

A GIAN course on Energy from Waste: Sustainable Approaches

Overview

Due to the increasing population in urban centers and increasing prosperity of the general population, Municipal Solid Waste (MSW) generation has been growing at an exponential rate leading to almost crisis like situations in major cities and municipalities across the nation. At the same time, the per capita energy consumption also has been increasing requiring larger imports of petroleum and natural gas. Concern about global warming has also increased the interest in the production of renewable energy. At present there is great interest in setting up waste to energy plants that addresses two key major issues facing society: waste disposal and renewable energy production.

The overall objective of this course is to provide students, teachers and professionals with an understanding of various approaches to recovering energy from waste material such as MSW, agricultural waste, animal husbandry waste, forest residues and industrial waste. This course is aimed at providing a sound theoretical and practical base of knowledge and tools for interested students, teachers and professionals in the field of waste management and energy production.

Starting with an overview of waste management and the nature of waste produced, this course will introduce the participant to various technological alternatives that are currently being practiced and those under development for deployment in the near future. These include: (i) production of biogas from anaerobic digestion (AD) of biomass with subsequent conversion to heat and power using turbines and internal combustion engines, (ii) combustion of MSW to produce heat and power, (iii) AD of food and animal waste to produce cooking gas in small rural communities, (iv) generation of refuse derived fuel (RDF) from MSW, (v) production of gaseous and liquid fuels via gasification followed by liquefaction, and, (vi) production of liquid fuels from waste plastics by pyrolysis. An important aspect of this course will be the coverage of sustainability issues associated with these waste to energy solutions.

Dates	December 10 – December 15, 2018 Number of participants for the course will be limited to fifty (50).
You Should Attend If...	<ul style="list-style-type: none"> ▪ You are a waste/environmental management consultant for industries or local municipal corporations, or a employee/member of local Municipal Corporation. ▪ You are working in an industry requiring active and intensive waste management. ▪ You are working with an NGO or citizen groups for sustainable management of MSW. ▪ You are a scientist working on developing novel or improved methods of waste management ▪ You are a student or faculty from academic institution interested in learning about sustainable waste management as part of your teaching or research.
Fees	<p>The participation fees (including taxes) for taking the course for different categories is as follows:</p> <p>Industry: INR 28,320 Government research organization and NGOs: INR 12,000 Academic institutes (faculty members): INR 8,000 Students: INR 5,000 Participants from abroad: INR 84,960</p> <p>The above fee includes all instructional materials, computer use for tutorials and assignments, 24 hr free internet facility, field visits, and lunch and tea during session breaks. The participants will be provided with accommodation on payment basis subject to availability.</p>

The Faculty



Prof. Babu Joseph is a faculty in the Department of Chemical and Biomedical Engineering, University of South Florida. His research interests include catalysis, waste to energy processes, dry reforming of methane and Fischer-Tropsch synthesis.



Prof. Yogendra Shastri is a faculty in the Department of Chemical Engineering at the Indian Institute of Technology Bombay. His research interests are sustainability assessment, biomass to energy systems, municipal solid waste management, and optimization.



Prof. Srinivas Seethamraju is a faculty in the Department of Energy Science and Engineering at the Indian Institute of Technology Bombay. His research interests include gasification, waste to energy, integration of renewable energy and fossil resources, and conceptual design of processes.

Course Co-ordinator

Prof. Yogendra Shastri
Phone: 022-2576 7203
E-mail: yshastri@iitb.ac.in

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https://portal.iitb.ac.in/ceqipapp/courseDetails.jsp?c_id=1061

Detailed Course Outline

Day	9:30 to 11:00	11:30 to 13:00	14:00 to 15:30	16:00 to 17:30
1	Introduction to Waste to Energy Conversion Systems. Overview of systems (BJ)	Introduction to Waste characteristics and Waste Disposal Systems (BJ)	Introduction to Anaerobic Digestion (SS)	Tour of IIT food waste to biogas production facility (YS)
2	Power production from biogas (BJ)	Economics of Power production from Biogas (BJ)	Tour of a local Waste to energy facility at Turbhe, Navi Mumbai (YS/BJ) (Tentative and subject to necessary approvals)	
3.	Landfill design, Landfill gas generation and collection (BJ)	Landfill gas utilization, power generation, CNG generation (BJ)	Emerging technology: Landfill gas conversion to liquid fuels (BJ)	Incineration to produce heat and power (BJ)
4	Gasification: Mass and energy balance and economics (BJ)	Liquefaction: Process and economics (BJ)	Biodiesel production (BJ)	Case studies in implementation (BJ)
5.	Torrefaction and production of Refuse Derived Fuels (SS)	Pyrolysis of biomass and pyrolysis products (SS)	Cellulosic ethanol production and Hybrid conversion processes (BJ)	Introduction to Sustainability and its relevance in waste management (YS)
6.	Sustainability of Waste to Energy processes (YS)	Case Study in Sustainability of LFG to energy process using OpenLCA (YS)	Emerging Technologies/Technology selection matrix (BJ)	Panel Discussion. Outcomes assessment and feedback (BJ/YS/SS)

Lectures will be accompanied by active learning interactive sessions to promote learning. Interactive sessions will involve group problem solving, group discussion, working on packaged software and simulation systems to analyze economics and environmental impact analysis.

Course Faculty:

BJ Babu Joseph

YS Yogendra Shastri

SS Srinivas Seethamraju

GIAN Short Term Course on

**Energy from Waste: Sustainable
Approaches**

December 10-15, 2018

Registration Form

Name(in block letters): _____

Qualification:

Designation: _____

Organization: _____

Mailing Address: _____

Mobile: _____

Fax: _____

Email: _____

Payment: Rs: _____

IIT Guest House/ Hostel accommodation required (will be provided as per availability and on a payment basis): YES / NO (Please contact the course co-ordinator for the availability details).

Signature of Applicant: _____

Date:

Venue for Classes

Classes will be held in Van Vihar Guest House seminar hall, IIT Bombay

Lecture Notes

To fully realize the objectives of the course, the lecture notes will be made available at the time of registration at IIT Bombay.

Date & Time of Registration:

December 10, 2018, 9.00 AM at Van Vihar Guest House seminar hall, IIT Bombay.

COURSE FEE:

The participation fees (including taxes) for taking the course for different categories is as follows:

Industry: 28,320 INR

Government organization and NGOs: 12,000 INR

Academic institutes (faculty members): 8,000 INR

Students: 5,000 INR

Participants from abroad: 84,960 INR

The above fees include all instructional materials, computer use for tutorials and assignments, laboratory usage charges, free internet facility, field visits, and lunch and tea during session breaks.

Subject to availability, the participants will be provided with accommodation on payment basis. This payment will be made separately by the participant at the accommodation venue.

The course fees have been paid by (Please tick appropriate option)

- (i) Logging in at <https://portal.iitb.ac.in/ceqipapp>. You will have to create a login ID, look up this course and fill up a registration form. After approval of the faculty co-ordinator, you can pay the fees.

OR

- (ii) Demand draft drawn in favour of "**The Registrar, IIT Bombay - CEP Account**". **If payment is by DD, please furnish the following details:**
- (iii) DD No.: _____ Dt: _____

All completed registration forms with bank transaction details may be mailed to: Prof. Y. Shastri, Department of Chemical Engineering, IIT Bombay, Powai, Mumbai 400076.