MAHSE

Manchester Academy for Healthcare Scientist Education

# Clinical Bioinformatics STP
# MAHSE Open Day 2019

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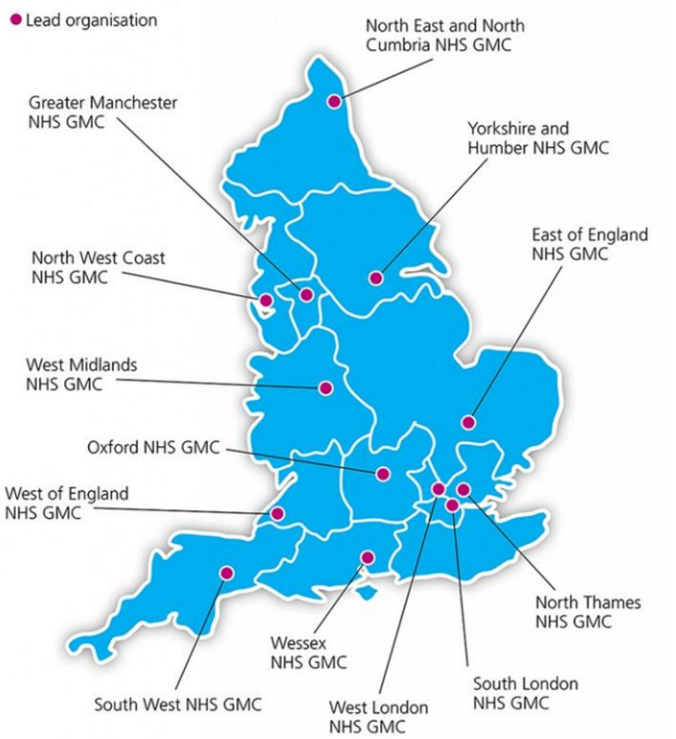
MANCHESTER 1824 The University of Manchester

Manchester Metropolitan University

UNIVERSITY OF LIVERPOOL

University of Salford MANCHESTER

# Genomics – Healthcare Transformation




Genomics england

# Transforming the NHS

## Make DNA tests routine, says England's chief medical officer

**Sally Davies calls for making genomic testing as common as blood tests to usher in the era of precision medicine to treat cancers and rare diseases**

News story

## Matt Hancock announces ambition to map 5 million genomes

The NHS Genomic Medicine Service is the first national genomic healthcare service in the world and will allow faster diagnosis and personalised care.


[Preparing the healthcare workforce for digital transformation]

https://www.theguardian.com/science/2017/jul/04/make-dna-tests-routine-part-of-nhs-care-says-uks-chief-medical-officer
https://www.gov.uk/government/news/matt-hancock-announces-ambition-to-map-5-million-genomes

Clinical Scientist:
Bioinformatician

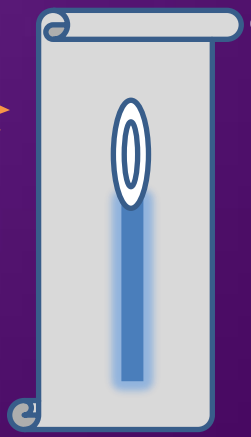
Genome
Technologist

Multidisciplinary
Teaching

Genetic
Counsellor

Clinical Scientist:
Geneticist

Clinician



# Big Data Climate for Healthcare

**DATA**


Vast data volume, velocity, variety

TSUNAMI

**METHODS & MODELS**

Supra-linear growth in papers & tools

BLIZZARD

**EXPERTISE**

Similar number of analysts

DROUGHT

We will develop the **next generation** of **health informaticians** who will possess the **technical skills** to design and perform complex analyses and the **business** and **informatics skills** to translate the information into business intelligence.

# Programme Structure

## MSc Clinical Sciences (Bioinformatics)

| MSc Clinical Sciences (Clinical Bioinformatics) | | | |
|---|---|---|---|
| | Year 1 | Year 2 | Year 3 |
| | Introduction to Healthcare Science, Professional Practice and Clinical Leadership [20] | Research Methods [10] | |
| | Clinical Bioinformatics: underpinning knowledge for rotational work based training [40] | | |
| | | **Genomics** | |
| | | Programming [10] | Next Generation Sequencing [10] |
| | | Advanced Clinical Bioinformatics [10] | Information Technology for Advanced Bioinformatics Applications [10] |
| | | Research Project in Clinical Bioinformatics [30] | Whole Systems Molecular Medicine [10] |
| | | | Research Project in Clinical Bioinformatics [30] |
| | | **Clinical & Scientific Computing** | |
| | | Clinical & Scientific Computing for the Physical Sciences 1 [20] | Clinical & Scientific Computing for the Physical Sciences 2 [30] |
| | | Research Project in Clinical Bioinformatics [30] | Research Project in Clinical Bioinformatics [30] |
| | | **Health Informatics Science** | |
| | | Policy, Strategy and Operational Management [10] | Systems Development and Design [10] |
| | | Co-Production of Health [10] | Information Knowledge Management [20] |
| | | Research Project in Clinical Bioinformatics [30] | Research Project in Clinical Bioinformatics [30] |
| **Credits** | | | |
| **Generic** | **20** | **10** | **0** |
| **Division/Theme** | **40** | **0** | **0** |
| **Specialism** | | **50** | **60** |
| **Total** | **60** | **60** | **60** |

https://curriculum.nshcs.org.uk/programmes/stp

Route Map: MSc Clinical Science (Clinical Bioinformatics)

MSc trainees begin by following the generic curriculum, which spans all divisions (blue), together with some theme-specific modules (yellow). In Year 2 of the MSc, trainees specialise (orange) in genomics

# Clinical Bioinformatician (Genomics)

- Responsible for **analysing and interpreting genomic data** and advising other scientists and clinicians to best inform patient care.
- Involved in **building the IT infrastructure** including appropriate servers, databases and pipelines to analyse the data.
- **Leadership** role in establishing best-practice for data analysis and interpretation, data storage and governance within their laboratory.
- **Communication** with **multidisciplinary teams** including clinical scientists, clinical geneticists, other specialty clinicians and genetic counsellors, and advise colleagues with respect to interpretation of genetic data that will inform patient care also **external solution providers** and training of other **staff** and **informing the public**

# Clinical Bioinformatician (Health Informatics)

- You will **advise other healthcare professionals**, and **lead and develop strategies** in the following areas:
  - **Data management** - collection, quality, representation
  - **Governance** –Security, patient confidentiality
  - **Systems** design and development, and technologies
  - **Data analysis**, interpretation and reporting
- Work as a **multi-disciplinary team**
- **Strong communication skills** to influence decision-making to ultimately improve the delivery of healthcare.

# Bioinformatician (Physical Sciences)

- Combines **computer science, statistics, mathematics**, and engineering to study and process biological data.
  - creating **computer-related interfaces** to control specialist medical equipment
  - **commissioning** (and approving) computer-related interfaces for clinical use
  - ensuring that the equipment and computer-related interfaces are continually fit for purpose
  - **constructing software**, either to model biological processes, investigations and treatments or to investigate and manipulate data produced by medical devices.

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## University of Manchester

- **Andy Brass** – *Programme Co-Director of Clinical Bioinformatics*
- **Ang Davies** – *Programme Co-Director of Clinical Bioinformatics*
- **Andrew Devereau** – *Clinical Lead of Clinical Bioinformatics*
- **Evangelos Kontopantelis E.Kontopantelis@manchester.ac.uk** - *Pathway Lead Health Informatics*
- **Manoj Mistry & John**– *Lay representatives*
- **Fern Johnson, Samuel Rowston, Adriana Toutoudaki, Christine Hicks** *Student representatives*

## University of Liverpool

- **Paul Nolan** – *Pathway Lead Medical Physics*
- **Azzam Taktak**
- **Tony Fisher** – *Clinical Lead Medical Physics*

## Administrators

- **Natalia Rossi**– *Clinical Bioinformatics*
- **Kate Evans and Amanda Benson** - *MAHSE*

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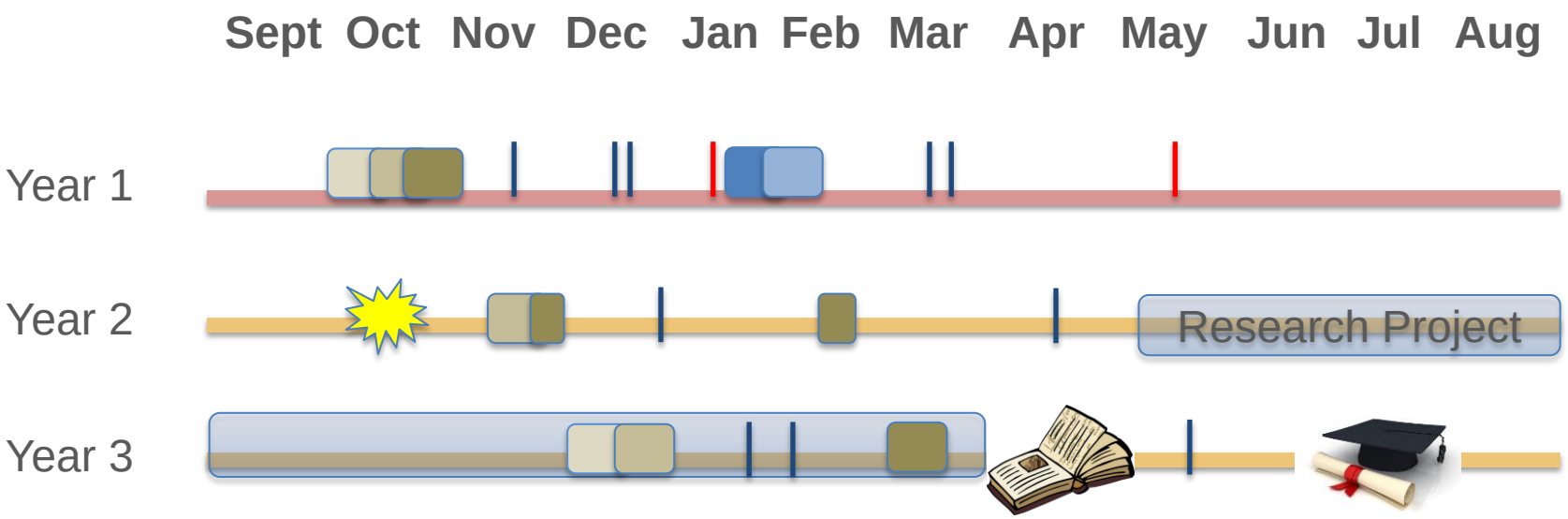
# Timelines




Teaching block in Manchester

Assignment deadline

Exam

Teaching block in Manchester/Liverpool

Project idea / research proposal submitted

Dissertation deadline

# Credit weightings

- **180 credits in total**
  - 120 credits taught
  - 60 credits research project
  - 1 credit = 10 hours study
- **National School stipulates 1 day/week academic work**
  - **Does not** include completion of OneFile
  - **Does not** include time in Manchester

# Flipped Problem-based Learning

- What is it?
  - It's a way of combining online learning with case-based scenarios studied in small groups
- What are the benefits?
  - To teach students how to work in groups and manage group projects
  - To improve and develop transferable skills of students
  - To develop problem solving skills of students
  - To encourage self-motivation, curiosity and thinking
  - **Creation of communities of practice**

# Genomics Projects

- VASA: An ACMG **Va**riant **S**coring **A**ssistant for genetic variant classification, variant review and teaching
- Development of a Clinical Next Generation Sequencing (NGS) **variant database**
- Next Generation **Copy Number Variation (CNV) Analysis**: Using whole genome sequencing to develop a sensitive diagnostic test for structural variants
- Machine learning to predict chronological age from metabolomic, genomic and glycomic data.
- Investigate the use of unique molecular identifiers to improve the sensitivity of detection of somatic variants in myeloma

# Health Informatics Projects

- iMerseySide – I'M MOBILE
  - Delivers bespoke apps, developed in-house to community-based clinicians with access to clinical/patient data from a tablet device
- Salford Lung Study – pragmatic clinical trial
  - Focuses on COPD and Asthma patients in Salford GP practices
  - Uses EHR to monitor patients in the trial in real-time with minimal intrusion
- WW&L Trust - Linking Health and Social care records
- Bibhas Roy - Shoulder Surgeon and PROMs
  - Design an interface/system to ensure patients are monitored after surgery via online questionnaires
  - ACTION can link to other technologies

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# Our graduates

- 31 students: 24 distinctions and 7 merits
- Most secured band 7 clinical scientist roles/other NHS roles/HSST posts

# Further Information

- Contact:
  - Angela.davies@manchester.ac.uk (Genomics)
  - Admin: Clinical.Bioinformatics@manchester.ac.uk
  - a.c.fisher@liv.ac.uk (Physical Sciences)
  - E.Kontopantelis@manchester.ac.uk(Health Informatics)
- Being a Clinical Bioinformatician: https://www.youtube.com/watch?v=scESiT3hygs
- https://www.genomicseducation.hee.nhs.uk/news/item/454-your-invaluable-genome/
- Twitter - @MSCclinbioinf
- Twitter - @HI_Education @HeRC_Farr #datasaveslives
- MOOC (FutureLearn): Clinical Bioinformatics: unlocking genomics in healthcare: https://www.futurelearn.com/courses/bioinformatics
- https://stpperspectives.wordpress.com/
- Article: http://www.frontlinegenomics.com/news/24628/developing-a-new-profession-introducing-the-clinical-bioinformatician/