MAHSE STP Open Day 2018 - Clinical Bioinformatics handout

Genomics – Healthcare Transformation

Mainstreaming Genomics

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

Genomics Focus

Annual Report of the Chief Medical Officer 2016

Generation Genome

Genomics is not tomorrow. Its here today. I believe genomic services should be available to more patients, whilst being a cost-effective service in the NHS. This is exciting science with the potential for fantastic improvements in prevention, health protection and patient outcomes.
Now we need to welcome the genomic era and deliver the genomic dream!

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/631043/CMO_annual_report_generation_genome.pdf

Clinical Scientist: Bioinformatician

Genome Technologist

Multidisciplinary Teaching

Genetic Counsellor

Clinical Scientist: Geneticist

Treatment   Patient

Clinician

Slide 1
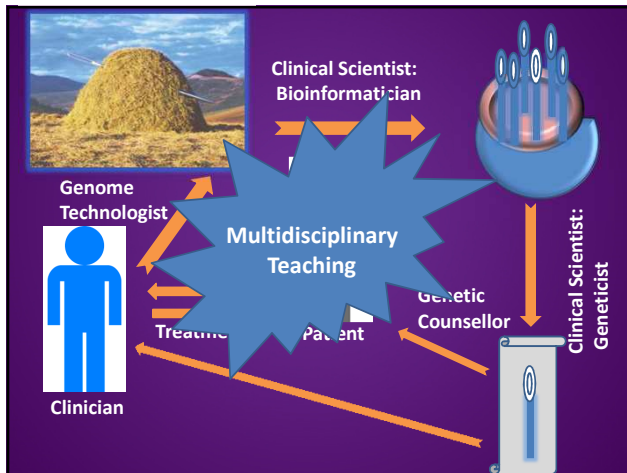
Big Data Climate for Healthcare

DATA   **METHODS & MODELS**   **EXPERTISE**

Vast data volume, velocity, variety	Supra-linear growth in papers & tools	Similar number of analysts
TSUNAMI	BLIZZARD	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.

Slide 2

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

http://www.networks.nhs.uk/nhs-networks/msc-framework-curricula

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

Slide 3

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**

Slide 4

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.

MANCHESTER
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The University of Manchester

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*
- **Georgina Moulton** – *Pathway Lead Health Informatics*
- **Manoj Mistry & Allison Allam** – *Lay representatives*
- **Rosie Coates-Brown, Christine Hicks, Tim Howcroft & Adriana Toutoudaki** *Student representatives*
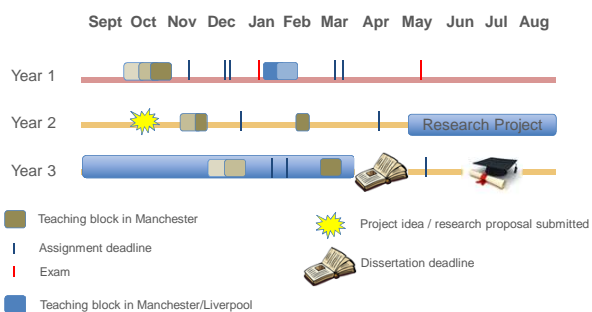
University of Liverpool
- **Paul Nolan** – *Pathway Lead Medical Physics*
- **Azzam Taktak**
- **Tony Fisher** – *Clinical Lead Medical Physics*

Administrators
- **Lisa McAuliffe**– *Clinical Bioinformatics*
- **Sarah Williams & Kate Evans** - *MAHSE*

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Timelines

Sept Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug

Year 1

Year 2   Research Project

Year 3

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 Online Learning & Assessment tool
  - **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

- **Implementation of ISO Standard** 15189: 2012, quality control procedures and software management systems in a Clinical Bioinformatic analysis pipeline
- 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

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

Our graduates

- 21 students
- 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)
  - Georgina.moulton@manchester.ac.uk (Health Informatics)
- https://www.healthcareers.nhs.uk/explore-roles/clinical-bioinformatics
- Twitter - @MSCclinbioinf
- Twitter - @HI_Education @HeRC_Farr #datasaveslives
- MOOC (FutureLearn): Clinical Bioinformatics: unlocking genomics in healthcare: https://www.futurelearn.com/courses/bioinformatics (next run April 2018)
- Article: http://www.frontlinegenomics.com/983/front-line-genomics-magazine-issue-three/