Green Chemistry and Sustainable Processes 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

Green Chemistry and Sustainable Processes represent a transformative approach to chemical design, manufacturing, and industrial innovation aimed at reducing environmental impact while improving efficiency and safety. Green Chemistry and Sustainable Processes Training Course is designed to equip professionals with cutting-edge knowledge in sustainable chemical engineering, green synthesis, circular economy principles, and low-carbon industrial processes. As global industries shift toward net-zero emissions, ESG compliance, and climate-smart production systems, mastering green chemistry has become essential for future-ready scientists, engineers, and sustainability leaders.

The course provides a deep dive into modern frameworks such as atom economy optimization, renewable feedstocks, catalysis innovation, waste minimization, and life cycle assessment (LCA). Participants will explore how industries are transitioning from traditional hazardous chemical processes to eco-efficient, bio-based, and energy-smart alternatives. With real-world case studies from pharmaceuticals, petrochemicals, agriculture, and materials science, this program bridges theory with industrial application, empowering learners to drive sustainable innovation, regulatory compliance, and green transformation strategies across global value chains

Programme Curriculum

Green Chemistry and Sustainable Processes Training Course

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Course Duration

5 days

Course Objectives

1. Understand principles of Green Chemistry & Sustainable Engineering
2. Apply 12 Principles of Green Chemistry in industrial processes
3. Design low-carbon chemical manufacturing systems
4. Optimize atom economy and reaction efficiency
5. Evaluate life cycle assessment (LCA) models
6. Implement circular economy strategies in chemical industries
7. Develop eco-friendly catalysts and bio-catalysis solutions
8. Reduce hazardous waste and toxic by-products
9. Integrate renewable feedstocks and bio-based materials
10. Improve energy efficiency in chemical production systems
11. Ensure ESG and environmental compliance standards
12. Apply green solvent selection and process intensification
13. Lead sustainable innovation and decarbonization initiatives

Target Audience

1. Chemical Engineers & Process Engineers
2. Environmental Scientists & Sustainability Consultants
3. Pharmaceutical Industry Professionals
4. Petrochemical & Refinery Engineers
5. R&D Scientists in Chemical Manufacturing
6. Industrial Safety & Compliance Officers
7. Graduate Students in Chemistry & Engineering
8. ESG Analysts and Corporate Sustainability Leaders

Course Modules

Module 1: Foundations of Green Chemistry

- Principles of sustainable chemical design
- 12 Principles of Green Chemistry
- Toxicity reduction strategies
- Green metrics and efficiency indicators
- Industrial sustainability frameworks

- **Case Study:** Replacement of toxic solvents in pharmaceutical synthesis

Module 2: Sustainable Chemical Processes Design

- Process intensification techniques
- Waste minimization strategies
- Reaction pathway optimization
- Energy integration in chemical plants
- Sustainable process simulation tools
- **Case Study:** Energy-efficient ammonia production via modified Haber process

Module 3: Renewable Feedstocks & Bio-based Chemistry

- Biomass conversion technologies
- Bio-refineries and biochemicals
- Plant-based polymer production
- Algae-based fuel systems
- Agricultural waste valorization
- **Case Study:** Bio-ethanol production from sugarcane waste

Module 4: Green Catalysis & Reaction Engineering

- Heterogeneous vs homogeneous catalysis
- Enzyme catalysis and biocatalysts
- Nanocatalyst innovations
- Catalyst recycling techniques
- Reaction selectivity improvement
- **Case Study:** Catalytic converters reducing automotive emissions

Module 5: Green Solvents & Safer Chemical Alternatives

- Ionic liquids and deep eutectic solvents
- Water-based reaction systems
- Solvent-free synthesis methods
- Toxicity profiling of solvents
- Sustainable solvent selection tools
- **Case Study:** Supercritical CO? in dry cleaning and extraction processes

Module 6: Waste Management & Circular Economy

- Industrial waste valorization
- Zero-waste manufacturing systems
- Recycling and upcycling technologies
- Industrial symbiosis models
- Closed-loop production systems
- **Case Study:** Plastic-to-fuel conversion in petrochemical industries

Module 7: Life Cycle Assessment & ESG Integration

- Cradle-to-grave analysis
- Carbon footprint measurement
- ESG reporting frameworks

- Sustainable supply chain evaluation
- Environmental risk assessment
- **Case Study:** LCA of biodegradable packaging vs conventional plastics

Module 8: Industrial Applications & Future Innovations

- Green hydrogen production
- Carbon capture and utilization (CCU)
- AI in sustainable chemistry
- Smart chemical manufacturing systems
- Net-zero industrial transformation
- **Case Study:** Hydrogen fuel adoption in steel manufacturing

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
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:

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