

Clean Energy Production from wastewater treatment plants

(03-12-2018 to 14-12-2018)

Department of Chemical Engineering, NIT Warangal

1. Overview

Biomass is the most used non source of biomass, a number of other sources—Sewage sludge is produced in wastewater treatment plants (WWTPs) as part of the water cleaning process. The potential for fuel cells to provide zero or near zero emissions has been a significant force in the development of the technology and is drawing increasing attention to the technology today. Washing one's hands with soap is usually accompanied with the satisfaction of killing harmful germs. However, scientists in many research labs around the world seek to put those pesky germs to work generating electricity. As important consumers and generators of energy, WWTPs are one of the numerous players influencing developments towards energy sustainability. Microbial Fuel Cells are an emerging technology that uses bacteria to generate electricity from waste. Bacteria in a Microbial Fuel Cell break down our food and bodily wastes, effectively generating power from the materials that are usually thrown away. Renewable and clean forms of energy are one of society's greatest needs. Microbial fuel cells represent a completely new method of renewable energy recovery: the direct conversion of organic matter to electricity using bacteria. However, expensive and toxic chemicals were needed to shuttle electrons from the bacteria to the electrode and purified chemicals (such as glucose) were needed for the bacteria to grow on. We now know that we can make electricity using any biodegradable material-- even wastewater-- and that we don't have to add any special chemicals if we use bacteria already present in the wastewater. Energy and water are tightly connected and awareness of that relationship is the starting point. We must innovate by moving toward zero discharge facilities, where zero discharge for this purpose means completely recycling/reusing a plant's outputs.

The course mainly focuses on clean energy production from wastewater treatment plants. The course is organized in terms of the lectures and tutorials covering fundamentals and advances of trends in converting sewage sludge into energy, Thermal oxidation of biosolids to produce energy, Anaerobic digestion of biosolids to produce heat in combined heat and power (CHP) systems, drying of biosolids, Biogasification of biomaterials, CFD modeling to hydrodynamics of circulating biomass fluidized bed gasifier, Integration of renewable and non-renewable energies in power plant planning, energy production using microbial fuel cells, modeling, simulation and optimization of activated sludge process, hydrogen production from biomass, microbial fuel cells, Pollution prevention and waste minimization. Hands on experience for modeling and simulation of wastewater treatment plants using Superpro Design software.

This course is organized in the form of lectures, tutorial / practical sessions all spread over 10 days. Course participants will learn these topics through lectures, tutorials and assignments. A graded examination will be conducted on the last day of the course.

Leading international researchers and academics with extensively recognized expert, and demonstrable ability in teaching, consultancy, research, and training in the field of clean energy technology will deliver lectures and discuss the latest trends in the course.

2. Objectives

On completion of the training, participants will be able to:

- (i) acquire knowledge on bioenergy production from waste water
- (ii) get exposed to anaerobic digestion for waste minimization
- (iii) know the role of microbial fuel cells for energy production from waste water
- (iv) expose the technique of drying of biosolids
- (v) compare with other renewable sources of waste to produce energy.

Dates	03-12-2018 to 14-12-2018
Modules	<ul style="list-style-type: none"> • Bioenergy production • Biogasification • Microbial fuel cells • Modeling, simulation and optimization • Case studies
You should attend if....	<ul style="list-style-type: none"> • You are a student of B.Tech or M.Tech or Ph.D in Chemical Engineering, Biotechnology, computer science, civil engineering and Mechanical Engineering. • You are a student of M.Sc. in Biotechnology, Microbiology, Biochemistry, Botany, Zoology, Chemistry. • You are a student of B.Pharmacy or M.Pharmacy. • You are a faculty member at any academic or technical institution/Industry Professional engaged in Chemical Engineering, Biotechnology, computer science, civil engineering and Mechanical Engineering and other applied areas. • You are interested in expanding your qualification and expertise and knowledge.
Fees	<p>The participation fees for taking the course is as follows: Participants from abroad :</p> <p>Students: US \$ 100</p> <p>Faculty/Scientists/</p>

	<p>Persons from Industry US \$ 200</p> <p>Industry/ Research Organizations: Rs. 8,000/-</p> <p>Faculty: Rs. 4,000/-</p> <p>Students & Research Scholars:</p> <p>Without award of Grade: Rs. 1,000/-</p> <p>With award of Grade: Rs. 2,000/-</p> <p>The above fee includes all instructional materials, computer use for tutorials and assignments. The participants from academic/research institutes and Industry will be provided with boarding and lodging on additional payment of Rs. 10,000/- in Visitors Block on twin sharing basis. Students & Research Scholars will be provided with boarding and lodging in Institute Hostels (DASA) on additional payment of Rs. 5,000/-. Please note that, accommodation inside NITW campus is very limited and same will be provided to participants on first-cum-first-serve basis. The accommodation facility is basic in nature. You can contact coordinators if you are interested in opting for better accommodation in nearby hotels on payment basis. Also, note that, if you are working in academia/industry and pursuing PhD, you are required to register under Faculty/Industry category and not as a student.</p>
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The Faculty

Prof. ALI ELKAMEL, International Expert	
	<p>Prof. ALI ELKAMEL is a Professor of Chemical Engineering at the University of Waterloo. He holds a BSc in Chemical Engineering and BSc in Mathematics from Colorado School of Mines, MS in Chemical Engineering from the University of Colorado-Boulder, and PhD in Chemical Engineering from Purdue University (West Lafayette), Indiana. His specific research interests are in computer-aided modelling, optimization and simulation with applications to energy production planning, sustainable operations and product design. He has supervised over 70 graduate students (of which 30 are PhDs) in these fields and his graduate students all obtain good jobs in the chemical process industry and in academia. He has been funded for numerous research projects from government and industry. His research output includes over 190 journal articles, 90 proceedings, over 240 conference presentations, and 30 book chapters. He is also a co-author of four books; two recent books were published by Wiley and entitled Planning of Refinery and Petrochemical Operations and Environmentally Conscious Fossil Energy Production. Mail: aelkamel@uwaterloo.ca</p>

Prof. Y. PYDI SETTY, Institute Expert

Prof. Y. Pydi Setty is working as a Professor in the Department of Chemical Engineering, National Institute of Technology Warangal, and is presently Dean (Academic). He has more than 30 years of teaching and research experience. Prof. Setty has obtained B.Tech in Chemical Engineering from Andhra University, M.Tech and Ph.D in Chemical Engineering from IIT Madras. He has published many research papers in national and international journals. He has guided 6 Ph.D students and several M.Tech students. He served as Head of Chemical Engineering and Biotechnology Departments and chaired two international conferences. He has executed several research projects sponsored by various funding agencies. He has developed a MHRD sponsored for Curriculum Design and Development for Novel separation techniques as a part of Developing suitable pedagogical methods for various classes, intellectual calibers and research in e-learning under National Mission project on education through ICT.

For more details: <https://www.nitw.ac.in/faculty/id/16320>

Dr. K. NARASIMHULU, Institute Expert

Dr.K.Narasimhulu is working as an Associate Professor in the Department of Biotechnology, National Institute of Technology Warangal, India. He obtained his B.Tech in Chemical Engineering from NIT Warangal, M.Tech in Biotechnology from JNTU Hyderabad and Ph.D in Biotechnology from NIT Warangal. He has 17 years of teaching experience in chemical engineering and biotechnology fields. He has published 23 research papers in national and international journals. He has developed two MHRD sponsored projects as co-coordinator for Curriculum Design and Development for Downstream Processing in Biotechnology and Novel separation techniques as a part of Developing suitable pedagogical methods for various classes, intellectual calibers and research in e-learning under National Mission project on education through ICT. He has published two book chapters. He has been sanctioned a research project from DST, India under fast-track worth of Rs.22 lakh. He has obtained 2015 Young Faculty Award and Young Scientist Award from Venus International Foundation, Chennai. India. He has under gone R&D training at Rice University, USA sponsored by TEQIP-II.

For more details: <https://www.nitw.ac.in/faculty/id/16351>

Course Coordinators

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