Photochemical Reactor Engineering Training Course

Professional Development Training Course Outline

Category	General Training	**Duration**	5 Days
Base Fee	$1,500 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

Photochemical Reactor Engineering is at the forefront of modern chemical process development, integrating advanced photochemistry principles with innovative reactor design for sustainable and efficient chemical manufacturing. Photochemical Reactor Engineering Training Course provides participants with cutting-edge knowledge in photochemical reaction mechanisms, reactor kinetics, and process intensification strategies, enabling them to design, optimize, and operate photochemical reactors for industrial and research applications. Emphasis is placed on practical skills, safety protocols, and environmental considerations, preparing professionals to tackle real-world challenges in the chemical, pharmaceutical, and materials industries.

The course leverages state-of-the-art simulation tools, case studies, and experimental demonstrations to bridge the gap between theory and practice. Participants will gain expertise in reaction engineering, light-source selection, photoreactor scale-up, and green chemistry principles. By the end of the program, trainees will have the analytical, technical, and problem-solving skills necessary to implement innovative photochemical processes that improve efficiency, reduce environmental impact, and drive technological innovation.

Programme Curriculum

Photochemical Reactor Engineering Training Course

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Course Duration

5 days

Course Objectives

1. Understand fundamental photochemical reaction mechanisms and kinetics.
2. Analyze and design photochemical reactors for diverse chemical processes.
3. Apply process intensification techniques to optimize photochemical reactions.
4. Evaluate light-source technologies and their impact on reaction efficiency.
5. Implement advanced modeling and simulation tools for reactor design.
6. Integrate green chemistry principles in photochemical engineering processes.
7. Optimize energy efficiency in photochemical reactor operations.
8. Develop scalable photoreactor systems for industrial applications.
9. Conduct risk assessment and implement safety protocols in photochemical operations.
10. Investigate photochemical process innovations in pharmaceuticals and specialty chemicals.
11. Analyze case studies to solve real-world photochemical engineering challenges.
12. Enhance troubleshooting skills for process optimization and quality control.
13. Promote sustainability and environmental compliance in photochemical manufacturing.

Target Audience

1. Chemical Engineers
2. Process Development Scientists
3. Photochemists
4. R&D Professionals in Pharmaceuticals
5. Industrial Chemists
6. Environmental Engineers
7. University Researchers & Academics
8. Graduate Students in Chemical Engineering or Chemistry

Course Modules

Module 1: Fundamentals of Photochemistry

- Principles of light-matter interaction
- Photon absorption and emission processes
- Photochemical reaction kinetics
- Quantum yield analysis
- Case Study: Solar-driven oxidation reactions

Module 2: Photochemical Reactor Design

- Types of photoreactors-batch, flow, and microreactors
- Reactor geometry and light distribution
- Material selection for photoreactors
- Scaling-up considerations
- Case Study: Industrial photoreactor for vitamin D synthesis

Module 3: Light Sources & Photonics Engineering

- LED, laser, and UV lamp technologies
- Spectral matching for specific reactions
- Energy efficiency optimization
- Maintenance and safety considerations
- Case Study: LED-based photocatalytic degradation of pollutants

Module 4: Process Intensification & Optimization

- Enhancing reaction rates using flow chemistry
- Mixing, residence time, and photon flux control
- Multiphase photoreactions
- Process simulation techniques
- Case Study: Continuous-flow photoreactor for fine chemicals

Module 5: Modeling & Simulation of Photochemical Processes

- Reaction-diffusion modeling
- Computational fluid dynamics (CFD) in photoreactors
- Kinetic modeling and reactor performance evaluation
- Data-driven process optimization
- Case Study: CFD simulation of LED microreactors

Module 6: Green Chemistry & Sustainability

- Photochemical processes for waste reduction
- Renewable energy integration
- Minimizing solvent usage and emissions
- Life cycle analysis
- Case Study: Solar photocatalysis for water purification

Module 7: Safety & Regulatory Compliance

- Photochemical reaction hazards
- Reactor safety design and protocols
- Risk assessment techniques
- Environmental compliance strategies
- Case Study: Safety management in industrial photoreactors

Module 8: Industrial Applications & Emerging Trends

- Pharmaceuticals and fine chemicals
- Material science and polymer synthesis
- Photocatalysis for environmental remediation
- Smart photoreactor technologies

- Case Study: Large-scale photocatalytic CO? reduction

Training Methodology

This course employs a participatory and hands-on approach to ensure practical learning, including:

- Interactive lectures and presentations.
- Group discussions and brainstorming sessions.
- Hands-on exercises using real-world datasets.
- Role-playing and scenario-based simulations.
- Analysis of case studies to bridge theory and practice.
- Peer-to-peer learning and networking.
- Expert-led Q&A sessions.
- Continuous feedback and personalized guidance.

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	27 Nov 2026	Online	$1,000
23 Nov 2026	27 Nov 2026	Physical	$1,500

Start Date	End Date	Location	Price
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$4,500
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$6,000

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

Register Online Now

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