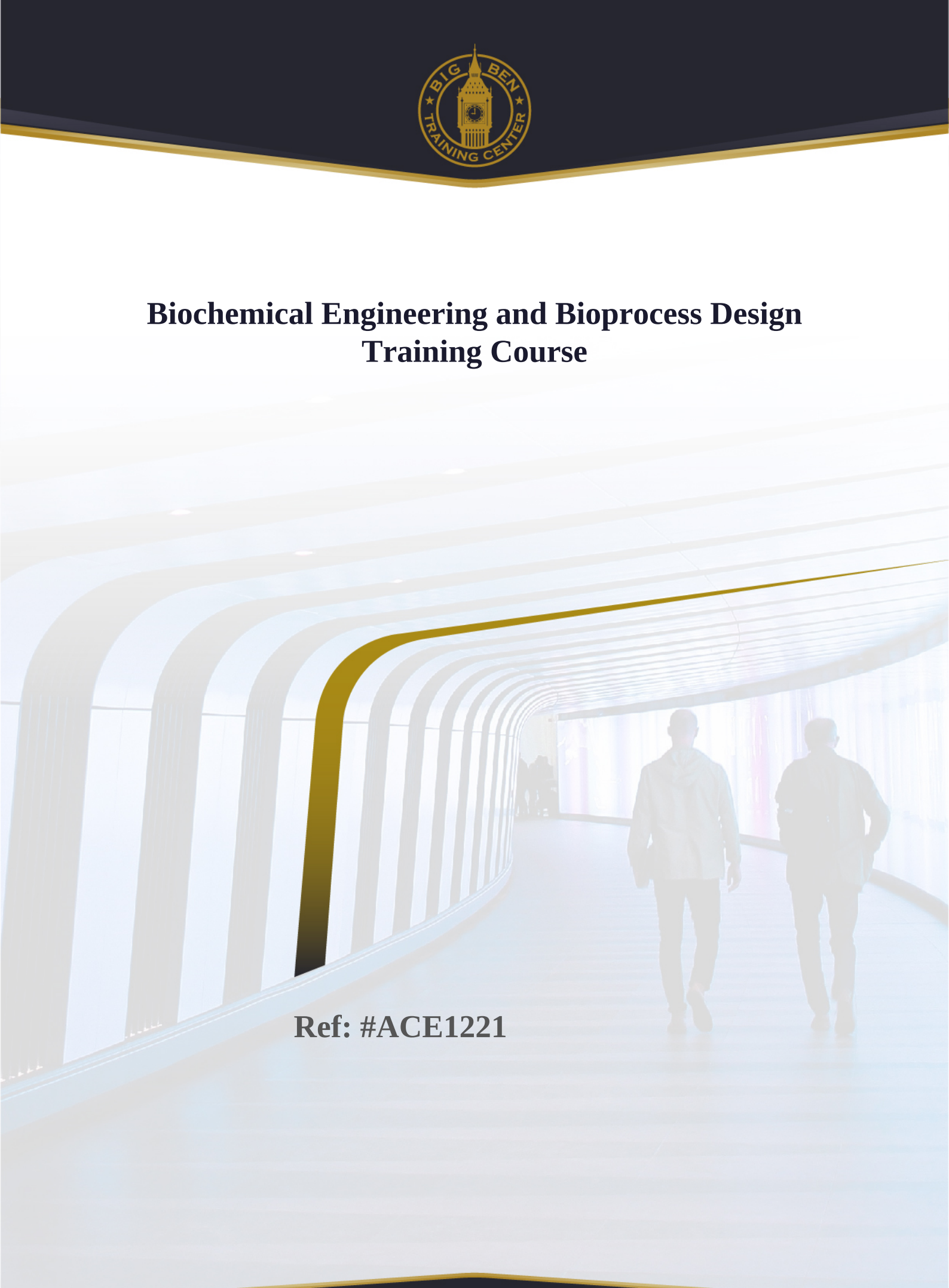
Biochemical Engineering and Bioprocess Design Training Course



Ref: #ACE1221

Course Introduction / Overview:

This training course gives a comprehensive look into the principles of biochemical engineering and bioprocess design. As the world turns toward more sustainable and biologically derived products, from pharmaceuticals to biofuels, the demand for expertise in this field is growing. This course gives participants a solid foundation in the fundamental concepts of biochemical engineering, including microbial kinetics, bioreactor design, and downstream processing. We explore how to design, scale, and optimize biological processes for the efficient production of high-value products. The curriculum is informed by leading academic and industry resources, such as the book Biochemical Engineering Fundamentals by James E. Bailey and David F. Ollis, a foundational text in the field. BIG BEN Training Center is committed to giving a forward-thinking curriculum that equips professionals with the skills needed to lead innovation in biotechnology and biomanufacturing.

Target Audience / This training course is suitable for:

- Chemical and biochemical engineers.
- Biotechnology and pharmaceutical scientists.
- R&D researchers.
- Process design and scale-up specialists.
- Operations managers in biomanufacturing.
- Academics and students in related fields.
- Regulatory and quality assurance professionals.

Target Sectors and Industries:

- Biotechnology.
- Pharmaceuticals.
- Food and beverage.
- Biofuels and renewable energy.
- Chemical manufacturing.
- Government agencies and research institutes.
- Environmental and waste management.

Target Organizations Departments:

- Bioprocess engineering.
- Research and development.
- Manufacturing and production.
- Quality assurance.
- Environmental, health, and safety.
- Process design.
- Product development.

Course Offerings:

By the end of this course, the participants will have able to:

- Describe the principles of microbial growth kinetics.
- Design and model different types of bioreactors.
- Understand the challenges of sterile operations.
- Apply principles of mass and energy balances to bioprocesses.
- Evaluate and select downstream processing techniques.
- Perform a preliminary economic analysis of bioprocess.
- Discuss the regulatory and safety requirements for biomanufacturing.
- Analyze case studies of commercial bioprocesses.

Course Methodology:

This training course uses a mix of interactive and practical training methods to give dynamic learning experience. The curriculum combines theoretical lectures with real-world case studies to bridge the gap between academic concepts and practical application. Participants will use hands-on activities, including group workshops and scenario-based exercises, to reinforce their understanding of key topics. We use discussions and Q&A sessions to encourage a collaborative learning environment, where participants can share experiences and insights. The course also includes an in-depth analysis of successful and unsuccessful projects from various industries to highlight best practices and common pitfalls. This approach gives participants the confidence to apply their new knowledge directly to their professional roles. At BIG BEN Training Center, we believe that an engaging and interactive format is key to mastering new skills, so we focus on giving immediate feedback and continuous support throughout the training. The methods are designed to ensure every participant leaf with a clear, practical skill set.

Course Agenda (Course Units):

Unit One: Fundamentals of Bioprocesses.

- Introduction to biochemical engineering.
- Cell biology for engineers.
- Enzyme kinetics and reaction modeling.
- Microbial growth kinetics.
- Bioprocess economics and sustainability.

Unit Two: Bioreactor Design and Operation.

- Types of bioreactors.
- Design of stirred-tank bioreactors.
- Mass transfer and oxygen supply.
- Sterilization and aseptic operations.
- Process control in bioreactors.

Unit Three: Downstream Processing.

- Overview of downstream processing.
- Cell separation: centrifugation and filtration.
- Cell disruption and product recovery.
- Chromatography for purification.
- Crystallization and final product formulation.

Unit Four: Process Modeling and Scale-Up.

- Mass and energy balances in bioprocesses.
- Scaling up bioreactors.
- Mixing and power consumption calculations.
- Modeling bioprocesses with software.
- Optimization of process parameters.

Unit Five: Industrial Bioprocess Case Studies.

- Case study: production of ethanol.
- Case study: manufacturing of antibiotics.
- Case study: bioplastics and biopolymers.
- Regulatory landscape and quality control.
- Future trends in biochemical engineering.

FAQ:

Qualifications required for registering to this course?

There are no requirements.

How long is each daily session, and what is the total number of training hours for the course?

This training course spans five days, with daily sessions ranging between 4 to 5 hours, including breaks and interactive activities, bringing the total duration to 20 - 25 training hours.

Something to think about:

How can advancements in synthetic biology and genetic engineering fundamentally change the way we design and optimize metabolic pathways for industrial bioprocesses?

What unique qualities does this course offer compared to other courses?

This training course is unique because it combines a strong theoretical foundation in biochemical engineering with a practical, hands-on approach to bioprocess design. While many courses discuss biology or engineering separately, our program shows you how they are deeply connected in biomanufacturing. We don't just teach you about microbial kinetics; we help you find out how to apply that knowledge to design a bioreactor or improve a fermentation process. The curriculum is heavily focused on real-world case studies from the pharmaceutical and biofuels industries, enabling participants to apply their knowledge to solve real-world problems. It’s an advanced program that gives professionals the skills needed to innovate and scale biological processes for a more sustainable future.