

SOLAR PHOTOVOLTAIC SYSTEM FUNDAMENTALS

COURSE OVERVIEW

The aim of this course is to provide the fundamental knowledge for a solar photovoltaic system which is widely used as renewable energy globally.

COURSE OBJECTIVES

Upon completion of this course, the participants shall be able to:

- Explain the basic operation of a photovoltaic system
- Quantify solar resources and performance of a photovoltaic system
- Identify various kinds of solar cell technologies and components used in a photovoltaic system
- Illustrate the applications of photovoltaics
- Elaborate a photovoltaic system design basis

ASSUMED SKILLS & KNOWLEDGE

Preferably with some basic knowledge of electricity and physics.

**SCEM-PDUs TO BE
AWARDED BY INSTITUTE
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SINGAPORE**

**PEB-PDUs TO BE
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**APPLICABLE FOR
PRODUCTIVITY AND
INNOVATION CREDIT (PIC)**

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PROGRAMME OUTLINE

DAY 1

Session 1: Basics of Electricity

- Voltage, current and resistance
- Basic ohm's law
- Series and parallel circuit
- DC and AC system
- Electric power and energy
- Electromagnetism
- Inductor and capacitor
- Transformer

Session 2: Basics of Solar Energy

- Properties of solar radiation
- Solar irradiation and measurement
- Sun path
- Radiation on tilted surfaces
- Sun-tracking and solar trackers

Session 3: Photovoltaics Fundamentals

- Introduction
- I-V characteristic curve and power curve
- Performance and losses
- Solar cell circuit model
- STC and NOCT
- PV efficiencies
- Series or parallel connections

Session 4: Solar Cell Technologies

- Introduction
- C-Si solar cell and module production process
- Thin film PV: CdTe, CIGS, a-Si, Dye-sensitized, OPV
- Multi-junction, III-V junction PV and CPV
- Comparison of various technologies

DAY 2

Session 5: PV System, Balance of System and PV Applications

- Introduction
- PV modules
- Solar inverters
- Combiner box and components
- Cables and connectors
- Switchgear and protection device
- Monitoring system
- Mounting structures
- Various PV applications

Session 2: Grid-Connected PV System Design & Operation

- System design procedures
- IEC standards for installation
- Design software
- Layout and electrical diagram
- Annual yield and performance ratio
- Installation, operation and maintenance

ABOUT THE TRAINER



Dr. Lim Boon Han is currently an Assistant Professor at Universiti Tunku Abdul Rahman (UTAR), Malaysia. He has engaged in solar energy research and engineering works for 17 years, involving full supply chain of photovoltaic technology, sun-tracking and non-imaging focusing technology. He has fruitful experiences in both academic and industrial. He had worked in China for 10 years. He was appointed as Associate Professor in China top ranked university, University Science and Technology of China (USTC). He also held positions of Chief Technical Officer, Chief Operating Officer and Chief Scientist in a few renewable energy companies in China.

His team had also applied NIFH Solar Furnace to purify metallurgical silicon into solar-grade silicon feedstock. The invention was awarded "China Top Ten Science and Technology Progress Award in year 2009" by both Chinese Academy of Science and Chinese Engineering Academy, which represent the highest level of science and technology award in China. He had built the first government subsidized solar photovoltaic demonstration power plant in China. The project had laid the foundation for the subsequent Feed-in Tariff or incentives introduced until now. He has also invented and mass produced the world largest solar tracker, which each rotating platform is 35m in diameter and had led the research on the largest Low Concentrated Photovoltaic (LCPV) solar power plant in China. Dr. Lim has designed more than 40MW of commissioned solar power plants and led more than 40 research projects, with total amount of funding equivalent to more than USD60 millions. He is the inventor of 14 patents. He has total 19 peer-review publications and 16 conference papers.

In professional organisations, he is a member of a few organisations. These include Global Young Academy (GYA), IET, IEEE, International Solar Energy Society (ISES), an Honorary Member of Malaysia Photovoltaic Industry Association (MPIA), working group committee of Photovoltaic Standards of SIRIM (Malaysia national standards development agency). He is also a journal article reviewer of Elsevier Science: Solar Energy, review editor of Frontiers in Solar Energy and an associate editor of Journal of Daylighting. He holds Malaysia Train the Trainers certificate.

RATES

EARLY BIRD (before 11 Sept 17)	NORMAL FEE	GROUP FEE
S\$850.00 (SEAS Member)	S\$950.00 (SEAS Member)	S\$900.00 (4+ delegates from 1 organization)
S\$950.00 (Non Member)	S\$1,200.00 (Non Member)	

* Fees inclusive of GST

* SEAS reserves the right to make changes to the trainer, programme, venue, cancel or reschedule the programme if necessary or warranted by circumstances beyond our control

* Payment to be made by the early bird closing date to enjoy early bird rate

* Payment to SEAS & Address: Please send a crossed cheque to:

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	HP No		
2	Name (Dr/Mr/Mrs/Ms)		NRIC No
	HP No		
ORGANISATION'S DETAILS			
Company Name			
Company Address			
Contact Name			Tel
Email			Fax