PG Cert Clinical Data Science 2526

Description

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Programme Handbook

Introduction

Welcome to your studies at the University of Manchester. This handbook contains all the relevant information on related policies, processes, procedures and contacts for your course.

Welcome from the Programme Director

We find ourselves in a period of unprecedented change as our healthcare systems adapt to the challenges of the 21st century. We strive to deliver state of the art healthcare whilst holding on to our traditional values and compassion. One of the ways healthcare can mitigate some of these challenges, such as an increasing aging population and the threat of global pandemics is through the effective and appropriate use of digital technology delivered through digital transformation. Many of these technologies require data in order to produce effective outputs. Access to and the quality of data collection and processing is vital to ensure effective outputs and informed data based decision making.

The Clinical Data Science Programme (CDSP) aims to equip learners like you who work in health and social care with foundational knowledge in data science so you can effectively support digital transformation and research projects in your area. The programme has been co-designed to be as flexible as possible for busy professionals and is presented in a blended modality (both online and face-to-face). Much of the course is presented online through self-directed learning that can be engaged with at a time of your convenience. This is also supported by synchronous online sessions and one face-to-face day for each unit.

The course also makes use of a team science approach where you can learn from others with different backgrounds and health data challenges. We hope to foster longer lasting communities of practice where you can form networks of like minded individuals to support you in these exciting times. On behalf of the programme team, I would like to warmly welcome you to the programme and your studies at the University of Manchester.

Dr. Alan Davies (MBCS, SFHEA)

I wish you every success in your postgraduate studies here at the University of Manchester. School of Health Sciences

SHS Student Handbook

To be read in conjunction with the programme handbook

Background to the programme

The University of Manchester was commissioned by Health Education England (HEE) via the National School of Healthcare Science to develop a flexible programme of learning in Clinical Data Science, supporting topics such as statistics, machine learning and programming.

We also work with other partners such as The Christie NHS Foundation Trust â€“ a cancer specialist centre who have helped us to develop case studies and other material for the programme.

Co-design

We have placed co-design and co-development at the heart of the programme. This was underpinned by a strong evidence base, including a systematic literature review and interviews/surveys with potential end users and related stakeholders.

We also have:

- a Clinical Advisory Group (CAG) made up of a variety of experts that consult on the clinical relevance and application of the course
- Curriculum development group made up of internal and external experts who help us to develop each unit and decide on the core content
- Lay reps that provide the perspective and voice of the patients and public and input on meetings and design sessions

While developing the programme we came up with a clear set of aims, principles and values to underpin the programmes development and delivery.

Aims

The aims of the Clinical Data Science Programme are:

- To empower healthcare professionals to apply data science in practice and translate data into patient benefit
- To promote patient benefit is at the core of our thinking, and the data science skills that
- Healthcare professionals will gain through this programme will enhance their ability to work better together for the benefit of patients and improve lives. The CDSP is aligned to the NHS Constitution

We DO NOT aim to train healthcare practitioners to become data scientists. Instead we aim to give professionals across the board the opportunity to develop their data science skills and drive digital transformation in their clinical practice.

Values

Key values of the CDSP include:

- Data science for the benefit of the patient
- Quality, transparency and consistency of data capture
  Respect for data governance and patient anonymity
- Use of data science to improve the quality of patient care and service delivery Democratisation of data for public good

Principles

Our core principles consist of:

- Real-world clinical case studies will be used throughout the programme
- Teaching design and assessment will centre on interdisciplinary team science
- The programme will be co-created with patient representatives and healthcare professionals
  Assessments will be designed to relate directly to clinical practice, service improvement and innovation
- Teaching will aim to develop sustained communities of practice that will help to drive change through the inclusion of networking events
- Equip healthcare practitioners with the tools to make use of the data available to them in order to improve service delivery

- The programme will be as flexible as possible to account for the learning needs and accessibility of busy healthcare practitioners
- The programme will promote data literacy and increase confidence in applying data science techniques

Key contacts

Please include your university ID in any correspondence to the admin team to aid them in responding to your enquiry more quickly.

Head of School / Head of Division:

Professor Andrew Brass / Professor John Ainsworth

Programme Director:

Dr. Alan Davies

alan.davies-2@manchester.ac.uk

Deputy Programme Director:

Dr. Iliada Eleftheriou

iliada.eleftheriou@manchester.ac.uk

TLSE Administrators:

shs.programmes@manchester.ac.uk

shs.assessments@manchester.ac.uk

Programme admissions:

pgtaught.cbm@manchester.ac.uk

+44 (0) 161 306 5438

Programme of study

The Clinical Data Science Programme (CDSP) aims to provide knowledge, skills and experience in the areas of computer science and applied mathematics and statistics. It is assumed that participants bring with them the domain expertise in the clinical, health and social care areas. The CDSP aims to bridge the gap between the clinical and the technical (data centric) professions by exposing clinical/health experts to technical language, methods and skills to enable them to better work with these professionals on interdisciplinary projects (e.g. research projects and/or digital transformation projects). Similarly, the program will also provide technical professionals with experience of the specific needs

and requirements of the healthcare sector, essential for anybody wishing to work in the region where the two disciplines meet. The programme will also impart some practical skills around working with data that would enable clinical professionals to process and analyse their own data and gain actionable insight from it to improve clinical and organisational processes, and ultimately improve organisational efficiency and patient care. The aims can be summarised as:

- To empower healthcare professionals to apply data science in practice and translate data into patient benefit
- The key aim of the Clinical Data Science programme is aligned to the NHS Constitution: patient benefit is at the core of our thinking, and the data science skills that healthcare professionals will gain through this programme will enhance their ability to work better together for the benefit of patients and improve lives
- The CDS programme does not aim to train healthcare practitioners to become data scientists. It will give professionals across the board the opportunity to develop their data science skills and drive digital transformation in their practice

Timetable

Details for the full time and part time timetables can be found in this section. The detailed timetable with face-to-face and online synchronous sessions will be provided each year to students through our virtual learning environments (see sections â€“ â€˜what is Canvas?â€™ and â€˜what is eLabâ€™ below).

Full time students:

Year 1	
Semester 1	***Semester 2***
Clinical Data Engineering (15 credits)	Data Visualisation & Communication (15 credits)
Maths, Stats and Machine Learning (15 credits)	Human Factors & Digital Transformation (15 credits)

Part time students:

Year 1		**Year 2**	
Semester 1	***Semester 2***	***Semester 1***	***Semester 2***

Clinical Data Engineering (15 credits)

Maths, Stats and Machine Learning (15 credits)

Data Visualisation & Communication (15 credits)

Human Factors & Digital Transformation (15 credits)

Programme structure and unit outline

Students on the full-time programme will be required to sit all the above units over a 12 month period.

Unit/module title	Code	Credit rating	Mandatory/optional
Clinical Data Engineering	IIDS69011	15	Mandatory
Maths, Stats and Machine Learning	IIDS69021	15	Mandatory
Human Factors & Digital Transformation	IIDS69042	15	Mandatory
Data Visualisation & Communication	IIDS69032	15	Mandatory

Details of the course units can be found on the course web page:

https://www.manchester.ac.uk/study/masters/courses/list/20306/pgcert-clinical-data-science/#co urse-profile

Course unit delivery

The majority of the programme is delivered in a blended learning format (i.e. a combination of eLearning via eLab/Canva and face-to-face workshops). Each unit has at least one mandatory face-to-face session held in Manchester.

Assignment submission

Please be aware of individual course unit assignment deadlines. Details of submission deadlines are available on the course unit pages and by the unit leads.

Submission of assessed work

All assignments for course units must be submitted electronically via Canvas on the date and time specified above. Please see instructions in your course unit assessment pages. Assignments e-mailed to tutors or administration will not be accepted.

Award level

Postgraduate Certificate in Clinical Data Science

Total: 4 course units â€“ 60 credits

Continuous/personal professional development (CPD)

We also welcome students who are taking single units for their own continuous professional development (CPD). They can choose from the same course units and study in the same way as other students.

You can take unlimited numbers of CPD units, but you are only able to use these credits towards a higher award under the AP(E)L (Accredited Prior Learning) regulations â€“ i.e. AP(E)L will be permitted up to a maximum of 15 credits towards a Certificate award, 45 credits towards a Postgraduate Diploma award and up to a maximum of 60 credits towards a Masters award (See section on AP(E)L for further details regarding AP(E)L regulations.

The recording is just over seven minutes long and covers most of the commonly used tools in Canva.

We use Canva to manage the submission of summative (marked) assessment on the programme as per university regulations.

Progression to Health Data Science route

We can APL 45 credits for students to progress to the MSc HDS for students who have done PGCert CDS (and scored 50% or more on each unit).

Students will then follow this arrangement:

Semester 1:

- student does not need to take Intro to HDS or Intro to Statistics
- student still required to take Programming for HDS, and Statistical Modelling and Inference for Health

Semester 2:

- student chooses three optional units. They may not take Digital Transformation Project.

Semester 3:

- dissertation as usual

What is eLab?

As the course makes use of data and data processing techniques and associated digital tools we use a piece of web-based software called the eLab to facilitate this. The eLab is where the majority of the course content can be accessed.

The eLab allows users access to datasets and data science tools safely and securely through a standard web browser without the need to download and install additional software. You can find out more about the eLab here: https://assets.bmh.manchester.ac.uk/diids/elab/homepage/index.html

Reading materials

All reading material is accessed through the university online library or the internet. The indicative reading list for each of the units is summarised below.

Unit	Indicative reading
Clinical Data Engineering	• McKinney, W (2017) *Python for Data Analysis.* Beijing: Oâ€™Reilly • Molin, S (2019) *Hands-On Data Analysis with Pandas.* Birmingham: Packt • Medium (2021) *Towards data science: A Medium publication sharing concepts, ideas and codes*. https://towardsdatascience.com/about
Mathâ€™s, Stats and Machine Learning	• Field, A., Miles, J., Field, Z (2012) *Discovering Statistics Using R*. Los Angeles: SAGE • James, G., Witten, D., Hastie, T., Tibshirani, R (2015) *An Introduction to Statistical Learning: With applications in R.* New York: Springer • GÃ©ron, A (2017) *Hands-on Machine Learning with Scikit-Learn & TensorFlow.* Beijing: Oâ€™Reilly • Lane, H., Howard, C., Hapke, H (2019) *Natural Language Processing in action.* Shelter Island: Manning Publications Co.

Human Factors & Digital Transformation

- Butler-Henderson, K., Day, K., Gray, K (2021) *The Health Information Workforce: Current and Future Developments.* Switzerland: Springer
- Marx, E (2020) *Healthcare Digital Transformation: How Consumerism, Technology and Pandemic are Accelerating the Future.* New York: Taylor & Francis
- Greenhalgh, T., Wherton, J., Papoutsi, C., Lynch, J., Hughes, G., Aâ€™Court, C., Hinder, S., Fahy, N., Procter, R., Shaw, S (2017) *Beyond Adoption: A New Framework for Theorizing and Evaluating Nonadoption, Abandonment, and Challenges to the Scale-Up, Spread, and Sustainability of Health and Care Technologies.* J Med Internet Res;19(11):e367 URL:

  https://www.jmir.org/2017/11/e367DOI: 10.2196/jmir.8775

- Wilson, A., Saeed, H., Pringle, C., Eleftheriou, I., Bromiley, P.A, and Brass, A (2021) *Artificial intelligence projects in healthcare: 10 practical tips for success in a clinical environment* BMJ Health & Care Informatics;28:e100323.

  doi: 10.1136/bmj hci-2021-100323

  Eleftheriou, I., Embury, S., Moden, R., Dobinson, P and Brass, A (2018) *Data journeys: Identifying social and technical barriers to data movement in large, complex organisations*.

  Journal of Biomedical Informatics, Volume 78, 2018, Pages

  102-122, ISSN 1532-0464,

  https://doi.org/10.1016/j.jbi.2017.12.001.

Data Visualisation & Communication

- Davies, A., Mueller, J (2020) *Developing Medical Apps and mHealth Interventions: A Guide for Researchers, Physicians and Informaticians.* Switzerland: Springer
- Wilkinson, L (2005) *The Grammar of Graphics.* New York: Springer
- Knaflic, CN (2015) *Storytelling With Data: A Data Visualization Guide For Business Professionals.* New Jersey: Wiley
- Yau, N (2011) *Visualize this: The Flowing Data Guide to Design, Visualization and Statistics.* Indianapolis: Wiley Publishing Inc.

Library resources

The University of Manchester Library has one of the biggest collections in the country and students should make the fullest use of this facility. So it is essential that you familiarise yourself with how to access journal articles, databases and ebooks. For information on library resources, please visit The University of Manchester Library webpage. More details of how to improve off site access is given in Online Skills and Resources (see below for further information). If you experience any difficulty please contact the e-learning team.

Referencing

All work provided for assessment at postgraduate level must be evidence based â€“ based on the literature and research that a learner has read to prepare their work. This evidence must be correctly referenced. In particular when students have a) used direct quotes or b) synthesised or paraphrased a section of text. The CDS programme requires students to use the **Harvard referencing system** when referencing literature. Failure to reference correctly can lead you to be suspected of plagiarism. Guidance can be found on referencing in the programme online space.

Computer hardware

You should have regular access to the same Microsoft Windows PC or Apple Mac on which you are able to adjust the settings if required. Canvas or Moodle may require you to make minor adjustments to your settings or browser.

You do not need a high specification (expensive) computer to do this course. However, you will need access to a good reliable internet connection to take part in online sessions and to access the course material.

It is also recommended that you have a headset and microphone to use with your computer.

Computer software

The software needed to complete this course includes:

- Modern web browser
- Microsoft Office (or alternative e.g. Google docs)
- Adobe Acrobat Reader
- Java installed and enabled

Additional software such as eLab, Slack and others will be made available via a web browser.

Assessment

We have strived to use authentic assessment across the units of the CDSP and also not to over assess learners. We aim to produce artefacts that are likely to occur and/or be useful in practice to support learners working on data based projects.

Formative assessment takes place regularly throughout the programme, this includes online material such as quizzes, peer review and feedback from unit tutors. Summative assessment takes place once for each unit and is submitted via Canvas. Learners are provided with clear instructions relating to each unitâ€™s assessment and provided with details of the marking criteria (e.g. a marking rubric).

A mark of 40% is required in order to pass a unit and progress. For more information see the student information under section 10 of the SHS handbook â€œAssessmentsâ€•.

Progressing from CPD units to PG Cert in Clinical Data Science

If you have completed course units on the CPD stand-alone unit scheme and would like to progress to the full PG Certificate, you must complete the online application form providing all supporting documents before the beginning of August. If you need any further information about this process, please contact the admissions coordinator (pgtaught.cbm@manchester.ac.uk).

Appendices

Appendix 1: Academic staff and course unit leads

Please note that on this programme we have co-unit leads who are equally responsible for the unit rather than a single unit lead as is the case on some programmes. If you want to contact a unit lead about the unit it is helpful to email both leads. This is so if one is away/busy, the other can pick up any correspondence in a timely manner.

Programme director	**Deputy programme director**
Dr Alan Davies (alan.davies-2@manchester.ac.uk) **T:** +44 (0)161 275 5147 (55147) **Room:** G529, Stopford Building, Oxford Rd, Manchester	Dr Iliada Eleftheriou (iliada.eleftheriou@manchester.ac.uk) **T:** +44 (0)161 27 55051 **Room:** G539B, Stopford Building, Oxford Rd, Manchester
Unit name/number	**Unit leads and contact information**
Clinical Data Engineering (IIDS69011)	Dr Alan Davies (alan.davies-2@manchester.ac.uk) Dr Iliada Eleftheriou (iliada.eleftheriou@manchester.ac.uk)

Mathâ€™s, Stats and Machine Learning (IIDS69021)	Dr David Jenkins (david.jenkins-5@manchester.ac.uk) Dr Jon Parkinson (jon.parkinson@manchester.ac.uk)
Human Factors and Digital Transformation (IIDS69042)	Prof Angela Davies (angela.davies@manchester.ac.uk) Dr Helen Hulme (helen.hulme@mancheste.ac.uk)
Data Visualisation and Communication (IIDS69032)	Dr Alan Davies (alan.davies-2@manchester.ac.uk) Frances Hooley (frances.hooley@manchester.ac.uk)