GLOBAL INITIATIVE OF ACADEMIC NETWORKS

MHRD
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हरियाणा केंद्रीय विश्वविद्यालय, महेन्द्रगढ़
CENTRAL UNIVERSITY OF HARYANA, MAHENDERGARH
(NAAC ACCREDITED 'A' GRADE UNIVERSITY)

Integrated Lignocellulosic Biorefinery for Sustainable Development

(Course Code: 174040H08)

April 29-May 3, 2019

**Sponsored by Ministry of Human Resource Development (MHRD)
under the scheme on Global Initiative of Academic Networks (GIAN)**

Organised By

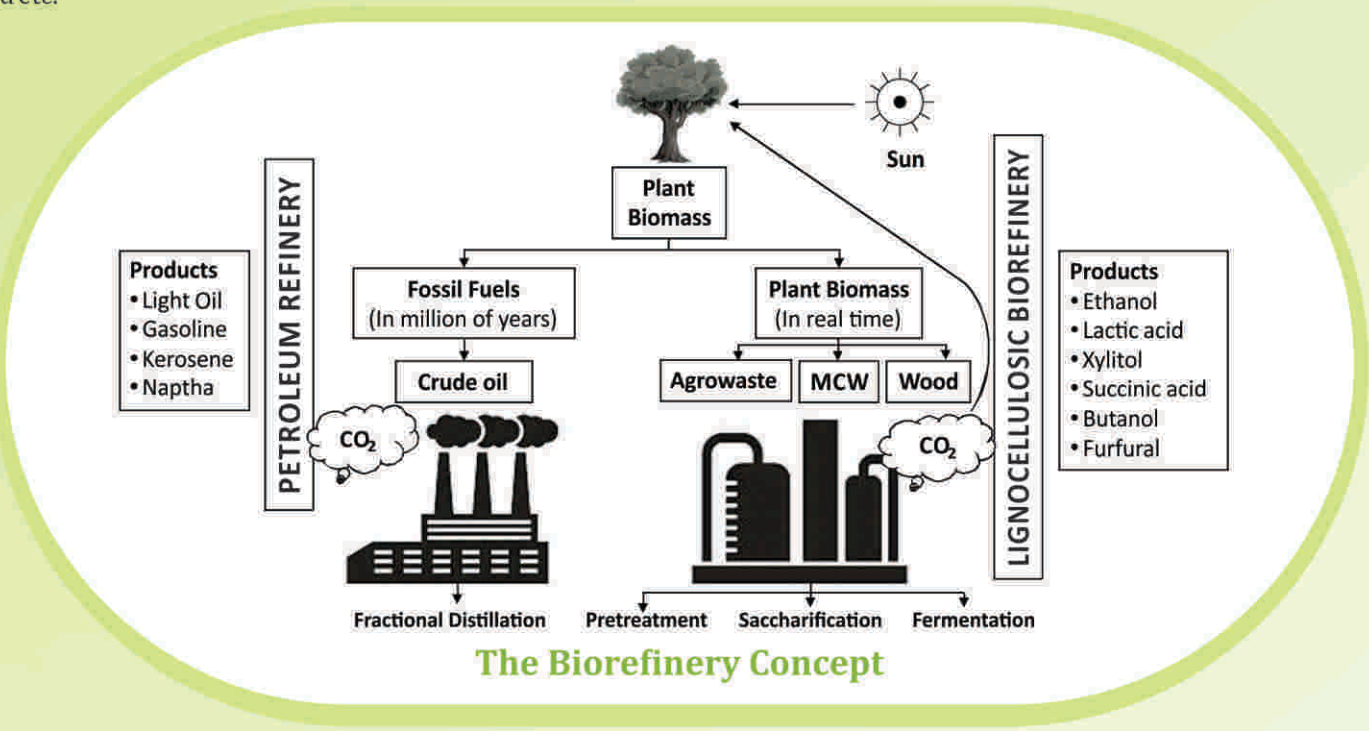
Department of Microbiology
School of Life Sciences

Integrated Lignocellulosic Biorefinery for Sustainable Development

MHRD Scheme on Global Initiative of Academic Networks (GIAN)

1.0 Overview

Currently, there is a growing worldwide interest in sustainable production of biofuels, and biochemicals from renewable resources mainly due to concerns of energy security, sustainability and global climate change. Lignocellulosic biomass is one of the most abundant, renewable and sustainable resource available in the globe and includes crop wastes, woods, municipal solids, etc. The traditional concept of only a single product from the original complex lignocellulose is being replaced with multiple-product 'biorefinery' approach, in which each component of the lignocellulosic feedstock is converted into more than one product with near zero-waste emission and maximum resource recovery. Upsurge of interests in sustainable production of bioenergy, biofuels and biochemicals by complete valorization of lignocellulosic wastes requires integrated biorefining technologies and has opened up many new challenges related to knowledge, technology, economics, environment and society. Lignocellulosic biomass utilization requires basic unit operations including its pretreatment, action of lignocellulolytic enzymes to release constituent sugars, microbial fermentation to the desired product and downstream processing for product recovery. Integrated biorefinery is expected to produce variety of products in terms of their biochemical properties and economic commercial value. Some examples of the biorefinery products are bioethanol, xylitol, succinic acid, butanol, lactic acid etc.



The Biorefinery Concept

In order to achieve complete, cost-effective and sustainable utilization of lignocellulosic feedstocks in industries, it is important to understand basic concepts and key issues in lignocellulose biorefining, especially from microbiological, biochemical and biotechnological perspectives. Therefore, this GIAN course has been designed to provide information on integrated lignocellulosic biorefinery, type, composition and pretreatment of lignocellulosic feedstock, expression and regulation of lignocellulolytic enzyme system, as well as systems and synthetic biotechnology of lignocellulolytic enzyme producing microorganisms through lectures, introductory tutorials and discussions.

2.0 Objectives

The main aim of this course is to improve participant's basic understanding of the potential benefits and challenges of lignocellulosic biorefinery in sustainable devleopment and motivate them to solve current problems in the integrated lignocellulosic biorefinery through research and development.

Following are the primary objectives of the course:

1. Exposing participants to the concepts and practices of lignocellulose based advanced biofuels and biorefinery products
2. Providing theoretical knowledge about the vast role of microbiology and biotechnology in integrated lignocellulosic biorefinery development
3. Sensitizing about regional and global impacts of biorefinery development in sustainability and mitigating global climate change
4. Motivating participants for taking up research in areas of lignocellulosic biofuels and biorefineries, addressing local opportunities and concerns.

3.0 Teaching Faculty

1. Foreign Faculty - Dr. Yinbo Qu, Professor of Microbiology, State Key Laboratory of Microbial Technology, Institute of Microbial Technology, Shandong University, 72 Binhai Road, Jimo, Qingdao, Shandong, 266237, P. R. China
2. Host Faculty - Dr. Jitendra Kumar Saini, Department of Microbiology, Central University of Haryana, Mahendergarh-123031, Haryana, India

4.0 Course details

4.1 Duration: April 29 - May 3, 2019 (5 days)

4.2 Tentative Lecture Schedule

Day 1	**Lecture 1** 10.15 a.m.- 11.15 a.m.	Advanced biofuels and biochemicals for sustainable development
	Lecture 2 11.45 a.m.- 12.45 p.m.	Concept and practice of integrated lignocellulosic biorefinery
	Tutorial 1 2.30 p.m. - 4.30 p.m.	Discussion on Bioeconomy and biorefinery
Day 2	**Lecture 3** 10.15 a.m.- 11.15 a.m.	Bioresource and structure of lignocellulosic (LC) biomass
	Lecture 4 11.45 a.m.- 12.45 p.m.	Pretreatment techniques for lignocellulosic biomass
	Tutorial 2 2.30 p.m. - 4.30 p.m.	Discussion on Green seperation process of biomass components for biorefinery Assignment on Lignocellulosic biomass avalability and pretreatment technology
Day 3	**Lecture 5** 10.15 a.m. - 11.15 a.m.	Lignocellulolytic enzyme (LCE) system, its composition, and characterization
	Lecture 6 11.45 a.m. - 12.45 p.m.	Screening of cellulase superproducer and their system biological studies
	Tutorial 3 2.30 p.m. - 4.30 p.m.	Discussion on Cellulolytic enzymes and their producers Group Discussion on Current challenges in advanced biofuel/biorefinery development and their potential solutions
Day 4	**Lecture 7** 10.15 a.m. - 11.15 a.m.	LCE expression, regulation network
	Lecture 8 11.45 a.m. - 12.45 p.m.	Redesigning and reconstruction of LCE expression
	Tutorial 4 2.30 p.m. - 4.30 p.m.	Discussion on Systems and synthetic biotechnology of filamentous fungi Debate on "Beyond Food versus Fuel" Assignment on lignocelluloytic enzyme producing microorganisms and pretreatment technology
Day 5	**Lecture 9** 09.00 a.m. - 10.00 a.m.	Microbial production of LCE, its optimization and scale-up
	Lecture 10 10.15 a.m. - 11.15 p.m.	Fermentation technology for cellulosic ethanol and chemicals
	Tutorial 5 11.30 a.m. - 1.00 p.m.	Discussion on Integrated lignocellulosic biorefinery Group Seminars by participants
	2.00 p.m. - 4.00 p.m.	**Examination**

5.0 Who can attend?

- Student at all levels (B.Tech./B.Sc/M.Sc./M.Tech./Ph.D./Post-docs) and Faculty from reputed academic institutions and technical institutions.
- Engineers, Researchers, Executives and Personnel from government organizations including R&D Institutions/ Laboratories and Industries.
- Applicants should have a basic working knowledge of microbiology, biotechnology and molecular biology and preferably involved in research where potential application of the course material would be useful
- Admittance to course is subject to selection and preference will be given to students and junior scientists

6.0 Participation Fees

- Students: INR 1000/- for OBC/UR; INR 500/- for SC/ST; Nil for PWD
- Faculty/Scientists: INR 2000/-
- Industry Participants: INR 4000/-

The participation fee includes course kit with instructional materials, access to computer for tutorials and assignments, laboratory equipment charges and 24x7 free internet facility.

Participants will be provided accommodation on payment basis.

From Patron & Vice-Chancellor

It is indeed a matter of happiness to know that the Department of Microbiology of the University is organizing a course entitled 'Integrated Lignocellulosic Biorefinery for Sustainable Development' under the MHRD Scheme on Global Initiative of Academic Networks (GIAN) from April 29 - May 3, 2019. I take pride in sharing that this course will be the 12th in the series of GIAN courses conducted by Central University of Haryana over a short span of two years.

The course is designed to provide the latest knowledge to the participants about lignocellulosic biorefineries and their role in sustainable development. The title and course content are very relevant in the present-day scenario as far as research and development around the globe is concerned. I am sure that the course content will enrich the participants about concepts and recent developments about microbiological and biotechnological aspects of advanced biofuels and biochemical production in abiorefinery based approach. The expertise of the foreign faculty chosen for this GIAN course convinces of its success, well in advance. I hope that the students, researchers and faculties from different universities and institutesas well as industry participants shall take full advantage of the course and will orient themselves towards innovative and emerging trends in this area of Microbiology.

I would like to extend my compliments to the local coordinator, GIAN and the host faculty coordinating this course for carrying forward the agenda of the University to adopt innovative pedagogies for the dissemination of knowledge. At the end, I wish all the very best for the organization of this course and happy learning to the course participants.

Prof. R. C. Kuhad (FNASc, FNAAS, FBRSI, FAMI)

Foreign Faculty

Dr. Yinbo Qu graduated at Shandong University in 1974, and received his MS and PhD degrees at the same university in 1982 and 1986, respectively. He was employed by Shandong University asassistant professor in1981,and was promoted to a full professor in1993. Prof. Qu had served the State Key Laboratory of Microbial Technology as its director from 1997 to 2013, and served the School of Life Science as its dean from 2001 to 2013. He was elected as Vice President of Chinese Society for Microbiology in 2006-2016 and Advisory Board Member of Asian Federation of Biotechnology (AFOB) in 2010-2016. He worked as a graduate student at Osaka University and University of Tokyo (1981-1982) for one year, and as a visiting scholar at Lund University (1993-1994) and Kyoto University (1998-1999). His research interests are focused on biodegradation and bioconversion of lignocellulosic biomass resources by microorganisms. He has coauthored more than 380 articles and 15 books and licensed 16 patents. He was awarded Second Prize of National Science and Technology Achievement in 2005 and Second Prize of National Technology Invention in 2011. As the Chief Scientist, his research on fundamentals underlying bioconversion of lignocellulosic biomass was granted by the National Basic Research Program (973 Program).

Host Faculty

Dr. Jitendra Kumar Saini received his M.Sc. degree from Gurukula Kangri University, Haridwar and PhD degree from Gobind Ballabh Pant University of Agriculture & Technology, Pantnagar in 2004 and 2010, respectively. He worked as a postdoctoral associate at GADVASU, Ludhiana in a World Bank funded NAIP project on Rumen Microbiology. As a Scientific Officer at DBT-IOC Centre for Advanced Bioenergy Research, Indian Oil Corporation Ltd., Research and Development Centre, Faridabad he led team on enzyme development for advanced biofuels. Dr. Saini joined Department of Microbiology at Central University of Haryana in 2016 and his teaching include Industrial Microbiology, Food and Dairy Microbiology, Principles of Microbiology and Introduction to Microbiology. His current research focuses on enzyme and microbial technologies for advanced biofuel and biorefinery development. Dr. Saini is a recipient of Early Carrier Research grant from Science and Engineering Research Board, Department of Science and Technology, Government of India. He is a coauthor of 20 articles and is an active reviewer for many reputed journals in biofuel and bioenergy research. He is a Life member of Association of Microbiologists of India (AMI) and Asian Federation of Biotechnology (AFOB).

About The University

The Central University of Haryana (established vide Central Universities Act 2009) is the only University of the state of Haryana to be funded and regulated by University Grants Commission and Ministry of Human Resource Development (MHRD), Government of India. Central University of Haryana is located at Jant-Pali villages of district Mahendergarh in South Haryana. Mahendergarh is now a part of the extended National Capital Region (NCR) and is around 125 kilometers away from Delhi. It is well connected to Delhi through railways and road. At present, there are 30 Departments of Study, which are clubbed under 11 Schools of Study and The University is one of the foremost universities in the country to implement CBCS at the Post Graduate level. Department of Microbiology was established under the aegis of School of Life Sciences and started functioning during the academic year 2015-16. The Department is currently offering M.Sc. and Ph.D. programmes.More details about the University and the Department can be found at: http://cuh.ac.in.

Course Coordinator

Dr. Jitendra Kumar Saini
Assistant Professor
Department of Microbiology
Central University of Haryana
Mahendergarh-123031
Mob: 99719-58118
Email: jitendrasaini@cuh.ac.in

Local Coordinator

Prof. Satish Kumar
Professor & Head
Department of Biotechnology
Central University of Haryana
Mahendergarh-123031
Mob: 9052456653
E-mail: satishk@cuh.ac.in

How to Participate:

1. Register yourself on GIAN portal of IIT Kharagpur (http://www.gian.iitkgp.ac.in/)
2. Choose the course i.e."Integrated Lignocellulosic Biorefinery for Sustainable Development" by drop down menu
3. Fill the Registration form and pay the course fee by DD/Cheque/RTGS
4. Scan filled Registration form & send to Course Coordinator by E-mail.

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REGISTRATION FORM

PERSONAL DETAILS

Name of the Applicant : _____

GIAN Application ID : _____

Date of Birth : _____

Occupation : _____

Institution Address : _____

E-mail : _____

Mobile Number : _____

Paste recent passport size coloured photograph

REGISTRATION FEE DETAILS

By Cheque

Amount (INR) : _____

Account Number : _____

Account Holder's Name : _____

Cheque No. & Date : _____

By NEFT

Amount (INR) : _____

Account Number : _____

Account Holder's Name : _____

Transaction ID & Date : _____

By Demand Draft

Amount: _____ DD No. _____

Bank: _____ Date: _____

Signature

Note:

- Registration should be made in favour of **GIAN, Central University of Haryana A/c** via **cheque/online transfer mode** only. (**Bank Name & Address**: Punjab National Bank, Jant-Pali, Mahendergarh, Pin-123031; **Account no.** 7824000100009605; **MICR** 123024106; **IFSC** PUNB0782400)
- Proof of Registration fee payment should be sent to Dr. Jitendra Kumar Saini, Department of Microbiology, Central University of Haryana, Mahendergarh - 123031
- The scanned copy of filled Registration form duly signed by the applicant along with the proof of fee submission should also be sent by E-mail to Dr. Jitendra Kumar Saini (jitendrasaini@cuh.ac.in)
- In case the candidate requires an accommodation a separate E-mail regarding this should be sent to jitendrasaini@cuh.ac.in **before March 29, 2019.**

Contact:
Dr. Jitendra Kumar Saini Course Coordinator; **Email:** jitendrasaini@cuh.ac.in; **Mob:** 99719-58118