Molecular Techniques to Monitor and Investigate Antimicrobial Resistance (AMR): Course Information Document

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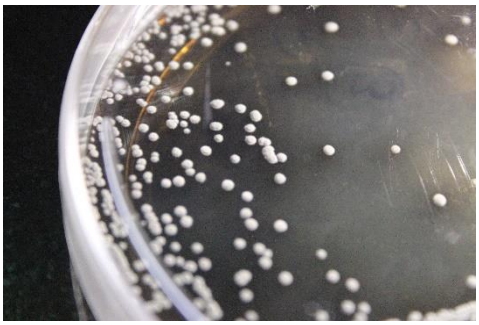
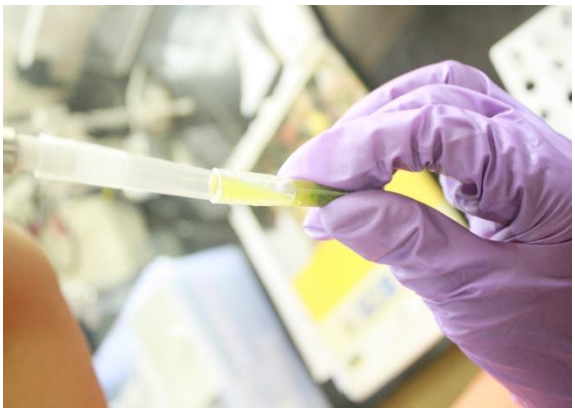


The growing prevalence of AMR is a global health challenge that requires accurate and rapid diagnostic methods to confirm phenotypic testing in surveillance studies and to understand the mechanisms responsible for the development of AMR. This course will provide the training for researchers to become expert in the detection of AMR, using techniques from basic antimicrobial susceptibility testing to molecular diagnostic methods.

Although AMR is a global issue, it is of particular importance in low and middle-income countries (LMICs) where antibiotics are widely available without the need for a prescription and where antibiotics are used inappropriately and excessively by humans and in livestock production. In such contexts, interventions to prevent further development of AMR are very urgent.

In order to inform AMR surveillance programmes that can track resistant microbes, their genes, and their mutations, molecular diagnostic methods are necessary. The detection of AMR in pathogens can be done by identifying phenotypic resistance using antibiotic susceptibility testing. However, this method is time consuming and insufficient to understand how AMR develops and spreads. Molecular methods are capable of detecting the exact genes or mutations in microbes which is needed to interpret AMR profiles at surveillance sites and overall understand the global occurrence and spread of certain resistance mechanisms. From a One Health perspective, monitoring the presence and development of resistance genes in bacteria infecting humans and animals and throughout the natural environment (soil and water) is critical to understanding and preventing the spread of AMR.



Although many microbiology laboratories have the capability to do phenotypic testing of AMR bacteria, they are unable to carry out resistance gene analysis and molecular diagnostics. Due to lack of knowledge, skills, and resources most research groups and laboratories are unable to develop molecular diagnostic capabilities. This course will train researchers in both advanced phenotypic testing and AMR molecular diagnostics. Those who undertake this course will have up-to-date knowledge and expertise on the measurement and understanding of AMR. These skills will allow the trained individuals to play a valuable and important role in helping national and international efforts to monitor and control the threat of AMR.

Intended Learning Outcomes: the 6-week online course and practical training intend to deliver the following learning outcomes: At the end of this course you will:

1) Develop theoretical understanding of the research skills for the diagnosis of AMR including:
   A) phenotypic resistance testing
   B) More advanced quantitative and molecular-based methods and their quality control

2) Obtain the skills to put into practice the knowledge and skills taught in the online course including:
   A) All necessary skills in obtaining and handling samples of faeces from animals and humans and samples of soil and water from the environment
   B) Growing pure culture
   C) Phenotypic disc diffusion analysis of resistant isolates
   D) Serotyping/phage typing
   E) Quantitative and molecular-based approaches including Polymerase chain reaction (PCR), quantitative PCR (qPCR), Next-generation Sequencing (NGS) and introducing whole genome sequencing and its uses for typing, generating phylogenetic trees, resistome analysis and identifying mutations related to AMR.

Entry Requirement: The course is tailored for post-graduate students and early career researchers. However, all interested participants with a bio-sciences background are encouraged to apply.

Time Commitment: The 6-week online course is free to attend, however, a time commitment is required to from participants. Two opportunities will be available to participate in the online course. These will run from **24th May – 4th July**, and **14th June – 26th July**. The online course can be undertaken at the participant's home or place of work and will be delivered through online materials including tutor-led interactive discussion forums based on audio and video-based materials and self-assessment quizzes.

In addition, there will be 10-day hands-on practical training on necessary skills, for selected participants from these online programs. The practical training will be only offered to 10 participants who are nationals of India (6), Bangladesh (2) and Sri Lanka (2) based on the successful completion of the course. The practical training will be held at the Anand

Agricultural University (AAU), India and Gujarat Biotechnology Research Centre (GBRC) in July or August. However, this is dependent on developments of the COVID-19 pandemic and associated travel restrictions.

Awards and Credits: A joint RVC/AAU certificate will be awarded to participants upon completion of the course, and an additional certificate will be issued to those who participate in the practical training. Successful completion of the online course will provide 7 academic credits (UK Credit accumulation and transfer scheme credits https://www.qaa.ac.uk/docs/qaa/quality-code/academic-credit-framework.pdf?sfvrsn=940bf781_12). A further 7 UK CATS credits are awarded for completion of the practical course for those who are eligible.

Applications will open on the **15th April** and will close on the **7th May**

For course-related enquiries, please contact Mr Jean-Christophe Arnold

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