Advanced Wind Turbine Technology Training Course

Professional Development Training Course Outline

Category	Renewable Energy	**Duration**	10 Days
Base Fee	$3,000 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

Advanced Wind Turbine Technology Training Course is designed to develop expertise in next-generation wind energy systems, renewable energy innovation, smart grid integration, and sustainable power generation technologies. With the rapid expansion of the global wind energy market, organizations require professionals skilled in advanced turbine design, digital wind farm operations, predictive maintenance, offshore wind technology, and energy optimization strategies. This course provides practical knowledge of modern wind turbine architectures, aerodynamic improvements, control systems, condition monitoring, and advanced analytics to support the transition toward a low-carbon, clean energy future.

This professional training program combines engineering fundamentals, real-world applications, emerging renewable energy trends, and industry case studies to prepare participants for challenges in utility-scale wind farms, offshore wind projects, hybrid energy systems, and smart renewable infrastructure. Through hands-on learning, simulation-based exercises, and expert-led sessions, participants gain advanced capabilities in wind turbine performance enhancement, AI-driven maintenance, digital twin technology, energy storage integration, and sustainable project management aligned with global renewable energy standards.

Programme Curriculum

Advanced Wind Turbine Technology Training Course

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Course Duration

10 days

Course Objectives

By completing this Advanced Wind Turbine Technology Training Course, participants will be able to:

1. Understand advanced wind turbine technologies and modern renewable energy trends.
2. Analyze aerodynamic optimization techniques for high-efficiency turbine performance.
3. Apply digital twin technology and AI analytics for wind turbine monitoring.
4. Develop expertise in smart wind farm management systems.
5. Evaluate offshore wind energy technologies and marine engineering challenges.
6. Implement predictive maintenance and condition monitoring strategies.
7. Understand advanced SCADA systems and industrial IoT applications.
8. Improve turbine reliability through data-driven performance optimization.
9. Explore energy storage solutions and hybrid renewable systems.
10. Apply advanced concepts in wind resource assessment and forecasting.
11. Understand grid integration and renewable energy management.
12. Develop skills in sustainable wind project development and lifecycle management.
13. Identify future opportunities in AI-powered renewable energy innovation.

Target Audience

1. Wind Energy Engineers
2. Renewable Energy Professionals
3. Electrical and Mechanical Engineers
4. Wind Farm Operations Managers
5. Maintenance and Reliability Engineers
6. Energy Consultants and Project Developers
7. Utility and Power Generation Professionals
8. Researchers, Academics, and Technical Students

Course Modules

Module 1: Fundamentals of Advanced Wind Turbine Technology

- Evolution of modern wind turbine systems.
- Global renewable energy market trends.
- Major turbine components and advanced architectures.
- Horizontal-axis and vertical-axis turbine technologies.

- Future innovations in wind energy systems.
- **Case Study:** Analysis of next-generation turbine development by leading global wind technology manufacturers.

Module 2: Advanced Wind Turbine Design and Engineering

- Turbine structural design principles.
- Blade engineering and lightweight materials.
- Tower and foundation optimization.
- Mechanical load analysis.
- Reliability-based turbine design.
- **Case Study:** Large-scale turbine design improvements for offshore wind applications.

Module 3: Wind Turbine Aerodynamics and Performance Optimization

- Advanced blade aerodynamics.
- Computational Fluid Dynamics (CFD) applications.
- Airfoil optimization techniques.
- Wake effect analysis.
- Increasing turbine energy yield.
- **Case Study:** Aerodynamic improvements that increased wind farm efficiency.

Module 4: Wind Resource Assessment and Forecasting

- Wind measurement technologies.
- Digital wind mapping.
- Meteorological data analysis.
- AI-based wind forecasting.
- Energy production estimation.
- **Case Study:** Wind resource optimization for a utility-scale wind project.

Module 5: Offshore Wind Technology

- Offshore turbine design concepts.
- Floating wind platforms.
- Marine engineering challenges.
- Subsea cable systems.
- Offshore operation strategies.
- **Case Study:** Floating offshore wind farm deployment challenges and solutions.

Module 6: Wind Turbine Electrical Systems

- Generator technologies.
- Power converters and transformers.
- Electrical protection systems.
- Voltage regulation.
- Grid compatibility requirements.
- **Case Study:** Electrical upgrades for improved wind farm grid stability.

Module 7: Advanced Control Systems and Automation

- Turbine control algorithms.

- Pitch and yaw control systems.
- Adaptive control technologies.
- Automation platforms.
- Intelligent turbine operation.
- **Case Study:** AI-assisted turbine control improving annual energy production.

Module 8: SCADA Systems and Industrial IoT Applications

- Wind turbine SCADA architecture.
- Real-time monitoring systems.
- IoT-enabled asset management.
- Data acquisition techniques.
- Remote turbine diagnostics.
- **Case Study:** Smart monitoring implementation across a global wind farm network.

Module 9: Predictive Maintenance and Reliability Engineering

- Condition monitoring systems.
- Failure prediction methods.
- Vibration analysis.
- Machine learning diagnostics.
- Maintenance optimization.
- **Case Study:** Reducing turbine downtime through predictive maintenance solutions.

Module 10: Artificial Intelligence and Digital Twin Technology

- AI applications in wind energy.
- Digital twin modeling.
- Machine learning algorithms.
- Real-time performance simulation.
- Advanced decision support systems.
- **Case Study:** Digital twin deployment for turbine lifecycle optimization.

Module 11: Wind Farm Operations and Asset Management

- Wind farm operational strategies.
- Performance benchmarking.
- Asset lifecycle management.
- Operational risk reduction.
- Productivity improvement techniques.
- **Case Study:** Optimization of multi-gigawatt wind farm operations.

Module 12: Energy Storage and Hybrid Renewable Systems

- Battery energy storage systems.
- Wind-solar hybrid solutions.
- Renewable energy balancing.
- Microgrid integration.
- Future energy management systems.
- **Case Study:** Hybrid renewable project improving grid reliability.

Module 13: Grid Integration and Smart Energy Systems

- Renewable power integration challenges.
- Smart grid technologies.
- Frequency regulation.
- Power quality management.
- Grid modernization strategies.
- **Case Study:** Successful integration of large wind farms into national grids.

Module 14: Sustainable Wind Energy Project Development

- Wind project planning.
- Environmental assessment.
- Regulatory compliance.
- Investment considerations.
- Sustainable development strategies.
- **Case Study:** Development roadmap for a commercial wind energy project.

Module 15: Future Trends in Wind Energy Innovation

- Next-generation turbine concepts.
- AI-driven renewable ecosystems.
- Hydrogen production from wind energy.
- Floating offshore wind expansion.
- Global renewable energy outlook.
- **Case Study:** Future wind energy technologies shaping the clean energy transition.

Training Methodology

- 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	04 Dec 2026	Online	$2,000
23 Nov 2026	04 Dec 2026	Physical	$3,000
23 Nov 2026	04 Dec 2026	Physical	$6,000
23 Nov 2026	04 Dec 2026	Physical	$6,000
23 Nov 2026	04 Dec 2026	Physical	$12,000
23 Nov 2026	04 Dec 2026	Physical	$9,000
23 Nov 2026	04 Dec 2026	Physical	$12,000
23 Nov 2026	04 Dec 2026	Physical	$12,000

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

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