Vaccine Manufacturing Technologies Training Course

Professional Development Training Course Outline

Category	General Training	**Duration**	10 Days
Base Fee	$3,000 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

The global vaccine industry is experiencing unprecedented growth driven by biopharmaceutical innovation, mRNA technology, viral vector platforms, recombinant vaccines, pandemic preparedness, biotechnology advancements, quality-by-design (QbD), digital manufacturing, Industry 4.0, and regulatory compliance requirements. Modern vaccine manufacturing has evolved into a highly sophisticated process involving advanced cell culture technologies, upstream and downstream bioprocessing, aseptic manufacturing, process analytical technology (PAT), artificial intelligence (AI)-enabled quality monitoring, and automated production systems. Organizations are increasingly investing in scalable and resilient vaccine manufacturing capabilities to meet global health demands while ensuring product quality, safety, efficacy, and regulatory compliance.

Vaccine Manufacturing Technologies Training Course is designed to provide participants with comprehensive knowledge of vaccine development, manufacturing technologies, process optimization, quality assurance, GMP compliance, biosafety management, technology transfer, supply chain resilience, and emerging vaccine platforms. Participants will gain practical insights into vaccine production lifecycle management, advanced manufacturing strategies, contamination control, validation methodologies, and case studies from successful vaccine manufacturing programs. The course equips professionals with the skills required to improve operational excellence, accelerate production timelines, and maintain compliance with international regulatory standards.

Programme Curriculum

Vaccine Manufacturing Technologies Training Course

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Course Objectives

Upon completion of this course, participants will be able to:

1. Understand modern vaccine manufacturing technologies and production workflows.
2. Analyze mRNA, DNA, recombinant, and viral vector vaccine platforms.
3. Implement Quality by Design (QbD) principles in vaccine manufacturing.
4. Optimize upstream bioprocessing and cell culture operations.
5. Improve downstream purification and recovery processes.
6. Apply Good Manufacturing Practices (GMP) for vaccine production.
7. Utilize Process Analytical Technology (PAT) for process monitoring.
8. Strengthen contamination control and aseptic processing systems.
9. Conduct technology transfer and process scale-up activities effectively.
10. Implement digital transformation and Industry 4.0 solutions in manufacturing.
11. Manage regulatory compliance and validation requirements.
12. Enhance cold chain logistics and vaccine distribution systems.
13. Develop strategies for pandemic preparedness and rapid vaccine deployment.

Target Audience

1. Vaccine Manufacturing Engineers
2. Bioprocess Engineers
3. Pharmaceutical Production Managers
4. Biotechnology Scientists
5. Quality Assurance and Quality Control Professionals
6. Regulatory Affairs Specialists
7. Validation and Qualification Engineers
8. Research and Development Personnel

Course Modules

Module 1: Vaccine Industry Fundamentals

- Global vaccine market overview
- Vaccine development lifecycle
- Types of vaccines and applications
- Manufacturing value chain
- Industry trends and innovations
- **Case Study:** Global COVID-19 vaccine manufacturing scale-up strategies.

Module 2: Vaccine Platforms and Technologies

- Live attenuated vaccines
- Inactivated vaccines
- Recombinant protein vaccines
- Viral vector vaccines
- mRNA and DNA vaccines
- **Case Study:** Development and commercialization of mRNA vaccines.

Module 3: Vaccine Manufacturing Process Design

- Process flow development
- Manufacturing facility design
- Production workflow mapping
- Process integration principles
- Capacity planning
- **Case Study:** Design of a multi-product vaccine manufacturing facility.

Module 4: Cell Culture and Upstream Processing

- Cell line selection
- Media optimization
- Bioreactor operations
- Cell growth monitoring
- Process scale-up
- **Case Study:** Optimization of mammalian cell culture productivity.

Module 5: Microbial Fermentation Technologies

- Bacterial fermentation systems
- Fermentation process control
- Yield enhancement techniques
- Monitoring critical parameters
- Production troubleshooting
- **Case Study:** High-yield bacterial antigen production.

Module 6: Downstream Processing and Purification

- Harvesting technologies
- Filtration systems
- Chromatography techniques

- Viral clearance methods
- Purification optimization
- **Case Study:** Improving vaccine purification efficiency.

Module 7: Formulation and Vaccine Stability

- Adjuvant technologies
- Formulation development
- Stability testing
- Lyophilization processes
- Shelf-life optimization
- **Case Study:** Stability enhancement of temperature-sensitive vaccines.

Module 8: Aseptic Processing and Fill-Finish Operations

- Cleanroom classifications
- Sterile manufacturing practices
- Filling technologies
- Container closure systems
- Environmental monitoring
- **Case Study:** Reducing contamination risks in fill-finish operations.

Module 9: GMP and Regulatory Compliance

- GMP requirements
- International regulatory frameworks
- Documentation practices
- Audit readiness
- Inspection management
- **Case Study:** Successful regulatory approval of a vaccine facility.

Module 10: Quality Assurance and Quality Control

- QA systems implementation
- QC laboratory testing
- Batch release procedures
- Deviation management
- CAPA programs
- **Case Study:** Root cause analysis of vaccine batch deviations.

Module 11: Process Validation and Qualification

- Equipment qualification
- Process validation lifecycle
- Cleaning validation
- Computer system validation
- Continued process verification
- **Case Study:** Validation of a commercial vaccine production process.

Module 12: Digital Manufacturing and Industry 4.0

- Smart manufacturing technologies

- AI-enabled process optimization
- Manufacturing execution systems (MES)
- Data analytics applications
- Digital twins
- **Case Study:** Digital transformation in vaccine production facilities.

Module 13: Supply Chain and Cold Chain Management

- Vaccine storage requirements
- Cold chain technologies
- Distribution networks
- Risk management strategies
- Inventory optimization
- **Case Study:** Global distribution of ultra-cold-chain vaccines.

Module 14: Technology Transfer and Scale-Up

- Technology transfer frameworks
- Process knowledge management
- Commercial scale-up strategies
- Risk assessment methodologies
- Knowledge transfer protocols
- **Case Study:** Technology transfer between international manufacturing sites.

Module 15: Future Trends and Pandemic Preparedness

- Next-generation vaccine technologies
- Personalized vaccines
- Continuous manufacturing
- Rapid response production systems
- Global preparedness planning
- **Case Study:** Vaccine manufacturing response during global health emergencies.

Register as a group from 3 participants for a Discount

Send us an email: info@fineskilltrainingcenter.org or call *+254769199797*

Certification

Upon successful completion of this training, participants will be issued with a globally- recognized certificate.

Tailor-Made Course

We also offer tailor-made courses based on your needs.

Key Notes

a. The participant must be conversant with English.

b. Upon completion of training the participant will be issued with an Authorized Training Certificate

c. Course duration is flexible and the contents can be modified to fit any number of days.

d. The course fee includes facilitation training materials, 2 coffee breaks, buffet lunch and A Certificate upon successful completion of Training.

e. One-year post-training support Consultation and Coaching provided after the course.

f. Payment should be done at least a week before commence of the training, to Fineskill Training Center account, as indicated in the invoice so as to enable us prepare better for you.

Upcoming Scheduled Sessions

Start Date	End Date	Location	Price
23 Nov 2026	04 Dec 2026	Online	$2,000
23 Nov 2026	04 Dec 2026	Physical	$3,000
23 Nov 2026	04 Dec 2026	Physical	$6,000
23 Nov 2026	04 Dec 2026	Physical	$6,000
23 Nov 2026	04 Dec 2026	Physical	$12,000
23 Nov 2026	04 Dec 2026	Physical	$9,000
23 Nov 2026	04 Dec 2026	Physical	$12,000
23 Nov 2026	04 Dec 2026	Physical	$12,000

Ready to enroll or request a customized program? Book online or contact us:

Register Online Now

Email: info@fineskilltrainingcenter.com | Website: www.fineskilltrainingcenter.com