

# Energy Management and Renewable Energy Intervention for Industrial Drying

(A course under *Global Initiative of Academic Networks (GIAN)*)

**Course Code:** 154016B03

## Overview

Drying is the most common, and perhaps the oldest operation of thermal removal of water, and is common to almost all industries. There is a direct correlation between the amount of water thermally removed in industrial operations and the GDP of the country. Thus, as the developing economies of the world raise their GDPs there is an increase in the energy needs for drying and the resulting increase in environmental concerns.

Estimates of energy consumption for industrial drying in the developed countries range from 11% (e.g., Canada, France, Sweden, USA) to more than 20% (e.g., Denmark, Germany). Most of this energy comes from combustion of fossil fuels. Most industrial dryers operate at thermal efficiencies ranging from a low of 20% to 80% with a median value of about 50%. Consumption of large amounts of energy in drying - both thermal and electrical - leading to high emission of greenhouse gases as a result of fossil fuel consumption has triggered the development of new sustainable technologies with the use of renewable energies. The scheduled course aims at giving an exposure to the issues and progresses in the field, and providing updated knowledge to equip to address the emerging need of evolving, adopting and implementing energy smart industrial drying practices.

### Major topics to be covered

- Industrial drying systems
- Advances in drying process analysis
- Processes of drying of paper and pulp, tea, low rank coals and biomass
- Energy assessment for typical industrial drying practices
- Waste heat recovery for drying
- Drying practices based on solar energy and energy from biomass
- Opportunities and challenges of renewable energy application in drying operations
- Economic and Environmental analysis of renewable energy applications in drying operations

<b>Duration</b>	<p><b>June 13 – 24, 2016</b></p> <p><b>Number of participants for the course will be limited to fifty.</b></p>
<b>You Should attend If...</b>	<ul style="list-style-type: none"> <li>▪ you are a student or faculty from academic institution or one working in industry interested to learn about <i>industrial drying , recent advances in drying and dryers</i></li> <li>▪ you are interested to learn the fundamentals of <i>drying principles its relationship with energy conservation</i></li> <li>▪ you are a college/university teacher interested to have an exposure to some specified topics of industrial drying, that are not usually covered in a usual college /university course.</li> <li>▪ you are interested to pursue a career as researcher or as industrial consultant in the areas of industrial drying</li> </ul>
<b>Fees</b>	<p>The participation fees for taking the course is as follows:</p> <p><b>Participants from abroad : US \$500</b></p> <p><b>Industry/ Research Organizations: Rs. 10,000.00</b></p> <p><b>Faculty from Academic Institutions: Rs. 5,000.00</b></p> <p><b>Research Scholars: Rs. 3,000.00</b></p> <p><b>PG Students: Rs. 1,000.00</b></p> <p>The above fee include all instructional materials, computer use for tutorials and assignments, laboratory equipment usage charges, 24 hour free internet facility. The participants will be provided with accommodation on payment basis in the University Guest House (current official rate is Rs.500/- per day for single occupancy; Rs.400/- per day for double occupancy and Rs.300/- per day in the dormitory of the guest house) and outstation research scholars/PG students will be accommodated in the University hostels (current official rate is Rs. 150/- per day with bed roll).</p>

## The Faculties



Dr. Bilash Kanti Bala is a Professor in the Department of Agro Product Processing Technology, Jessore University of Science and Technology, Jessore, Bangladesh. Professor Bala, a PhD from the University of Newcastle upon Tyne, UK, has started his carrier as an Assistant Professor at the Faculty of Agricultural Engineering and Technology, Bangladesh Agricultural University, Mymensingh, Bangladesh, in 1970 and then served the University in different positions including Professor, Dean. He also worked as a Researcher at the Agricultural and Food Policy Studies Institute, Universiti Putra Malaysia (UPM).

Professor Bala has taught subjects on agricultural process engineering, rural electrification and electrical machinery at the undergraduate levels and system dynamics, bio-resources modelling and advanced agricultural process engineering. His research topics and consultancies include agriculture and food policy, modelling of agricultural, biological, aquacultural, environmental and socio-economic systems, drying and storage of agricultural products, energy and environment and climate change. He has completed many research and consultancy projects of national and international organizations including World Bank, German Energy Foundation, DFID, GTZ and FAO.

Besides numerous research publications, Prof Bala has authored Eight Books in the areas of Drying and storage, energy and environment, system dynamics, Renewable energy, energy transmission, and electrical machineries. He has also served as Associate Editor of Energy-An International Journal from 1991-1996; Founding Editor, Bangladesh Journal of Agricultural Engineering from 1987-1990 and member of the editorial board, International Journal of System Dynamics and Policy Planning since 1990.



**Prof. Debendra Chandra Baruah** is in the Department of Energy, Tezpur University, Assam. His research interest includes applications of renewable energy and energy conservation in different facilities including farming and industries. Prof. Baruah has published more than 50 research papers and guided/guiding 14 PhD Scholars and more than 32 M Tech students. Prof Baruah has experiences of handling National and International collaborative research projects and also visits countries including USA, UK, Bangladesh and Thailand on academic and research purposes.



**Dr. Manuj Kumar Hazarika** is an Associate Professor in the Department of Food Engineering and Technology, Tezpur University, Assam. A PhD from IIT Kharagpur on Modelling of Drying, his current research interests include drying of agricultural and food products, process modelling, and transport processes in biomaterials. Dr. Hazarika has guided M Tech project work of 11 students, currently guiding 03 research scholars and has 15 publications to his credit including one book chapter on energy conservation in food processing.

**Travel Information:** The University campus is located about 15 km east of Tezpur, the headquarters of Sonitpur District of Assam, INDIA. It is well connected with Guwahati, the capital city of Assam, which is about 200 km from Tezpur. Guwahati is also well connected by air and train with the rest of the country.

**Registration:** Interested participants will have to first register with the GIAN website (<http://www.gian.iitkgp.ac.in>) for a one-time registration fees of Rs. 500.00 which will enable them to enrol for any number of courses being offered. Subsequent registration for this course will have to be done with Tezpur University by the **SHORTLISTED CANDIDATES AFTER GETTING CONFIRMATION E-MAILS FROM THE COURSE COORDINATOR**. They need to pay the requisite fees and fill up the Registration Form attached with this brochure. Duly filled in registration form can be sent to the coordinator both by online and offline mode.

## Course Coordinators

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A GIAN Course on  
**Energy Management and Renewable Energy Intervention for  
Industrial Drying**  
June 13 - June24, 2016

**Department of Energy in collaboration with Department of Food Engineering  
and Technology,  
Tezpur University, Napaam-784028, Sonitpur, Assam, INDIA**

**REGISTRATION CUM ACCOMODATION REQUEST FORM**

(To be submitted by the **SHORTLISTED CANDIDATES ONLY AFTER GETTING CONFIRMATION E-MAILS FROM THE COURSE COORDINATOR**. This form should reach electronically by April 25, 2016 and hard copy by June 6, 2016)

Name (Block Letters): ..... M/F: .....

Designation/ Professional Title: .....

Organization: .....

Address: .....

.....

Tel.: ..... Mobile: .....

E- mail: .....

Accommodation Required (Yes/ No): .....

Single Accommodation (Yes/ NO) : .....

Double Accommodation (Yes/ NO):.....

The Registration fee of Rupees .....has been paid via Demand Draft No.....in favour of The Registrar, Tezpur University/Through SBI online/offline banking bearing Transaction No. .... to SBI Tezpur Main Branch (RTGS/IFSC code: SBIN0000195, Bank MICR Code: 784002002) A/C No. 30448821505 of Tezpur University. Demand Draft/ Fee Receipt have been enclosed herewith.

Date:

Signature