GIAN course on

Advances in Renewable Energy Technologies

02-13 January 2017

Course Coordinators
Dr. T.J. Sarvoththama Jothi and Dr. S. Jayaraj

Organized by
Department of Mechanical Engineering
National Institute of Technology Calicut
Calicut 673601 Kerala
Overview

Energy is the driving force behind all economic activities. Consequently the ever increasing population and the associated energy requirements to meet the increasing living standards have become matters of great concern. In particular, the availability of suitable and sufficient energy sources, development of environmental friendly utilization technologies and the cost of energy have become extremely important factors needing immediate attention. In this context, several schemes have been proposed for developing new and renewable energy technologies. With this background, a two week course on Advances in Renewable Energy Technologies is being organized for middle level practicing engineers, managers from industry and personnel from academic and R&D institutions. The main objective of the course is disseminating relevant information on various aspects and current advancements happened in the field of renewable energy utilization.

Who should attend?

This course will benefit students and teachers in familiarizing the state of the art energy technologies. For working engineers and scientists, this programme will open up new vistas to the problems in advanced renewable energy technologies that are currently faced. Internationally acclaimed academician cum researcher with proven knowledge, expertise and demonstrable ability in teaching, consultancy, research and training in the field of renewable energy technology will deliver lecturers in the course. Students of all levels (B.Tech./M.Sc./M.Tech./ Ph.D.) are encouraged to attend. Faculty members from academia, engineers and researchers from service/government organizations/R&D laboratories are welcome to attend.

The International Teaching Faculty

Dr. Sumathy Krishnan is a professor in the Department of Mechanical Engineering, College of Engineering, North Dakota State University (NDSU), USA. She did her Ph.D. in Mechanical Engineering from the Indian Institute of Technology Madras. Before joining NDSU, Dr. Sumathy worked as a visiting faculty at Anna University Chennai, Post-Doctoral Fellow at Korea Institute of Energy Research and Associate Professor at the University of Hong Kong. Her area of research includes renewable energy utilization, solar thermal and photovoltaic applications, integrated renewable energy systems.

Benefits of course

Participants will benefit in following ways after completing the course successfully.

- Exposure to the fundamentals, and overview of different renewable energy technologies and their applications.
- Builds confidence and capability to solve problems in the applications of renewable energy.
- Exposure to practical problems and their solutions through case studies and live projects.
- Enhance the capability to identify, control and eliminate energy related problems through renewable sources.
- Present the different technological options under the definition of renewable energy, giving special emphasis to the methods used in developing countries.
- Review the issues affecting the deployment of renewable energy systems in developing nations.
## Course Modules

<table>
<thead>
<tr>
<th>Module 1</th>
<th>Introduction to renewable energy technologies.</th>
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| **Module 2** | **Solar Energy**  
| **Module 3** | **Bioenergy**  
Biomass - Classification and characteristics; Techniques for biomass assessment. Bio-fuels - Importance, production and applications. Thermo-chemical conversion - Pyrolysis, combustion, gasification, liquefaction. Bio-chemical conversion - Aerobic and anaerobic conversion, fermentation, etc. Carbon credits and CDM calculations – Micro level energy planning and CDM implementation. |
| **Module 4** | **Wind Energy**  
Wind resource assessment, power conversion technologies and applications, wind power estimation techniques, principles of aerodynamics of wind turbine blade, various aspects of wind turbine design, site selection, etc. Wind energy cost calculations. |
| **Module 5** | **Hydrogen Energy & Fuel Cell**  
| **Module 6** | **Alternative fuels for IC Engines**  
| **Module 7** | **Geothermal, Tide and Wave Energy**  
Availability of geothermal energy-size and distribution, recovery of geothermal energy, various types of systems to use geothermal energy, direct heat applications, power generation using geothermal heat, sustainability of geothermal source, status of geothermal technology, economics of geothermal energy. |
| **Module 8** | **Energy Storage**  
Energy storage in conventional and non-conventional energy systems. Various forms of energy storage - Thermal, chemical, mechanical, electrical and nuclear. Techno-commercial analysis. Energy storage - Devices and systems. |
| **Module 9** | **Hydel Energy & Nuclear Energy**  
Hydro power - Potential, hydropower generation and distribution, mini and micro-hydel power generation. Classification of hydel plants, components, design & layout, turbines, efficiency calculation. Cost calculations for hydel plants. Potential of nuclear energy, international nuclear energy policies and regulations. Nuclear energy technologies - Fuel enrichment, different types of nuclear reactors, nuclear waste disposal, and nuclear fusion. Direct and indirect costs involved for nuclear energy use. Pollution aspects (air, water & soil) of nuclear energy. |
Course registration

**Step 1: One time Web Portal Registration**

Participants have to visit [http://www.iitkgp.ac.in/GREGN/index](http://www.iitkgp.ac.in/GREGN/index). Create a login with password in your name. Complete the registration form with the required details. Select this course from the listed GIAN courses. Confirm your application by paying the registration fee of Rs. 500/- (Rupees five hundred only). Payment can be made through online methods. Please note that the amount paid is non-refundable, however can be used for registration of other listed GIAN courses. Download the registered form and forward a copy to the course coordinator.

**Step 2: Institute Registration**

The registration form for this course can be found along with this brochure. The soft copy of the brochure can be downloaded from the institute website [www.nitc.ac.in](http://www.nitc.ac.in). Participants are requested to fill the registration form and send to the course coordinator along with the course registration fee. The registration fee details and important dates are listed below:

### Registration Fees

<table>
<thead>
<tr>
<th>Participants from abroad</th>
<th>: US$ 100</th>
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<tbody>
<tr>
<td>Participants from India:</td>
<td></td>
</tr>
<tr>
<td>Industry/ Research organizations</td>
<td>: Rs 5000/-</td>
</tr>
<tr>
<td>Faculty from Academic Institutions</td>
<td>: Rs 2000/-</td>
</tr>
<tr>
<td>Research Scholars/Students</td>
<td>: Rs 1000/-</td>
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</tbody>
</table>

The registration fee includes the instructional materials, refreshments between sessions and working lunch. The accommodation will be provided to the outstation participants on payment basis subject to availability. Separate request is to be submitted in prior by participants for accommodation arrangement. TA/DA will not be paid for any participants.

The course registration fee can be paid using following options:

1. Demand Draft in the name of the Director, NIT Calicut, payable at Calicut.

<table>
<thead>
<tr>
<th>Account Name</th>
<th>DIRECTOR NIT CALICUT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Account No.</td>
<td>35909407299</td>
</tr>
<tr>
<td>Bank</td>
<td>State Bank of India</td>
</tr>
<tr>
<td>Branch</td>
<td>CREC, Chathamangalam, Kozhikode</td>
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<tr>
<td>Branch Code</td>
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<tr>
<td>IFSC</td>
<td>SBIN0002207</td>
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<td>MICR Code</td>
<td>673002012</td>
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<tr>
<td>SWIFT Code</td>
<td>SBINPN BB392</td>
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Scan copy of the filled course registration form (from step 2), GIAN registration form (from Step 1), and scan copy of Demand Draft/Receipt of NEFT must be sent via E-mail to the course coordinator tjsjothi@nitc.ac.in. Original hard copies along with Demand Draft/Receipt of NEFT should be sent to the course coordinator at the following address.

**Dr. T.J. Sarvoththama Jothi/Prof. S. Jayaraj**
**GIAN Course coordinators**
**Department of Mechanical Engineering**
**National Institute of Technology Calicut**
**Kerala 673601 India**
**O: 0495 2286419**
**M: 08893814713**
**Email: tjsjothi@nitc.ac.in**
**Important dates**

- Last date for receiving the scan copy of above forms: 21 Nov. 2016
- Last date for receiving the hard copy (original) of above forms: 30 Nov. 2016
- Intimation to participants: 05 Dec. 2016
- Course dates: 02 – 13 Jan. 2017

Maximum 50 participants are allowed for this course. Selection will be based on the eligibility, and First Come First Serve Basis.

**About the Host Institution**

National Institute of Technology Calicut (NITC) is located about 22 km from Calicut City. The institute imparts technical education at the degree and post graduate levels viz., Under-Graduate programme leading to B.Tech degree and Post-Graduate programme leading to M.Tech, M.Sc, MCA, and MBA. In addition, Ph.D programme are offered in all disciplines. NITC is as an institution of higher technical education and is under the Institution of national importance, fully funded by the Government of India under the Ministry of HRD. More details can be obtained from the institute website at www.nitc.ac.in.

**About the Host Department**

Department of Mechanical Engineering is the largest department in the Institute. The department offers regular undergraduate programmes (B.Tech) in Mechanical Engineering and Production Engineering. Postgraduate programmes (M.Tech) are offered in six streams of Mechanical Engineering. Further all faculty members are involved in guiding full time and part time doctoral degree programmes leading to a PhD degree. Besides teaching, good numbers of faculty members are involved in consultancy, Design & Development, Energy Auditing, Industrial Sickness Evaluation, sponsored research work (from DST, AICTE, ARDB etc.). More details can be obtained from the departmental website at http://nitc.ac.in/index.php/?url=department/index/12.

**Course Coordinators**

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Department of Mechanical Engineering  
National Institute of Technology Calicut  
Kerala 673601 India  
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Prof. S. Jayaraj  
Professor  
Department of Mechanical Engineering  
National Institute of Technology Calicut  
Kerala 673601 India  
O: 0495 2286416  
Email: sjayaraj@nitc.ac.in

**GIAN Local Coordinator**

Dr. Abraham T. Mathew  
Professor and Dean (R&C)  
National Institute of Technology Calicut  
Kerala 673601 India  
O: 0495 2286144  
Email: atm@nitc.ac.in
REGISTRATION FORM

Name (In Block Letters): ________________________________________________

Designation: ____________________________________________________________

Qualification: ____________________________________________________________

Institution: ______________________________________________________________________

Address: ______________________________________________________________________

_________________________________________________________________________________

Email address: __________________________ Mobile No: ____________________________

Accommodation Required : YES/NO

Details of payment of course registration fees:

DD No: __________ Date: __________ Bank: __________________________ Amount Rs: ______

If paid through NEFT,

Transaction Number: _________________ Date: __________ Bank: _________________

Date:

Place: ____________________________ Signature of the Candidate