



SHORT TERM COURSE ON Bioremediation for Environmental Sustainability

Organized by
NATIONAL INSTITUTE OF TECHNOLOGY KARNATAKA, SURATHKAL

OVERVIEW

Environmental pollution has become an issue of serious international concern since the start of the industrial revolution. Large amounts of toxic waste are being generated and leading to contamination of air, water and soil. The risk to human health and environment is rising. As a developing country, India has been paying more attention to economic growth. In recent times, environmental pollution and depletion of resources have become major issues affecting the sustainable social and economic development. The growing concern over the quality of our environment demands prevention of polluting releases in the ecosystem and treatment of pollutants already there. The challenge is to develop innovative and cost-effective solutions to decontaminate polluted environments, to make them safe for human habitation and consumption, and to protect the functioning of the ecosystems which support life. Biotechnology offers a "natural" way of addressing environmental problems ranging from identification of biohazards to bioremediation techniques for industrial, agricultural and municipal effluents and residues. We need to bolster a biotechnology approach to environmental issues within an international context. It is necessary to concentrate research and commercial efforts for the development of advanced technologies based on biological systems to improve efficiency and reduce or utilise waste to benefit a wide range of industries and the environment. Bioremediation is emerging as an effective innovative technology for treatment of a wide variety of contaminants and is an invaluable tool box for wider application in the realm of environmental protection.

According to United States Environmental Protection Agency (USEPA), "Bioremediation is a treatment that uses naturally occurring organisms to break down hazardous substances into less toxic or non-toxic substances." If the process occurs in the same place affected by pollution then it is called in-situ bioremediation. In contrast, deliberate relocation of the contaminated material (soil and water) to a different place to accelerate biocatalysis is referred to as ex-situ bioremediation.

Although natural microorganisms collectively exhibit remarkable evolutionary capabilities to adapt to a wide range of chemicals, natural evolution occurs at a relatively slow rate. In these cases, the acceleration of these events via genetic engineering/process engineering is helpful since the desirable traits can be carefully designed and controlled. The drive toward this goal represents the essence of bioremediation technology. Bioremediation has been successfully applied for clean up of soil, surface water, groundwater, sediments and ecosystem restoration. It has been demonstrated that a number of xenobiotics can be cleaned up through bioremediation. These technologies have become attractive alternatives to conventional clean-up technologies due to relatively low capital costs and their inherently aesthetic nature. In India, there is an urgent need to evaluate the exciting developments coming out of various laboratories; adopt and promote bioremediation technology for pollution abatement.

The proposed course is designed (a) to expose the participants to scientific and engineering principles of bioremediation technologies for cleaning up of contaminated environments and to generate valuable resources for the human society. (b) to build confidence and capability amongst the participants to apply and engineer bioremediation processes (c) to provide exposure to practical problems of environmental pollution and their solutions by bioremediation, through case studies and (d) to enhance the capability of participants to apply the knowledge both for real life problems and in laboratory setting for research.

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| Course Schedule | <p>11th-15th August 2018 Total : 23h (20 h lectures and 3 h tutorial)</p> |
| Modules | <ul style="list-style-type: none"> ● Fundamentals of Microbiology (PJA) ● Microbial Genetics (PJA) ● Introduction to Bioremediation(PJA) ● Biodegradation Mechanisms and Pathways(PJA) ● Common xenobiotic transformations(PJA) ● Biodegradation Kinetics (PJA/VSK) ● Monitored Natural Attenuation and Risk Based Corrective Action(PJA) ● Determining In Situ Biodegradation rates(PJA) ● Principles of Biological Treatment: Microbial kinetics, Stoichiometry of biodegradation, McCarty's Thermodynamic model (PJA) ● Suspended Growth Processes for biological treatment(PJA) ● Attached Growth Processes (VSK) ● Engineered Bioremediation Systems(PJA) ● Transport phenomena in bioremediation processes(MBS) ● Scale up of bioreactors (VSK) ● Phytoremediation (PJA) ● Industrial perspective of Bioremediation (GS) ● Analysis of pollutants in soil and water (KR) ● Activated Sludge Treatment: Design approach (PJA) <p><i>Prof. Pedro J Alvarez (PJA), Dr. Vidya Shetty K (VSK), Prof. G. Srinikethan (GS), Prof.M.B.Saidutta (MBS); Dr. Keyur Raval (KR)</i></p> |
| Who should attend? | <ul style="list-style-type: none"> ● Executives, engineers and researchers from Industry and R&D laboratories. ● Faculty members from academic institutions and Universities ● Students at all levels (B.Tech/ M.Sc/ M.Tech/PhD) <p><i>Number of participants for the course will be limited to fifty [50].</i></p> |
| Registration Process and Fee | <p>Stage-1: Web Portal Registration: Visit http://www.gian.iitkgp.ac.in/GREGN/index and create login User ID and Password. Fill up the blank registration form and do web registration by paying Rs. 500/- online through Net Banking/Debit/Credit card. This provides the user with life time registration to enroll in any number of GIAN courses offered.</p> <p>Stage-2: Course Registration: Login to the GIAN portal with the user ID and Password already created in Step 1. Click on Course registration option at the top of Registration form. Select the Course titled "Bioremediation for Environmental Sustainability" from the list and click on Save option. Confirm your registration by clicking on Confirm Course. The last date for course registration is 20th June 2018.</p> |

Course Faculty

Dr. Pedro J. J. Alvarez is the George R. Brown Professor of Engineering and Director of the Nanosystems Engineering Research Center on Nanotechnology-Enabled Water Treatment (NEWT) in the Department of Civil and Environmental Engineering at Rice University.



Prof. Alvarez's research focuses on environmental sustainability through bioremediation of contaminated aquifers, fate and transport of toxic chemicals, water footprint of biofuels, microbial-plant interactions, water treatment and reuse, and environmental implications and applications of nanotechnology. He is a Diplomat of the American Academy of Environmental Engineers, a Fellow of AAAS, ASCE, IWA, WEF and the Leopold Leadership Foundation, and a founding member of the Nicaraguan Academy of Sciences.

Dr. Vidya Shetty K is Associate Professor in the Department of Chemical Engineering at National Institute of Technology Karnataka, Surathkal, India. Her research focuses on Environmental Biotechnology, Bioreactors for bioremediation of contaminated water, bioleaching, biosorption, biosynthesis and chemical synthesis of nanoparticles for wastewater treatment and water disinfection by nano-photocatalysis.



Dr. G. Srinikethan is Professor in the Department of Chemical Engineering at National Institute of Technology Karnataka, Surathkal, India. His research interests are in Transfer Operations, Industrial Pollution Control, Hydrodynamics and Environmental Biotechnology. He has served as expert member in various committees of Karnataka State Pollution Control Board.

Dr. M.B. Saidutta is Professor in the Department of Chemical Engineering at National Institute of Technology Karnataka, Surathkal, India. His research interests are Reaction Engineering, Catalysis, Biotechnology and Transport Processes.

Dr. Keyur Raval is Assistant Professor in the Department of Chemical Engineering at NITK, Surathkal. His research focuses on sustainable bioprocesses and bioreactor development for environmental applications. He has industrial experience at one of the India's largest bioprocess facility.

Course Coordinator

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| | <p>Stage 3: Selection of Candidate and Payment of Course Registration Fee Selected candidates will be intimated through email. The Course registration fee for the course is separate. The participation fee for the course is as follows:</p> <ul style="list-style-type: none"> ● Faculty/Students/Research Scholars from NITK: NIL ● Students/Research Scholars from other organizations: Rs.1,000/- ● Members of Faculty from other Academic Institutions: Rs.3,000/- ● Industry/ Research Organizations: Rs. 5,000/- ● Participants from abroad : US \$200 <p>Course fee in the form of a DD in favour of "Director, NITK" payable at Mangalore/Surathkal, to be sent along with the filled in registration form to the Coordinator so as to reach on or before 15th July 2018.</p> |
| <p>Accommodation</p> | <p>Accommodation may be provided to outstation participants at nominal cost in the Institute guest houses/hostels on prior request.</p> |



Short Term Course on
Bioremediation for Environmental Sustainability
11th-15th August 2018
Department of Chemical Engineering
National Institute of Technology Karnataka, Surathkal, India
Registration Form

Name (in block letters): _____
Qualification: _____
Designation: _____
Organization: _____
Mailing Address: _____

Mobile: _____ Fax: _____
Email: _____

Category of participants (Tick):
Faculty/Students/Research Scholars from NITK
Students/Research Scholars from other organizations
Members of Faculty from other Academic Institutions
Industry/ Research Organizations
Participants from abroad

Payment: Rs: _____

DD No.: _____ Amount: _____ Date: _____

(DD in favour of "Director, NITK" payable at Mangalore/Surathkal)

(Please write your Name and Institution on the backside of DD)

NITK Guest House/ Hostel accommodation required*: YES / NO

Declaration

All the details provided above are true to best of my knowledge. I agree to abide by the rules and the regulations governing the GIAN Course and I will attend the course for the entire duration.

Place:

Date:

Signature
of the applicant

This is to certify that Mr/Ms/Dr. _____ is a
Faculty/employee/student /Research Scholar in our Organization and he/she is sponsored
/permitted to attend the conference.

Place:

Signature of the Head of the (applicant's) Department/
Institution and Seal

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Institute guest houses/hostels on prior request.