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HM Government



NEXT GENERATION DIAGNOSTICS



DELIVERED IN PARTNERSHIP WITH THE
NATIONAL MEASUREMENTS LABORATORY



A UK CENTRE OF EXCELLENCE
FOR THE BIOSCIENCE INDUSTRY

TRAINING

WELCOME

Dr Jen Vanderhoven

DIRECTOR

Welcome to the National Horizons Centre (NHC). We are Teesside University's centre of excellence for the biosciences and healthcare sector. With research, partnerships and training at our core, we bring together industry, academia, talent and world-class facilities to create real-world impact.

As a National Training Centre for Advanced Therapies, funded from the Department for Business, Energy & Industrial Strategy and Innovate UK delivered through the Cell and Gene Therapy Catapult, our courses are industry approved and we have worked closely with key bioindustry leaders across the sector to ensure our courses have been designed to deliver vital skills needed for advanced therapies, vaccines manufacturing and bioprocessing.

Delivered in partnership with the National Measurement Laboratory this course covers all aspects of diagnostic methods used in clinical medicine including current best practices through to novel approaches to improving healthcare outcomes using smart technologies. Participants will take part in a combination of theoretical and hands-on practical sessions in our state-of-the-art teaching facilities.

I look forward to welcoming you to the NHC.

Learning outcomes:

- > Develop an understanding of the elements of developing a diagnostic method spanning discovery, development, evaluation and integration.
- > Evaluate the genomic and proteomic approaches used for tissue and fluid samples.
- > Recognise and interpret the key measures by which the accuracy of diagnostic methods is assessed.
- > Gain an appreciation of the regulatory process for adoption in the UK and US.

Who should attend:

- > Academic scientists seeking to translate their discoveries.
- > Clinicians wanting to engage in translational research.
- > Academics, clinicians and industry scientists seeking to understand the data by which diagnostics are evaluated.
- > Academics, clinicians and industry scientists looking to upskill.

The NHC is one of the National Training Centres part of the ATSTN programme funded from the Department for Business, Energy & Industrial Strategy (BEIS) and Innovate UK (IUK) delivered through the Cell and Gene Therapy Catapult.



COURSE OVERVIEW

MODULE 1 - Introduction to Diagnostics

Session 1	Lecture - Introduction to diagnostics History of diagnostic testing, major breakthroughs in testing and the future of diagnostics.
Session 2	Lecture - The importance of early detection Oncology. Non-oncology: diabetes, neurodegenerative conditions.
Session 3	Lecture - Blood assays and testing Clinical and metabolic chemistry. Immunological assays. Flow cytometry.
Session 4	Lab Practical – Blood typing Immunological approaches to include blood type, rhesus factor, haematocrit, red cell count, white cell differentiating count.
Session 5	Lab Practical - Flow Cytometry Principles of flow cytometry and its applications – with a focus on haematological malignancies.
Session 6	Lab Practical/Tour - Analytical biochemistry Overview of analytical biochemistry approaches followed by a tour of the state-of-the-art facilities at the NHC.

MODULE 2 - Genomic Testing

Session 1	Lecture - Introduction to genomic testing Sanger sequencing. Illumina sequencing. Long-read sequencing.
Session 2	Lab Practical – qRT-PCR Detection and measurement of genes.
Session 3	Lecture - Proteomic analyses from solid samples Methods to determine spatial distribution and quantitative expression of proteins of interest. This session will focus on histology and Nanostring approaches.
Session 4	Lab Practical - RNA analyses How RNA is isolated from FFPE samples and analysed using the Nanostring platform.
Session 5 Industry Speaker	Lecture – Consistency and reproducibility in diagnostic testing

MODULE 3 – Innovations in Diagnosis; evaluation towards implementation

Session 1	Lecture - Commonly used methods
Session 2	Computer class - Use of statistics in evaluating diagnostic methods ROC curves, sensitivity, specificity, PPV and NPV.
Session 3	Lecture - Novel methods Wearable, non-invasive sensors – and their implications for patient-centred monitoring.
Session 4	Lecture - Bioinformatics QC, alignment and variant calling for NGS data. Nanostring data analysis. Viral sequencing and clinical metagenomics - and its relevance to Covid.
Session 5 Industry Speaker	Lab Rotation 1 - Approvals Processes for seeking approvals in the UK and US.
Session 6	Lecture - Integration into UK healthcare

