



# MAMMALIAN CELL CULTURE

## JIB INDUSTRY BIOPROCESS TRAINING (IBioT) PROGRAM

July 15 - 17, 2019

October 4 - 6, 2019

Jefferson Institute for Bioprocessing, Spring House Innovation Park

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### COURSE PROGRAM SYNOPSIS:

Chinese Hamster Ovary (CHO) is the cell expression system of choice in the growing field of both monoclonal antibody manufacturing and proteins with complex posttranslational modifications. In traditional deep-tank mechanically stirred bioreactors, production levels have increased 10,000-fold during the past two decades and product protein titers are now routinely measured in grams per liter. These achievements are leading to significant cell culture bioprocess sophistication, and, along with emerging single use and continuous technologies, are making the future of flexible bioprocess manufacturing a distinct possibility.

This three day hands-on intensive course is designed and delivered by industry experts at Jefferson's state-of-the-art facility located at Jefferson Institute for Bioprocessing (JIB). The course is intended for professional scientists and engineers who wish to enhance their knowledge and training in the upstream functional area of cell culture process design and operation. The primary goal of the course is to update the participants' background in mammalian cell biotechnology; from bioreactor design to scale-up/scale-down, and general operation.

### COURSE OVERVIEW

Scientific, engineering, and practical industrial aspects will be presented in a series of interactive presentations and workshops complemented with case studies and laboratory demonstrations in JIB. Course attendees will gain first-hand experience in principles of mammalian cell culture technologies, process development, scale up and scale down, control and measurement of dissolved oxygen, pH and temperature, setting up and running experiments, and analyzing data from high cell-density, fed-batch and perfusion cultures in lab and pilot-scale bioreactors.

### FORMAT

This three-day course is highly experiential and integrates seminars and presentations in a group setting with lab work or advanced projects gauged to the experience level of each participant.

Typically, presentations and workshops will take place in the morning, with case studies, lab demonstrations, and advanced project discussions in the afternoon. Break out sessions will be based on participants' experience.

This format maximizes content appropriateness for each participant, offers the opportunity to apply knowledge gained in the morning to a lab and pilot-scale operation or project/computational design and case studies in the afternoon. Sessions are structured to provide ample time for interaction between participants and speakers.

## LECTURE TOPICS

- Cell culture bioreactor design and scale-up and scale-down models
- Impacts of agitation and aeration on cell growth and product quality
- Batch vs. fed-batch vs. perfusion bioreactor
- pH measurement and control
- Dissolved oxygen measurement and control
- Volumetric Oxygen transfer rate and its impact on cells growth
- Impact of shear on cells in bioreactors
- Design and operation of single use bioreactors
- Media selection and optimization
- Cell culture Process Analytical Technology (PAT)
- Integration of cell culture processes with downstream product recovery and purification
- Key issues and tools used in industrial cell culture operations, including economies of scale, control charts, and process flow diagrams
- Measurement of cell growth, death, and primary metabolism
- Performance of mammalian cell culture operations under current Good Manufacturing Practices (cGMPs)
- Operation of a laboratory- and pilot-scale bioreactors, for growth of a high-density, suspension culture
- Measurement, tracking, and control of culture pH, oxygen, temperature and other environmental parameters

## COURSE DIRECTOR

**Parviz Shamlou** – Executive Director and Head, Jefferson Institute for Bioprocessing (JIB)

## WHO SHOULD APPLY?

JIB has designed this MCC course for scientists and engineers with a diverse range of industry skills and experiences. The course will provide practical operations training for industry professionals with little/no lab experience as well as expand the knowledge of those with previous bioprocessing background.

## LOCATION

The course will be held at the state of the art Jefferson (University) Institute for Bioprocessing, a 25,000 sq. ft. fully flexible cGMP-like facility approximately 20 miles northwest of Philadelphia with close access to the Philadelphia International Airport, highways, hotels, and restaurants.

## FEE

The course fee is \$3,000 per attendee, and includes all lab equipment and supplies, handouts and materials. Breakfast, lunch, snacks and 1 course dinner are also included. If requested, the JIB team can assist in securing convenient accommodations.

## ACCOMMODATIONS

**Residence Inn by  
Marriott Philadelphia  
Montgomeryville**

1110 Bethlehem Pike  
North Wales, PA 19454  
267-468-0111

**Hampton Inn &  
Suites Philadelphia  
Montgomeryville**

121 Garden Golf Blvd.  
North Wales, PA 19454  
215-412-8255

**Courtyard by  
Marriott Philadelphia  
Montgomeryville**

544 Dekalb Pike  
North Wales, PA 19454  
215-699-7247

**Candlewood  
Suites Philadelphia-  
Willow Grove**

250 Business Center Dr.  
Horsham, PA 19044  
888-614-3125

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