DRIVE-Health
EPSRC Centre for Doctoral Training in Data-Driven Health

UKRI Engineering and Physical Sciences Research Council

KING'S College LONDON

TRAINING PROGRAMME OVERVIEW

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INTRODUCTION

The EPSRC Centre for Doctoral Training in Data-Driven Health (DRIVE-Health) trains the next generation of health data scientists, computer scientists, engineers, and AI/machine learning researchers to support innovative, equitable, and sustainable global healthcare. Co-created with over 30 partners spanning the NHS, patients, health tech, and pharma, DRIVE-Health has been granted £8.9M in funding from EPSRC to 2032, with partner contributions bringing the total investment to £17M. By 2028, we will be training over 85 doctoral students.

EPSRC DRIVE-Health's interdisciplinary training programme bridges the gap between technological advancements and complex healthcare challenges. DRIVE-Health is hosted by King's College London, a leading international research institution for data-driven healthcare (ranked 35 in the world). The Research Excellence Framework 2021 confirmed King's research excellence, ranking it 6th in the UK for research power and 3rd among UK multidisciplinary institutions for impact. The wider environment includes King's Health Partners, London AI Centre for Value-Based Healthcare, and the King's AI Institute.

EPSRC DRIVE-Health doctoral students are uniquely positioned to lead innovation across academia, industry, the NHS, and the wider healthcare ecosystem, and to create impact in a global sector projected to be worth over £1.2 trillion by 2030.

TRAINING

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The training offered by our programme is research-led, collaborative, and highly personalised. It is structured to encourage a deeper understanding of healthcare systems alongside technical excellence in areas such as AI, software engineering, digital twins, and public engagement. A strong focus on co-design, responsible innovation, and stakeholder involvement ensures that graduates are prepared not only to advance technology, but to shape the future of healthcare policy, delivery, and governance.

These core modules lay the groundwork for students to navigate interdisciplinary challenges with rigour and sensitivity, both within academia and in collaboration with healthcare and industry partners.

INTRODUCTION TO KEATS

King's E-learning and Teaching Service (KEATS) is the university's centrally supported Virtual Learning Environment (VLE), built on the Moodle platform.

KEATS serves as the primary online hub for teaching and learning at King's College London, providing a comprehensive and user-friendly digital space where students and faculty can interact seamlessly. For EPSRC DRIVE-Health students, KEATS offers convenient access to a wide range of academic resources, including lecture notes, reading materials, and recorded seminars. Students can submit assignments securely through the platform, track their progress, and receive timely feedback from instructors. KEATS also facilitates the enrolment process for elective modules, enabling students to tailor their learning experience to their individual research interests and career goals. Additionally, the platform supports interactive learning activities such as quizzes, discussion forums, and collaborative projects, encouraging active engagement and peer-to-peer learning.

By integrating all these features into one accessible online environment, KEATS helps ensure that EPSRC DRIVE-Health students have the tools and support they need to succeed in their studies and research.

Access the EPSRC DRIVE-Health Training Programme KEATS page.

PERSONAL DEVELOPMENT PLANS

All EPSRC DRIVE-Health students develop a Personal Development Plan (PDP) to support their progression and ensure they receive the right training at the right time throughout the four-year programme. The PDP is based on the Researcher Development Framework (RDF), a nationally recognised approach to researcher development.

The PDP is a living document that helps students identify areas where they may benefit from additional support or skills development, and provides a structured way to plan and track their training goals in line with their research and career aspirations.

The PDP process is introduced during Welcome Week, when the CDT Training Lead explains the use of the RDF as a guiding tool. Students are encouraged to reflect on their current skills, identify areas for growth, and start planning their training pathway in collaboration with their supervisors.

PERSONAL DEVELOPMENT PLANS

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Key stages of the PDP process include:

- Introduction and Guidance: During Welcome Week, students are introduced to the RDF and the structure of the PTP, including how to use it to assess development needs across a range of domains.

- Initial Completion and Submission: The PDP tool is made available on KEATS, and students are required to complete it in discussion with their supervisory team. The completed plan should be submitted by the end of November in the first year.

- One-to-One Review Meetings: Students take part in dedicated one-to-one sessions with a mentor or member of the CDT team in December/January and again in June/July, to review their training progress, update goals, and access additional support if needed.

- Progress Monitoring: The PDP is formally reviewed twice a year – in May and early December – by a panel that includes the Training Lead, CDT Directors, and CDT Manager.

CORE MODULES

In their first year, all EPSRC DRIVE-Health students are required to complete a series of mandatory and assessed core modules. These are designed to establish a strong foundation for doctoral research and equip students with essential skills relevant to both academic and industry settings. Some of these are provided by EPSRC DRIVE-Health, and some by a cross-college partnership, the Medical Research Council Doctoral Training Partnership (MRC DTP). The full list of modules is:

Experimental Design (MRC DTP)

This module introduces key principles of experimental design. Students will learn how to plan robust experiments, minimise bias, ensure reproducibility, and select appropriate controls and sample sizes. The module covers both clinical and computational settings, equipping students with the skills to critically assess and design experiments that generate reliable, interpretable data for healthcare innovation.

Research Ethics (MRC DTP)

This module explores the ethical considerations central to conducting research in a medical setting. Topics include informed consent, data privacy, equity, bias in algorithms, and the responsible use of health data. Students will engage with real-world case studies and current guidelines to develop a strong ethical framework for designing and conducting research that respects the rights, dignity, and wellbeing of individuals and communities.

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Critical Thinking

This module develops the ability to critically evaluate scientific evidence, arguments, and assumptions within data-driven health research. Students will learn to identify biases, assess the validity of conclusions, and engage with complex ethical and methodological issues. Emphasis is placed on reflective thinking, structured reasoning, and effective argumentation to support sound decision-making in research and healthcare contexts.

Patient and Public Involvement and Engagement (PPIE)

This module explores the importance of involving patients and the public in health research. Students will learn principles and best practices for meaningful engagement throughout the research process, from design to dissemination. The module highlights how PPIE can improve research relevance, transparency, and impact, and equips students with practical skills to build respectful, inclusive, and effective collaborations with diverse communities.

Responsible Research and Innovation (RRI)

This module introduces the concept of Responsible Research and Innovation, focusing on the ethical, societal, and environmental dimensions of research in data-driven health. Students will explore how to anticipate and reflect on the impacts of their work, engage stakeholders, and align research practices with public values and needs. The module encourages a proactive and inclusive approach to innovation that supports sustainability, accountability, and trust in science.

ELECTIVE MODULES

In addition to the core modules, students are required to complete at least two assessed elective modules each year. These electives are designed to help students build deep technical expertise while also developing essential skills in public engagement, co-design, and responsible innovation.

Through this flexible, modular approach, students gain hands-on experience with cutting-edge tools and methodologies, and cultivate skills in data analysis, software development, regulatory compliance, and the responsible use of digital health technologies. This ensures students can access the latest expertise across disciplines and develop a well-rounded skillset tailored to their individual career paths.

Students may choose elective modules from the full MRC DTP catalogue of courses, from the Applied Statistical Modelling and Health Informatics MSc, and from EPSRC DRIVE-Health's own modules.

MRC DTP Elective Modules

Please refer to the MRC DTP catalogue of courses for these modules.

ELECTIVE MODULES

Applied Statistical Modelling and Health Informatics MSc modules

Full details on applying for these modules can be found on the EPSRC DRIVE-Health Keats page. Modules include:

- Introduction to health informatics
- Introduction to statistical modelling
- Prediction modelling
- Causal modelling
- Clinical Trials
- Machine Learning
- Natural Language Processing
- Artificial Intelligence

An introduction to programming with Python

Many students will have extensive experience of programming, but some will not. This course is designed for the latter group and will introduce the key concepts of programming using Python, through a set of online lectures and practicals, and a weekly face to face tutorial. It is recommended that students follow this module with the Coding Club module (see below).

Coding Club

This module is a peer-based training for both experienced programmers and students who are relatively new to programming. Experienced programmers design and deliver sessions on specific programming topics to new programmers.

ELECTIVE MODULES

Experienced programmers benefit through having to reach the depth of understanding required to teach a topic, and new programmers from extending and practicing their skills in a peer environment. Topics will vary according to group interests, but have previously included object-oriented programming, exception handling, functional programming, version control.

DNA Sequencing

This module provides a practical and conceptual introduction to DNA sequencing technologies and their applications in health research. Students will explore the principles behind next-generation sequencing (NGS), data generation workflows, and common sequencing platforms. The module also covers key steps in data processing, quality control, and interpretation of sequencing results. Through hands-on exercises and case studies, students will gain foundational skills in analysing and critically evaluating DNA sequencing data, preparing them to apply these methods in genomics-driven healthcare research.

RNA Sequencing

This module introduces the principles and applications of RNA sequencing (RNA-seq) in biomedical research. Students will learn about experimental design for transcriptomic studies, RNA-seq technologies, and key steps in data processing - including alignment, quantification, and differential expression analysis.

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The module combines theoretical background with practical experience in analysing RNA-seq datasets, enabling students to investigate gene expression patterns and regulatory mechanisms relevant to health and disease. By the end of the module, students will be equipped to critically interpret RNA-seq results and integrate transcriptomic data into broader data-driven health research.

Introduction to Epidemiology

This short course provides an introduction to epidemiological methods and their application in answering clinically relevant questions, with a particular focus on big data from mental health records. Students will learn about key study designs - including cohort, case-control, cross-sectional studies, and randomised controlled trials - and how to interpret statistical outputs such as p-values, confidence intervals, and effect estimates. The module also covers core concepts such as risk and protective factors, bias, confounding, sampling, and measurement. Students will gain experience with disease mapping and surveillance techniques, and develop the skills to critically evaluate and apply epidemiological evidence in health research.

Practical Machine Learning

This module offers a hands-on introduction to machine learning techniques commonly used in health data science. Students will learn how to prepare data, select appropriate models, and evaluate performance using

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real-world healthcare datasets. Topics include supervised and unsupervised learning, model training and validation, overfitting, and interpretability. The module emphasises practical implementation using common programming tools, alongside critical understanding of the strengths and limitations of machine learning in clinical and research contexts. By the end, students will be able to apply core machine learning methods to solve problems in data-driven health.

Electronic Health Records Research

This module explores the use of electronic health records (EHRs) in health research, focusing on their potential to generate real-world evidence at scale. Students will learn about the structure, strengths, and limitations of EHR data, as well as methods for data extraction, cleaning, linkage, and analysis. Key topics include cohort creation, phenotyping, missing data, and handling bias in observational research. Through practical exercises and case studies, students will gain the skills needed to design and conduct robust research using EHRs in data-driven healthcare.

Sustainable Software Engineering

This module introduces principles and practices for building reliable, maintainable, and energy-efficient software in health research. Students will learn how to write clean, reusable code; use version control; implement testing frameworks; and adopt good documentation standards. The module also explores strategies for

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reducing the environmental impact of computing and promoting reproducibility in data-driven research. By the end, students will be equipped with the tools and mindset needed to develop sustainable software that supports long-term, collaborative health research projects.

Using Trusted Research Environments

This module provides an overview of Trusted Research Environments (TREs) and their role in enabling secure and ethical access to sensitive health data. Students will learn about data governance, privacy protection, and compliance requirements when working within TREs. The course covers practical skills for accessing, managing, and analysing data in these controlled settings, ensuring responsible handling of confidential information. By the end of the module, students will be confident in navigating TREs to conduct robust and compliant data-driven health research.

Using Cloud Computing

This module introduces cloud computing technologies and their application in data-driven health research. Students will learn how to utilise cloud platforms for scalable data storage, processing, and analysis, enabling efficient handling of large and complex health datasets. The course covers essential concepts such as virtualisation, resource management, security, and cost optimisation. Through practical exercises, students will gain hands-on experience deploying workflows and tools in cloud environments, preparing them to leverage cloud computing for flexible and powerful health data science.

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Using High Performance Computing (HPC)

This module introduces the principles and practical use of High Performance Computing (HPC) in health research. Students will learn how to access and work with HPC systems to manage and analyse large-scale biomedical datasets efficiently. Topics include parallel computing, job scheduling, data management, and optimisation of computational workflows. Hands-on sessions will provide experience with real-world tools and environments, equipping students to harness HPC resources for complex, data-intensive health research projects.

Medical Device Regulation and Quality Management

This module provides an overview of the regulatory landscape and quality management processes for medical devices, with a focus on digital health technologies and software as a medical device (SaMD). Students will learn about key regulatory frameworks such as the UK MDR and EU MDR, risk classification, clinical evaluation, and post-market surveillance. The module also covers principles of quality management systems (e.g. ISO 13485) and their role in ensuring safety, effectiveness, and compliance. By the end, students will understand how to navigate regulatory requirements and implement quality standards in the development of health technologies.

More modules are being developed and will be added over time.

TRANSFERABLE SKILLS TRAINING

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Besides the elective modules organised by the CDT, students benefit from a broad range of transferable skills training designed to enhance both their research and professional development.

Students will be able to access selected modules from King's MSc in Applied Statistical Modelling & Health Informatics, as well as Innovation Scholars programmes that encourage creative problem-solving and innovation.

Students also have access to premium online learning platforms such as Nature Masterclasses, SAGE Campus, Elsevier Researcher Academy, Databricks, and AWS, which offers over 400 hours of structured technical training to build practical skills. Additional opportunities come through King's Medical Research Council Doctoral Training Partnership activities, which provide interdisciplinary learning and networking.

Communication skills are developed through live workshops, helping students present their research effectively, while the King's Engaged Researcher Network fosters collaboration and peer support. For those interested in entrepreneurship, there is a comprehensive nine-month Digital Health entrepreneurship pathway that guides students in translating their research into real-world impact.

This flexible and personalised training structure ensures students build a solid core foundation while deepening expertise tailored to their research interests and career ambitions.

PLACEMENTS

As part of the training programme, all students are required to complete an assessed placement lasting approximately three months, typically during their second year of study. These placements are intended to expose students to professional environments outside academia and to strengthen their collaboration with external partners. Most placements are hosted by one of our industry or healthcare collaborators, and are designed to help students develop relevant skills, gain real-world experience, and explore the wider applications of their research. Students are also welcome to explore opportunities beyond those offered by the CDT's partners, should they find placements that would further support their research and professional development.

Students are expected to proactively identify a placement opportunity that aligns with their professional goals and complements their doctoral work. Those undertaking projects co-funded by an industry partner will generally be expected to complete their placement with that partner, as outlined in their studentship agreement. The CDT team will provide guidance and support throughout the placement preparation and evaluation process.

COHORT DEVELOPMENT

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Over the four-year programme, EPSRC DRIVE-Health students will engage in a rich and evolving suite of activities designed to build a strong, collaborative, and supportive research community. Cohort development is a key pillar of the CDT's training strategy, with structured opportunities to build personal and professional connections, encourage interdisciplinary learning, and promote a shared sense of belonging.

Through a mix of academic, social, and experiential activities, students will enhance their communication, leadership, and teamwork skills while navigating the challenges of doctoral research. These activities not only support students' personal development but also prepare them to become leaders in data-driven healthcare.

Welcome Week

The programme begins with Welcome Week, an intensive and engaging introduction to EPSRC DRIVE-Health. New students participate in a range of activities including induction sessions, student-led mentoring, lightning talks by current students, and social events. This week also marks the beginning of the Personal Development Plan process, where students work with the Training Lead to assess their individual development needs. Within the first three months, students will attend compulsory cohort induction training workshops on topics such as public involvement, research ethics, experimental design, and critical thinking.

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Residential

Each year, students attend a two- to three-day residential retreat held outside London. The Residential combines training with strategic planning and community building. Activities and workshops focus on transferable skills such as communicating research, leadership, personal branding, pitching skills, and co-designing CDT strategy. It also offers valuable time for cross-cohort interaction and creative problem-solving in an informal setting.

Data-DRIVE

The Data-DRIVE is a week-long, hackathon-style group project event held in the second term of the first year. Students work in teams on real-world datasets and challenges provided by EPSRC DRIVE-Health industry and NHS partners. This mandatory activity is designed to strengthen collaboration skills, encourage interdisciplinary thinking, and foster early engagement with real-life data problems. Students are welcome to participate in future iterations of the event to further hone their skills.

Summer Symposium

Held annually, the Summer Symposium is a flagship, student-led event that brings together students, supervisors, CDT partners, and invited guests. Centred around a theme chosen by our student body, the event features keynote speakers, poster sessions, student spotlight talks, and networking opportunities. It is a key moment in the CDT calendar for showcasing student research, fostering external connections, and celebrating cohort achievements.

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Monthly Meetings

The CDT hosts monthly cohort meetings that serve as both a social and academic touchpoint. These sessions provide a space for students to develop their communication skills through presentation, share updates on their research, discuss training needs, and offer feedback to the CDT team. They also help build community, encourage peer learning, and support collective problem-solving. The meetings evolve in response to student input and reflect the dynamic needs of the cohort.

Seminar Series

The Seminar Series is a monthly, student-led event featuring external speakers from academia, healthcare, and industry. As well as providing students with an opportunity to develop skills in organising academic events, these seminars offer insights into a wide range of research areas and professional pathways, providing students with opportunities to engage with leading experts and broaden their academic and career horizons. The series also strengthens professional networking and communication skills.

Additional Activities

- Public Engagement Fairs, hosted at King's Science Gallery.
- Sponsor showcases and poster sessions.
- Alumni and mentor networking events.
- Workshops on research resilience, healthcare sustainability, digital health entrepreneurship, and policy translation.

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- Personal development sessions on work-life balance, intellectual risk-taking, and responsible innovation.