

Knowledge exchange:

Genomic Science
training at the Wellcome
Sanger Institute
1993-2023





Introduction

Knowledge exchange at the Sanger Institute encompasses a wide range of activities including collaborations within and beyond the Institute, sharing our research findings and data, and sharing knowledge globally through training. Our researchers and technical experts work closely with the Institute’s Wellcome Connecting Science programme to share knowledge and design and deliver training.

Wellcome Connecting Science use learning and training to widen the impact and reach of our science, globally. They identify training needs in emerging areas of healthcare arising from the rapid developments in genomic technologies and have made sustained contributions to capacity building globally, through training in technical skills and methodologies, creation of educational materials and schools engagement activities. Wellcome Connecting Science also informs public discourse on genomic science, and measures public attitudes towards genomic science.

Training in genomics

Wellcome Connecting Science develops and delivers content for courses and conferences in working with colleagues at the Wellcome Sanger Institute and partners at EMBL-EBI. Courses are developed to address defined gaps in skills and knowledge and to share expertise in cutting-edge methods.

Learning and training is delivered in three ways:

- In-person training courses and in-person/hybrid conferences held on the Wellcome Genome Campus at the Hinxton Hall Conference Centre.
- In-person training courses held at regional hubs in Latin America, Asia, and Africa.
- Online courses.

Face-to-face immersive training has been the focus of the courses delivered on the Wellcome Genome Campus and in LMICs, as it provides opportunities for exploring topics in detail and building new research networks and collaborations, adding substantial additional value to the core learning objectives.

Table 1. Number of courses delivered 2011-2022.

Year	2011/ 12	2012/ 13	2013/ 14	2014/ 15	2015/ 16	2016/ 17	2017/ 18	2018/ 19	2019/20	2020/21	2021/22
Number of courses – Genome Campus	20	29	22	21	31	25	30	29	7 (virtual and in-person)	14 (virtual only)	14 (virtual and in-person)
Number of course participants – Genome Campus	454	848	550	496	800	626	750	723	462	263	590
Number of Global Training courses	5	4	6	6	5	6	9	10	2 (in-person)	14 (virtual only)	9 (virtual only)
Number of Global Training participants	119	90	134	133	106	129	220	235	67	89	262





In-person courses at the Wellcome Genome Campus

On average twenty-six in-person training courses took place each year between 2011 and 2019. During the COVID-19 pandemic, courses were delivered virtually, before returning to being in-person in 2022-2023.

Bioinformatics-based courses comprise around 25% of the training. They are open to applicants from anywhere in the world. Attendees from LMICs are offered financial support, and comprise between 10-40% of course participants with 60-90% from the UK, Europe, and the USA.

Many courses are linked to our scientific programmes, and provide an important route for sharing the knowledge of new methods, tools, and research findings.

In-person courses held in Latin America, Asia, and Africa

Courses are often held in LMICs, aimed exclusively for participants from each region and drawing participants from surrounding countries:

- Latin America: Uruguay, Peru, Argentina.
- Asia: Vietnam, Malaysia.
- Africa: Ghana, Kenya, Uganda, South Africa.

Sustained demand for these courses led to the development of new approaches, such as the Train-the-Trainer programme, which equips participants with the skills to pass on their learning. Course content and topics are designed in collaboration with local partners to address defined skills gaps and build research capacity in genomics.

Global training courses primarily focus on infectious disease, genomic surveillance of infectious disease and public health. Examples from 2023 include:

- Antimicrobial resistance in bacterial pathogens - Asia
- Cancer Genome Analysis – Latin America and the Caribbean
- Polygenic Risk Score Analysis – Africa
- Single Cell Genomics - Latin America and the Caribbean
- Helminth Bioinformatics – Asia
- Molecular approaches to clinical microbiology in Africa

The learning acquired we and our collaborators acquired through the COVID-19 Genomics UK (COG-UK) consortium, was collated into a multi-module training programme, COG-Train, which was delivered over an 18-month period in 2022-2023. Established as a collaboration between Wellcome Connecting Science, COG-UK, and partners all over the world as trainers and advisors, COG-Train was funded by Wellcome to share COVID-19 genomics expertise globally through a portfolio of open-access courses which blended online, virtual, and face-to-face training (Figure 1).

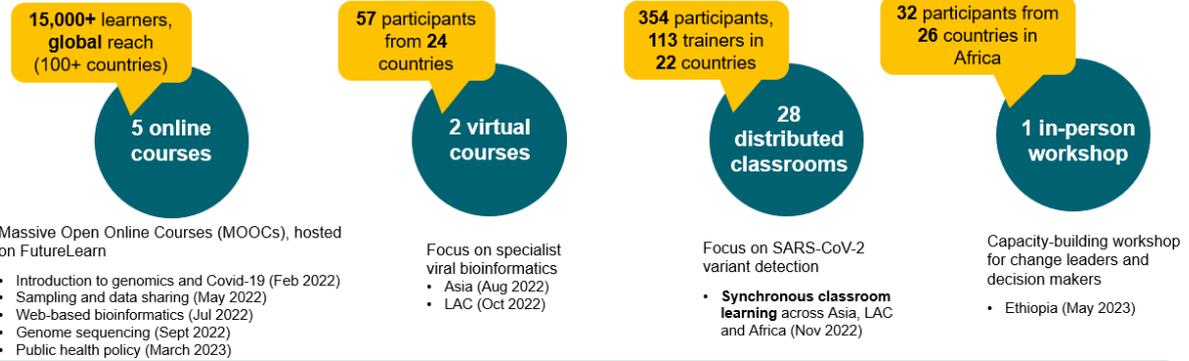




Accelerated programme of training: COG-Train

A partnership between Wellcome Connecting Science and COG-UK
Started October 2021 - project completion Dec 2023

COG-Train portfolio: Providing open-access learning and training



Massive Open Online Courses (MOOCs), hosted on FutureLearn

- Introduction to genomics and Covid-19 (Feb 2022)
- Sampling and data sharing (May 2022)
- Web-based bioinformatics (Jul 2022)
- Genome sequencing (Sept 2022)
- Public health policy (March 2023)

Focus on specialist viral bioinformatics

- Asia (Aug 2022)
- LAC (Oct 2022)

Focus on SARS-CoV-2 variant detection

- **Synchronous classroom learning** across Asia, LAC and Africa (Nov 2022)

Capacity-building workshop for change leaders and decision makers

- Ethiopia (May 2023)

Impact evaluation is ongoing - reported at project end

Figure 1. The COG-Train training programme, combining the online courses with the remote classroom model, delivered in 2022-2023.

Participant feedback

We use regular feedback and gap analyses are used to ensure the relevance and effectiveness of our courses. Broad evaluations allow us to assess the impact of the training courses.

Nearly all participants rate our courses as good or excellent. The majority of participants report that they can apply what they had learned, and that our courses contribute to career progression, new publications and grant applications. Analysis of the feedback received has highlighted the continuing relevance of three key goals: i) to accelerate global research in genomics; ii) develop global capacity; and iii) contribute to the implementation of genomic medicine.



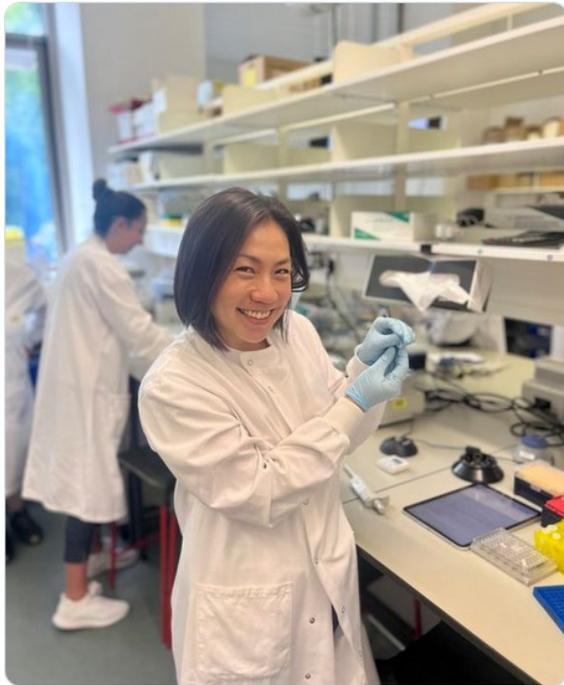


Antonia Ho
@DrToniHo

I've been let loose in a lab! 🥳🥳

Over a decade since I've held a pipette, but really enjoyed immersing myself in the technical details of metagenomic & target enrichment sequencing. 🧪🔬

Thanks to the amazing @ConnectingSci instructors from @CVRinfo @CVR_Genomics @ucl @UKHSA



Rebecca Miller @Rebecca_MSc · 7 Sep

I attended this excellent conference in my first year, grateful to be attending again as I wrap up my PhD!

#neuroscience #neurodegeneration #trafficking #science #conference

Wellcome Connecting Science Learning and Training @eventsWCS · 6 Sep
Welcome to all our Trafficking Pathways in Neurodegeneration delegates! 🙌

We're delighted to be joined by 180 scientists, from 38 countries, for exciting discussion on the latest #genomics tools/approaches to tackle #BrainDisorders. 🌍🔬🧬

Join the conversation 🗨️ #NeuroPath23



Welcome to:
**Trafficking Pathways
in Neurodegeneration**

6-8 September 2023



Join the conversation on social media using #NeuroPath23

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Wellcome Connecting Science Learning and Training
@eventsWCS

🎉 Congratulations to the #SciPol23 bursary winners! 🙌

Thanks to @RoyalSocBio for generously sponsoring these awards. 🙌

#Bursaries #GrantFunding

#AcademicChatter #ECRchat #PhDChat #SciencePolicy #Inclusion





Audiences

Most of our courses are aimed at early or mid-career life science researchers who are seeking to develop and/or diversify their research skills. As the intersection between genomics and applications in healthcare grows, several training courses also target healthcare professionals. In-person courses aimed at healthcare professionals with an interest in genomics include:

- Genomics for Dermatology
- Clinical Genomics: Fundamentals of Variant Interpretation in Clinical Practice
- Genomic Practice for Genetic Counsellors
- Genomics and Clinical Virology

Conferences generally bring together multi-disciplinary communities of researchers and healthcare professionals, around a specific topic. Delegates range from early career stage researchers and PhD students, to leaders in the field. New conferences such as World Congress in Genetic Counselling and Nursing Genomics and Healthcare specifically cater for healthcare professionals and complement some of the courses.

Some conferences have become regular meetings that have over time been embedded within their respective communities, e.g. Genome Informatics (2001-); Genomics of Rare Disease (2007-); Applied Bioinformatics and Public Health Microbiology (2008-); Genetic Epidemiology of Malaria (2010-); Epigenomics of Common Diseases (2011-) and Exploring Human Host-Microbiome Interactions in Health and Disease (2012 -). Some of these have led to the creation of new consortia and initiatives, such as DECIPHER and MatchMaker Exchange enabling sharing of genomic data for patient benefit.

Conclusion

The courses and conferences developed by Wellcome Connecting Science have influenced the research and careers of participants as well as feeding back into the policy and practice of the organisations they represent. The established network of the Sanger Institute and other campus partners, alongside strategic partnerships with many consortia have enabled courses to be tailored rapidly according to need, and filling skills gaps. Training in LMICs has reached large audiences, with initial evaluation confirming that they are relevant and address training expectations.

Courses and conferences have a global reach and participants from more than 100 countries have attended. Courses and conferences have expanded over the 25 years of delivery from Hinxton. Between 2014-2019, 49 in-person conferences, 50 unique in-person courses on the Genome Campus and 18 unique courses in multiple LMIC regional hubs were held. Researchers remain the key audience, with increasing numbers of courses tailored for healthcare professionals.

Participant feedback indicates that the courses and conferences are having substantial impact on the capability of participants to understand genome science, conduct research, and develop careers in the field.

