

Advances in Solar Collector Technologies



GIAN
GLOBAL INITIATIVE OF ACADEMIC NETWORKS

ASCT - 2025



03 – 07 March, 2025



IIT Guwahati

Register by

17th Feb. 2025

**Seats are
limited to**

**75 Participants
only**

Overview

Solar energy has emerged as one of the promising renewable energy sources to address the growing concerns of environmental sustainability and energy security. Globally, both Solar PV and thermal technologies contributed immensely for power generation, and heating and cooling applications. In the proposed course, primarily, solar collector (thermal and PV) technologies and their recent developments in the field of cooling and heating, and generation of electricity will be exclusively studied.

In the recent past, notable developments in solar collector technology have been achieved. Looking into the potential and the recent mandate of COPs, more installations of solar technologies are promoted globally. In order to implement the various technologies effectively, a deep scientific understanding about significant advancements in solar collector technologies are of paramount importance. Some of the key areas of advancement in solar collector technologies lies in their design, better solar irradiation trapping, better heat absorption, minimization of energy losses, use of sustainable and effective materials and appropriateness. The course is oriented into the fundamentals and applications of collector technologies; recent developments in collector technologies: BIPV, PVT, CPVT collectors, optimization and system integration, such as coupling with heat pumps, etc. providing insights into its sustainable deployment on a larger scale along with the challenges and future prospects. Sufficient number of case studies will be discussed in the course to strengthen the understanding of the design calculations and its significance.

Objectives

The primary objectives of the course are:

- Exposure to the fundamentals, design, applications and advancement in solar thermal (low, mean, high temperature) and PV technologies
- Providing exposure to practical problems and their solutions, through case studies, modeling and live projects
- Expose participants (academicians and professionals) to the state of the art technologies for strengthening their understanding and confidence in large scale installation

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Tentative Schedule

Day 1

03 March 2025

Lecture 1 | 2 hrs

Solar geometry, fundamentals and design of solar thermal collector

Lecture 2 | 2 hrs

Fundamentals and design of solar PV systems

Tutorial 1 | 3 hrs

1. Estimation of solar radiation under varied climatic conditions and earth localization, mask evaluation, design of thermal collector, and
2. Design of solar PV

Day 2

04 March 2025

Lecture 3 | 1.30 hrs

Low, medium and high temperature solar thermal collector for thermal and electricity generation

Tutorial 2 | 2 hrs

Case study I: Energy and exergy analysis of solar PV collector with phase change material
Case study II: Simulation of solar concentrating collector by using PolySun software

Day 3

05 March 2025

Lecture 4 | 2 hrs

Advanced collectors: PVT, heat pump, BIPV

Tutorial 3 | 2 hrs

Case study: Design of a Solar PV pumping station for irrigation

Day 4

06 March 2025

Lecture 5 | 1.30 hrs

Solar heating and cooling systems

Lecture 6 | 1.30 hrs

Solar collector and grid integration

Tutorial 4 | 2 hrs

Case study: Solar thermal or photovoltaic (PV) cooling system along the sun

Day 5

07 March 2025

Lecture 7 | 1.30 hrs

Solar collector testing, and quality control

Tutorial 5 | 2 hrs

Case Study: Performance analysis of a grid connected and building integrated solar PV systems

Tutorial 6 | 2 hrs

Estimation of drying kinetics and energy consumption of agricultural products

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Eligibility

- Executives, engineers and researchers from manufacturing, service and government organizations including R&D laboratories.
- Student at all levels (B. Tech /M.Sc. /M. Tech /Ph.D.) and faculty from reputed academic institutions and technical institutions.

Fees

Student:	INR 1000/- (including GST)
Participants from abroad:	US \$100/-
Industry/Research Organizations:	INR 5000/- (including GST)
Academic Institutions (Faculty):	INR 2000/- (including GST)

- The selected candidates must pay the applicable fees by online bank transfer/wire transfer/ internet banking to the given bank account. Please keep the online transfer receipt for proof of transfer.
- Hostel accommodation and lodging necessities will be provided for students, at per day per person cost of approximately INR 250 /-.
- Faculties and industry persons would be provided IITG Guest House rooms (twin sharing / single rooms depending on availability) at per day per person cost of approximately INR 500 /- (Charges may vary).
- Participants may avail food/meals inside or outside the IITG campus, wherever they prefer, on their own expenses.

Payment Details

Account Name : IIT GUWAHATI R&D – MHRD
Account No : 31151533220
Account Type : Savings
Bank Name : STATE BANK OF INDIA
Branch Name : IIT GUWAHATI BRANCH
IFSC Code : SBIN0014262
MICR code : 781002053

Registration Procedure

Please follow the following steps for registration:

- Candidate should apply to the course using the following Application form link:
<https://forms.gle/za28A5FDH526JF6Z9>
- After shortlisting the candidate will be notified via email.
- Shortlisted candidate should pay the registration fee and provide the details using the given link/QR code.

<https://forms.gle/iibyE9LHzKyghpT1A>



Application Deadline: 17th January 2025
Intimation of Selection: 31st January 2025
Registration Deadline: 17th February 2025

The Faculty



Prof Ménézo Christophe is the Director of the LOCIE Laboratory (UMR CNRS 5271) at Université Savoie Mont-Blanc and serves as the Director of the National Solar Energy CNRS Research Federation – FéEsol FR 3344. He holds significant leadership roles in solar energy research, including Deputy Head of the Solar Academy Graduate School. His expertise spans hybrid photovoltaic-thermal (PV/T) solar collectors, energy management, adaptive façades, and sustainable building solutions. With over 67 journal publications, 23 supervised PhDs, and a Scopus h-index of 33, he is a recognized authority in the field. His notable awards include the Best Solar Energy Researcher in France (2017) and the Chinese Academy of Sciences "President's International Fellowship Initiative."



Dr. Pankaj Kalita is an Associate Professor in the School of Energy Science and Engineering, Indian Institute of Technology Guwahati. His current areas of research include solar energy conversion, thermochemical and biochemical conversion, energy management, energy storage and integration of renewable energy for remote electrification. He has published more than 100 articles in various peer reviewed journals and conferences with h-index of 23 (Scopus). He has also contributed many chapters in different book volumes. Further, he has edited 4 book volumes so far. He has successfully implemented several research projects funded by different government and private agencies in the fields of energy generation, energy management, energy modelling, solar power plant design, engine testing etc. He is currently offering two moocs under SWAYAM-NPTEL in Solar Energy Engineering and Technology and Sustainable Power Generation Systems.

Course Coordinator

Dr. Pankaj Kalita

Associate Professor
School of Energy Science & Engineering
Indian Institute of Technology Guwahati
Guwahati-781039, Assam, India

 pankajk@iitg.ernet.in

 +91-361-2583129

 +91-361-2690762