Composite Materials 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

Composite Materials Engineering is a high-impact, future-driven discipline at the core of aerospace innovation, automotive lightweighting, renewable energy systems, marine engineering, and advanced manufacturing. This training course delivers a comprehensive foundation and advanced applied knowledge in fiber-reinforced polymers (FRP), carbon fiber composites, nanocomposites, hybrid materials, and structural optimization techniques. Learners will gain exposure to cutting-edge finite element analysis (FEA), material characterization, failure mechanics, and smart composite systems that are reshaping global engineering industries.

With increasing demand for lightweight, high-strength, corrosion-resistant, and energy-efficient materials, composite engineering has become a critical skill in Industry 4.0. This course equips participants with practical competencies in composite design, manufacturing processes, testing standards, sustainability in materials engineering, and AI-driven material selection tools. Composite Materials Engineering Training Course is designed to bridge the gap between academic theory and industrial application through real-world case studies and simulation-based learning.

Programme Curriculum

Composite Materials Engineering Training Course

Introduction

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Course Objectives

1. Master advanced composite materials design principles
2. Understand fiber-reinforced polymer (FRP) structures
3. Apply finite element analysis (FEA) in composites
4. Evaluate failure modes and fracture mechanics
5. Develop skills in lightweight structural optimization
6. Analyze carbon fiber and graphene-based composites
7. Understand hybrid composite material systems
8. Apply advanced manufacturing processes
9. Perform non-destructive testing (NDT) on composites
10. Integrate sustainable and green composite technologies
11. Use AI-assisted materials selection tools
12. Improve thermal, mechanical, and fatigue performance analysis
13. Implement industry-grade composite engineering solutions

Target Audience

1. Mechanical Engineers
2. Aerospace Engineers
3. Automotive Design Engineers
4. Materials Scientists
5. Civil/Structural Engineers
6. Manufacturing & Production Engineers
7. R&D Professionals in Advanced Materials
8. Engineering Students & Researchers

Course Modules

Module 1: Fundamentals of Composite Materials

- Matrix and reinforcement basics
- Types of composite materials
- Material anisotropy behavior
- Strength-to-weight ratio optimization
- Introduction to composite microstructure
- **Case Study:** Boeing 787 Dreamliner carbon fiber fuselage design

Module 2: Fiber Reinforcement Technologies

- Carbon, glass, aramid fibers

- Fiber orientation and load transfer
- Weaving and lamination techniques
- Interfacial bonding mechanisms
- Nano-reinforced fibers
- **Case Study:** Formula 1 monocoque chassis reinforcement systems

Module 3: Composite Manufacturing Processes

- Hand lay-up and vacuum bagging
- Resin Transfer Molding (RTM)
- Filament winding techniques
- Autoclave curing processes
- Additive manufacturing of composites
- **Case Study:** Airbus A350 wing structure manufacturing process

Module 4: Mechanical Behavior & Failure Analysis

- Stress-strain behavior of composites
- Delamination and crack propagation
- Fatigue and creep analysis
- Impact resistance evaluation
- Fracture mechanics models
- **Case Study:** Wind turbine blade failure investigation in offshore farms

Module 5: Finite Element Analysis (FEA) in Composites

- Composite modeling in ANSYS/ABAQUS
- Mesh design for layered structures
- Load distribution simulation
- Failure prediction algorithms
- Optimization techniques
- **Case Study:** Automotive crash simulation for carbon fiber EV chassis

Module 6: Testing & Non-Destructive Evaluation (NDE)

- Ultrasonic testing methods
- X-ray and thermography inspection
- Mechanical testing standards
- Microstructure analysis
- Quality assurance in composites
- **Case Study:** Aircraft composite wing defect detection program

Module 7: Advanced & Smart Composite Systems

- Shape memory composites
- Self-healing materials
- Nanocomposites and graphene integration
- Sensor-embedded smart structures
- Adaptive material systems
- **Case Study:** NASA smart composite spacecraft components

Module 8: Sustainability & Industrial Applications

- Green composite materials development
- Recycling of composite waste
- Life cycle assessment (LCA)
- Energy-efficient manufacturing
- Industry 4.0 integration
- **Case Study:** Wind turbine blade recycling project in Europe

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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