panel and periodic employers' needs surveys;

- School annual student programme and module evaluations.

External

Framework for Higher Education Qualifications (2008)
http://www.qaa.ac.uk/Publications/InformationAndGuidance/Pages/The-framework-for-higher-education-qualifications-in-England-Wales-and-Northern-Ireland.aspx

20. Programme structure and regulations

This is a full-time programme undertaken over 12 months, starting in late September.

The programme is modular in nature, allowing students flexibility in the design of their degree.

Core modules are compulsory and ensure a coherent programme structure providing all students with the key concepts and essential tools they need to work as competent professionals in their chosen field.

Approved modules allow students to follow professional and personal interests in specialised areas in greater depth. In consultation with staff, students choose modules to design an academically coherent programme consistent with their own career aspirations and interests.

All core and approved modules are worth 15 credits and are designed on the basis of approximately 150 hours of work (including contact hours, private study and assessment) in order to ensure an appropriate and uniform workload. To achieve a Masters' degree, students must complete modules to the value of 180 credits, which must include the Research Methods and Dissertation Preparation module and a research project/dissertation is worth 45 credits.

Successful completion of the programme leads to the award of the Masters' degree, with either a 'pass', 'pass with merit' or 'pass with distinction' grade.

Postgraduate Certificate and Postgraduate Diploma level awards are available after successful completion of taught modules to the value of 60 credits and 120 credits respectively (excluding the Research Methods and Dissertation Preparation module and the Dissertation module) for students who do not wish to progress further.

An '*Essential Computing Skills*' module is also available in Semester 1 to support students on the programme. This involves up to two hours of lectures/practical laboratory work per week and is not credit-rated. In consultation with the module co-ordinator, students may decide to attend all, some or no sessions on this module, depending on their prior technical skills and experience in relevant areas.

Detailed information about the structure of programmes, regulations concerning assessment and progression and descriptions of individual modules are published in the University Calendar available on-line at
http://www.shef.ac.uk/govern/calendar/regs.html

21. Student development over the course of study

Core (compulsory) modules ensure that students take a coherent course, and introduce them to fundamental principles, key concepts and techniques.

Approved (elective) modules enable students to design a programme reflecting their developing interests and career aspirations in depth.

All students registered for the MSc Data Science are required to complete a research-based project/dissertation of 10,000-15,000 words. Various types or project could be addressed in the MSc Data Science, for example investigating the potential of Big Data technologies in a specific organisation, analysis of existing datasets, visualisations of datasets, etc. This enables students to apply appropriate research techniques to a real problem, for example a gap in knowledge, a disagreement between 'the experts', a hypothesis which has not been adequately tested, or a question which previous research has left unanswered. For full-time students the dissertation is carried out in the period from mid-June to September. Students may develop their own dissertation topics, in consultation with staff, or select from a list of possible topics generated by academic staff and employers. The dissertation will be similar in nature to other Masters programmes and therefore does not require any change to the existing dissertation module.

22. Criteria for admission to the programme

Applicants to the Programme will normally be graduates with a minimum of 2:1 in any discipline, or equivalent work experience, and IELTS 6.5 with 6 in each component, or equivalent.

Detail regarding admission to programmes is also available from the University's On-Line Prospectus at http://www.shef.ac.uk/courses/

23. Additional information

The Information School is housed in the modern purpose-built Regent Court and has its own dedicated computer facilities, laboratories and students social/study area. The School is ten minutes' walk from the city centre and is adjacent to the St. George's Library which contains the University's main collection of Librarianship, Information Science, Data Science, Computer Science and Management materials. The University's Information Commons, with its excellent resources for individual and group study, is within a few minutes' walk from the School.

This specification represents a concise statement about the main features of the programme and should be considered alongside other sources of information provided by the teaching department(s) and the University. In addition to programme specific information, further information about studying at The University of Sheffield can be accessed via our Student Services web site at http://www.shef.ac.uk/ssid