

# Thermochemical Conversion of Biomass Wastes to Bioenergy and Value-added Products

*Under Global Initiative of Academic Networks (GIAN)*



**6<sup>th</sup> – 11<sup>th</sup> January 2025**



## Course overview

The increasing demand for energy and diminishing sources of fossil fuels have called for the discovery of new energy sources. The effective energy conversion process of biomass is able to fulfil this energy needs. Among the advanced biomass conversion technologies, thermochemical processes hold considerable potential approaches and needed for optimization. This course explores the development on the thermochemical conversion of biomass to bioenergy and other value-added products. The course content including the pyrolysis, co-processing, gasification, hydrogenation process from biomass conversion, as well as using advanced technology such as microwave and ultra-sonication assists process, utilizing the catalytic process. The effects on the related to reaction conditions, various reactor types, fundamental principles and products are discussed comprehensively with the reaction mechanisms involved in the catalytic effects. Expanding and enhancing knowledge about advanced thermochemical conversion technologies of biomass will play an important role in the generation of renewable bioenergy and carbon-neutral fuels toward environment sustainability.

The primary objectives of the course are:

- i. Exposing participants to the concept of biomass energy
- ii. Building in confidence and capability amongst the participants in the application of thermochemical conversion process (Catalytic thermochemical, Co-processing, Co-hydrothermal, gasification, pyrolysis etc.)
- iii. Providing exposure to practical problems and their solutions, through case studies in biomass waste to bioenergy

Course participants will learn these topics through lectures and hands-on experiments. Also case studies and assignments will be shared to stimulate research motivation of participants. The course has been planned and offered as per the norms set by IIT Bhubaneswar.

## Course content

- Introduction to biomass energy
- Solid biofuel production from waste biomass
- Ultrasonic irradiation for biodiesel production
- Catalytic thermochemical conversion of biomass for biofuel production
- Co-processing of biomass and plastic waste for hydrogen production
- Catalytic conversion of biomass wastes for jet fuel production
- Microwave co-pyrolysis for conversion of commingled waste to biofuels
- Co-hydrothermal conversion of microalgal biomass wastes into biofuel and value-added product
- Biomass gasification technology for sustainable energy: Addressing environmental challenges in renewable energy production
- Biomass conversion through fast pyrolysis: Technology advancements and environment sustainability
- Challenges & future perspectives of bioenergy and biofuel

### Who can attend?

- ✓ Executives, engineers and researchers from manufacturing, service and government organizations including R&D laboratories.
- ✓ Students at all levels (B. Tech/MSc/M. Tech/PhD) or Faculty from reputed academic institutions and technical institutions.

### Course period and venue:

Duration: 6<sup>th</sup> – 11<sup>th</sup> January 2025  
Venue: School of Infrastructure  
Indian Institute of Technology Bhubaneswar  
Argul, Jatni, Khurdha-752050, Odisha, India  
Direction: <https://maps.app.goo.gl/DMLJdfgbNc9qiO9g6>

### Course fee and payment:

- Industry/ Research Organizations: INR 10,000 + GST 18%
- Faculties @ Academic Institutions: INR 3,000 + GST 18%
- Students or PhD Scholars: INR 1000
- Participants from Abroad: US\$ 100

The fee includes all instructional materials, computer use for tutorials and assignments, and laboratory equipment usage charges. The course fee does not include accommodation. However, the participants will be provided accommodation on payment basis in the institute guest house based on availability.

Payment can be made via NEFT transfer, in favor of

“CEP IIT Bhubaneswar”,

A/C. Name: CEP, IIT Bhubaneswar,

A/c No. 24282010001960,

Canara Bank,

IFSC: CNRB0017282

or

ONLINE by scanning the QR code.



### Registration:

Fill the [google form](#) after fee payment for registration

<https://forms.gle/zBkFej5ASBaXiGdf7>

The last date of registration is *10<sup>th</sup> December 2024*.

Number of participants for the course is limited to 50.

For more information, please visit: <https://gian.iith.ac.in/>

## Course faculty:



### **Prof. Hwai Chyuan Ong**

Distinguished Professor

Department of Engineering

Sunway University, Malaysia

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**Prof. Hwai Chyuan Ong** is a Distinguished Professor at School of Engineering and Technology, Sunway University, Malaysia and an Adjunct Professor at Faculty of Engineering & IT, University of Technology Sydney, Australia. Prior to that he completed his PhD in Engineering (2013) and Bachelor of Engineering (Mechanical) (Hons) (2007) from University of Malaya. He is a registered Professional Engineer (Ir) in Board of Engineers Malaysia (BEM) and Chartered Engineer (CEng) in Engineering Council, UK.

His research interests are under the general umbrella of renewable energy system, energy & fuel, green technology, environmental sustainability, solar thermal system, and waste management. He has published more than 250 high impact SCI journal papers with H-index 65 (WOS). He had secured and completed several grants as principal investigator from ministry, university and private nationally and internationally.

Prof. Ong is listed as Highly Cited Researcher (Engineering) by Clarivate Analytics in 2019-2022. In 2021, he is also named as Australia's top early career researcher in sustainable energy. In 2018 & 2017, he received the Malaysia's Research Star Award (frontier researcher) and in 2016, received the Malaysia's Rising Star Award (young researcher) by Ministry of Higher Education and Clarivate Analytics. In 2018, he also received the outstanding research award and the most highly cited paper award by University of Malaya Excellence Award. Prof. Ong is also Core Group Member of APRU Sustainable Waste Management (SWM) program. Currently, he is Associate Editor of Alexandria Engineering Journal, e-Prime and editorial board member for few other journals.

## Course coordinator:



### **Dr. Remya Neelancherry**

Associate Professor

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**Dr. Remya Neelancherry** is an Associate Professor in the School of Infrastructure, Indian Institute of Technology Bhubaneswar. Her research interest include Microwave pyrolysis for conversion of waste to value added products, Advanced oxidation process for water and wastewater treatment, Development of novel nano-catalyst for environmental application and Microalgae for wastewater treatment and biofuel production.