Smart Materials in Construction Training Course

Professional Development Training Course Outline

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

Course Introduction

Smart Materials in Construction Training Course is designed to equip learners with advanced knowledge in intelligent building materials, sustainable construction technologies, nanotechnology in construction, and next-generation infrastructure innovation. As the global construction industry shifts toward green building solutions, energy-efficient infrastructure, and climate-resilient materials, smart materials are becoming the backbone of modern engineering and architectural transformation.

This course explores the integration of self-healing concrete, shape memory alloys, electrochromic glass, phase change materials (PCM), and nanomaterials in construction systems. Participants will gain deep insights into how IoT-enabled smart structures, sustainable urban development, and AI-driven material optimization are reshaping the future of construction engineering, making buildings more durable, adaptive, and energy-efficient.

Programme Curriculum

Smart Materials in Construction Training Course

Introduction

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Course Duration

5 days

Course Objectives

1. Understand fundamentals of smart materials in construction technology
2. Analyze applications of self-healing concrete and bio-based materials
3. Explore nanotechnology in modern building materials
4. Evaluate performance of shape memory alloys in structural engineering
5. Apply concepts of energy-efficient and green building materials
6. Integrate IoT-enabled smart construction systems
7. Study phase change materials for thermal regulation
8. Assess durability of high-performance composite materials
9. Understand electrochromic and smart glass technologies
10. Implement sustainable urban infrastructure solutions
11. Examine role of AI in material optimization and selection
12. Develop skills in climate-resilient construction design
13. Master emerging trends in future-ready smart construction ecosystems

Target Audience

- Civil Engineers and Structural Engineers
- Architects and Urban Planners
- Construction Project Managers
- Material Science Engineers
- Infrastructure Consultants
- Real Estate Developers
- Government Urban Development Authorities
- Engineering Students & Researchers

Course Modules

Module 1: Introduction to Smart Materials

- Definition and evolution of smart materials
- Classification: passive, active, and adaptive materials
- Role in modern construction industry
- Comparison with traditional building materials
- Future trends in smart construction
- **Case Study:** Use of smart composites in Dubai’s sustainable city projects

Module 2: Self-Healing Concrete Technology

- Mechanism of microbial self-healing systems
- Crack detection and repair processes
- Durability enhancement techniques
- Cost-benefit analysis in infrastructure
- Real-world application in bridges and highways
- **Case Study:** Netherlands self-healing concrete road project

Module 3: Nanotechnology in Construction

- Nano-silica and nano-coatings applications
- Strength enhancement at molecular level
- Water and corrosion resistance improvements
- Environmental impact of nanomaterials
- Industrial scalability challenges
- **Case Study:** Nano-treated high-rise buildings in Singapore

Module 4: Shape Memory Alloys (SMA)

- Properties of SMA in construction engineering
- Stress recovery and adaptive structures
- Earthquake-resistant applications
- Smart reinforcements in buildings
- Integration with modern structural systems
- **Case Study:** Japan seismic-resistant smart buildings

Module 5: Energy Efficient Materials

- Phase change materials (PCM) in temperature control
- Thermal insulation advancements
- Energy-saving building envelopes
- Smart roofing systems
- Sustainable material lifecycle analysis
- **Case Study:** PCM-based green buildings in Germany

Module 6: Smart Glass and Adaptive Facades

- Electrochromic and thermochromic glass systems
- Light and heat regulation technologies
- Smart building envelope design
- Energy optimization in skyscrapers
- Integration with building automation systems
- **Case Study:** The Edge Building, Amsterdam

Module 7: IoT and AI in Smart Construction

- Sensor-based structural monitoring
- Predictive maintenance systems
- AI-driven material selection
- Digital twin technology in construction
- Smart infrastructure analytics
- **Case Study:** Smart city infrastructure in Songdo, South Korea

Module 8: Sustainable and Green Smart Materials

- Eco-friendly construction materials
- Recycled and bio-based composites
- Carbon-neutral building technologies
- Circular economy in construction
- Future of sustainable urban development

- **Case Study:** Masdar City sustainable construction model, UAE

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

Start Date	End Date	Location	Price
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