Biomass Conversion Technologies 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

Biomass Conversion Technologies are at the forefront of the global transition toward renewable energy, circular economy, carbon neutrality, and sustainable development. This training course provides a comprehensive foundation in converting organic materials such as agricultural residues, forestry waste, municipal solid waste, and energy crops into valuable energy products including biofuels, biogas, biochar, syngas, and bioelectricity. With rising demand for green energy solutions, decarbonization strategies, and climate-resilient technologies, biomass conversion has become a critical pillar in modern energy systems.

Biomass Conversion Technologies Training Course is designed to equip learners with cutting-edge knowledge in thermochemical, biochemical, and physical biomass conversion processes. Participants will gain hands-on insights into technologies such as pyrolysis, gasification, anaerobic digestion, combustion, and fermentation, alongside real-world applications in energy production, waste management, and industrial sustainability. The course emphasizes innovation, scalability, and practical deployment aligned with global ESG standards, net-zero targets, and sustainable energy policy frameworks.

Programme Curriculum

Biomass Conversion Technologies Training Course

Introduction

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Course Duration

5 days

Course Objectives

1. Understand fundamentals of biomass energy systems and renewable energy transition
2. Analyze feedstock characterization and biomass resource assessment
3. Apply principles of thermochemical conversion
4. Evaluate biochemical conversion processes
5. Design biofuel production systems for sustainable energy generation
6. Develop knowledge of bioenergy policy, carbon credits, and ESG compliance
7. Assess waste-to-energy technologies and circular economy models
8. Optimize biogas plant operations and efficiency improvement techniques
9. Explore advanced bio-refinery concepts and integrated energy systems
10. Implement carbon footprint reduction strategies using biomass
11. Understand industrial scale biomass plant design and commissioning
12. Evaluate economic feasibility and lifecycle cost analysis of bioenergy projects
13. Promote innovation in green hydrogen, biochar, and next-gen bioenergy solutions

Target Audience

1. Renewable energy engineers and technicians
2. Environmental scientists and sustainability consultants
3. Government energy and climate policy officers
4. Industrial plant operators and process engineers
5. Agriculture and forestry professionals
6. Waste management and sanitation professionals
7. Researchers and university students in energy/environment fields
8. ESG analysts and sustainability reporting professionals

Course Modules

Module 1: Introduction to Biomass Energy Systems

- Overview of biomass resources and classification
- Global energy demand and renewable transition trends
- Biomass vs fossil fuels comparison
- Sustainability and carbon neutrality concepts
- Energy conversion pathways overview
- **Case Study:** EU renewable energy integration using biomass co-firing in power plants

Module 2: Biomass Feedstock Analysis & Pre-Treatment

- Types of biomass feedstocks

- Moisture content and calorific value analysis
- Pre-treatment methods
- Logistics and supply chain optimization
- Quality control and standardization
- **Case Study:** Sugarcane bagasse utilization in bioenergy production in Brazil

Module 3: Thermochemical Conversion Technologies

- Pyrolysis process and bio-oil production
- Gasification and syngas applications
- Combustion systems for heat and power
- Reactor design and efficiency optimization
- Emission control and safety systems
- **Case Study:** Biomass gasification power plants in India rural electrification projects

Module 4: Biochemical Conversion Technologies

- Anaerobic digestion fundamentals
- Biogas upgrading and biomethane production
- Fermentation for bioethanol production
- Microbial pathways in biomass conversion
- Digestate utilization and waste recovery
- **Case Study:** Germany’s biogas grid injection system for renewable gas supply

Module 5: Biofuels and Advanced Bioenergy Products

- Biodiesel production processes
- Second-generation biofuels
- Biojet fuel development trends
- Algae-based biofuel systems
- Fuel standards and regulatory frameworks
- **Case Study:** Aviation biofuel trials by leading global airlines

Module 6: Bioenergy Systems Design & Engineering

- Biomass plant design principles
- Heat and mass balance calculations
- Process flow diagram development
- Equipment selection and integration
- Safety and environmental compliance
- **Case Study:** Municipal solid waste-to-energy plant in Sweden

Module 7: Circular Economy & Waste-to-Energy Systems

- Waste valorization techniques
- Industrial symbiosis models
- Biochar and soil regeneration applications
- Circular bioeconomy frameworks
- Policy incentives and carbon trading
- **Case Study:** Japan’s integrated waste-to-energy smart city model

Module 8: Emerging Trends in Biomass & Future Energy Systems

- Green hydrogen from biomass
- AI and IoT in bioenergy optimization
- Carbon capture integration with biomass systems
- Next-gen bio-refineries
- Net-zero energy system design
- **Case Study:** Carbon-negative bioenergy with CCS (BECCS) projects in Scandinavia

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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