



GLOBAL INITIATIVE OF ACADEMIC NETWORKS
(GIAN)



Ministry of Human Resource Development
Government of India

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 lectures 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

Module 1	Introduction to renewable energy technologies.
Module 2	<p>Solar Energy</p> <p>Solar radiation at the earth's surface, solar radiation measurements, estimation of average solar radiation, solar thermal flat plate collectors, concentrating collectors. Solar thermal & PV applications - heating, cooling, desalination, drying, cooking, solar thermal electric power plant - principle of photovoltaic conversion of solar energy, types of solar cells. Solar energy cost calculations.</p>
Module 3	<p>Bioenergy</p> <p>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.</p>
Module 4	<p>Wind Energy</p> <p>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.</p>
Module 5	<p>Hydrogen Energy & Fuel Cell</p> <p>Sources of Hydrogen & Hydrogen production - Direct electrolysis of water, thermal decomposition of water, biological and biochemical methods of hydrogen production. Fuel cells – Principle of working, construction and applications. Hydrogen economy and future prospects.</p>
Module 6	<p>Alternative fuels for IC Engines</p> <p>Introduction to fuel characterization and Standards. Characteristics of alternate fuels (biodiesel, ethanol, biogas, hydrogen). Alternate fuels for automobile - technological issues in connection with handling and storage, delivery, combustion, emission & pollution.</p>
Module 7	<p>Geothermal, Tide and Wave Energy</p> <p>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.</p>
Module 8	<p>Energy Storage</p> <p>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.</p>
Module 9	<p>Hydel Energy & Nuclear Energy</p> <p>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.</p>

Course registration

Step-1: One time Web Portal Registration

Participants have to visit <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. 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

Participants from abroad	: US\$ 100
Participants from India:	
Industry/ Research organizations	: Rs 5000/-
Faculty from Academic Institutions	: Rs 2000/-
Research Scholars/Students	: Rs 1000/-

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.
2. National Electronic Fund Transfer (NEFT).

Account Name	DIRECTOR NIT CALICUT
Account No.	35909407299
Bank	State Bank of India
Branch	CREC, Chathamangalam, Kozhikode
Branch Code	002207
IFSC	SBIN0002207
MICR Code	673002012
SWIFT Code	SBINPN BB392

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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GIAN Local Coordinator



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राष्ट्रीय प्रौद्योगिकी संस्थान कालिकट
NATIONAL INSTITUTE OF TECHNOLOGY CALICUT

Advances in Renewable Energy Technologies 02-13 January 2017

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