Course Type	Course Code	Name of the Course	L	T	P	Credits
OE	CHO402	Biofuels and Biomass Conversion Technology	3	0	0	9

Course Objective
The primary focus of proposed course would be to teach the current trends in the area of biofuel and value-added chemicals production, the current status of bio-renewable energy, current opportunities, and emerging areas, major challenges towards sustainability and implementation of bio-based technologies. The course will also include waste (such as waste plastic) to wealth technologies.
Learning Outcome
The students will have basic understanding of different biomass conversion technologies which can be used to design product centric biorefineries. Also, students would learn waste to wealth technologies with focus on biofuels and biomass conversion technologies.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1	**Introduction to Biorenewable Energy and Chemicals**, Sources of Biorenewable Energy and Chemicals, Biorenewable Energy and Chemicals Market	**05**	Students will understand Biomass Availability, Types, Need for Biomass Conversion, Potential Market
2	**High-Temperature Biomass Conversion Process,** Gasification, Pyrolysis, Supercritical Processing of Biomass, Bio Oil Upgradation Technologies	**08**	Students will understand High Temperature Methods for Biomass Conversion, Catalytic Materials for Bio Oil Upgradation,
3	**Integration of High-Temperature Biomass Conversion Technologies for Waste Plastic Conversion,** E-Waste Conversion, Waste to Wealth Technologies	**07**	Students will understand Technologies for Plastic Waste and E-waste Conversion.
4	**Low-Temperature Biomass Conversion Process,** Catalytic vis a vis Non-Catalytic Processing of Biomass, Heterogeneous Catalysts for Biomass Conversion	**08**	Students will understand Catalytic Materials and Processes for Biomass Conversion.
5	**Building Block Platform Chemicals,** Pre-treatment and delignification of Biomass, Production	**06**	Students will understand US DOE recommended Multipurpose Products (Serves Both as Fuel and Chemicals)

6	**Algal Biomass and Non-Edible Oils Resources,** Fuel Production from Non-Edible Oils, Processing of Algal Biomass, and Principles of Green Chemistry	**08**	Students will understand Conversion Processes for Non-Lignocellulosic Biomass.

Textbooks:

1. Jean-Luc Wertz, Olivier Béduéand "Lignocellulosic Biorefineries", EPFL and CRC Press, Edition 2013
2. Thallada Bhaskar, Ashok Pandey, S. Venkata Mohan, Duu-Jong Lee, Samir Kumar Khanal "Waste Biorefinery: Potential and Perspectives", Elsevier, Edition 2018
3. Algal Biofuels: Recent Advances and Future Prospects, Springer Nature, 2017, S. Gupta et al.

Reference Books:

1. Sustainable Environment Volume-I: Biomass Conversion and Biorefinery, KK Pant, S. Gupta, E. Ahmad, Springer Nature, 1st Edition
2. Several research articles will be given from time to time by the concerned faculty