

# GIAN Course on Solar Energy Technologies

8<sup>th</sup> May, 2017 - 18<sup>th</sup> May 2017

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## 1. Overview

### Solar Energy Technologies

The course will deliver fundamental to advanced knowledge and problem solving techniques in the solar energy technologies, both, thermal and photovoltaic. A significant focus will be on potential technological interventions that can be applied to buildings, new or existing, with particular emphasis on advanced building fabric and building mounted/integrated energy generating systems. This course will help faculty to share and enrich knowledge at international level in the area of solar energy technologies.

## 2. Course Objectives

The primary objectives of the course is to deliver knowledge at fundamental and advanced levels in the following topics:

- Solar energy technologies and their design principles
- Sources of energy consumption in buildings
- Solar thermal and photovoltaic (PV) technologies for application in buildings
- Enhancing efficiency of energy use in buildings through advanced building fabric
- Principles and design criteria for advanced building insulation and windows

## 3. Course Details

<b>Course Module</b>	Solar Energy Technologies
<b>Course Duration</b>	08 <sup>th</sup> May 2017 - 18 <sup>th</sup> May 2017
<b>Host Institute</b>	NIT Tiruchirappalli
<b>Eligibility Criteria</b>	<ul style="list-style-type: none"><li>• Students at all levels (Btech/MSc/MTech/PhD) or Faculty from academic institutions and technical institutions.</li><li>• Executives, engineers and researchers from manufacturing, service and government organizations including R&amp;D laboratories.</li></ul>
<b>Maximum number of participants</b>	40
<b>Fee Structure</b>	<p>The participation fees (<b>Excluding Lodging &amp; Boarding</b>) for taking the course is as follows:</p> <p><b>Student Participants without/with Grading : Rs. 1000/Rs. 1500</b> <b>Faculty (Internal &amp; External) &amp; Scientists : Rs. 3,000</b> <b>Persons working in Industry / Consultancy firms : Rs. 6,000</b> <b>Student Participants from Abroad : USD 50</b> <b>Other Participants from Abroad :USD 100</b></p> <p>The above fee is towards participation in the course, use of lab facilities, all instructional materials, computer use for tutorials, 24 h free internet facility, working lunch and accommodation. The participants will be provided with twin sharing air-conditioned/single non-A/C accommodation.</p>

	<b>Mode of payment:</b> Demand draft in favour of “Director, NIT, Tiruchirappalli” payable at Tiruchirappalli. The demand draft is to be sent to the Course Coordinator.
<b>How to register?</b>	<p>Stage 1: Web (Portal) Registration: Visit GIAN Website at the link: <a href="http://www.gian.iitkgp.ac.in/GREGN/index">http://www.gian.iitkgp.ac.in/GREGN/index</a> and create login User ID and Password. Fill up the registration form and do web registration by paying Rs. 500/- online through Net Banking/ Debit/ Credit card. This provides the user with lifetime registration to enroll in any number of GIAN courses.</p> <p>Stage 2: Course Registration (Through GIAN Portal): Log in to the GIAN portal with the user ID and Password created. Click on “Course Registration” option given at the top of the registration form. Select the course titled “Solar Energy Technologies” from the list and click on “Save” option. Confirm registration by Clicking on “Confirm Course”. Only Selected candidates will be intimated through E-mail by Course Co-ordinator. They have to remit the necessary course fee in the form of DD drawn in favor of ‘The Director, NIT, Tiruchirappalli-15” payable at SBI-NIT-Tiruchirappalli.</p>

## Course Schedule

<b>Module A: Solar Energy Technologies</b>	
<b>Lecture 1</b> 8 <sup>th</sup> May, Monday	<b>Basics of solar geometry and radiation</b>
<b>Lecture 2</b> 9 <sup>th</sup> May, Tuesday	<b>Non-concentrating solar thermal systems: basics and design principles</b>
<b>Tutorial 1</b> 10 <sup>th</sup> May, Wednesday	Problem solving session with examples: <b>solar thermal systems, non-concentrating</b>
<b>Lecture 3</b> 11 <sup>th</sup> May, Thursday	<b>Concentrating solar thermal systems: basics and design principles</b>
<b>Lecture 4 and Tutorial 2</b> 12 <sup>th</sup> May, Friday	<b>Solar photovoltaic (PV) systems</b> Problem solving session with examples: <b>Concentrating solar thermal systems and solar PV</b>
<b>Examination</b> 13 <sup>th</sup> May, Saturday	<b>Examination for students</b>
<b>Module B: Energy Use in Built Environment and Energy Efficiency</b>	
<b>Lecture 5</b> 14 <sup>th</sup> May, Sunday	<b>Sources of energy consumption in buildings</b>
<b>Lecture 6</b> 15 <sup>th</sup> May, Monday	<b>Energy efficient building fabric through advanced thermal insulation, windows, roof and facades</b>
<b>Tutorial 3</b> 16 <sup>th</sup> May, Tuesday	<b>Problem solving on energy use in buildings and advanced insulation</b>
<b>Lecture 7</b> 17 <sup>th</sup> May, Wednesday	<b>Energy efficient building fabric through advanced thermal insulation, windows, roof and facades</b>
<b>Tutorial and Examination</b> 18 <sup>th</sup> May, Thursday	Problem solving session with examples: <b>Energy efficient building fabric through advanced thermal insulation, windows, roof and facades. Examination for students</b>

## 4. Teaching Faculty



Dr. Harjit Singh received PhD from the University of Ulster (UK) in 2009 in natural convection phenomena in concentrating solar collector cavities. Currently he is Lecturer in Built Environment Engineering and Energy at Brunel University London since 2011. He is the Course Director for Mechanical Engineering (UG) course and a Research Leader in the Institute of Energy Futures at Brunel. His research is focussed onto advanced solar thermal technologies (concentrating and non-concentrating), application specific vacuum insulation panels (VIPs), energy generating building elements and energy storage through phase change materials. A range of alternative core materials to replace fumed silica based VIP cores and novel multi-layered hybrid VIP envelopes have been developed. He has published over 30 technical papers in the area. Dr Singh has received funding from DST- UKIERI (India-UK project) in 2014-15 (IND/CONT/E/14-15/381) to develop novel solar collectors using directly absorbing nano heat transfer fluid. He has received Brunel's BRIEF AWARD, 2015-16, to design and develop advanced multifunctional energy saving and generating building elements. Funding has also been secured from (i) UK's Technology Strategy Board (TSB File Ref: 971254) and (ii) international building and refrigeration industry such as Evonik, (Germany) and Sure Chill (UK) to develop new VIP materials and components. He was a consultant to Sure Chill Company (UK) on developing novel three-dimensionally shaped VIPs for vaccine storage containers funded by the Bill & Melinda Gates Foundation. He has been a member of the Scientific Committee of the Vacuum Insulation Symposium (IVIS) since 2011.

### Course Co-ordinators

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