# PROGRAMME SPECIFICATION

## Rationale for the Degree Programme

New forms of data are increasingly pervasive, generated through use of new technologies such as smart card enabled transit or by ambient mechanisms that continuously stream data through sensor networks, generating a variety of new attributes about our city environments. Such data impact and document our lives as customers, as workers and as travellers, in the home and in our private and public relationships, in our physical health and well-being. Unlike many traditional data, they are often of higher spatio-temporal granularity and change with high frequency and increasingly in real time, but come with particular methodological challenges to account for higher degrees of uncertainty, and bias. They also highlight particular ethical questions of data privacy, the transparency of the algorithms and platforms used to collect the data, and the deviation from original intended use.

This integrated MSc and PhD programme builds on the strengths of four partner institutions with a strong commitment to data science and capabilities that reinforce and complement one another. This programme exploits substantial existing commitments to data analytics, including the Institute for Data Science (Manchester), Leeds Institute for Data Analytics, Sheffield Methods Institute and Geographic Data Sciences Lab (Liverpool). Each of these research hubs connect with relevant expertise in Centres and Departments across their respective institutions and beyond. Additionally our city regions represent four of the UK top ten urban cores ([https://citymonitor.ai/environment/where-are-largest-cities-](https://citymonitor.ai/environment/where-are-largest-cities-britain-1404) [britain-1404](https://citymonitor.ai/environment/where-are-largest-cities-britain-1404)). We include letters of support to demonstrate engagement with both public service institutions and commercial organisations within each area.

This Centre leverages the considerable cumulative experience of two existing ESRC Doctoral Training Centres (North-West and White Rose). This allows us to draw on established and highly regarded programmes of core research methods training, and work within established management structures in each partnership, seeking guidance and feedback where necessary. We will exploit an existing track record of collaborative working between the Universities, together with new mechanisms and structures, to provide our doctoral training cohorts with an integrated and coherent development programme.

## Programme Overview

## Aims of the taught component of the Programme

The programme aims to:

1. Prepare students for doctoral study and professional research roles by offering a course which meets the requirements of world class academic institutions.
2. Provide students with the skills they need to undertake data analytics in a social science context.
3. Engender in students an awareness of both the possibilities and limitations of a range of methodological approaches and techniques used across the social sciences in identifying and researching real world problems.
4. use teaching informed by research to provide a stimulating culture of learning, the development of high-level research skills, and enthusiasm for applying these within subject-specific and interdisciplinary contexts.
5. Support students in developing critical thinking, intellectual curiosity, and independent judgement. To educate able and well-motivated students from a wide variety of backgrounds.

### Intended Learning Outcomes of the taught element of the Programme

#### Knowledge & Understanding

Students should be able to:

A1. Identify, summarise and critically compare key theories, concepts and empirical research evidence within the fields of data analytics and social science. (PG Dip and MSC only)

A2. Appraise the relative strengths and weaknesses of different methodologies in analysing different types of social and cultural data, and apply knowledge in managing the implications of applied research. (MSc only)

A3. Access and work with data in an ethical way mindful of the legal complexities and restrictions associated with sensitive data. (All)

#### Intellectual Skills

B1. Develop a good understanding of contemporary topics in social science and data analytics and how the global landscape shapes the analysis of large datasets, and non-standard forms of data structure, such as those where it is

the links between observations, rather than the observations themselves. (PG Dip and MSC only)

B2. Apply data management, high-level programming and analytical tools and techniques to analyse data describing social and cultural environments, and set appropriate objectives and strategies in complex situations. (All)

#### Practical Skills

C1. Demonstrate in-depth, specialist knowledge and mastery of techniques relevant to the disciplines of data analytics and social science; including an ability to demonstrate a sophisticated understanding of concepts, information and techniques at the forefront of the disciplines. (All)

C2. Apply ethical codes to the practice of data analytics in the context of social and cultural sciences. (All)

C3. Demonstrate advanced independent research skills and analytical abilities in the fields of data analytics and social science, along with the ability to develop research ideas and questions and to undertake analysis of data and written presentation of results for practice. (MSC Only)

#### Transferable Skills and Personal Qualities

D1. Develop transferable professional skills in working with others required for using social science data to form and implement analysis strategies, such as thought leadership. (All)

D2. Develop and deliver professional quality oral presentations that distil insights from analyses of data from social and cultural perspectives to describe, interpret, and explain the social world. (PG Dip and MSC only)

D3. Take a proactive and self-reflective role in working and to develop professional relationships with others. (All)

### Learning & Teaching Processes (to allow students to achieve intended learning outcomes)

Lectures will largely be used for imparting essential knowledge and are an important means of engaging students with an understanding of substantive issues around the research process, methodological approaches, and subject- specific debates.

Computer workshops are an absolutely essential part of the MSc programme. Skill development will largely be assisted through lab-based activities. Labs will enable students to learn and put into practice a wide range of quantitative and qualitative research techniques of data collection and analysis. There is a strong emphasis in the programme on the development of critical thinking about the research process but, in addition, we also expect all students to emerge from

the programme with advanced data analysis skills that are developed in the context of a variety of different software tools. Computer lab exercises will also help develop critical thinking and a reflective, ethical approach to research, with applications to core social science issues to enhance disciplinary knowledge and data visualisation skills.

Independent study provides students with the opportunity to develop important knowledge and skills at the postgraduate level. Students will need to spend a significant amount of time working on their own (with learning material provided by tutors). Within core modules there is considerable flexibility for students to identify topics that particularly interest them and then to take these forward in study for the Research Project and/or in choosing assessment topics for core and option modules.

Individual tutorials will be used to embed critical self-reflection (in the form of the Training Needs Analysis) from the outset, and will be the main mechanism of supervision and support for the dissertation.

### Assessment (of intended learning outcomes)

Essays are used as an assessment method where there is a need to evaluate comprehension of particular concepts, theoretical perspectives, or methodological and epistemological debates (A1, A2, A3, B1).

Project reports test students’ knowledge and understanding and demonstrate their skills across more applied elements of the programme. (B2, C1 and C2) They play an important role in demonstrating understanding of the practical utility of research methods.

Oral presentation is part of the formative assessment within the programme since it tests students’ ability to communicate their thinking, its implications and limitations (D2).

Internship The internship will require substantial interaction with the non- academic organisation, often leading an extended placement at the host’s place of business. It will therefore aid in the development of transferable and professional skills (D1, D2 and D3).

Research Project This will be an important piece of work but less heavily weighted than the traditional dissertation. It will involve the articulation of research objectives, an outline literature review and indicative methodology. This will provide a valuable stepping stone towards the main thesis project, and a good applied test of professional skills. (All but particularly C2,C3)

### The Structure of the Taught Element of the Programme

The programme structure is divided into five elements, with Domain skills being shared equally amongst the partners. New modules are in italics, all other modules exist and are being delivered to other programmes.

The bulk of the work will be completed in year one of a four year programme and will be completed in year two and will be complemented with preliminary PhD work and partner engagement, which in an integral part of the PhD

Year 1 – 120 Credits

* Domain Skills for Data Science (60) –
	+ delivered: September, Christmas, Easter, Summer
* Internship (15)
* Core Research Training (30)
* Advanced skills (15)

Year 2 – 60 Credits

* Research project (30)
* Advanced skills options (30)

#### Core research training (Credits: 30)

* SOCY60231 Qualitative Research Methods (10 credits)
* Qualitative Research Methods elective (5 credits)
* SOST70521 Methodology and Research Design (15 credits)

#### Domain skills for Data Science (Credits: 60)

* MANC Understanding Data and its Environment (15 Credits; Manchester)
* LIV Analysis of Human Dynamics (15 Credits; Liverpool)
* SHEF Social Analytics and Visualisation 1 (15 Credits; Sheffield)
* LEEDS Programming for Social Sciences (15 Credits; Leeds)

#### Data Analytics and Society Internship (Credits: 15)

**Data Analytics and Society Research Project (Credits: 30)** **Advanced skills (Credits: 45)**

Elective modules (Students may substitute additional electives for core training depending on prior learning and qualifications). Selection of these will decided through training needs analysis. Possible module choices are from:

* DATA70141 Understanding Databases
* DATA70132 Statistics & Machine Learning 2: AI, Complex Data, Computationally Intensive Statistics
* SOST70022 Longitudinal Data Analysis (15 credits)
* SOST70032 Complex Survey Design and Analysis (15 credits)
* COMP61011 Foundations of Machine Learning (15 credits)
* COMP60411 Modelling Data on the Web(15 credits)
* COMP60711 Data Engineering (15 credits)
* BMAN70142 - Simulation & Risk Analysis (15 credits)
* BMAN60092 - Risk Performance and Decision Analysis
* BMAN60111 - Information Systems Strategy and Enterprise
* BMAN73271 - Decision Behaviour, Analysis and Support

### Student Induction, Support and Development

#### Induction week

Apart from formal registration, induction week includes an introductory meeting with the programme director and teaching staff, and a welcome lunch. Students receive programme handbooks. They also attend an introduction to the School of Social Sciences, and several additional events at School, Faculty and University level. These include a tour of the library facilities and an IT training. Students are shown on-line registration to the computer network and given instruction in use of e-mail etc.

#### Student representation

Students nominate a representative to formally raise any issues and concerns on behalf of the group at relevant committee meetings (two formal programme meetings are held each year) and at school level. They may also present views and issues directly to the programme director at any point during the academic year.

#### Evaluation Questionnaires

At the end of each module, and at the end of the programme, students are asked to complete a short, anonymous evaluation questionnaire. The results are used to evaluate the organisation and content of the individual courses and overall programme.

#### Student Support

Programme Director: The programme director is available for academic guidance or to discuss issues of a personal nature that may have an impact on a student’s ability to study and/or meet course requirements. The programme director is

available to meet students during dedicated office hours or at other times by appointment. General queries regarding the course should be directed to the programme administrator.

**Supervisor:** Each student is assigned a supervisor of staff who takes some role in providing pastoral care, answering queries and referring students to other University services.

**Training needs Analysis (TNA):** All students taking the Data Analytics and Society programme are encouraged to engage in an on-going process of personal development planning. The primary objective for TNA is to help students improve capacity to understand what and how they are learning, and to review, plan and take responsibility for their own learning. To assist in the TNA process all students will be invited to meet their Supervisor and/or the Programme Director at the start of the programme, and at the end of the First Semester to review progress and options. Subsequently the TNA will be captured by the normal e-prog based review process.

**Office Hours:** All teaching staff have office hours during approximately the weeks in which they are teaching to enable students to get extra guidance. On some courses we additionally use Graduate Teaching Assistants (GTAs) to provide additional student support.

#### Research Project arrangements

Students who successfully complete the taught part of the course may proceed to the research project, which is carried out during year 2 under the supervision of their supervisor. Project reports (of a maximum of 8,000 words) are based on an original piece of independent research. Students are encouraged to think about their dissertation topics early and staff will be happy to discuss ideas. They are required to provide a one page outline of your proposal to the Programme Director early in year 2.

By the end of semester 1 year 2, students will be asked to confirm with their supervisor the title of their proposed project. They then complete a Project Title and Ethical Declaration form, which will be sent via the Programme Administrator.

A project presentations workshop will be arranged during the second semester year 2, where students present their project ideas to fellow students and academic staff and receive feedback on those ideas.

There will also be a session on producing publishable output.

### The reuse of assessed work from taught units within the PhD thesis

In this programme, you will undertake taught units at an MSc level of study as part of your PhD but you do not obtain a separate MSc. Consequently, the declaration that you are required to make at the beginning of your PhD thesis (see the University’s presentation of the thesis policy: <https://documents.manchester.ac.uk/display.aspx?DocID=7420>). Clause 6.1 g does not proscribe the reuse material from taught work submitted as part of your PhD programme within the PhD thesis itself.

Consequently, you will have more latitude than usual to reuse such material. This could happen in two ways:

1. Ad hoc Reuse of material. This would typically happen in one of three ways:
	1. that you refer to some of the same literature in the literature review of research project module in the lit review chapter(s) of the thesis.
	2. Some of the methodology that you develop in the research project (and possibly the Methodology and research design) is reused.
	3. you want in the thesis to describe or refer to the relationship with your project partner and that may naturally lead you to reuse material from your internship report.
2. Use of a revised version of the research project report as one of the papers in the thesis.

There are two significant caveats to this:

* 1. The expectations for the standard of work required for a PhD thesis are higher than the expectations for MSc work. The PhD regulations state that PhD work should be publishable. This issue is particularly relevant to point 1-b above. You would expect to work further on and improve the research project report with feedback from markers, the end of year review, your supervisory team and possibly journal reviewers. This may lead to you carrying out additional analyses and the work will certainly require redrafting.
	2. The rules about self-plagiarism still apply. Please refer to the University’s Academic Malpractice Procedure (<http://documents.manchester.ac.uk/display.aspx?DocID=639>).

The key to navigating this is transparency; you should not re-use your submitted work without appropriate acknowledgment. This might mean citing and referencing in the normal way or - in the situation where you choose to reuse the research project report as one of the PhD papers - you should acknowledge that in the (required) section of your introduction where you describe authorship

of (and contributions to) the papers. Something like: “an early version of paper

1 was submitted as my research project report during year 2 of my PhD

programme” would be appropriate.

If you are in any doubt about this, discuss with your supervisory team or the programme director.

## Taught Modules

### Module enrolment

You will need to choose and confirm the modules you wish to take as part of your programme of study. You will need to discuss which modules are appropriate for you to select as part of your initial Training Needs Analysis with your supervisor. The form and guidance for this are included at the back of the handbook.

#### CMI Short Courses

A list of courses is available here: <http://www.cmist.manchester.ac.uk/study/short/>

There are usually 5 places on each course available for free to Manchester students, allocated on a first come, first served basis. These can be a valuable source of research training, so discuss your training needs with your supervisors early in each semester and try to book as early as possible to secure a free place.

### Attendance

Attendance at tutorials/seminars is compulsory. Attendance monitoring will take place according to your home institution attendance monitoring policy, or for the core module, according to the policy of the institution hosting the module.

Acceptable reasons for absence include health problems, bereavement, maternity leave, and serious personal difficulties.

Traffic delays, attending family celebrations, paid employment or extra-curricular sports activities are normally regarded as unauthorised absence. However, we do consider each case on an individual basis.

For absences other than illness, you must notify your school’s administrative office

in advance of the absence, or as soon as is practical afterwards.

If you have problems that may prevent you from attending sessions or continuing as a student at any time, talk to your personal tutor or a member of student support staff who will do their best to help you.

If you are unable to attend due to ill health, you should report this using the appropriate method for your home institution. If you are ill and the absence is for less than five working days there is no need to provide medical evidence. However if you are ill for more than five working days, **a doctor’s medical certificate** should be provided to your local postgraduate administrator.

**Please report to** **elisabeth.mccormick@manchester.ac.uk** **for taught modules or** **jackie.boardman@manchester.ac.uk** **for research activities.**

Remember: it is your responsibility to catch up with missed work, lectures and other academic commitments, please also speak to your supervisors if you are concerned that illness is disrupting the progress of your research.

If you are ill just before or during examinations you should seek written medical confirmation from your GP. Arrangements can be made for students who are ill to take exams in the sick bay and these special circumstances will then be taken into account. In addition, if you have been ill during the year and think that this has adversely affected your studies, or led to an underperformance in your assessed work/exams, you should provide written supportive evidence for the Exam Board. Please speak to your local postgraduate administrator or refer to local guidance for the correct procedure for your Home University.

### Assessment of taught modules

To see how your modules are assessed and to find out the marking criteria, please refer to the individual module details.

Students are responsible for knowing and understanding the examination/assessment regulations for the modules chosen. Details of the CDAS ‘core’ modules are included over the following pages, but please ensure you check the requirements for each module assessment at the beginning of each module.

Graded and Formative Assessments

You will be both assessed formally and formatively. The formal assessments will ultimately become part of your grade for the course. While the formative assessments are designed to give you feedback and a sense of where you stand in terms of knowledge, however they do not affect your grade. You still expected to complete formative assignments and to make a good faith effort.

### Module Descriptions

#### Programming for Social Science module

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| Modulesummary | This module provides foundation level skills in computer programming for socialscientists. It introduces programming, along with associated introductory techniques for data analysis, visualisation, and modelling. The module will also introduce ancillary themes around good research programming practice, such as version control and licensing. |
| Moduleobjectives | * To develop core computer programming skills in students.
* To develop and awareness of the issues around computer programming.
* To develop an understanding of good research programming practice.
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| Learningoutcomes | * Foundation level computer programming for social scientists.
* How to build computer analysis and modelling tools.
* Practical skills in good research programming.
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| Outlinesyllabus | 1. Introduction to computer programming.
2. Variables and Objects.
3. Flow control and procedures.
4. Classes and inheritance.
5. Dealing with data, online and off.
6. Basic data analysis and modelling.
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| Subjectspecific skills | * Abstraction and synthesis of information from a variety of sources.
* Solving problems and making reasoned decisions.
* Plan, design, execute and report research.
* Undertake effective analysis work.
* Employ a variety of technical methods for the analysis and presentation of spatial and environmental information.
* Apply numerical and computational skills to data.
* Use information technology effectively.
* Industry knowledge.
 |
| Details ofprivate study and independe nt learning | Students will be given structured online learning materials that supplement thecourse in a variety of areas of interest to their research. As part of their project for the module, they will be expected to work through at least one set of materials. |
| Rationalefor teaching and learning methods and relationshi p tolearning outcomes | The course is an intensive introduction to computer programming, completed infive days. The first two days will introduce the core ideas of programming, followed by a day looking at core programming themes, and then two days examining particular methodologies. This will be followed by a period of independent working and project formulation. |

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| Monitoring of student progress | The practical components will build up software which will be assessed in portfolio form. The projects will be set during the week long teaching period, and then three weeks later will be formatively assessed for progress during a half-day workshop. The final project will be due in some five weeks after this. |
| Rationale for assessmen t andrelationshi p ofassessmen t methods to learning outcomes | The major assessment will be a single project, designed following the constructionist principle common in computing, that is, with the student. Given the intensive nature of the course, only a single project is appropriate, but formative feedback on progress will be given during the project period to ensure feedback is available for students to act on. The project will be expected to show core programming skills, but will also be embedded in a framework of good research practice, for example, matching research community standards on documentation, licensing, and distribution. The minor assessment will be practical work built up during the course, assessed as a portfolio of work. |

#### Analysis of Human Dynamics module

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| Module summary | The two enduring characteristics of many new forms of data concerned with human dynamics are time and location; however, these attributes require special treatment by the social sciences. The content of this module reflects various spatial turns within the social sciences and concerns how techniques of modern spatio- temporal data analytics can be integrated with Data Science tools to solve practical real-world problems. |
| Module objectives | This module seeks to provide students with a robust grounding in those methods enabling the study of human dynamics, providing particular focus on programmatic implementations. The content of this module will enable students to develop a deeper understanding of how new forms of big data with spatio-temporal attributes can be synthesised into useful information when making decisions. |
| Learning outcomes | * Demonstrate advanced analysis of human dynamics concepts and be able to use tools programmatically to import, manipulate and analyse data in different formats.
* Understand the motivation and inner workings of the main methodological approaches of human dynamics, both analytical and visual.
* Critically evaluate the suitability of a specific technique, what it can offer and how it can help answer questions of interest.
* Apply a number of analysis techniques and how to interpret the results, in the process of turning data into information.
* When faced with a new data-set, work independently using tools programmatically.
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| Outline syllabus | Concepts and methods for the study of human dynamics This first component introduces the student to the general concepts that are relevant to the study of human dynamics, with a practical lab associated with the computational environment and programming software utilized in the rest of the module.Visualization and Choropleth mapping This part of the course will cover the basic principles in geographic data processing and visualization design, including choropleth mapping. A practical lab will develop computational skills related to map creation from data using programming scripts. |

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|  | Exploratory Spatial Data Analysis After initial basic visualization, the next step in the process of geodata analysis involves exploring the existence of patterns and associations over space and time. Students will develop knowledge in the main statistical tools to study such distributions as well as how these concepts are encapsulated by state-of-the-art software programming packages.Making decisions When attempting to make optimized choices from a given set of options, problems are often multi-dimensional, dynamic and spatially varying. Through a practical class students will develop methodological skills that reduce such complexity, highlighting salient patterns within data. |
| Details of private study andindependent learning | Students will be set computer based tasks in practicals that will take longer than the timetabled practicals to complete. They will have to access on-line resources to which they will be directed for support. |
| Rationale forteaching and learning methods and relationship to learning outcomes | These supported day long practical sessions will introduce concepts and ideas and then support students in applying them By working through a series of sequential practicals they will understand the motivation and inner workings of the main methodological approaches and develop skills in the critical evaluation of the suitability of different analytical techniques. The combined sessions will also support students in applying a number of spatial analysis techniques and interpreting the results. |
| Monitoring of student progress | The practical components will build up skills which and students will be given the opportunity to test their learning in class. The projects will be set during the week long teaching period, and then will be formatively assessed for progress during a half-day workshop 2 or 3 weeks later. |
| Rationale forassessment andrelationship of assessment methods to learning outcomes | The 5000 word project report will allow students to demonstrate the following module LOs: the application of advanced GIS/GDS concepts to analyse spatial data; to critically evaluate and apply suitable techniques in spatial data analysis and to work independently using GIS/GDS tools programmatically. |

#### Understanding Data and their Environment module

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| Module summary | This module is a combination of technical and non-technical topics all related to critical externalities to the data analytics process.The primary aim of the module is to demonstrate that data science cannot be carried out in a vacuum that a whole range of extrinsic considerations affect our ability to carry out the research that we wish to carry out. However appropriate management of these externalities can lead to higher quality as well more responsible research. |
| Module objectives | * To develop basic understanding of the technical processes of anonymisation, disclosure control and data linkage.
* To develop an awareness of the issues around the use of data in research.
* To develop fundamental skills in data husbandry.
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| Learning outcomes | * Understand the ethical issues surrounding the use of data in research.
* Understand the concepts and technical vocabulary of anonymisation and statistical disclosure.
* Be able to make informed decisions about linkage/integration of data and carry out a basic data linkage.
* Be able to go through a basic anonymisation process with a dataset.
* Be able to identify an appropriate collection of data sources for a project and to identify the issues in using those data sources.
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| Outline syllabus | Ethics and the law: data protection, anonymisation, statistical disclosure, understanding consent.Information about Data: Metadata and Paradata. Provenance and data generating processes. Issues about data quality and the impact on inference. Accessing and finding data.Pre-Processing: Understanding data quality and divergence and the impact on inference; Cleaning data; Editing and imputation models.Combining and enhancing data: Basics of data linkage/integration, synthetic data production. |

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| Details of private study andindependent learning | Students will be given structured online learning materials that supplement the course.They will also be provided with a set of readings covering the four main components of the syllabus, which will also provide background for the assessed work. |
| Rationale forteaching and learning methods and relationship to learning outcomes | Lectures will introduce specific ideas in relation to data management, the ethics and disclosure of data in relation to researchThe practicals and the clinics will allow the students to apply those ideas and to manage data and be able to make informed decisions about linkage/integration of data and to apply anonymisation processes to data. |
| Monitoring of student progress | Student progress will be monitored through the staff engagement with practical work. Highly interactive seminars and online clinics will allow students to bring questions and practical issues for discussion and feedback. |
| Rationale forassessment andrelationship of assessment methods to learning outcomes | The learning outcomes of the course are dividing into comprehension/understanding and skills. The comprehension and knowledge skills will be tested through a short critical review of a key area. The skills will demonstrated though a project report. |

#### Social Analytics and Visualisation module

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| Module summary | This module will introduce machine learning, cluster analysis, social network analysis, textual analysis and data visualisation. The course will emphasise methods that can be applied to real-world applications. Employable skills include techniques for analysing large complex datasets in non-standard ways. A programme of lectures, guided practical classes and independent study will help develop a set of hands-on practical skills useful for social science applications. Students will undertake a small secondary data analysis project for assessment. |
| Module objectives | This unit aims to:* introduce students to methods for data analytics and data visualisation and help them learn how these techniques can be employed in social science research;
* enable students to critically assess the validity, strengths and limitations of different data analytical and visualisation methods;
* give students knowledge of specific techniques employed in social analytics;
* teach students how to apply techniques for data analytics and visualisation using the statistical programming software R and other appropriate packages;
* develop good report writing and critical analytical skills.
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| Learning outcomes | By the end of the unit, a student will be able to:* be familiar with advanced methods of social analytics including machine learning, cluster analysis, social network analysis, sentiment analysis and data visualisation, and have a critical/reflective understand of how these can be used in social research;
* be able to undertake secondary data analysis to answer research questions and have a broad knowledge of the fundamentals of designing a social science research project that involves data analytics and visualisation;
* be familiar with how to undertake appropriate analysis using relevant software packages;
* demonstrate good analytical and report writing skills.
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| Outline syllabus | TBC |

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| Details of private study andindependent learning | Students will be given structured learning materials that supplement the course in a variety of areas of interest to their research. |
| Rationale forteaching and learning methods and relationship to learning outcomes | The 10 integrated lecture / practical sessions will introduce and then apply ideas on social data analytics. Through supported introductory talks, students will become familiar with advanced methods in social analytics and will develop a critical/reflective understand of how these can be used in social research. The practicals will develop understanding of and capability in secondary data analysis to answer research questions how to design a social science research project that involves data analytics and visualisation. Together these will support student learning of how to undertake appropriate analysis. |
| Monitoring of student progress | The practical components will build up skills which and students will be given the opportunity to test their learning in class. The projects will be set during the week long teaching period, and then will be formatively assessed for progress during a half-day workshop 2 or 3 weeks later. The final project will be due in some five weeks after this. |
| Rationale forassessment andrelationship of assessment methods to learning outcomes | A small scale comparative quantitative research project must be designed by the student using available secondary data and incorporating multivariate techniques taught in the course. The student must write a report of 4000 words. This report will be used to assess critical thinking, the ability to undertake some secondary data analysis, use of appropriate software, and analytic and report writing skills. The project has to be approved by the convenor of the module in advance. All learning outcomes will be assessed. |

#### Internship Project module

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| Module summary | In this module students will work with one of the non-academic partners, which may be their long - term PhD sponsor but not necessarily so. It will involve a piece of data analysis which has been agreed with the non-academic partner. The internship will require substantial interaction with the non-academic organisation, often involving an extended placement at the host’s place of business. It will therefore aid in the development of transferable and professional skills, as well as establishing mastery of applied data analytics techniques and problem-solving ability. |
| Module objectives | This module will engage students with one or more non-academic partners, and will benefit them through real- world support including provision of data, advice. This model of co-production will have significant benefit in terms of knowledge transfer, specifically around the complexities of those new forms of data that students will likely encounter. This experience will also act as a trigger for development of professional skills through engagement with non- peer or academic colleagues. |
| Learning outcomes | On completion of this module students will have gained experience of working with an organisation solving a problem involving data analytics.They should be able to demonstrate:* how to negotiate, specify and define a problem and design a method of solving the problem with the resources, facilities and time available.
* an ability to manage the task of solving the problem and effecting a solution using scientific knowledge, initiative and skills.
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| Outline syllabus | The student will work on a research project defined between the student and an external organisation. The aims of the placement will be defined in terms of progressive risks in effecting a solution. The first aim should have a low risk of failure; the second aim will be more challenging but capable of solution given initiative and energy on the part of the student; and the third aim can have a 'blue skies' element, a real research challenge and consequently a high risk of failure but success will demonstrate exceptional competence and initiative. Students in an external placement will have the opportunity to work closely with the external organization. |

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| Details of private study andindependent learning | This is part of the ESRC CDT ‘A Centre for Doctoral Training in New Forms of Data’. The successful proposal for the integrated MSc and PhD ‘Data Analytics and Society’ specifies the inclusion of an internship module. The internships will be undertaken by each student and could involve up to 3 months at a remote location, but will often be shorter. A balance of local and remote projects has been assumed. |
| Rationale forteaching and learning methods and relationship to learning outcomes | A critical element of the CDT is collaboration with non-academic partners. These are vital for several reasons: as a key source of new data, as a source of insight into social problems and the associated requirements, and as collaborators in the provision of training and capacity-building. This module speaks to the third of these reasons.Partners will be a mix of global, national and regional business, government and third sector. We expect that most of these partners will contribute data to projects and that they will usually play a strategic role in the supervision and direction of projectse.g. within a six monthly cycle of review and research support. Many of them will host students on an occasional or extended basis within their own organisations and we expect that many of them will participate directly in the thematic clusters which are established around our research topics.A deep engagement with the partners with whilst under continued supervision from their academic supervisor will enable the students to learn about applying data analytics in real world settings. |
| Monitoring of student progress | Through email communication with student’s supervisors and non- academic partner |
| Rationale forassessment andrelationship of assessment methods to learning outcomes | The project report allows students to describe the analyses they undertook during their internship and to reflect on the nature of working in the commercial arena. The presentation provides them with experience of presenting their work in front of other people. The supervisory sessions / tutorials provide the students with an opportunity to discuss progress with their supervisors and they act as check. |

#### Research Project module

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| Module summary: | This is a research project complementary to but separate from the PhD research project. This will be an important piece of work but less heavily weighted than the traditional dissertation. It will involve the articulation of research objectives, an outline literature review and indicative methodology.It provides students with the opportunity to undertake a major piece of supported independent research. It is an opportunity to apply skills and techniques learned during the taught component of this programme to a substantive original research or industry focused problem of interest to the student. Dissertations will be supervised by academic staff from the Centre for Spatial Analysis and Policy (CSAP) or other appropriate members of CDRC.Individual projects and research questions are chosen and formulated by students, and supported during the research process by one-to-one or small group meetings with a nominated member of academic staff, and student-led group meetings to seek peer support. The dissertation may address a methodological or practical issue using desk based research and secondary data sources or may involve primary data collection. It may also be carried out in conjunction with an external organisation (such as local government, a charitable organisation or a commercial organisation) in order to address a relevant research or practical issue of interest to them, and making use of their data or other input. Regardless of the nature of the project itself, all dissertations must have a clearly defined aim and set of specific objectives that are novel or original and which relate to this programme of study. All dissertations should be written up as an academic piece of work, using the guidance provided during the module. |
| Module objectives: | To provide a valuable stepping stone towards the main thesis project, and a good applied test of professional skills in a research environment, drawing on core research skills alongside some more advanced elements.This module seeks to:* Enable students to develop and undertake a substantive piece of independent research related to Social Analytics, addressing original practical issues identified through independent research, the commercial and policy sector where appropriate.
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|  | * Allow students to demonstrate that they can work independently on a series of research questions over a sustained time period, making effective use of support available and problem solving independently where required.
* Give students a supported opportunity to apply skills, methodologies and techniques introduced within this programme in order to address a research question of interest to them.
* Give students the opportunity to personalise their learning experience by researching a topic of interest to them, and of relevance to their future career and professional development objectives.
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| Learning outcomes: | On completion of this module students will be able to:* design, executing and presenting a sustained piece of novel or original research related to Social Data Analytics.
* work independently on a substantive research question, using initiative and reasoned thinking to problem solve.
* select, apply and critically evaluate appropriate spatial and statistical analysis techniques and/or theories in order to address their research questions.
* Be able to communicate research findings in an academic style, situating their findings within the broader academic literature and wider developments in the field or industry sector.
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| Outline syllabus: | This module is primarily made up of private study, with scheduled or ad-hoc individual/small group meetings with students’ dissertation supervisor or other module staff as appropriate.The learning and execution of the dissertation is student driven and students are expected to work on their dissertation full time over the summer months. The methods and techniques appropriate to execute independent research have been introduced throughout the taught component of this programmeIn addition to the support of their supervisor, students also benefit from dissertation briefing sessions which include:* Choosing an original research topic
* Identifying appropriate literature
* Project managing a dissertation
* Writing-up a dissertation
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| Details of private study andindependent learning: | This module is primarily composed of private study as students work independently on their dissertations. Students are expected to work on this full time during the summer period and projects are student driven.Private study encompasses all aspects of the dissertation process, including topic choice, data acquisition, literature searches, data analysis and final write-up of the submitted dissertation. |
| Rationale forteaching and learning methods and relationship to learning outcomes | The introductory lecture will set the frames of reference for the work, especially the issues around overlap with PhD study including the design, execution of the research.Private study will develop skills in working independently on a substantive research question, using initiative and reasoned thinking to problem solve.The supervisory meetings will allow the students to demonstrate their learning and critical evaluation of appropriate spatial and statistical analysis techniques and/or theories and to communicate their research findings in an academic style. |
| Monitoring of student progress: | Progress will be primarily monitored via individual supervision, comprising student-led scheduled or ad-hoc contact with their supervisor, to discuss their research and to identify any problems they are facing. Students will receive verbal/email advice/suggestions/comments as a result of these interactions, and supervisors will be able to identify students who may need further support to meet the LOs of this module.Additionally student progress is monitored via their research proposal, enabling students to be matched to an appropriate supervisor and screening to ensure that chosen topics and approaches are feasible and in line with the module objectives. |
| Rationale forassessment andrelationship of assessment methods to learning outcomes | The dissertation and the associated proposal will allow students to develop and then demonstrate their achievement of the following LOs:* to design, execute and present a sustained piece of novel or original research
* work independently
* to apply and critically evaluate appropriate spatial and statistical analysis techniques and/or theories in order to address research questions.
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|  | * to be able to communicate research findings in an academic style, situating their findings within the broader academic literature and wider developments in the field or industry sector.
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