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# INTRODUCTION TO ANALYTICAL TECHNIQUES FOR BIOPROCESSING



A UK CENTRE OF EXCELLENCE  
FOR THE BIOSCIENCE INDUSTRY

TRAINING



TEES VALLEY MAYOR



HM Government



# 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 (BEIS) and Innovate UK (IUK) 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.

This three-day course introduces analytical techniques, analytical method development and validation

for therapeutic proteins, including antibodies and enzymes. Content includes basic knowledge of protein chemistry, manufacturing of protein drugs and associated regulatory affair knowledge.

Our unique training facility houses state-of-the-art equipment that provides delegates with the opportunity to gain hands-on practical training in complex bioprocessing procedures.

**I look forward to welcoming you to the NHC.**

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

### DAY 1

#### Lecture one

Introduction to Bioprocessing – Analytical Challenges

#### Lecture two

Introduction to Polymerase Chain Reaction (PCR) – Application in Bioprocessing

#### Lecture three

Determining viral titres

#### Practical session one

Designing Primers using digital technologies

#### Lab one

PCR technique in the lab

#### Lab two

Technique in the lab

#### Lab three

ELISA technique  
>ELISA to derive  $K_D$ .  
>Immunoprecipitation.  
>Hook effect in ELISA.

### DAY 2

#### Lecture four

Image Quant 800 CCD camera system and Typhoon Laser Scanner for imaging and analysis of 1D and 2D protein gels

#### Lecture five

Screening, characterization, process optimization, and quality control of small molecules and biotherapeutics; an introduction to Biacore SPR

An overview of how Biacore SPR systems are used to measure kinetics, affinity, concentration and specificity biomolecular interactions in real time.

#### Lecture six

Key applications in bioprocess analytics

#### Lecture seven

Key steps in setting up a Biacore SPR kinetics assay

- >The general steps in a Biacore assay compared to ELISA.
- >How to capture molecules on the sensor surface.
- >Sample and buffer prep, sample injection, regeneration, and key considerations for kinetic assays.

#### Lab four

Biacore technique in the lab - mAb kinetics

#### Lab five

Imaging techniques

#### Lab six

Agarose gel electrophoresis - PCR technique in the lab

### DAY 3

#### Lecture eight

Stability testing of biologics through spectroscopy and dynamic light scattering

#### Lecture nine

Analytical ultracentrifugation

#### Lecture ten

Applications of flow cytometry

#### Lecture eleven

Mass spectrometry case studies – mAb characterisation and HCP analysis

#### Lab seven

LC-MS basic instrumental set up and principles

#### Lab eight

Preparation for LC-MS – applications in bioprocessing

#### Lab nine

Waters Centre for Innovation: Mass spectrometry lab tour