



Training Catalogue





About Us

National Institute for Bioprocessing Research and Training (NIBRT) is a global centre of excellence for training and research in bioprocessing. NIBRT's unique bioprocessing training facility allows trainees the opportunity to learn and practice complex technical bioprocessing procedures. NIBRT provides a range of programmes which are specifically tailored to meet the needs of trainees who wish to develop their careers in the bioprocessing industry.

www.nibrt.ie

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Why train with NIBRT?



Welcome to the NIBRT Training Catalogue for 2021.

We are pleased to present NIBRT's Training Catalogue for 2021 which includes a wide

variety of courses and training solutions to suit your personal or corporate learning requirements. In 2020 we successfully delivered over 25,000 learning days to over 4,700 trainees, who come to NIBRT for many reasons including:

State-of-the-art training facilities

The centre piece of the NIBRT training offering is the state-of-the-art pilot production facility which has continued to evolve since we first opened for training collaborations in 2011. Our current courses are focused on key aspects of drug substance and drug product manufacturing from *"vial to vial"*, utilising a range of fixed-in-place stainless steel and flexible single-use technologies. Associated quality control training in bioanalytics, product characterisation and microbiological testing are also addressed in our current curriculum. The simulated GMP nature of our facility design and operation allows for all our trainees to experience active and engaged learning in a real-world environment.

Customisation of training content

NIBRT continues to offer its clients a flexible approach to collaborate on course design so that the specific content will meet the learning outcomes of the client. Such customisation is available for both theory and practical focused courses and ensures that courses have the greatest impact for both the sponsoring company and their trainees. NIBRT subject matter experts utilise instructional design best practice when generating course content to ensure that training sessions are informative, stimulating and interactive for all concerned.

Competency-based learning

Experience informs us that training of individuals to work in the industry is best achieved using competency-based solutions that encourage the trainee to develop critical learning skills in an environment that uses process flows, equipment and interactions that are all aligned to real life scenarios.

NIBRT's industry focused training solutions ensures all our trainees engage in sessions that encourage and facilitate active learning. All our courses are designed to focus on the individual learning needs of the trainee so that they can attain the required level of competence to successfully operate within the industry in their selected discipline.

NIBRT a global leader

NIBRT continues to be a global leader in biopharmaceutical manufacturing training and has established global partnerships in USA, China and Australia. Our clients are drawn from both industry and academia and as shown later in this document 2020 has been another highly successful year. Our programs and varied delivery options continue to resonate with clients and we look forward to further positive engagements and expanding our client base.

New for 2021

NIBRT continues to develop and expand its training offerings through new course content developed in-house or in partnership with industry subject matter experts. As detailed in this Catalogue we look forward to bringing new exciting courses to our clients most notably, in the area of cell/gene therapies and vaccine manufacturing which are now clearly now emerging as an important class of therapeutics.

We look forward to meeting you in 2021.

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John Milne NIBRT Training Director



2 Social Distance Training

Due to the impact of Covid-19 NIBRT has altered its training delivery methods to ensure a safe environment for all those participating in training activities.

All onsite classroom and hands-on practical sessions have been modified where appropriate to ensure that training is performed in full compliance with necessary physical distancing and hygiene requirements.

Training ratios in each session have been reduced to reflect reduced room capacities and proper personal protective equipment is supplied for all trainees. In addition NIBRT has implemented procedures for the sanitising of any shared equipment/surfaces before and after use. Health questionnaires and full contact tracing protocols have also been developed.

For those who are unable to travel to the

NIBRT facility, lectures, practicals and tours can be delivered live (or recorded) via live streaming platforms with full questions and answering interactivity with the NIBRT training team.

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Which training programme should I choose?

NIBRT provides a broad range of flexible training solutions to meet a diverse range of learning requirements. Please contact us at any time to discuss the most appropriate programme for you or your organisation.

Learning requirement	Recommended programme	Section
Bespoke training programmes that are customised to my organisation's requirements	Customised courses	<u>6</u>
Continuous Professional Development programmes that are accredited by Higher Education Institutes ¹	Certificate, Diploma, BSc and MSc options available	<u>9,10,11</u>
An online, part-time MSc programme	MSc in Biopharmaceutical Science	<u>9</u>
Practical courses to provide deeper levels of understanding on a particular biopharma manufacturing topic	NIBRT short courses	<u>13</u>
An online, introduction to a broad range of biopharma manufacturing topics	NIBRT Online Academy	<u>8</u>
90% funded, accredited up-skilling programmes	Springboard+	<u>12</u>

Contact NIBRT:

Book a course directly via www.nibrt.ie or contact us at training@nibrt.ie or +353 1 215 8100 to speak with one of our training team. Or purchase a NOA course directly via https://noa.nibrt.ie

For more information, please visit our website at www.nibrt.ie. Here you will find up-to-date information about course schedules, descriptions, registration, location and contact information.

1 Quality and Qualifications Ireland https://www.qqi.ie/



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NIBRT Training Facilities

The NIBRT training facility (6,500 m²) is a purpose-built, multi-functional building which replicates the most modern industrial bioprocessing facility.

At the heart of the NIBRT building is the bioprocessing pilot plant, consisting of extensive upstream, downstream, fill-finish, associated analytical facilities and process utilities for both stainless steel and single use bioprocessing. These facilities are all operated in a realistic GMP simulated, operational manufacturing environment.

Upstream

- + Upstream Aseptic processing and cell culture lab
- + Cell Culture Analysis: Vi-CELL XR, YSI, Cedex HiRes, Vi-CELL MetaFLEX, Microscopes, NC-202 Cell counter (Chemometec *)
- + Inoculum Lab & Upstream Suite
- + Bioreactors:10L+20L Biostat Cultibags, 30L & 2x150L stainless steel, 200L single use STR, perfusion system
- + Repligen XCell Single Use ATF 6 NEW FOR 2021
- + Capacitance probes (Aber*)
- + Harvest: disc stack centrifuge, microfiltration, stainless steel and single use depth filtration; 3M Zeta Plus +
- + Pods (3M*), Pall Stax, Millistak+ POD Millipore, DiscStar Bio SD

Cell and Gene Therapy

+ Via Thaw, Sepax C-Pro, Xuri W25, Via Freeze (All Cytiva*)

Downstream

- + Protein purification lab and downstream processing suite
- + Bench top UF systems and pilot scale UF/DF automated systems
- + 2 x automated process chromatography systems, automated column packing technologies including AxiChrom Master and column
- + Viral Inactivation Vessels, Planova cellulose filters including gold particle testing set up, Planova filter 4m² (Asahi Kasei*)
- + 6 x Filter Integrity Testers from various vendors
- + In Line Dilution Skid (Avantor*)
- + Endress and Hauser Automated Rig

NIBRT-Cytiva Single Use Centre of Excellence

- + Fully integrated biomanufacturing platform including Wave 25's, XDR-50 and XDR-200,
- + ÄKTA Ready and Readyflux and associated single use technologies.
- + Quantum 600 Universal Pump
- + Xcellerex XDUO Single-Use Mixing System (Cytiva*)

Fill Finish & Lyophilisation

- + Vial Filling Machine under LAF and RABS
- + Modular aseptic workstation with integral HPV Biodecontamination
- + Telstar Lyobeta 3PS Lyophilisation Technology
- + Benchtop Lyobeta Mini lyophiliser (New for 2020!)
- + Lyostat-5 freeze drying microscopy (New for 2020!)

Manufacturing Support & Utilities

- + Buffer and Media preparation suites using both Stainless steel and disposable technologies
- + Equipment preparation area including parts washer and autoclave, COP/SOP station, down flow booth preparation area
- + Central clean utilities including highly purified water, clean steam, CIP system and clean air generating systems

QC Micro & Bioanalytics Labs

- + Suite of analytical laboratories for environmental monitoring, sterility, raw material, drug substance and drug product testing training courses
- + QC Analytics:
 - Raw material testing Mettler Toledo C20 Coulometric Karl Fischer Titrator (New for 2020!)
 - Drug substance/drug product testing Waters Acquity H Class Bio UPLCs, Beckman Coulter PA 800 plus CE, Biacore T100, c-Technologies Solo VPE, Perkin Elmer LapChip
 - Laboratory management system training LIMS/LES software (Orbis and Thermo Fischer*)
- + QC Micro:
 - EM sampling Particle Counters (Climet, Lighthouse, AeroTrak), Active Air samplers (MAirT, AirIdeal 3P Air Sampler from Biomerieux*, Emtek p100 from PMT*)
 - Microscopy Gram staining, phenotypic IDs, API kits
 - Bioburden testing membrane filtration method (Millipore Oasis Bioburden systems New for 2020!)
 - Rapid Sterility testing BAcT/Alert 3D System by Biomerieux
 - BIOFIRE Rapid Mycoplasma Tester by Biomerieux NEW FOR 2021
 - Endotoxin testing Recombinant Factor C (rFc) method (Synergy HTX Endotoxin Plate Reader from Biomerieux*, rapid Endpoint Chromogenic method (Charles River PTS*)
 - UV Torches for contamination checks (Ecolab*)

Emerson DeltaV Control Room

- + 5 Thinclient operator stations
- + DeltaV proplus station
- + DeltaV Control Panel (S-series controllers & CHARMS I/O)

Biopharma 4.0

- + QC lab of the Future: RFID Sample identification, Dynamic Smart scheduling (Binocs), AR guided QC testing (Tulip*)
- + Evolved Upstream: Technical and behavioural VR training (Oculus Rift S, Oculus Quest 2), Big Data analytics, AR process performance and remote maintenance (Realwear HMT-1*, Hololens*)
- + QA Centre: Process Mining and optimisation, Robotic Process optimisation, Scheduling and Time Management

Scale-up Systems

+ Dynochem licenses (Dynochem)*

*Equipment kindly donated to NIBRT in 2020 under partnership loan agreements

To explore an online virtual tour of our facilities, please click on https://www.nibrt.ie/about/ or scan the following QR code.



5 NIBRT Training Team

NIBRT's training team has a broad range of industry and academic experience, please see below for profiles of some key members of our team:



John Milne, PhD, Director of Training

Director of Training at NIBRT, John has a BSc in Biochemistry and a PhD in molecular

enzymology from University College, Dublin. He has direct industry experience (15+ years) in all aspects of the manufacture of biological products including process development, optimisation, scale-up, clinical production and ensuring GMP compliance in regulated facilities.



Kate Cotter, PhD, NIBRT Training Manager

Coordinates training team activities and works with companies to develop customised training courses.



Shada Warreth, BSc, MSc, Dip.BsMgmPsyc, Senior Bioprocessing Trainer & Training Coordinator

Coordinates the training resources. Specialises in the areas of harvesting, aseptic processing, fill and finish and regulations.





Melissa Hoare, PhD, PGDE, Senior Bioprocessing Trainer & Academic Coordinator

Coordinates NIBRT's academic programmes and works with higher

education institutes to develop practical based education programmes.



Adam Pritchard, PhD, Senior Bioprocessing Trainer

Specialises in the areas of upstream processing, advanced therapy medicinal products and disposable technologies



Aoife Barron, BSc, Senior Bioprocessing Trainer

Specialises in the areas of aseptic processing, fill finish, QC microbiology and project lead for the Biopharma 4.0 Innovation Centre for Operations (ICO) at NIBRT.



Maja Kristek, PhD, Senior Bioprocessing Trainer

Specialises in the area of bioanalytics and quality control.



Anita Murphy, PhD, Senior Bioprocessing Trainer

Specialises in the area of bioanalytics, particularly quality control testing.

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Kevin Lomasney, PhD, Senior Bioprocessing Trainer

Specialises in the areas of final product fill and finish, lyophilisation and upstream processing.



Paul Adams, MSc, Senior Bioprocessing Trainer

Specialises in the areas of upstream processing, viral clearance and single use technology.



Robert Byrne BSc, Senior Bioprocessing Trainer

Specialises in the areas of downstream processing and disposable technologies.



Tadeusz Tazbierski, MSc, Senior Bioprocessing Trainer

Specialises in the areas of upstream processing and disposable processing.



Patrick Torrie, MSc, Bioprocessing Trainer

Specialises in the areas of process automation, single-use technologies, and upstream and downstream processing.



Carl Bermingham, MSc, Senior Bioprocessing Trainer

Specialises in the areas of Upstream Processing and Disposable Technologies



Aoife Kearney, PhD, Senior Bioprocessing Trainer

Specialises in the areas of downstream processing and protein purification.



Dermot O Sullivan, PhD, Bioprocessing Trainer

Specialises in the areas of Upstream Processing & Fill Finish.



Dennis Shaw, BSc, MSc, Bioprocessing Trainer

Specialises in the areas of upstream processing and single-use technology, and QC microbiology.



Hayden Wilkinson, BSc, MSc Bioprocessing Trainer

Specialises in the area of bioanalytics and quality control.



Stephen McCann, MSc, Bioprocessing Technician

Provides training support and day to day operation of pilot plant and laboratory equipment.



James Berhanu, BSc, Bioprocessing Technician

Provides training support and day to day operation of pilot plant and laboratory equipment.



Lisa Murphy, BSc, Training Administrator

Organizes training logistics including training bookings, trainee information and feedback and manages training events.



Aleksandra Ostropolska, MA, CAPM, Online Training Specialist

Develops and manages the NIBRT Online Academy

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Eric Dumas BSc, Training & Education, MA eLearning, Online Training Specialist

Develops and manages the NIBRT Online Academy



Andrea Silva, MBA, Training Administrator

Organizes training logistics including training bookings, trainee information and feedback and manages training events. Contact andrea.silva@nibrt.ie for any training or events queries.



Customised Courses

NIBRT specialises in designing, developing and delivering customised training programmes to meet the requirements of industrial clients. All aspects of the course can be customised in discussion with the client including:

Customised Content

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+ We will develop and implement course content to your specifications in order to replicate how operations, processes and procedures are applied in your organisation.

Customised Scheduling

+ We can organise training courses to suit your business priorities and work schedules.

Customised Delivery

+ NIBRT can deliver courses to clients via online learning, training at the NIBRT facility or by on-site visits if required.

Customised training solutions were delivered for the clients below in 2020



Customised training solutions were delivered for the academic institutions below in 2020





NIBRT Training Catalogue 2021

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Case Study 1



Pfizer Grange Castle

An Introduction to Bioprocessing for Engineers at Pfizer's Grange Castle Biotechnology Facility

Engineering as a discipline will always be crucial to the successful manufacture of biopharmaceutical products. With constantly evolving pipelines and production scenarios engineers will continue to play a key role within our manufacturing sites. With the emergence of newer more flexible unit operations, innovative production methodologies and the developing interest in the manufacture of more complex and personalised protein products, there is a focus from engineers to upskill accordingly or perhaps transition to a different role within their company.

It is becoming more apparent that engineers who perhaps traditionally remained in the background focusing on utilities and equipment support, are now playing a more important role to support front line manufacturing operations and as a result training programmes, that help to increase their fundamental bioprocessing knowledge are deemed to be highly beneficial.

In 2013 Pfizer Grange Castle first contacted NIBRT to collaborate on the development of a customised training program for their Engineering group. The pilot program was designed to deliver training on the overall process of biopharmaceutical production and the key operations involved including upstream processing, downstream processing and concepts in bioprocess engineering. Additional sessions were included focusing on current and emerging trends within bioprocessing.

Based on the success and positive feedback from attendees the course has been further developed and refined and to date five iterations of the course have been held, with the latest iteration started in October 2020. Over 100 employees have successfully completed the programme drawn primarily from the Engineering discipline, although the course has also been attended by employees from other disciplines such as process sciences and quality assurance.

The current program is delivered on site in the Grange Castle facility and involves ten half day sessions covering all aspects of biologics manufacturing that are delivered by subject matter experts from NIBRT and also guest presenters drawn from industry and academia respectively. Trainees are then given the opportunity to build on the theoretical knowledge gained with subsequent hands-on practical training in the NIBRT production training facility. The course is finally completed by a written examination based on the content covered.

"The Bioprocessing for Engineers Programme authored and delivered by NIBRT offers our staff a unique and very worthwhile development opportunity to increase knowledge of Bioprocessing Optimisation"

Jim Conerney, Training Specialist, Pfizer Grange Castle



Case Study 2



Canadian Alliance for Skills & Training in Life Sciences (CASTL) & NIBRT Partnership

NIBRT are excited to be collaborating on the CASTL program that will engage more than 100 Canadian bioscience companies, three universities, three colleges and hundreds of students and employees in the Prince Edward Island region to provide the skilled workforce required to achieve the potential of Canada's bioscience industry.

CASTL is a first-of-its-kind partnership between academia, industry, and government to address the future skills needs of the Canadian life sciences sector, with the objective of creating a flagship skills and training model for Canada that will drive change in academic skills and talent programs and equip Canadians for highly skilled jobs in the life sciences sector. A partnership has been established with NIBRT for facility design input, curriculum design and train-the-trainer services. The CASTL project presents multiple applied learning streams for individuals to achieve the competencies required to be workforceready. Learning will be advanced across all educational levels: technical diplomas and certificates, bachelor's degrees, master's degrees and doctorates, internships and residencies, as well as upskilling of workers to address the future needs of employers, and the reskilling of persons wishing to change employment sector or take advantage of openings in biosciences, or those who wish to work across sectors.

Phase One of the project commenced in March 2020 and involved developing a curriculum establishing industry partnerships and acquiring equipment for practical training components.

Future phases will involve the launch of formal learning and training programmes, with handson training being delivered in dedicated training facilities for those wishing to engage in career advancement, reskilling and career change.

https://www.nibrt.ie/wp-content/uploads/2021/05/ NOA_CASTL_case_study.pdf



8 NIBRT Online Academy (NOA)



The NIBRT Online Academy (NOA) provides industry leading, elearning courses on key aspects of biopharma manufacturing.

NOA courses can be accessed online (https://noa.nibrt.ie) on a range of devices to provide "just in time" learning in an engaging, stimulating format. NOA courses can also be installed on client's Learning Management Systems, with individual and group pricing options also available. New courses are added on a quarterly basis to ensure NOA provides the most current content to clients.



Current NOA courses in association with Skillpad:

General Overview*

- + Cell Biology and Recombinant DNA Technology
- + Overview of Biopharmaceutical Manufacturing
- + Biotechnology and Biopharmaceuticals

Upstream Processing*

- + Cell Culture in Biopharmaceutical Manufacturing
- + Upstream Processing: Bioreactors in Bioprocessing
- + Fermentation in Biopharmaceutical Manufacturing

Downstream Processing*

- + Downstream Processing: Centrifugation
- + Downstream Processing: Protein Purification Chromatography
- + Downstream Processing: Ultrafiltration and Diafiltration

Process Validation*

- + Process Validation 1: Process Design
- + Process Validation 2: Process Qualification and Control

Current NOA courses in association with Skillpad:

Formulation, Fill Finish and Aseptic Processing*

- + Aseptic Processing: Cleanrooms and Control Technologies
- + Aseptic Processing: Concepts and Controls
- + Aseptic Processing: Contamination Control
- + Aseptic Processing: Decontamination and Sterilization Technologies
- + Aseptic Processing: Gowning
- + Clean In Place
- + Formulation in the Biopharmaceutical Industry
- + Freeze Drying

Current NOA courses in association with Quality Risk Management Institute:

Quality Risk Management (QRM)

- + Module 1: The fundamentals of Effective Risk Management for Biopharmaceutical Manufacture
- + Module 2: Fundamentals of Risk Management
- + Module 3: Regulatory Requirements for Quality Risk Management in the Biopharmaceutical Industry
- + Module 4: Implementing Effective Risk Control Strategies
- + Module 5: Application of Quality Risk Management Every Day
- + Module 6: Your Role in Preventing and Reducing Product and Patient Risk
- + Assessment and Certification for Fundamentals of Effective Risk Management



Current NOA courses in association with CYTIVA:

Biomanufacturing Processes

- + Overview of the Biopharma Industry and Products
- + Biomanufacturing Process Capability Requirements
- + Understanding Upstream Bioprocessing
- + Understanding Filtration in Bioprocessing
- + Filtration Process Development
- + Introduction to Preparative Protein Chromatography

Coming Soon:

- + Overview of Host Cells for Bioprocessing
- + Advanced MM Chromatography for Bioprocessing
- + Advanced IEX Chromatography for Bioprocessing
- + Advanced Affinity Chromatography
- + Advanced Hydrophobic Interaction Chromatography
- + Advanced Size Exclusion Chromatography

NIBRT courses

Cell and Gene Therapy

- + Introduction to Cell Therapy
- + Introduction to Gene Therapy

Vaccine Manufacturing

- + Introduction to Viruses (Free)
- + Vaccine and Immunity (Free)
- + Vaccine Development for COVID-19 (Free)
- + Introduction to Vaccine Manufacturing
- + Developing Vaccine for Shigella (Free)
- + Plant-Based Biopharmaceuticals: Plant and yeast derived malaria vaccines (Free)

Free Content

- + Good Handwashing Technique (Free)
- + Glycan Characterisation (Free)
- + The Essential 14.0 technologies to assist with manufacturing in the new C19 reality (Free)
- + Inoculum and Cell Culture Virtual Reality (Free)
- + Bioreactor Operations (free)

Coming soon:

- + Trends in Biopharma Manufacturing 2021
- + Cleanrooms and Cleanroom Behaviour
- + Introduction to Biopharmaceutical Manufacturing for Non-Scientists
- + Single-Use technologies in Biopharmaceutical Manufacturing
- + Introduction to Quality Control in Biopharmaceutical Manufacturing

NOA Case Study

WuXi Biologics approved access to NOA for its employees at its new facility in Dundalk. We asked them how they found the NOA experience.

How did you find out about NOA Training?

Site Sponsor – "I was informed about the training being available from Kate Cotter Bioprocessing Program Manager at NIBRT, she also mentioned there was discount available due to the COVID19 lockdown. It was a training package that people could access on-line and would be useful to them in their everyday work and increase their understanding of the biological processes in use at WuXi Biologics in Ireland. It was brought to the attention of the Site Leadership Team and it was agreed to proceed with the NOA training program."

How was your NOA learning experience?

Bioprocess Associate – "I personally found the online courses quite good. Having some experience in the biopharma industry and having previously attended NIBRT's facility in Dublin, I went into it thinking there wouldn't be much left to learn. But I definitely did pick up some new knowledge, especially around centrifugation and other downstream processes. It was very interactive, which was great as it kept me engaged throughout the whole course."



Maintenance Technician - "I have to say that I was starting with very limited knowledge of the processes and I found the 'step by step' explanations of the Upstream and Downstream processes very informative and easy to understand. For me it was pitched at a level which kept me interested, I found myself very engaged and even took notes to refer back to in the future."

How did you find the course delivery by the NOA team?

Site Program Coordinator – "All courses were rolled out in a timely manner. Amendments to courses were completed with ease. We could not fault course delivery, an excellent service so far."



Try the Bioreactor Operations NOA course for free:

https://noa.nibrt.ie/learn/course/external/view/elearning/24/bioreactor-operations

9 M.Sc. Programmes

NIBRT is pleased to partner with Irish Universities and Institutes of Technology to provide a range of M.Sc. programmes. These M.Sc. programmes include options to study online, full-time or part-time:

M.Sc. in Biopha	rmaceutical Science	ONLINE
Description:	This post-graduate programme in biopharmaceutical science aims to provide students with a comprehensive grounding in critical aspects of biopharmaceutical processing and their support services.	
Duration:	A part-time programme delivered by online learning which can be completed in a 2 – 3 year timeframe.	
Price:	€12,000 (EU students)	
Accrediting body:	IT Sligo (Level 9 90 credits)	Visitigo

M.Sc. in Biopharmaceutical Processing (by research) ONLINE			
Description:	This M.Sc. in Biopharmaceutical Processing involves study of the discovery, development and processing of biopharmaceutical drug products. Students complete a range of online modules that have been designed in conjunction with the biopharmaceutical industry, while also completing a significant research project in an applied biopharma area.		
Duration:	A part-time programme delivered by online learning which can be co in a 2 – 3 year timeframe.	ompleted	
Price:	€8,500 (EU Students)		
Accrediting body:	IT Sligo (Level 9 90 credits)		

M.Eng.Sc. in Biopharmaceutical Engineering			
Description:	This advanced postgraduate degree programme offers a combination of lectures, tutorials, practical sessions and project work delivered by university and industry experts.		
Duration:	The full time programme is completed in one year, and part-time programme can be completed in a 2 – 3 year timeframe.		
Price:	€6,195 per year (part-time students) €7,830 full time EU students		
Accrediting body:	University College Dublin (Level 9 90 credits)		

M.Sc. in Bioprocess Engineering			
Description:	The M.Sc. is an interactive and dynamic programme that will develop students' knowledge and appreciation of the conceptual and factual basis for bioprocess design and operation.		
Duration:	The programme is offered on a one year full-time basis, and up to four year part-time basis.		
Price:	€6,277 (full time EU students)		
Accrediting body:	Dublin City University (Level 9 90 credits)		

M.Sc. in Biopharmaceutical Technology			
Description:	Conceived in response to increasing job opportunities within Ireland's biopharmaceutical sector, the M.Sc. in Biopharmaceutical Technology builds on biotechnology expertise and industry links that have been developed over the past 20 years and includes classes and laboratory sessions at AIT, site visits to local biopharmaceutical plants and guest lectures delivered by people at the cutting edge of the biopharmaceutical industry, in addition to students receiving practical training at the National Institute for Bioprocessing Research & Training (NIBRT) in Dublin.		
Duration:	One year full time.		
Price:	€7,800		
Accrediting body:	Athlone Institute of Technology (Level 9 90 credits)		

M.Sc. Immunotherapeutics			
Description:	The MSc. in Immunotherapeutics in the School of Biochemistry & Immunology is a new, innovative and multidiscliplinary 90 ECTS 1 year full time masters programme specifically designed for biological, medical, dentistry, engineering and veterinary graduates who wish to enter the pharmaceutical industry.		
Duration:	One year full time.		
Price:	€10,815 for EU students €21,630 for non-EU students		
Accrediting body:	Trinity College Dublin (Level 9 90 credits)		

10 Academic Programmes

NIBRT's major award programmes are delivered by online learning techniques. These programmes are accredited by various academic institutes, with hands-on practical training in the NIBRT biopharmaceutical facility.

NEW FOR 2021	TU Dublin/NIBRT Postgraduate Diploma in Validation Technology		
	Description:	The School of Chemical and Pharmaceutical Science TU Dublin are partnering with NIBRT to offer a Postgraduate Diploma in Validation Technology for Science and Engineering Graduates. The aim of this postgraduate diploma is to allow graduates to gain the skills and education needed to take up validation roles in the biopharmaceutical industry. Graduates of the programme will be equipped to take up positions as validation professionals and managers in the (bio)pharmaceutical and related industries. Upon completion of the programme, graduates will have completed an 18-month Postgraduate Diploma in Validation Technology funded under the Human Capital Initiative Pillar 1 programme. Graduates can then advance their academic qualifications to complete the MSc in Pharmaceutical Validation Technology with TU Dublin afterwards if desired	
	Duration:	18 months	
	Price:	€12,000 funded under the HCI Pillar 1. Employed participants pay 10% of the course fee & programme is free for unemployed participants.	
	Accrediting body:		

BSc (Hons) in Biopharmaceutical Science			
Description:	This graduate programme in Biopharmaceutical Science aims to provide students with a comprehensive understanding of the critical aspects of Biopharmaceutical Processing and Support Services, with specific focus on the product lifecycle of Biological products and associated processes.		
Duration:	2 years part-time		
Price:	€9,000		
Accrediting body:	IT Sligo (Level 8 60 credits)		

BSc in Biopharmaceutical Science			
Description:	This programme in Biopharmaceutical Science aims to provide students with the knowledge, know-how, training and practical experience to enable them to gain employment in the Biopharmaceutical or Biomedical industries.		
Duration:	2 years part-time		
Price:	€7,200		
Accrediting body:	IT Sligo (Level 7 60 credits)	ligo	



11 Certificate Programmes

NIBRT and IT Sligo have aligned to provide certificate programmes that are short, accredited programmes designed in association with industry partners. These programmes focus on upskilling students on the key competencies required for biopharmaceutical manufacturing. These part-time programmes are delivered via a blend of online learning with IT Sligo, and practical modules in the NIBRT facility.

NEW FOR L9 Certificate in Commissioning, Qualification and Validation for Biologics 2021 (30 credits, IT Sligo)

An objective of this new postgraduate certificate programme in CQV is to help support new facilities and extensions with commissioning, qualification and validation work before manufacturing can commence. This programme presents a pathway for qualified graduates who wish to pursue a career in validation.

Programme Title	Level	ECTS Credits	Cost
Certificate in Biopharmaceutical Science	L9	30	€6,000
Certificate in Biopharmaceutical Processing	L9	30	€6,000
Certificate in Bioanalytical Techniques	L9	10	€2,000
Certificate in Commissioning, Qualification and Validation for Biologics		30	€6,000
Certificate in Biopharmaceutical Science		30	€5,600
Certificate in Bioprocessing Technologies		30	€5,600
Certificate in Biopharmaceutical Processing		30	€4,500
Certificate in Bioprocess Engineering		30	€4,500
Certificate in Biopharmaceutical Processing		30	€3,150
Certificate in Aseptic Biopharma Operations		30	€,3150











HEA HIGHER EDUCATION AUTHORITY

FUTURE JOBS

What is Springboard+?

Springboard+ is an upskilling initiative in higher education which offers courses at certificate, degree and masters level leading to qualifications in areas where there are employment opportunities in the economy.

Springboard+ is co-funded by the Government of Ireland and the European Social Fund as part of the ESF programme for employability, inclusion and learning 2014-2020.

Human Capital Initiative Pillar 1 is funded by the National Training Fund.

How much does the programme cost?

- Courses are free for unemployed jobseekers.
- For employed participants on courses NFQ L7 - L9, 90% of the course fee will be funded, with participants required to contribute just 10% of the programme fee.

NIBRT and Springboard+

NIBRT's Springboard+ programmes are designed in conjunction with the biopharmaceutical industry, and aim to provide participants with the knowledge and skills required to become part of the biopharmaceutical and biotechnology workforce.

- NIBRT Springboard+ graduates have a strong track record of obtaining employment in the biopharmaceutical sector.
- All lectures are delivered online to provide a flexible learning environment, while practical components provide candidates with the practical skills and experience required by industry.
- Modules in career support and development are provided.
- Instructors have extensive experience in training + in the biopharmaceutical industry.

What courses are available?

Springboard+ 2021 courses			
Title	Duration	ECTS Credits	Level
Certificate in Biopharmaceutical Science	9 months	40	L9
Certificate in Biopharmaceutical Processing	9 months	40	L9
Certificate in Commissioning, Qualification and Validation	9 months	40	L9
Postgraduate Diploma in Validation Technology	18 months	60	L9
M.Sc. in Biopharmaceutical Processing	9 months	100	L9
Certificate in Biopharmaceutical Science	9 months	40	L8
Certificate in Bioprocessing Technologies	9 months	40	L8
Certificate in Biopharmaceutical Processing	9 months	40	L7
Certificate in Bioprocess Engineering	9 months	40	L7
Certificate in Biopharmaceutical Processing	9 months	40	L6

Application Process

All applications can be made on **www.springboardcourses.ie.**

Please contact **springboard@nibrt.ie** with any queries you may have.



NIBRT's highly popular portfolio of short, intensive courses provides:

- + Access to state-of-the-art NIBRT facility and equipment
- + Focus on the equipment and solutions to the real challenges you face in your own workplace
- + Opportunities to share experiences with people from a variety of organisations
- + Undisturbed time for training away from workplace interruptions
- + Options for online and onsite courses available
- + Options for live streaming of practical sessions available on request for groups of trainees who cannot travel to NIBRT

The current range of short courses in 2021² is shown below:

	Course Title	Further information
	Automation	
New for 2021	Introduction to Delta V TM	Section 13.1
	Emerson courses	Section 18
	Discharges 4.0	
	Biopharma 4.0	
New for 2021	Biopharma 4.0 Innovation Centre for Operations Tour	Section 15.1
	Biopharma 4.0	Section 15.2
	Biopharma Manufacturing Operations	
	Downstream Processing Operations	Section 13.2
	Fill Finish Operations	Section 13.3
	Lyophilisation for Biopharmaceutical Fill-Finish Operations	Section 13.4
	Upstream Processing Operations	Section 13.5
	Single Use Technologies in the Biopharmaceutical Industry	Section 13.6
	Cell and Gene Therapy	
	Cell T1 Advanced Cell Therapy Technology	Section 17.2
	NIBRT and CCMI Fundamentals of Stem Cell Therapy Manufacture	Section 17.3
New for 2021	Introduction to Cellular Immunotherapy	Section 16.5
New for 2021	Introduction to Gene Therapy	Section 16.5
New for 2021	Introduction to Stem Cell Therapy	Section 16.5

² All price and course details are correct at time of publication but are subject to change, please refer to https//:www.nibrt.ie for the most current information or contact training@nibrt.ie

Course Title	Further information
Introduction	
Bioprocessing for Non-Scientists	Section 13.7
Bioprocessing for Engineers	Section 14.1
 Quality Control	
Navigating QC Testing for Biologics and Biosimilars	Section 13.8
QC Micro Skills for Biopharma	Section 19.1
Vaccine Manufacturing	
Vaccine Manufacturing	Section 20.1

Automation

NEW FOR 2021	13.1. Introduction to Delta V ™		
	Course Description	This intensive 1.5 day course provides an introduction to the operation of a DeltaV [™] Distributed Control System within a biopharmaceutical batch manufacturing environment. This course will include both hands-on practical and theory components. During this course trainees will be introduced to the principles of process automation and control using DeltaVa [™] DCS.	
		Topics include: Navigating DeltaV [™] , Batch Operation and Control, Alarm Management, Batch Operation and Troubleshooting. Trainees will gain hands on practical experience working with stainless steel and disposable bioreactor systems within DeltaV [™] . Trainees will prepare, run, and troubleshoot a simulated large scale cell culture bioprocess.	
	Format	1.5 days theory and practicals in NIBRT	
	Who should attend	This course is designed for operators, technical staff, engineers and managers wishing to improve their operational knowledge of DeltaV [™] DCS within a biopharmaceutical manufacturing environment.	
	Dates	December 14 -15	
	Price	€1,200	

Biopharma Manufacturing Operations

13.2. Downstream Processing Operations		
Course Description	This course is designed to deliver an introduction to the typical downstream operations used in a biopharmaceutical production process. This course includes both hands-on practical and lecture components covering topics such as harvest, ultrafiltration/diafiltration, viral clearance and chromatography. During this course trainees will be introduced to the basics of filtration and chromatography in theory sessions before building on this knowledge and performing these operations using a practical component.	
Format	Two days theory and practicals at NIBRT	
Who should attend	This course is designed for those that are new to downstream processing including operators, technical staff, engineers and managers who need to increase their basic knowledge of actual operations in a modern downstream processing biopharma plant.	
Dates	 + September 15-16 2021 + December 08-09 2021 	
Price	€1,600	



13.3. Fill Finish Operations		
Course Description	This three day programme is designed to provide an introduction to current aseptic techniques related to working in an aseptic filling environment. This blended programme provides both a theoretical introduction to contamination control, environmental monitoring, filter integrity testing and filling systems, while also allowing trainees hands-on interaction with both isolator and RABs units while conducting glove integrity tests, media fills and troubleshooting. An introduction to Grade B gowning will also be included in the programme.	
Format	3 Days Blended Online and Onsite in NIBRT	
	+ Two mornings online theory	
	+ Two days practicals at NIBRT	
Who should attend	This course is designed for those that are new to downstream processing including operators, technical staff, engineers and managers who need to increase their basic knowledge of actual operations in a modern downstream processing biopharma plant.	
Dates	Course 3	
	+ Two mornings online theory, September 20-21	
	+ Two days practicals at NIBRT, September 22-23	
	Course 4	
	+ Two mornings online theory, December 13-14	
	+ Two days practicals at NIBRT, December 15-16	
Price	Option 1: Online theory only, €800 Option 2: Full course online theory and practicals at NIBRT, €2,400	

13.4. Lyo	philisation for	Biopharmaceutical	Fill-Finish Operations
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Course Description	This course will provide an introduction to the theory and practice of biopharmaceutical lyophilisation. It will first introduce learners to the key principles of lyophilisation before focusing on its use in the context of sterile fill-finish manufacturing. What are the critical process parameters to consider during a fill finish operation of a lyophilised biologic? How do these relate to critical quality attributes? How does formulation impact on the process? These questions and others will be considered during the course which will be delivered through a combination of classroom lectures and workshops supported by hands-on practical sessions with our pilot-scale lyophiliser (Lyobeta 3PS), fill finish line and other supporting equipment.
Format	Two Days onsite in NIBRT
Who should attend	Bioprocess Operators working in the fill finish and lyophilisation space and anyone who wants an introduction to the concept and principles of biopharmaceutical lyophilisation in the context of sterile biopharmaceutical fill-finish operations. Experience working in an aseptic processing environment would be an advantage but is not required to attend this course.
Dates	November 3-4
Price	€1,600

13.5. Upstream Processing Operations		
Course Description	This three-day course provides an introduction to the typical upstream operations carried out in a biopharmaceutical manufacturing facility. This course will include both hands-on practical and theory components covering cell vial thaw, aseptic techniques, cell counting, metabolite analysis, scale up, and bioreactor operation. Equipment such as single-use rocking bioreactors and stirred-tank reactors, as well as stainless steel reactors, will all be utilised to reflect the current state of biopharmaceutical manufacturing technology.	
Format	 3 Days Blended Online and Onsite in NIBRT + Two mornings online theory + Two days practicals at NIBRT 	
Who should attend	This course is designed for operators, wishing to increase their knowledge of bioprocessing plant.	technical staff, engineers and managers f the upstream operations in a modern
Dates	 Course 3 Two Mornings Online Theory September 07-08 Two Days NIBRT Practicals September 13-14 	 Course 4 Two Mornings Online Theory November 30-December 01 Two Days NIBRT Practicals December 06-07
Price	Option 1: Online theory only, €800 Option 2: Full course online theory an	d practicals at NIBRT, €2,400

13.6. Single Use Technologies in the Biopharmaceutical Industry		
Course Description	Single Use Technology is widely used within the biopharmaceutical industry and has quickly become a mainstay within the sector.	
	This training programme will highlight the readily available technologies that can be implemented in upstream and downstream processing. It will allow trainees to gain hands on experience of common disposable technologies used in upstream and downstream processing including bioreactors, chromatography systems, UFDF systems, connects/disconnects and tube welders and sealers.	
Format	2 Days Onsite in NIBRT	
Who should attend	This course is designed for those that are new to the use of single use technologies, including development scientists, process engineers, and manufacturing operators. It is expected that attendees will have a basic knowledge of the manufacturing process prior to attending the course.	
Dates	Course 3	
	+ Two Days NIBRT Theory and Practicals September 06-07	
Price	€1,600	

13.7. Bioprocessing for Non-Scientists		
Course Description	This course is designed to give attendees an overview of the main processes involved in biopharmaceutical manufacturing.	
	The online theory introduces the biopharmaceutical industry and the main processes including upstream, downstream and fill finish operations. The course includes interactive virtual tours of the NIBRT training facility.	
	The NIBRT practical day of the courses is an optional add-on day focussing on hands on practical sessions in upstream, downstream and fill finish processing activities.	
Format	2 Days Blended Online and Onsite in NIBRT	
	+ Two mornings online theory	
	+ Two days practicals at NIBRT	
Who should attend	This course is designed to give anyone working in or looking to move into areas associated with the Bioprocessing industry a good overview of the operations involved. E.g. Recruitment personelle, business and finance teams, suppliers & vendors sales teams etc.	
Dates	Course 3	
	+ Two Mornings Online Theory September 06-07	
	+ 1 Day NIBRT Practicals September 08	
Price	Option 1: Online Theory Only €800 Option 2: Full Course Theory and Practicals €1,600	



Short training solutions were delivered for the companies below in 2020

13.8. Navigating QC Testing for Biologics and Biosimilars		
Course Description	This 3.5 day course guides trainees through the Critical Quality Attributes of biologics (ICH Q6B) as well as core analytical platforms routinely employed in a QC testing environment in order to measure them. Using a combination of lecture sessions online followed by hands-on practical training, the course will cover methods such as electrophoretic separations (capillary electrophoresis, slab gels), HPLC/UPLC methods (peptide mapping, SEC, etc), and immunoassays (ELISA).	
Format	 3.5 Days Blended Online and Onsite in NIBRT + Three Mornings Online Theory + Two days practicals at NIBRT 	
Who should attend	This course is suitable for graduates seeking to gain entry into the area of biopharma QC, those currently working in QC/QA (small molecule or large), those working in product or process development/characterisation or anyone looking to increase and expand their understanding of QC testing for biologics and biosimilars.	
Dates	 Course 3 Three Mornings Online Theory December 06-08 Two Days NIBRT Practicals December 09-10 	
Price	Online Theory Only €1,200 Full Course Theory and Practicals €2,800	



14 Short courses with **NIBRT Partners**

Company	Course Title	Dates	Price
Engineers Ireland	An Introduction to Bioprocessing for Engineers	Sept 23, Oct 21, Nov 25, Dec 16	Members €300 Non members €350
STERIS	Cleaning Validation Masterclass	13th + 14th Oct onsite in NIBRT	€1550
Kaye Amphenol	Introduction to Thermal Validation	Coming soon	€500
BPS Crowthorne	BPS Crowthorne Lyophilisation technology: Products, Process and Systems	Coming soon	€2445

14.1. Bioprocessing for Engineers		
Course Description	The aim of this course is to introduce the biopharmaceutical industry and its associated processing principles and techniques to those from a nonbiopharma background. The course will expand attendees' knowledge and understanding of all aspects of the bioprocessing industry. This online theory course introduces the biopharmaceutical industry and the main processes including upstream, downstream and fill finish operations. The course includes interactive virtual tours of the NIBRT training facility. The course is offered in association with Engineers Ireland.	
Format	1 day online	
Who should attend	Engineers and managers working in the biopharma and related industries who wish to further their understanding of all aspects of biopharma manufacturing.	
Dates	 + Sept 23 + Oct 21 + Nov 25 + Dec 16 	
Price	Members €300 Non members €350	



15 The Biopharma 4.0 Innovation Centre for Operations at NIBRT

In 2019, NIBRT and Industry 4.0 experts, Boston Consulting Group (BCG), formally announced the creation of the Biopharma 4.0 Innovation Centre for Operations (B4.0 ICO) at the NIBRT site in Dublin.

The ICO is focused on showcasing cutting-edge technologies such as augmented reality (AR), virtual reality (VR), artificial intelligence (AI), machine learning and big data analytics in a GMP-replica environment, to demonstrate the revolutionary benefits of these technologies to the biopharmaceutical production process.

The ICO demonstrates how these technologies can be seamlessly integrated with core operating processes to enable proof-of-concept studies on new innovations and new ways of working. Visitors to the centre will experience an interactive and immersive journey into Biopharma 4.0.

B4.0 ICO Learning Packages at NIBRT

In 2021, NIBRT are offering a variety of different B4.0 ICO packages, which cater to the various needs of biopharma industry and academic clients. In these Open Day tours, bespoke client-focused deep dives or interactive training courses, NIBRT and BCG will answer all of your questions on all things 4.0; What is Industry 4.0 and more specifically, Biopharma 4.0? What technologies are out there and currently available? How are they suitable for GMP cleanroom environments and heavily regulated biopharma processes?

In each of these sessions, you will be guided through a conceptual "Facility of the Future", focusing on designated key focus areas, Training, Manufacturing, QC, QA, Fill Finish and Plant Control Tower.

Exciting 4.0 Technologies

To enhance the B4.0 tours, training and bespoke sessions, NIBRT has acquired some exciting 4.0 technologies that you can try out as part of your session with us.

- + VR training packages on aseptic tasks such as cell culture and inoculation, using an Oculus Quest or Rift S headset.
- + AR headsets, such as the Realwear HMT-1, to verbally and visually record step-by-step instructions as you work hands-free and learn how your instructions can be automatically transcribed into an SOP.
- + AR solutions, such as the Tulip system, to guide you through lab-based testing procedures.
- + Mixed reality headsets such as the Microsoft Hololens 2, allowing you to connect with your colleagues remotely, sharing your field of view with them and assisting each other with complex tasks.
- + RFID personnel and sample tracking to automatically update dynamic laboratory testing schedules and standard work plans.
- + Digital Tier Boards and Dashboards for interactive information sharing at handover meetings, which can be facilitated remotely.

Biopharma 4.0 Packages for 2021

Session Type	Duration	Delivery	2021 Dates	Price pp
Open Tour of the ICO	½ Day (AM and PM available)	Onsite	November 2	€950
Biopharma 4.0 Open Course	3 mornings	Online	On request	€1300
	2 days	Onsite	TBC ¹	€1600
Bespoke 4.0 Event for your company ²	1 day to 7 days	Onsite / Online	On Request	POA ³
1 To be confirmed based on COVID restrictions at the time				

2 Co-ordinated and facilitated by Boston Consulting Group (BCG)

3 Guide price €20,000 per day for a group of 20 people



Biopharma 4.0

NEW FOR 2021	15.1 Biopharma 4.0 Innovation Centre for Operations Tour		
	Course Description	This interactive tour of the 4.0 Biopharmaceutical "Facility of the Future" will provide an immersive educational experience in how cutting-edge technologies such as robotics, artificial intelligence (AI), virtual reality (VR) and augmented reality (AR) can revolutionise manufacturing operations, technical learning and quality assurance. The tour will be hosted by Industry 4.0 experts from Boston Consulting Group (BCG) and the 4.0 team at NIBRT. There will be opportunity for open discussions on topics such as return on investment and steps for implementation.	
Format		0.5 Day Onsite in NIBRT	
	Who should attend	Manufacturing, quality and site organization managers and engineers who are looking to increase their understanding of and learn how to apply the latest digital trends and technologies in biopharma.	
		Data science & analytics engineers within biopharma who want to assess the latest 4.0 technologies. People who are new to Industry 4.0 who are looking for a "taster" of the available technologies.	
Dates November 2		November 2	
	Price	€950	

15.2 Biopharma 4.0		
Course Description	This comprehensive 3-morning course is designed to equip biopharma manufacturing and quality personnel with advanced knowledge of how biopharma companies can use cutting-edge technologies such as robotics, artificial intelligence (AI), virtual reality (VR) and augmented reality (AR) to revolutionise manufacturing operations. The course will include an on overview of biopharma 4.0; digital immersion deep dives; and demos and case studies of how the technologies can be applied across manufacturing, quality and organizational excellence.	
Format	Three mornings online	
Who should attend	Manufacturing, quality and site organization managers and engineers who are looking to increase their understanding of and learn how to apply the latest digital trends and technologies in biopharma. Data science & analytics engineers within biopharma who want to assess the latest 4.0 technologies	
Dates	On request	
Price	€1,300	

16 Biopharma Data Champions Kickstarter

SIEMENS

Siemens Ireland and the National Institute for Bioprocessing Research and Training (NIBRT) have launched innovative training programme to improve data literacy that aims to transform how lifesaving medicines are produced in Ireland.

How does Kickstarter work?

This is a practical programme, aimed at helping you to deliver on the potential of data analytics to improve operations in your organisation. In a rapid 'kickstarter' six-month cycle, you will be guided in selecting a real use case project from within your own business and making progress in addressing it through data analytics. You will gain the knowledge and practical skills required to identify opportunities, manage stakeholder groups, and deliver real value to your organisation.

Who is it for?

The modern pharmaceutical industry needs crossfunctional teams, rich in expertise across science, engineering and data. The kickstarter programme is designed for professionals from various pharmaceutical functions wishing to develop capabilities in delivering successful data projects, including:

- + R&D / Process Scientists and Engineers
- + Automation and Information Technology
- + Manufacturing Science & Technology (MSAT)
- + Continuous Improvement / Lean
- + Quality Management / Quality Control
- + Data champions from any discipline

Programme Structure and Content

The kickstarter programme will be delivered over six months, between June and December 2021. It will consist of both group theory sessions and individual coaching sessions delivered online and in person. Group sessions will address use case selection, applications across the biopharmaceutical value chain, stakeholder management, data and technology. Delivered by experts from Siemens and NIBRT and external industry experts, these half-day sessions will be held every three weeks, commencing June 2021. In parallel, you will have access to eight individual coaching days to guide you through your own project, data sets and delivery choices, to solve problems in your organisation using complex data.

Topics:

- + Selecting a use case
- + Developing the business case
- + Managing key biopharma considerations
- + Acquiring and preparing data
- + Data project methodologies and technologies
- Data analytics technologies (commercial and open source)
- + Selecting analysis and modelling techniques
- + Deploying results: visualisation, reporting and dashboarding
- + Communicating benefits
- + Building a data strategy

The Biopharma Data Champions Kickstarter programme will begin on 30th June 2021. To express interest, please contact Siobhan.Fleming@siemens.com.



17 Cell and Gene Therapy

Cell and gene therapies are having a significant impact on the treatment of a wide range of diseases. The gene therapy market is now predicted to have a compound annual growth rate of 33.3% from 2017 to 2023 and to reach \$4.4 billion by 2023.

To support the manufacture of these therapies, NIBRT is currently constructing a CGT expansion to its existing facilities. NIBRT is also pleased to offer the following CGT courses:

17.1. NIBRT Online Academy		
Course Description	e-Learning courses available form NIBRT Online Academy https://noa.nibrt.ie	
	+ Introduction to Cell Therapy	
	+ Introduction to Gene Therapy	

17.2. Cell T1: Advanced Cell Therapy Technology in collaboration with Cytiva		
Course Description	This course provides both classroom and laboratory instruction within cell therapy processes and cell manufacturing under good manufacturing practice (GMP) procedures. Divided into upstream, cell expansion, and downstream applications, practical laboratory sessions will provide beginning to-end technical knowledge and training on industry standard equipment and reagents. Guidance to Standard Operating Procedures (SOP) development will also be discussed. Templates for SOPs are provided upon request.	
Format	Three Days NIBRT Theory and Practicals	
Who should attend	This training course will be useful for research and development scientists, process engineers, and manufacturing technicians. A basic understanding of cell culture and corresponding techniques is required for this course.	
Dates	November 23-25	
Price	€2,960	

17.3. NIBRT and CCMI Fundamentals of Stem Cell Therapy Manufacture		
Course Description	Stem Cell Therapy is an area of increasing investigation and investment as a treatment option for patients with a previously unmet clinical need.	
	This training programme, presented as a collaboration between the Centre for Cell Manufacturing Ireland (CCMI) and NIBRT, will cover all aspects of stem cell therapy manufacture. It will allow trainees to gain hands on experience of cell vial thaw, initial seeding, expansion and cryopreservation as well as the associated equipment required to carry out these tasks. In addition, trainees will gain insight into the morphology of stem cells and indications of cell culture contamination, allowing them to identify and troubleshoot potential issues. The important aspect of QC, both micro and analytics, will also be demonstrated during the course.	
Format	4.5 Days NIBRT Theory and Practicals	
Who should attend	This course is designed for those that have some knowledge of cell culture techniques but would like to specifically learn how stem cell therapy manufacture is conducted. This course would be ideally suited to graduates with a cell culture background or cell culture technicians from a biologics manufacturing setting.	
Dates	On request	
Price	€3,600	

17.4 New courses

new for 2021	Introduction to Cellular Immunotherapy		
	Course Description	This course will provide a blend of theory and practical content covering the following indicative sessions:	
		Theory: What are Cellular Immunotherapies? Autologous vs. Allogeneic Cell Therapies. Vectors and Transduction for Cell Therapies. Associated QC Methods.	Practical Sessions: Cell Thaw and Isolation. Rocker Bioreactor Operation (Perfusion culture). Harvest and Cryopreservation.
	Dates	On request	
	Price	On request	

2021 17.5. Introduction to Gene Therapy

Course Description	Gene therapies have the power to transform the lives of patients and provide cures to diseases that up till now had few or no treatment options. The processes for manufacturing these therapies require similar technologies to other biologic manufacturing processes but also have unique challenges and issues. This course will provide a background to the underlying concepts of gene therapy, including viral vector-based therapies and nuclease-mediated gene editing. In addition, practical hands-on sessions will introduce the technologies that are commonly used for the manufacture of these ground- breaking products. This includes technologies for the culture of suspension and adherent cells as well as downstream purification of the gene therapy products.
Format	2 days onsite in NIBRT
Dates	October 7-8
Price	€1,600



2021 17.6. Introduction to Stem Cell Therapy

Course Description	Regenerative medicine and stem cell therapies have long been touted as a revolutionary change in the treatment of disease. While the rate of release of these therapies may not have been as rapid as some expected, we are now seeing the advent of stem cell therapies as viable and powerful options for the treatment of a range of disorders. This course will describe the basics of stem cell biology, the difference between autologous and allogeneic therapies, the different types of stem cell-based therapy, and the culture methods that can be used to produce them. In addition, hands-on practical sessions will allow the trainee to practice the inspection, handling, and culture of stem cells using a variety of technologies. Furthermore, the harvest, cryopreservation, and aseptic filling of a stem cell product will also be conducted.
Format	2 days onsite in NIBRT
Dates	December 13-14
Price	€1,600

18 Emerson training at NIBRT



Emerson Automation Solutions

Preparing Life Sciences Workforce for Digital Transformation

The drive towards digital transformation within biopharmaceutical facilities is helping organisations meet their most pressing challenges, such as increasing operational efficiency, improving batch quality and reducing time to market. To support the industry, Emerson is providing a range of courses that will increase operator competency in industry-leading control and automation solutions that are fundamental to successful digital transformation strategies. These virtual and classroom-based courses held in NIBRT will focus on DeltaV[™] distributed control system operation and automated batch control, which are advanced technologies used to improve batch production quality and consistency.

Course	Duration	Location
DeltaV Implementation - part I	4.5 days	Classroom (NIBRT) or Virtual
DeltaV Operator Interface for Continuous Control	2 days	Classroom (NIBRT) or Virtual
DeltaV Operator Interface for Batch	2.5 days	Classroom (NIBRT) or Virtual
DeltaV System Batch Implementation	4.5 days	Classroom (NIBRT) or Virtual
DeltaV Implementation - part II	4.5 days	Classroom (NIBRT) or Virtual
Plantweb/DeltaV Introduction	3 days	Classroom (NIBRT) or Virtual
DeltaV Implementation using DeltaV Live - Introduction	4.5 days	Classroom (NIBRT) or Virtual
DeltaV Hardware and Troubleshooting	4 days	Classroom (NIBRT)

Each course is designed for a specific set of attendees, including operators, supervisors and managers responsible for the operation of continuous or batch processes, process and process control engineers responsible for designing, implementing and testing configurations, and instrumentation and maintenance technicians, managers and configuration engineers responsible for configuring and troubleshooting.

2021 dates for these courses will be confirmed in due course or these courses may be arranged for groups on request. Full details of Emerson courses can be found at: **www.Emersonprocesscourseadvisor.eu**

19 QC Micro Courses at NIBRT

NIBRT have been developing a curriculum in QC Micro testing since 2019 and we are proud to have many new technologies included in our lab from industry leading suppliers such as Biomerieux, Millipore, Charles River and PMT.

The world of QC Micro testing is changing quickly, with newly adapted test methods for product testing and advancements in technology designed to make testing quicker, easier, and more reliable. At NIBRT, our aim is to keep our finger on the pulse when it comes to these industry changes and, as such, we have updated our list of training equipment in our Micro lab for 2021 courses to include:

+ Recombinant Factor C (rFc) endotoxin testing,

using the ENDONEXT[™] and Endozyme testing system from Biomerieux; the LAL-free alternative to bacterial endotoxin testing. This newly FDA approved test and recent addition to the chapters of the European Pharmacopoeia (Ph Eur.) has revolutionised bacterial endotoxin testing (BET) by creating reagents completely free of any animal-derived materials. The test uses fluorescence-based reading with the Synergy HTX, with assay sensitivities as low as 0.005EU/ml to 50EU/ml, ensuring a comprehensive assessment of product safety. Learn how the Endozyme II Go test range cuts sample preparation time significantly by removing standard curve and positive product control preparation steps.

- + **Rapid, mobile endotoxin testing** using the Charles River PTS designed for at-location testing with results time reduced to 15 minutes. This system uses pre-validated, pre-prepared single-use cartridges, which completely cuts out sample preparation and standard curve preparation times. Learn how the system can be used with minimal training and expertise.
- + Rapid Sterility Testing of biologics using the BacT/ ALERT® 3D System from Biomerieux, which uses direct sample inoculation and rapid colorimetric reading in response to CO₂ production. This former clinical method is now gaining popularity in biopharma as a method of in-process and finished product testing and is now an approved compendial method for ATMP sterility testing. The BacT/ALERT® 3D System dramatically simplifies the sterility testing process and cuts results reporting time hugely, to ensure rapid time-to-market. Learn the simplicity of inoculating, loading and reading results with our in-house single temperature system.













charles river

+ Simplified bioburden testing of waters and inprocess samples using the Milliflex Oasis membrane filtration system from Millipore. Millipore have listened to the demands of customers looking to simplify the bioburden testing procedure and reduce errors. The newly improved membrane filtration methods features track-and-trace consumables by barcoding systems, colour-coded agar plates to avoid errors when testing water samples with in-process samples and more intuitive sample funnels, to avoid analyst contamination of samples during processing. Learn the ease and simplicity of membrane filtration testing!



Experience these testing procedures and more at NIBRT!

Our 3.5 day open course for QC Micro will give you a chance to try these test methods out for yourself. Compare and contrast the "traditional" methods of QC Micro testing with newly-approved "rapid" compendial methods, using novel equipment and reagents, designed to reduce the time-to-release of biopharmaceutical products from several weeks to several days or even hours, in some cases.

With the rapid (pun intended!) changes that continue to revolutionise QC Micro testing, keep an eye out for equipment coming soon to NIBRT, to include rapid bioburden testing systems, rapid mycoplasma testing equipment and more!

19.1. QC Micro Skills for Biopharma		
Course Description	This 3.5 day course is designed to equip QC Microbiology analysts with the main theory and practical experience required to develop their skills in a GMP biopharmaceutical microbiology laboratory. The course will cover microbiology basics in the classroom-based lectures and lab-based practical sessions, including Growth Promotion Testing and BI Processing, Environmental Monitoring, Water Sampling, Bioburden and Sterility testing (using rapid methods) & Endotoxin testing (using recombinant Factor C technology), Microbial Identifications, and Virus and Mycoplasma testing. The course will also cover data trending and an overview of how to approach deviations and investigations.	
Format	3.5 Days Blended Online and Onsite in NIBRT	
	+ Three Mornings Online Theory	
	+ Two days practicals at NIBRT	
Who should attend	QC Micro personnel looking for a refresher or introduction to the relevant theory and practical elements of common microbiology lab tests.	
	Lab management personnel who want to refresh their knowledge on testing protocols and regulatory requirements. QA, Manufacturing or Engineering personnel who have an invested interested in what happens in a QC Micro lab.	
Dates	Course 3	
	+ Three Mornings Online Theory September 08-10	
	+ Two Days NIBRT Practicals September 14-15	
Price	Online Theory Only €1,200	
	Full Course Theory and Practicals €2,800	

20 Vaccine Manufacturing

Building on NIBRT's extensive track record of training delivery in recombinant protein and monoclonal antibody manufacture, courses are being developed for 2021 in the area of protein and viral vector based vaccine manufacture.

20.1 Fundamentals of Vaccine Manufacture	Vaccines play a vital role in human health and the defence against infectious diseases. Awareness of the importance of vaccines has never been as high as during the COVID-19 pandemic. This course aims to give a general overview of the various vaccine modalities; from live or attenuated viruses to recombinant protein and DNA/mRNA-based vaccines. This course will also describe the various methods of manufacture of these different vaccines from upstream to downstream to fill-finish and quality control. Furthermore, practical sessions will allow the trainee to work with the equipment used in these manufacturing processes and gain hands-on experience of the associated techniques.	
	Theory:	
	+ Introduction to vaccines and immunity	
	+ Strategies for vaccine manufacturing	
	+ Quality control and characterisation in vaccine manufacturing	
	Practical Sessions:	
	+ Vial Thaw and Flask/Factory Seeding (Adherent/ Stem Cell).	
	+ Microscopy and Morphology of Adherent Cells.	
	+ Trypsinisation and Cell Culture Scale Up.	
	+ Suspension Cell Seeding and Scale Up in single-use bioreactors.	
	+ Clarification and Depth Filtration Technologies.	
	+ Purification Strategies for viral vector based vaccines, using ultrafiltration/ diafiltration and chromatographic separations.	
	+ Formulation and Aseptic Filling.	
	+ QC methodologies in vaccine manufacturing.	
Format	4 days onsite in NIBRT	
Who should attend	This course is designed for operators, technical staff, engineers and managers wishing to increase their knowledge of the strategies used in vaccine manufacturing.	
Dates	November 9-12	
Price	€3,200	

Webinar Series

NIBRT are hosting the **"NIBRT Vaccine Manufacturing Webinar Series"**. The series includes seven separate webinars which brings together leading experts in vaccine manufacturing to share their perspectives on the challenges involved in manufacturing vaccines. Topics range from vaccine development for COVID-19 to world-wide vaccine formulation and distribution. The webinars are available from the NIBRT Online Academy https://noa.nibrt.ie/

21 NIBRT Global Partners Programme

The NIBRT Global Partner Programme supports an international alliance of leading training and education organisations to help address the global shortage of a skilled biopharma workforce.



The Jefferson Institute for Bioprocessing

Jefferson Institute for Bioprocessing, Philadelphia, USA

In the spring of 2019, Jefferson officially opened the doors to the first - and only - specialized education and training institute for biopharmaceutical processing in North America that combines commercial single-use processing equipment with the internationally recognized NIBRT curriculum.

The focus of JIB is hands-on training of industry professionals through short-term trainings, certificates and hands-on education of new bioprocessing engineers and scientists at both undergraduate and graduate levels. The education and training programs in bioprocessing are anchored at the new state-of-the-art JIB facility, located minutes from Philadelphia, PA. The institute is focused on biomanufacturing and dedicated to education and industry-based research that translates advances in the life sciences into emerging therapeutics that benefit humanity.

Training Courses

JIB understands the critical need to rapidly develop and advance the skills and knowledge of scientists, engineers and technicians who work in process development and biomanufacturing of biopharmaceuticals and biologics. They provide a broad-range of trainings in commercial single-use processing equipment as well as customized trainings to meet the full needs of the industry. Through its 25,000 sq. ft. fully flexible state-of-theart facility, JIB provides a truly tactile training experience by combining interactive presentations, workshops, hands-on laboratory and pilot-scale experience.

Academic Offerings

Offering both an MS in Biopharmaceutical Process Engineering and a Graduate Certificate in Biopharmaceutical Process Development (BPD Certificate), JIB is ideal for employment-focused graduates with first degrees in Life Sciences and Engineering.

Training and education in biopharmaceutical processing are exceptionally laboratory intensive. At JIB, the students spend less time in traditional classroom settings and more time in JIB's pilot-scale facility, fully equipped with the most advanced technologies and processes used by industry to manufacture biopharmaceuticals.

More Information

For Trainings: Lyn Kugel at **HLynda.Kugel@jefferson.edu** For Academic Programs: Geoff Toner at **Geoffrey.Toner@jefferson.edu Jefferson.edu/JIB**

University of Technology, Sydney, Australia

An alliance agreement between University of Technology Sydney (UTS) and NIBRT to deliver selected NIBRT courses utilising the purpose built \$11.5m UTS Biologics Innovation Facility (BIF) launched in July 2019.

The UTS Biologics operation, designed for practical vocational and professional training, is a strategic investment between UTS and the NSW Government aimed at building a future workforce with high quality transferable STEM skills for the biopharma industry. Key stakeholders include the federal Government through the National Collaborative Research Infrastructure Strategy and global biopharma company Cytiva.

BIF replicates the NIBRT's Irish facility including separate teaching and process spaces and a full range of single-use upstream and downstream equipment, giving operators and technicians training opportunities ranging from fundamental sterile production techniques to complex biomanufacturing processes in a GMP environment.

The University of Technology, Sydney is in the southern part of Sydney's CBD near Central Station, which is only a 20-minute train ride from Sydney Airport.

More Information

For more information on the capabilities of the UTS Biologics Innovation Facility **www.uts.edu.au/bif** or contact **biologicsinnovationfacility@uts.edu.au**

Industry Course Offerings

- + Upstream and Downstream Operations
- + Scale Up/Scale Down
- + Quality and Regulatory Compliance
- + Continuous Bioprocessing
- + Single Use Technologies
- + Quality by Design and Design of Experiments
- Process Modeling and Process
 Integration
- + Analytical Methods and Applications
- + Process Tech Transfer, Qualification, and Validation
- + Aseptic Process and Cleaning Operations

NIBRT courses at UTS

- + Introduction to Single Use Technologies
- + Bioprocessing for Engineers
- + Introduction to Upstream Processing Operations
- + Introduction to Downstream Processing Operations
- + Introduction to Fill Finish Operations



Biologics Innovation Facility at University of Technology, Sydney



Downstream processing suite at Guangzhou Bioprocess Academy

Bioprocessing Research and Training Academy Guangzhou (BRTAG), Guangzhou, China

Launched in March 2020, Bioprocessing Research and Training Academy Guangzhou (BRTAG) is a Chinese Government funded GMP bioprocessing facility equipped with cutting-edge single use technology from Cytiva. BRTAG has joined NIBRT's global partnership programme to deliver localized NIBRT training courses in the Guangdong-Hong Kong-Macao Greater Bay Area, an active economic area in southern China attracting millions of high-tech talents as well as 10,000+ thriving biological companies.

BRTAG provides both theoretical and practical biomanufacturing training, devoted to cultivating high-end talents with in-depth perspectives of China's bio-industry and global pharma. Key partners include Guangzhou Development District (GDD), China's top 3 development district, and Cytiva, one of the Fortune 500. BRTAG is located in the International Bio Island and operated by a subsidiary of Guangzhou Hi-tech Investment Group (GHIC), under the administration of GDD.

BRTAG is proud to be the first NIBRT partner in the Great China area and provides a bioprocess training facility with a full range of single-use upstream and downstream equipment, offering trainees hands-on practice opportunities ranging from fundamental aseptic skills to complex biomanufacturing and bioprocessing procedures in a GMP environment.

For more information of the BRTAG, please contact **gtc@bio-island.com**

NIBRT Courses at BRTAG

- + Introduction to single-use technologies in both upstream and downstream processing operations
- + Introduction to QC technologies
- + Bioprocessing for Engineers



22 Testimonials

Since undertaking the NIBRT/Sligo IT L9 Diploma course I have moved job to a leading biopharmaceutical company and the information I have learned, particularly around regulations and single use plastics has been interesting and I believe has assisted me in my career within my current company".

Frances Doherty

Springboard Student

I want to thank everyone that has been involved in the Graduate Programme The course is highly focused on the area of validation. The staff have been really helpful (special thanks for the staff in NIBRT which gave us a 3 months hands on experience before actually going into our internship). One of the skills which I found really useful from NIBRT was how to properly gown, which I have used every day in my internship.

Thank you everyone that has given me this opportunity, and I highly recommend it for anyone who wants to have a future path in the area of validation because this can open many doors, not just one."

Student

TU Dublin and NIBRT Graduate Program

I would strongly recommend Bioreactor Operations to anyone looking for an introduction to the biopharmaceutical industry. It gives an overview of the types of bioreactors, monitoring and modes of operation, using informative graphics and follow-up questions at the end of each section to strengthen learning, as well a final quiz assessment. The course material is clearly explained and is easy to understand to someone relatively new to concepts in biopharmaceutical technology."

NOA student, Sakshi Hans

Medical Lab Aide at TTM Healthcare Group

The course is well structured and well explained with interesting content. The course was informative and helpful. It discussed the important aspects of the bioreactor in detail including the insights on dealing with the troubleshooting. The course was interactive and had many questions-answer rounds which were very useful, touching upon the all the technical elements of the bioreactor relevant to my current work. The questions were analytical and extra study material was provided in addition to the course content, level and depth of the information just right.

Overall my experience with NOA has been great and these learning experience will aid in future development."

NOA Student, Preeti Saroha Indian Institute of Technology

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We studied a number of technologies including single use technology and wave reactors it's been phenomenal. Our experience with the NIBRT trainers has been excellent. They have made us really comfortable with hands on experience"

Global Business Development Manager Asgard Cleanroom Solutions



Fantastic friendly, enthusiastic and knowledgeable trainers who were always so helpful. Small groups worked really well to have better interaction with trainers and easier to ask questions. An overall fantastic

MSD

experience".



Thank you very much, this was a very informative, educational and very fun training course".

Engineers Ireland attendee



MSD Biotech



Saudi Vax

NIBRT Training Catalogue 2021



23 Outreach and Engagement

A key component of NIBRT's remit is to help develop the next generation of biopharma talent with a number of exciting initiatives throughout 2020 including:

Amgen's School of Biotech Excellence (ABE) which is an innovative science education programme that empowers teachers to bring biotechnology into their classrooms. ABE-Ireland offers training in molecular biology experiments for secondary school teachers at locations in University College Dublin, Dublin City University and NIBRT.

NIBRT's Biopharmaceutical Science Transition Year Competition. The very popular competition invites transition year students to submit an essay focusing on the biopharma sector in Ireland. The successful students get a one week structured placement in NIBRT where they get the opportunity to experience the state-of-the-art facilities and learn from scientists working in the research and training team. info@nibrt.ie

Careers in Biopharma, NIBRT's annual Careers in Biopharma continues to be a very popular event to connect the Industry with high quality prospective employees. Unfortunately due to Covid 19 this event was cancelled in 2020 however, the event will be held virtually in 2021.



NIBRT is pleased to have a won a wide selection of national and international awards for its training and education programmes including:

2020	2020 Pharma Industry Awards: Innovation of the Year
2020	2020 Pharma Industry Awards: Partnership Alliance of the Year
2020	2020 Pharma Industry Awards: Pharma Project of the Year - Small
2019	Invest in Ireland Staff Upskilling Award with Takeda Dunboyne Biologics
2019	Pharma Industry Awards: Project of the Year Award with Siemens
2018	Pharma Industry Awards: Pharma Research Centre of the Year
2017	SFI Industry Partnership Award
2017	Postgraduate Course of the Year Award in Health Sciences
2017	Pharma Industry Awards: Partnership Alliance of the Year with GE Healthcare
2016	Pharma Industry Awards: Pharma Education and Training Award
2015	Pharma Industry Awards: Pharma Education and Training Award
2015	Pharma Industry Awards: Partnership Alliance of the Year with Bristol Myers Squibb
2012	ISPE Facility of the Year Award "Novel Collaboration"
2012	Bioprocess International "Manufacturing Collaboration of the Decade" Award





- 1. The Arla team at Biopharma 4.0 Training at NIBRT
- 2. NIBRT Training team delivering remote training to Saudi Vax
- Killian O'Driscoll, NIBRT, Simon Coveney TD, Minister for Foreign Affairs & Trade, Matt Moran, Director, BioPharmaChem Ireland at BioPharma Archiving
- 4. The NIBRT Online Academy team with Simon Coveney TD, Minister for Foreign Affairs & Trade
- 5. Dan Mulhall, Ambassador of Ireland to the United States of America with Jefferson Institute for Bioprocessing at the Ambassador's Awards in Philadelphia
- 6. Shada Warreth, Kate Cotter and Alex Ostropolska at the launch of the NIBRT Online Academy
- 7. Mr. Wei Zeng, Chairman of Guangzhou Bioprocess Academy; Ms. Yu Xin, CEO of Guangzhou Hi-tech Investment Group; Mr. Huang Weijian, Deputy Director of GDD Investment Promotion Bureau; Ms. He Lulu, Vice Governor of GDD; Ms. Therese Healy, Charge d'Affaires, Embassy of Ireland; Ms. Yu Lihua, CEO of Cytiva Great China, Mr. Jevery Zhang, Director of IDA China
- 8. Senior Trainer Robbie Byrne conducting remote online SAT of Avantor ILD system at NIBRT
- 9. Signing of an MOU with Korean Health Industry Development Institute (KHIDI)



Inline Dilution

Automated in-line dilution is an increasingly popular technology that can increase process efficiency and flexibility. Improved buffer management strategies can greatly reduce downstream bottlenecks and costs. NIBRT was delighted to work with technical experts from Avantor to recently complete the site acceptance test for the installation of a best-in-class in-line dilution system. NIBRT's collaboration with Avantor will provide industry leading buffer management training to provide solutions to mitigate downstream challenges faced by manufacturers.



Lyophilisation of Biologics

NIBRT have recently installed a pilot-scale lyophiliser, the Lyobeta 3PS, and will be offering both theory and practical training on lyophilisation operations, formulation, validation and more. NIBRT will also be further developing our Lyophilisation training capabilities with the addition of a Lyobeta Mini, benchtop lyophiliser as well as the Lyostat 5. The Lyostat-5 is a best-in-class freeze-drying microscopy system which allows real-time visualisation of a freeze-drying as well as monitoring of critical process parameters. These systems enable further training in the areas of formulation, cycle, process development and scale-up.

Advanced Fill Finish

NIBRT are currently reviewing tender submissions for a new filling line to add to our training capabilities in the aseptic fill and finish space. NIBRT are hoping to select a filling line that adds to our current vial filling line under RABS by purchasing as line that can fill syringes and other containers and operates under a closed system.

New NOA courses

The following elearning courses will be launched on NIBRT Online Academy in quarter 3 2021:

- + Cleanrooms and Cleanroom Behaviour
- + Single-Use technologies in BioPharmaceutical Manufacturing
- + Introduction to Quality Control in BioAnalytics
- + Trends in in BioPharmaceutical Manufacturing
- + Introduction to in BioPharmaceutical Manufacturing for non-Scientists
- + Viral Vectors in Partnership with Cytiva and Pall



26 Contact Us

Book a course directly via **www.nibrt.ie** or contact us at **training@nibrt.ie** or **+353 1 215 8100** to speak with one of our training team. Or purchase a NOA course directly via **https://noa.nibrt.ie**

For more information, please visit our website at **www.nibrt.ie**. Here you will find up-to-date information about course schedules, descriptions, registration, location and contact information.

Please sign up to our NIBRT newsletter to receive updates throughout 2021

https://www.nibrt.ie/media-centre/

Clients are very welcome to visit us at:

National Institute for Bioprocessing Research and Training (NIBRT), Foster Avenue, Mount Merrion, Blackrock, Co. Dublin, Ireland, A94 X099.

Web: www.nibrt.ie Phone: +353 (0) 1 215 8100 Email: training@nibrt.ie

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