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## Resource Recovery: A New Paradigm for Sustainable Wastewater Treatment (Course ID: 171031G01)

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### Overview

Conventional wastewater treatment considers the source to contain undesirable concentration of pollutants. If this waste stream is discharged to a water-receiving body without any treatment, it can be a threat to public health and can also damage the environment. Therefore, regulatory agencies typically provide maximum pollutant concentration that is allowable in the discharged water, and wastewater treatment plants are designed to meet these discharge limits. Regulatory compliance by the wastewater treatment plants is observed by removing pollutants from the source streams through a variety of physical, chemical, and biological processes.

A new paradigm, however, considers the aqueous stream to be rich in resources which can be recovered. While the overall goal of meeting regulatory limits is not compromised, this paradigm allows the added benefit of extraction of resources from the waste stream, thus providing twin benefits of: (1) reducing the need to produce fresh supplies of precious resources which typically consume high amounts of energy and also adversely impact the environment, and (2) offsetting the cost of treatment.

Although this is a win-win situation, its implementation requires a deeper understanding of principles of selective separation. The resource-species typically are present in trace concentration and in the background of competing species with much higher concentration. Therefore, removal and eventual recovery of the resource is a challenging separation problem. Moreover, the purity of the recovered resource is a major criterion in its marketability and the efficiency of the entire process. This short course will provide a road map in support of this new paradigm through case studies.

The primary objectives of the course are as follows:

- Providing participants with the scientific, environmental, and economic framework of the resource-recovery paradigm,
- Covering the physical-chemical principles of selective separation,
- Exposing the participants to modifications of conventional wastewater treatment processes to accommodate resource recovery, and
- Conducting Life Cycle Analyses of proposed resource-recovery schemes.

## Course Outline

- Resource recovery and sustainability principles, environmental and economic perspectives, governing framework. Case Study
- Energy recovery, fundamentals of anaerobic treatment, relationship of energy with oxygen demand, forms of energy (methane, hydrogen, or fuel cell). Case Study
- Recovery of Nitrogen, nitrogen cycle, fundamentals of ion exchange, ammonia-selective zeolite chemistry. Case Study
- Ammonia recovery using clinoptilolite, Phosphorus recovery. Case Study
- Heavy metal recovery from hazardous wastes, : role of ion-exchanger functional group, morphology of exchanger, equilibrium and kinetics of heavy metal uptake and regeneration of a selected ion exchanger. Case Study
- Chemistry of silver recovery from laundry wash water – role of exchanger and detergent composition
- Life Cycle Analysis (LCA), integration of recovered resource with the industrial market. Case Study

<b>Course Information</b>	<b>Dates : 27th August 2018 – 31th August 2018</b> <b>Place: Department of Civil Engineering, NIT Silchar, Assam, India</b>															
<b>Who can attend the course</b>	<ul style="list-style-type: none"> <li>• Executives, Engineers &amp; Researchers from Industry and Government Organizations including R&amp;D Laboratories.</li> <li>• Students (BTech/MSc/MTech&amp;PhD) and Faculty Members from reputed Academic and Technical Institutions.</li> </ul>															
<b>Registration fees</b>	<p>The participation fees for taking the course is as follows:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 80%;">Participants from Abroad</td> <td style="text-align: right;">USD 500</td> </tr> <tr> <td>Industry and Government Organizations including R&amp;D Laboratories</td> <td style="text-align: right;">Rs. 10,000/-</td> </tr> <tr> <td>Academic and Technical Institutions</td> <td></td> </tr> <tr> <td> <ul style="list-style-type: none"> <li>• Faculty (Internal &amp; External)</li> </ul> </td> <td style="text-align: right;">Rs. 5,000/-</td> </tr> <tr> <td> <ul style="list-style-type: none"> <li>• External Students</li> </ul> </td> <td style="text-align: right;">Rs. 1,000/-</td> </tr> <tr> <td> <ul style="list-style-type: none"> <li>• Internal PG &amp; PhD Students</li> </ul> </td> <td style="text-align: right;">Rs. 500/-</td> </tr> <tr> <td> <ul style="list-style-type: none"> <li>• Internal UG Students:</li> </ul> </td> <td style="text-align: right;">Nil</td> </tr> </table> <p>The above fee includes the use of all instructional materials assigned for the course and access to 24 hour free internet facility.</p> <p>The participants will be provided accommodation on payment basis.</p> <p>Number of participants for the course will be limited to fifty.</p>		Participants from Abroad	USD 500	Industry and Government Organizations including R&D Laboratories	Rs. 10,000/-	Academic and Technical Institutions		<ul style="list-style-type: none"> <li>• Faculty (Internal &amp; External)</li> </ul>	Rs. 5,000/-	<ul style="list-style-type: none"> <li>• External Students</li> </ul>	Rs. 1,000/-	<ul style="list-style-type: none"> <li>• Internal PG &amp; PhD Students</li> </ul>	Rs. 500/-	<ul style="list-style-type: none"> <li>• Internal UG Students:</li> </ul>	Nil
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## The Faculty

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**Dr. Sukalyan Sengupta** is a Professor of Civil & Environmental Engineering at the University of Massachusetts Dartmouth, North Dartmouth, Massachusetts, United States. He received his M.S. and his Ph.D. degrees in Civil Engineering from

Lehigh University in Bethlehem, Pennsylvania. He is the author of a number of articles and papers in journals/conference proceedings. His research interests include physico-chemical treatment processes in hazardous waste decontamination systems, mathematical modeling of groundwater flow and contaminant transport systems, and process modeling of water/wastewater treatment systems. He is also a member of the American Society of Civil Engineers, American Water Works Association, Association of Environmental Engineering and Science Professors, Materials Research Society, Water Environment Federation and the American Chemical Society.

### Course Coordinator

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**Dr. Upendra Kumar** is Associate Professor & Head in Department of Civil Engineering, National Institute of Technology, Silchar, Assam, India. He received his Master of Engineering degree in Civil Engineering with specialization in Environmental Engineering from

Jadavpur University and Ph.D. degree in Civil Engineering from Indian Institute of Technology Kharagpur, West Bengal. His current and previous researches are in the field of Water and Wastewater Engineering. His key area of research is in Adsorption Technology. He is also a Fellow Member of International Congress of Environmental Research (F.I.C.E.R.), Senior Member of IACSIT, Senior Member of Asia-Pacific Chemical, Biological & Environmental Engineering Society (APCBEEES) and Life Member of Institution of Engineers (India).

### Course Coordinator:

#### **Dr. Upendra Kumar**

Associate Professor & Head

Department of Civil Engineering

NIT Silchar, Assam, India

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Email:

[upendra\\_kumar72@rediffmail.com](mailto:upendra_kumar72@rediffmail.com)

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**For details:** Please click on  
<http://www.gian.iitkgp.ac.in>

**For registration:** Please click on  
<http://www.gian.iitkgp.ac.in/GREGN/index>.

**GIAN Course**  
**On**  
**Resource Recovery: A New Paradigm for Sustainable Wastewater Treatment**

**REGISTRATION PROCESS**

**Registration Guidelines (Step-by-Step):**

- 1) First, 'web register' at GIAN 'Courses Registration Portal': <https://goo.gl/AhcCyS>  
by paying Rs. 500 in the GIAN portal. This is not the GIAN course fee which you intend to attend. If you're already registered in GIAN portal then skip this step.
- 2) Next, log into the GIAN portal and click 'Course Registration' tab on the GIAN Portal, and 'check box' to select this course (Course ID: 171031G01) from the list. Click 'save' to register, and 'Confirm Course(s)' to confirm.
- 3) Now, pay the requisite Course Fee Either, in Demand Draft: In favour of "The Director, NIT Silchar" Payable at Silchar.  
  
Or,  
  
Pay through online banking to: The Director, NIT Silchar, A/C No: 10521277057, IFSC Code: SBIN0007061, MICR Code: 788002004.  
  
(Keep the payment details (Transaction ID & date) for filling up the registration form)
- 4) Post payment, fill up the "Registration Form".
- 5) Next, email the following: (i) Registration form, (ii) Payment proof, (iii) Scan copy of valid Identity card/bonafide letter (in case you are a student), to course coordinator, at: [upendra\\_kumar72@rediffmail.com](mailto:upendra_kumar72@rediffmail.com) (You will get an acknowledgement within 48 hours).

P.S. Registering on the GIAN portal does not guarantee participation in the course. Please do not confuse web registration with course registration. You might have been 'shortlisted' after paying the 500/-, but your selection is subject to paying the requisite course fee to NIT.

For queries and clarifications, write to the Course Coordinator at:  
[upendra\\_kumar72@rediffmail.com](mailto:upendra_kumar72@rediffmail.com)

N.B: Please retain the original receipt (in case Demand Draft)/one photocopy (in case online transfer) for on-spot submission/verification.

GIAN: Global Initiative of Academic Network  
**Resource Recovery: A New Paradigm for Sustainable Wastewater Treatment**

(Course ID: 171031G01)

Dates: 27th August 2018 – 31th August 2018

Place: Department of Civil Engineering, NIT Silchar, Assam, India

**REGISTRATION FORM**

GIAN Portal Application Number:

Full Name:

Category (Industry/Academic/Student):

Organization:

Address:

Email Id:

Mobile Number:

Highest Academic qualification:

Payment option and details:

a. Demand draft:

Draft No.	Bank	Date	Amount

b. Online transaction

Transaction Id/ Ref. No.	Bank	Date	Amount

Accommodation Required: Yes/No (please tick in the applicable field)

Date:

Place:

Signature of Applicant