Solar Thermal Energy Systems Engineering 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

Solar Thermal Energy Systems Engineering Training Course is designed to develop advanced expertise in solar thermal technologies, renewable energy engineering, sustainable power systems, and clean energy innovation. With the global transition toward decarbonization, net-zero energy solutions, energy efficiency, and climate-resilient infrastructure, solar thermal systems are becoming a critical component of modern energy strategies. This course equips professionals with practical knowledge of solar thermal collectors, concentrated solar power (CSP), thermal energy storage, solar heating and cooling systems, industrial process heat applications, and hybrid renewable energy integration.

The program combines engineering principles, system design, simulation tools, performance optimization, and real-world project analysis to prepare participants for careers in the rapidly growing renewable energy, green technology, sustainable engineering, and energy transition sectors. Through technical sessions, hands-on exercises, and global case studies, learners gain the ability to design, evaluate, install, operate, and optimize advanced solar thermal energy systems for residential, commercial, industrial, and utility-scale applications.

Programme Curriculum

Solar Thermal Energy Systems Engineering Training Course

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Course Objectives

By completing this Solar Thermal Energy Systems Engineering Training Course, participants will be able to:

1. Understand the fundamentals of solar thermal energy conversion and renewable energy engineering.
2. Analyze solar radiation data and perform solar resource assessment for thermal applications.
3. Design high-performance solar thermal collector systems.
4. Apply engineering principles for solar water heating and space heating systems.
5. Develop expertise in concentrated solar power (CSP) technologies.
6. Design and optimize thermal energy storage solutions.
7. Evaluate system efficiency using energy modeling and performance analysis techniques.
8. Understand advanced solar thermal cooling and refrigeration technologies.
9. Integrate solar thermal systems with hybrid renewable energy networks.
10. Apply sustainable engineering practices for low-carbon energy projects.
11. Conduct feasibility studies and economic analysis for solar thermal installations.
12. Implement best practices in operation, maintenance, and system optimization.
13. Develop innovative solutions supporting net-zero energy buildings and industrial decarbonization.

Target Audience

1. Renewable energy engineers and consultants.
2. Mechanical and electrical engineers.
3. Solar energy professionals and project developers.
4. Energy managers and sustainability specialists.
5. Researchers and academic professionals.
6. Facility managers and industrial energy users.
7. Government energy planners and policymakers.
8. Entrepreneurs investing in clean energy technologies.

Course Modules

Module 1: Fundamentals of Solar Thermal Energy Engineering

- Solar energy principles and thermal conversion technologies.
- Global trends in renewable energy transition.
- Solar thermal system classifications and applications.
- Heat transfer fundamentals for solar systems.
- **Case Study:** Solar thermal adoption roadmap for sustainable cities.

Module 2: Solar Radiation Measurement and Resource Assessment

- Solar geometry and radiation analysis.
- Solar data collection and evaluation methods.
- Site assessment techniques for thermal projects.
- Solar mapping and resource optimization.
- **Case Study:** Solar resource assessment for a commercial heating project.

Module 3: Solar Thermal Collectors: Design and Performance

- Flat plate collector engineering.
- Evacuated tube collector technologies.
- Parabolic and advanced collector systems.
- Collector efficiency improvement strategies.
- **Case Study:** Performance comparison of industrial solar collectors.

Module 4: Solar Water Heating Systems Engineering

- Domestic and industrial water heating applications.
- System configurations and component selection.
- Storage tank design principles.
- Installation and operational considerations.
- **Case Study:** Large-scale solar water heating system implementation.

Module 5: Solar Space Heating and Building Integration

- Solar heating system design concepts.
- Passive and active solar heating solutions.
- Building energy integration strategies.
- Energy-efficient building applications.
- **Case Study:** Net-zero building solar thermal integration project.

Module 6: Concentrated Solar Power (CSP) Technologies

- CSP system fundamentals and configurations.
- Parabolic trough technology.
- Solar tower and dish systems.
- High-temperature solar thermal applications.
- **Case Study:** Utility-scale CSP power plant analysis.

Module 7: Thermal Energy Storage Technologies

- Sensible heat storage systems.
- Latent heat storage materials.
- Thermochemical storage concepts.
- Storage efficiency improvement methods.
- **Case Study:** Molten salt storage system for CSP plants.

Module 8: Solar Thermal Cooling and Refrigeration

- Solar absorption cooling principles.
- Solar adsorption refrigeration systems.

- Cooling system integration methods.
- Energy efficiency optimization.
- **Case Study:** Solar cooling application in commercial facilities.

Module 9: Industrial Solar Process Heat Applications

- Solar thermal solutions for industries.
- High-temperature heat generation.
- Food, textile, chemical, and manufacturing applications.
- Industrial decarbonization strategies.
- **Case Study:** Solar process heat integration in manufacturing.

Module 10: Solar Thermal System Design and Simulation

- Engineering design methodologies.
- System modeling approaches.
- Performance simulation techniques.
- Software tools for solar analysis.
- **Case Study:** Solar thermal system simulation project.

Module 11: Hybrid Renewable Energy Integration

- Solar thermal and photovoltaic integration.
- Hybrid energy management systems.
- Grid-connected renewable solutions.
- Smart energy optimization.
- **Case Study:** Hybrid renewable energy microgrid project.

Module 12: Solar Thermal Project Development and Economics

- Feasibility studies and project planning.
- Cost-benefit analysis methods.
- Investment models and financing strategies.
- Lifecycle cost evaluation.
- **Case Study:** Commercial solar thermal investment analysis.

Module 13: Installation, Commissioning, and Maintenance

- Installation standards and procedures.
- System testing and commissioning.
- Preventive maintenance strategies.
- Troubleshooting operational issues.
- **Case Study:** Maintenance optimization for solar heating systems.

Module 14: Sustainability, Regulations, and Future Trends

- Renewable energy policies and standards.
- Carbon reduction strategies.
- ESG and sustainability frameworks.
- Future solar thermal innovations.
- **Case Study:** National renewable energy transition program.

Module 15: Advanced Solar Thermal Engineering Applications

- Artificial intelligence in solar optimization.
- Digital monitoring and smart sensors.
- Advanced thermal materials.
- Future-generation solar technologies.
- **Case Study:** AI-enabled solar thermal performance monitoring.

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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