Preamble:

Fossil derived fuels, petrochemicals and products have decided the lifestyle and comfort of our civilization. However, these fossil sources will always be finite and will continue to get depleted due to the increasing consumption by a growing world population. Hence, there is an urgent need to focus on developing biological and sustainable technologies for fuels and commodity chemicals to reduce the dependency on fossil fuels. This proposed course on biorefineries, which is aimed at imparting knowledge to senior undergraduate, postgraduate and doctoral students, will discuss majorly on process synthesis and design required in a biorefinery plant, role of biorefinery in polymer production and bio-oil refining, and other biorefinery systems of contemporary research. The course also covers some typical case studies to illustrate the importance and implications of biorefineries in the near future.

Course contents:

Introduction to biorefineries; Process synthesis and design: generic reactors and thermochemical processing of biomass, platform chemical production from biomass, downstream processing of biomass derived platform chemicals; Polymer processes in biorefinery: polymers and biobased polymers, reactor design for biomass based monomers and biopolymers, integrated biopolymer production in biorefineries; Bio-oil refining: bio-oil refining and its conversion to fuels, novel membrane reactors for bio-oil refining; Fuel cells and other renewables; Algal biorefineries; Case studies in biorefineries.

Texts/ References:

- 1. S.K. Brar, S.J. Sarma, and K. Pakshirajan, Platform Chemical Biorefinery, 2016, Elsevier.
- 2. L. Christopher, Integrated forest biorefineries, Royal Society of Chemistry, 2012.
- 3. A. Pandey, R. Höfer, M. Taherzadeh, M. Nampoothiri, and C. Larroche, *Industrial Biorefineries & White Biotechnology,* Elsevier, 2015.
- 4. J. Sadhukhan, K. S. Ng and E. M. Hernandez, *Biorefineries and chemical processes: design, integration and sustainability analysis*, John Wiley & Sons, 2014.