PROGRAMME SPECIFICATION

1. Overview

Academic Year (student cohorts covered by specification	2020-21
Programme Title	MSc Health Data Science
Programme Director	Melanie Smuk
Awarding Body	University of London
Teaching Institution	London School of Hygiene & Tropical Medicine
Faculty	Epidemiology and Population Health
Length of Programme (months)	MSc – Full time = 12 months
Entry Routes	MSc
Exit Routes	MSc/PGDip/PGCert
Award Titles	MSc in Health Data Science (180 credits) Exit awards: PGDip in Health Data Science (120 credits) PGCert in Health Data Science (60 credits)
Accreditation by Professional Statutory and Regulatory Body	None
Relevant PGT QAA Benchmark Statement and/or other external/internal reference points	Consistent with the Framework for Higher Education Qualifications at Masters level (Level 7), this programme will provide students with an understanding of key concepts relevant to health data science and training in essential tools and skills to manage and analyse very large diverse datasets across healthcare systems and to communicate results appropriately to diverse audiences. See pages 28-29 at: https://www.qaa.ac.uk/docs/qaa/quality-code/qualifications-frameworks.pdf?sfvrsn=170af781_14

Level of programme within the Framework for Higher Education Qualifications (FHEQ)	Masters – Level 7			
Total Credits	**CATS:**	180	**ECTS:**	90
HECoS Code	Health sciences (100246), computer science (100366), medical statistics (101031)			
Mode of Delivery	Students may complete the whole 2020/21 MSc programme online or may choose to come to London in anticipation of some face-to-face teaching. For Health Data Science: Term 1 core module teaching will be delivered online only, with a combination of synchronous (live and interactive) and asynchronous (recordings, independent study, individual exercises, etc) activities. All terms 2 and 3 modules will be offered online. Certain modules will also have some optional on-campus components. The face to face components may be limited to ensure that UK social distancing rules are adhered to. If at any point during the academic year the UK is forced to go into another period of lockdown, this programme will be delivered using online methods only. Throughout the year there will be programme- and LSHTM-level activities, such as group seminars and a themed lecture series and discussion forums. These will allow students to study the programme safely at a distance but remain together as a community.			
Mode and Period of Study	Full time (12 months)			
Cohort Entry Points	Annually in September			
Language of Study	English			

Re-sit Policy	https://www.lshtm.ac.uk/sites/default/files/academic-manual-chapter-08a.pdf
Extenuating Circumstances Policy	https://www.lshtm.ac.uk/sites/default/files/academic-manual-chapter-07.pdf
Programme Description	Health Data Science is an emerging discipline, combining mathematics, statistics, epidemiology and informatics. This programme will equip graduates with the tools and skills to manage and analyse very large diverse datasets across healthcare systems. This programme aims to train a new generation of world-leading health data scientists, to work in both the public and private sector. The overall strategy towards teaching and assessment focuses on building strong quantitative, computational, and practical data management skills, while providing opportunities to develop key professional skills required to be a successful health data scientist.
Date of Introduction of Programme (month/year)	September 2020
Date of production / revision of this programme specification (month/year)	Extraordinary revisions made in August 2020 in response to Covid-19 mitigation planning

2. Programme Aims & Learning Outcomes

Educational aims of the programme

The programme aims are to:

- equip graduates with the tools and skills to manage and analyse very large diverse datasets across healthcare systems;
- provide opportunities to allow students to develop the professional skills – including teamwork, project management, and presentation skills – to work as a successful data scientist in the public or private sector.

Programme Learning Outcomes

1. Knowledge and Understanding of:

1.1 the varied roles of a health data scientist within the wider health and health research environment;
1.2 key sources of health data, the context in which these data are collected and implications for issues such as data quality and accessibility;
1.3 implications of the context of data collection on bias and the appropriateness of use to address specific questions;
1.4 commonly used statistical and machine learning techniques;
1.5 key issues related to ethics, security and information governance and current debates in these areas in the specific arena of health data science.

2. Skills and other Attributes

Intellectual Skills – able to:

2.1 critically appraise ethical, security and information governance implications of a proposed study design in the context of a data science project;
2.2 devise and implement an appropriate analysis approach, drawing on a range of statistical and machine learning techniques, to address a health data science research question;
2.3 critically evaluate potential sources of bias, and the likely impact on results, in relation to the data and question at hand, focusing on the context of data used in typical health data science projects;
2.4 justify conclusions drawn from results of analyses, acknowledging uncertainty appropriately.

Practical Skills – able to:

2.5 extract, assemble, clean, and manipulate health data within a reproducible workflow.

Transferable Skills – able to:

2.6 work effectively within a multi-disciplinary environment, including the ability to talk to clients to delineate the scope of a data science project;
2.7 communicate technical methods and results to a mixed audience through written reports and oral presentations;
2.8 effectively manage a data science project, to deliver key objectives within a set timescale, and work both independently and as an effective team member.

Teaching and Learning Strategy

The role of the health data scientist requires a wide range of technical, practical, and professional skills, many of which are best developed by hands-on experience grappling with real-world problems. Professional skills, including project management, communicating to diverse audiences, and effective teamwork, are also crucial. The teaching approach for this MSc is designed to maximise students' time working on practical problems, in individual and group settings, and will require students to interact with a range of collaborators/clients.

As well as traditional lectures followed by problem-based practical sessions, with or without computers, teaching strategies in the programme will include:

- **Flipped classroom** approaches where students are provided with materials to read/watch independently, followed by formative assessment in class to assess understanding (e.g. via Moodle-based multiple choice questions), allowing contact time to focus on practical problem-based learning.
- **Interactive lectorials**, alternating lecture-based and hands-on practical sessions.
- **Panel discussions and workshops**, to stimulate debate particularly for current live controversies such as the ethics of algorithms.
- **Teamwork**, particularly in the team-based module and the hackathon.
- **Opportunities to develop and practice professional skills**, including a range of student-led presentations, modules which require student

teams to interact with a client (someone who is not a data scientist working outside of the LSHTM who wishes to "employ" our students to address a particular research question).

Assessment Strategy

Assessments have been designed to reflect the reality of life as a health data scientist. The programme will include a mix of formative and summative assessment. A range of assessment techniques will be deployed, including:

- In-module examinations
- Submission of code to perform a given task
- Oral presentations of technical material
- Coursework, with structured and unstructured questions
- Comprehensive written report of an in-depth exploration into an area chosen by the student (research project)

Students will not be required to attend on-campus where assessments can be taken online.

3. Programme Structure and features, modules, credit assignment and award requirements

Full-time Masters	Term 1	Term 2	Term 3	Total Credits
Compulsory Modules	5	2	0	90
Recommended Modules	0	2	0	30
Projects	0	0	1	60

Module information is correct at the time of publication, but minor amendments may be made subject to approval as detailed in Chapter 3 of the LSHTM Academic Manual. Optional (i.e. recommended non-compulsory) modules listed are indicative and may change from year to year.
https://www.lshtm.ac.uk/study/courses/changes-courses

Term	Slot	Module Code	Module Title	Module Type (compulsory or recommended)	Credits (CATS)	Contact hours*
1	AB1	2485	Introduction to Health Data Science	Compulsory	10	22
1	AB1	2486	Programming	Compulsory	10	40
1	AB1	2487	Health Data Management	Compulsory	15	40
1	AB1	2488	Epidemiology for Health Data Science	Compulsory	10	35
1	AB1	2489	Statistics for Health Data Science	Compulsory	15	37.5
2	C1	2490	Machine Learning	Compulsory	15	40
2	C2	2491	Data Challenge	Compulsory	15	30
2	D1	2492	Genomics Health Data	Recommended	15	40
2	D1	2464	Modelling & the Dynamics of Infectious Diseases	Recommended	15	60
2	D1	2465	Analysis of Hierarchical and Other	Recommended	15	48

			Dependent Data			
2	D1	3135	Spatial Epidemiology in Public Health	Recommended	15	50
2	D2	1301	Environmental Epidemiology	Recommended	15	30
2	D2	2463	Survival Analysis and Bayesian Statistics	Recommended	15	50

* Student contact time refers to the tutor-mediated time allocated to teaching, provision of guidance and feedback to students. This time includes activities that take place in face-to-face contexts such as on-campus lectures, seminars, demonstrations, tutorials, supervised laboratory workshops, practical classes, project supervision and external fieldwork or visits, as well as where tutors are available for one-to-one discussions and interaction by email. Student contact time also includes tutor-mediated activities that take place in online environments, which may be synchronous (using real-time digital tools such as Zoom or Blackboard Collaborate Ultra) or asynchronous (using digital tools such as tutor-moderated discussion forums or blogs often delivered through the School's virtual learning environment, Moodle). These contact hours reflect provision during the 2019/2020 session. We anticipate that in 2020/2021 there will be fewer hours with tutor presence at specified times and a greater emphasis on directed study such as recorded lectures, recommended readings and guided exercises. Please refer to the individual 2020/2021 module specifications for more detail. This definition is based on the one provided by the Quality Assurance Agency for Higher Education (QAA) Explaining contact hours (2011) guidance document, page 4 available here. Student contact time, together with time allocated for independent study and assessment, determines the total student study hours for a module or programme. Although there are separate hours allocated for each of these activities, they should always be clearly linked together to support effective learning.
The London School of Hygiene and Tropical Medicine (LSHTM) defines high quality contact time as structured, focused, purposeful and interactive.

4. Entry Requirements

Criteria for admission
The normal **minimum** entry requirement to be considered for master's degrees admission at the LSHTM is at least one of the following: • a second-class honours degree from a UK university, or an overseas qualification of an equivalent standard, in a relevant subject • a qualification appropriate to the course of study to be followed   ➢ In this case appropriate qualifications will include mathematics, statistics, physics, engineering and computer science. Life science qualifications will be considered subject to evidence of sufficient quantitative background. • a master's degree in a subject appropriate to the course of study to be followed • a professional qualification appropriate to the programme of study to be followed Applicants who do not satisfy these above requirements may still be admitted at the discretion of the LSHTM on the basis of their academic qualifications, work experience and references. In addition, applicants must demonstrate a high level of quantitative skills and knowledge, including: basic probability, calculus and linear algebra. They must have some prior experience of computer programming. Applicants who have little background in some of these areas will be considered and may receive a conditional offer, subject to undertaking some preparatory learning prior to commencing the programme.

English language entry requirements
The English language entry requirement for MSc Health Data Science is **Band B.** It is essential that all students have a good command of the English language to benefit from their studies at the LSHTM. As part of the application process, applicants are required to demonstrate how they meet the LSHTM's minimum English language requirements. This is particularly important for applicants requiring a Tier 4 Student visa, as the UK Home Office dictates that every student from outside the UK and European Union (EU) must show evidence of a minimum level of English language ability (called CEFR1 B2 level), in order for a Tier 4 Student visa to be issued for entry to the UK. Additionally, the LSHTM asks applicants to have minimum English language proficiency levels that are necessary for our academic programmes. These levels are higher than the CEFR B2 minimum level and also apply to EU applicants, although these will not normally require a Tier 4 Student visa. The academic English language requirements for each of the LSHTM's programmes are categorised into one of three profiles A, B or C. For information on these three profiles, please refer to the LSHTM English Language Requirement Policy: https://www.lshtm.ac.uk/sites/default/files/english_language_requirements_policy.pdf