



**DEPARTMENT OF BIO AND NANO TECHNOLOGY  
GURU JAMBHESHWAR UNIVERSITY OF SCIENCE & TECHNOLOGY  
HISAR-125001 (HARYANA)**

***ORGANIZES TWO WEEK WORKSHOP-COURSE***

**ON**

**APPLICATION OF THERMODYNAMIC PREDICTION FOR DEVELOPMENT OF  
MICROBIAL BIOTECHNOLOGICAL APPROACHES**

**12<sup>th</sup> November to 21<sup>th</sup> November, 2018**

**BROAD AREA: Environmental Biotechnology/ Industrial Microbiology/ Solid Waste Management**

**OVERVIEW:**

Catastrophic deterioration of the environment has become a worldwide phenomenon. The vast majority of environmental technologies are empirical and specialize in dealing with only certain type of waste and organic compounds. As a result huge amounts of highly toxic liquid and solid wastes accumulate in the environment. Which is bound to cause global environmental catastrophe. Quick and effective solution to this problem requires concept allowing theoretical assessment and realization of neutralization of all types of relevant waste.

Environmental biotechnologies, which exploit ability of living organisms, in general, and microorganisms, in particular, to function as self-replicating biocatalysts, have been shown to be more effective compared to their physical and chemical analogues. Present workshop is focuses on the thermodynamic rationale of the optimal way of neutralization of any xenobiotic by controlling microbial metabolism. The process of neutralization of any organic waste requires identification of thermodynamic conditions necessary for their destruction along with selection of microorganisms, effective in carrying out the process.

The application of developed concept enables solving of several problems like, cleaning the environment from toxic wastes, obtaining commercially valuable products, biofuels, metal concentrates, clean water. The course of lectures will facilitate learning of basics of thermodynamic allows learning the basics of thermodynamic predictions of microbial interaction with toxic compounds for the development of new environmental bio-technologies.

**OBJECTIVES:**

The primary objectives of the course are as follows:

- i) To introduce the concept of prediction of microbial interaction with the xenobiotics.
- ii) To introduce current and emerging technologies in the field of environmental Biotechnology.
- iii) To demonstrate how thermodynamic calculations can be used to create microbial biotechnology with special reference to environment.
- iv) How the thermodynamic calculations can be used to predict the stability of organic and inorganic xenobiotics in the physical and chemical coordinates like pH and Eh.
- v) Thermodynamic rational of optimal metabolic pathways for neutralization of xenobiotics by using microorganisms.
- vi) Practical application of the concept of disposal of xenobiotics and production of commercially valuable products.

## Application of Thermodynamic Prediction For Development of Microbial Biotechnological Approaches

**12<sup>th</sup> November to 21<sup>th</sup> November, 2018**

<b>November 12, 2018 (MONDAY)</b>	<ol style="list-style-type: none"> <li>1. <b>Inauguration: 9:00 AM</b></li> <li>2. <b>Lecture 1 (9:30 to 10:30 AM):</b> Novel biotechnologies: commercially valuable products obtaining from ecologically hazardous waste (Part 1)</li> <li>3. <b>Lecture 2 (11:00 to 12:00 Noon):</b> Novel biotechnologies: commercially valuable products obtaining from ecologically hazardous waste (Part 2)</li> <li>4. <b>Lecture 3 (2:00 to 4:00 PM):</b> Strategic problems of environmental biotechnologies and methods of their solution</li> </ol>
<b>November 13, 2018 (TUESDAY)</b>	<ol style="list-style-type: none"> <li>1. <b>Lecture 4 (9:30 to 10:30 AM):</b> Thermodynamic prediction of microbial interaction with metals. General terms</li> <li>2. <b>Lecture 5 (11:00 to 12:00 Noon):</b> Reducing transformation of metals. General regularities</li> <li>3. <b>Tutorial 1 (2:00 to 4:00 PM):</b> Problem solving</li> </ol>
<b>November 14, 2018 (WEDNESDAY)</b>	<ol style="list-style-type: none"> <li>1. <b>Lecture 6 (9:30 to 10:30 AM):</b> Prediction of microbial interaction with metals due to stereochemical analogy. General terms</li> <li>2. <b>Lecture 7 (11:00 to 12:00 Noon):</b> Examples of prediction of microbial interaction with metals due to stereochemical analogy.</li> <li>3. <b>Tutorial 2 (2:00 to 4:00 PM):</b> Problem solving</li> </ol>
<b>November 15, 2018 (THURSDAY)</b>	<ol style="list-style-type: none"> <li>1. <b>Lecture 8 (9:30 to 10:30 AM):</b> Prediction and experimental confirmation of microbial interaction with toxic metals-oxidizers. General terms</li> <li>2. <b>Lecture 9 (11:00 to 12:00 Noon):</b> Examples of prediction and experimental confirmation of microbial interaction with toxic metals-oxidizers</li> <li>3. <b>Tutorial 3(2:00 to 4:00 PM):</b> Problem solving</li> </ol>
<b>November 16, 2018 (FRIDAY)</b>	<ol style="list-style-type: none"> <li>1. <b>First Examination for Participants: (9:30 to 10:30 AM)</b></li> <li>2. <b>Lecture 10 (11:00 to 12:00 Noon):</b> Prediction and experimental confirmation of microbial interaction with radionuclides. General terms</li> <li>3. <b>Lecture 11 (2:00 to 3:00 PM):</b> Prediction of microbial interaction with synthetic organic compounds (1-chloro-4-nitrobenzene, phenol, dyes). General terms</li> <li>4. <b>Lecture 12 (3:30 to 5:00 PM):</b> Examples of prediction and experimental confirmation of microbial interaction with synthetic organic compounds (1-chloro-4-nitrobenzene, phenol, dyes).</li> </ol>
<b>November 17, 2018 (SATURDAY)</b>	<ol style="list-style-type: none"> <li>1. <b>Lecture 13 (9:30 to 10:30 AM):</b> Biological basis of hydrogen fermentation</li> <li>2. <b>Lecture 14 (11:00 to 12:00 Noon):</b> Biological basis of methane fermentation</li> <li>3. <b>Tutorial 4 (2:00 to 4:00 PM):</b> Problem solving</li> </ol>
<b>November 18, 2018 (SUNDAY)</b>	<ol style="list-style-type: none"> <li>1. <b>Lecture 15 (to 9:30 to 10:30 AM):</b> Thermodynamic prediction for development biotechnologies for energy obtaining during organic waste fermentation (Part 1)</li> <li>2. <b>Lecture 16 (11:00 to 12:00 Noon):</b> Thermodynamic prediction for development biotechnologies for energy obtaining during organic waste fermentation (Part 2)</li> <li>3. <b>Tutorial 5 (2:00 to 4:00 PM):</b> Problem solving</li> </ol>
<b>November 19, 2018 (MONDAY)</b>	<ol style="list-style-type: none"> <li>1. <b>Lecture 17 (9:30-10:30 AM):</b> Combined biotechnologies on the basis of thermodynamic prediction</li> <li>2. <b>Lecture 18 (11:00 to 12:00 Noon):</b> Summary. The prospects of industrial implementation of environmental and energetic biotechnologies in India (Part 1)</li> <li>3. <b>Tutorial 6(2:00 to 4:00 PM):</b> Problem solving</li> </ol>
<b>November 20, 2018 (TUESDAY)</b>	<ol style="list-style-type: none"> <li>1. <b>Lecture 19 (9:30 to 10:30 AM):</b> Summary. The prospects of industrial implementation of environmental and energetic biotechnologies in India (Part 2)</li> <li>2. <b>Lecture 20 (11:00 to 12:00 Noon):</b> Using of the modern biotechnological approaches as a tool for plants bio fortification.</li> <li>3. <b>Tutorial 7 (2:00 to 4:00 PM):</b> Problem solving</li> </ol>
<b>November 21, 2018 (WEDNESDAY)</b>	<ol style="list-style-type: none"> <li>1. <b>Second examination of the participants: 9:30 to 10:30 AM</b></li> <li>2. <b>Closing and group Discussions 10: 30 to 12:20</b></li> </ol>
<b>You should attend if....</b>	<ul style="list-style-type: none"> <li>▪ You are an executive and researcher from manufacturing, service and government organizations including R&amp;D laboratories in the area of any field of Life sciences/Environmental Sciences/ Basic sciences/ Chemistry/Biotechnology/ Engineering.</li> <li>▪ You are a student (at all levels including BSc/B.Tech/MSc/M.Tech./PhD) or faculty from reputed academic institutions and technical institutions.</li> </ul> <p><b>Number of participants will be limited to 50 only.</b></p>
<b>Registration</b>	<p>The participants are required to get themselves register on GIAN web portal (<a href="http://www.gian.iitkgp.ac.in">http://www.gian.iitkgp.ac.in</a>)</p> <p>The course registration fee is separate. The participation fees (Demand draft drawn in favour of Registrar, GJUS&amp;T, Hisar or NEFT/RTGS at PNB A/C No. 4674000100036542 IFSC: PUNB0467400) for taking the course is as follows:</p> <p>Participants from abroad : US \$400          Indian Industry: Rs. 6,000/-          Indian Academic Institutions/ Research Organizations : 4,000/-          Participants from host Department: 3,000/-</p> <p>The above fee includes all instructional materials, computer use for tutorials and assignments, equipment usage charges, and internet facility. However, the participants will be provided with accommodation on payment basis, subject to availability.</p>

## A Brief Profile of The Invited Experts:



**Professor Oleksandr B. Tashyrev** earned his Ph.D. in Microbiology from Academy of Sciences USSR, Institute of Microbiology, Moscow. He joined as a Senior Scientist at Referent, Presidium of the National Academy of Sciences of USSR till 1991. He joined as a Senior Scientist in the Department of general and soil microbiology in the year 1991 at Zabolotny Institute of Microbiology and Virology of the National Academy of Sciences. Now he is working as Department Chair, Department of Biology of Extremophilic Microorganisms, Zabolotny Institute of Microbiology and

Virology of the National Academy of Sciences of Ukraine. He has the vast experience of more than 30 years in the field of microbiology, especially extremophiles microorganisms and their interaction with metals, toxic metals-oxidizers and synthetic organic compounds, hydrogen and methane fermentation by using organic waste etc.

**Area(s) of expertise:** Microbial processes of industrial/municipal wastewater treatment, biogas production, dark fermentation biohydrogen production, food waste recycling. He has authored many books and published more than 100 research articles in premier peer-reviewed journals such as Biotechnol. Acta, Ecol. Eng. Environ. Protect., Mikrobiol., World J. Microbiol. Biotechnol., Mikrobiologiya.



Dr. Vira M. Hovorukha had done her Ph.D in Microbiology from Zabolotny Institute of Microbiology and Virology of the National Academy of Sciences of Ukraine. Now she is working as Scientist and Deputy Chair in the same Department. She has a vast experience in the field of Thermodynamic modelling of microbial interactions with iron-containing compounds; Fe(III)-reducing microorganisms from extremophilic environments; regulation of microbial metabolism, hydrogen dark

fermentation. She has published many research papers in various journals such as Biotechnol. Acta, Ecol. Eng. Environ. Protect, Int. J. Bio automation, Microbial. etc.

## Host Faculty



**Prof. Namita Singh** completed her Masters and Doctorate degree in Microbial Biotechnology from Institute of Microbial Biotechnology, Barkatullah University, Bhopal (India) in collaboration with Ben-Gurion University, Israel. She is presently working as Professor at the Department of Bio and Nano Technology, Guru Jambheshwar university of Science and Technology, Hisar, Haryana, India. She has over 22 years of research and 17 years of PG Teaching experience. Prof. Namita Singh has guided 15 Ph.D., 96 M.Sc., 4 M.Tech. and 2 M.Phil. Students till so far. Presently, 6 Ph.D. scholars

and 9 M.Sc. students are pursuing research under her guidance. She had received various prestigious fellowships such as UNESCO-American Society For Microbiology, PDF by Jacob Bluestein Institute for Deserts Ben-Gurion University of Negev sde Boker Campus, ISRAEL. Prof. Namita Singh had received EP Odum Gold Medal from International Society for ecological communication in June 2009. Prof. Namita Singh is a widely travelled person. She had done several international academic visits in various countries such as Israel, Japan, Germany, Canada, England, Dubai, Ukraine & Ethiopia. Dr. Namita is also the member of various National and International scientific societies of repute. She had coordinated over 30 national/ international conference/ workshop/ seminars/ training programs. Dr. Namita Singh has published 40 national and 60 international publications, 1 book, 3 manual, 123 sequence published on NCBI & 1 Patent. Prof. Namita is the Deputy Coordinator of SAP DRS I & II at Department of Bio and Nano Technology, GJUS&T, Hisar. Prof. Namita Singh has completed eighteen national projects successfully and currently working on 03 national and 01 international Project. Dr. Namita has received several grants from national and international funding agencies like DST, UGC, DBT, HSCST, MOEF Haryana etc. to support her research activities.

**Area(s) of expertise:** Microbial Biotechnology, Fermentation Technology, Environmental Biotechnology, Algal Biotechnology, Enzyme Technology, Solid Waste Management

## Course Co-Coordinator



**Dr. Rajesh Kumar Lohchab** is a faculty member in the Department of Environmental Science and Engineering, Guru Jambheshwar University of Science and Technology, Hisar, Haryana, India has completed major research projects from AICTE of Rs 24,70,000/- and from UGC Rs 10,69,800/- He has successfully completed Short Course on Biological Processes from Cranfield University, Cranfield, UK in 2006. He has published more than 35 research papers in refereed national and international journals of repute along with 29

research papers presentations and invited talks in National and International Conference/ Symposium/ Workshop/ Training Programs. Best Journals of Publications are Cleaner Production- Impact Factor 5.715, Waste management- Impact Factor 4.03, Environmental Science and Pollution Research- Impact Factor- 2.741 etc. He has also published 4 books and one module "hydropower generation" in e-PG pathshala, UGC.

## INTERNATIONAL WORKSHOP

On

Application of Thermodynamic Prediction  
for Development of Microbial  
Biotechnological Approaches

12<sup>th</sup> November to 21<sup>th</sup> November, 2018

An event under



**GIAN**  
GLOBAL INITIATIVE OF ACADEMIC NETWORKS



Organized by

Department of Bio & Nano Technology  
Guru Jambheshwar University of Science and  
Technology, Hisar

## Course Coordinator

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**(Sponsored by: GIAN-MHRD, Govt. of India)**

## **REGISTRATION FORM**

### **Personal Information: (write in capital letters)**

- 1) Name of the Participant: Mr./Ms./Mrs./Dr./Prof. \_\_\_\_\_
- 2) Gender: \_\_\_\_\_
- 3) Date of Birth: \_\_\_\_\_
- 4) Academic Qualification & Designation: \_\_\_\_\_
- 5) Institution/Organization: \_\_\_\_\_
- 6) Address for Communication: \_\_\_\_\_  
\_\_\_\_\_
- 7) E-Mail ID: \_\_\_\_\_
- 8) Mobile Number(s): \_\_\_\_\_
- 9) Payment Details (DD/NEFT/RTGS)
  - (a) Demand Draft: \_\_\_\_\_  
\_\_\_\_\_
  - (b) NEFT/RTGS: \_\_\_\_\_  
\_\_\_\_\_
- 10) Accommodation Required (Yes/No): \_\_\_\_\_  
(Note: GIAN is not providing food and accommodation for the participants)

**Signature of the Participant**

Duly Filled Registration form along with payment details (attached demand draft, if done) should be sent to the following Address:

### **Prof. Namita Singh**

Course Coordinator  
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Hisar (Haryana) PIN-125001  
Email: [biotechgian2018@gmail.com](mailto:biotechgian2018@gmail.com), [namitasingh71@gmail.com](mailto:namitasingh71@gmail.com)

**VENUE:  
SEMINAR HALL,  
CH. RANBIR SINGH  
AUDITORIUM, GJUS&T, Hisar**