Course title : Wind & Biomass Technologies
Course credits : 2
No. of modules : 2
Module 1: Wind Technologies
Module 2: Biomass Technology

Detailed syllabus:

Module 1: Wind Technologies

I. Different types of wind turbines. Trends in development of wind turbines, Modern wind turbine, working principles, trends in evolution and worldwide development.

II. Offshore wind turbines, onshore vs offshore wind turbines, floating wind turbines

III. Wind turbine manufacturing. Transport, logistics, assembly and installation of wind turbines, connection of power produced to grid transport.

Module 2: Biomass Technology

IV. **Thermo-chemical conversion:** Thermo-chemical conversion of biomass, biomass processing, briquetting, pelletization, biomass combustion, biomass stoves, biomass carbonization, pyrolysis of biomass, biomass gasification, gasifiers: [updraft (forced draft & Natural draft), downdraft (Open core, throat type & modular)], Gasifier stoves, gasifier thermal applications, gasifier for engine applications: dual fuel and 100% gas mode operation, power generation systems: (decentralized, grid interactive).

V. **Bio-chemical conversion:** Aerobic and anaerobic processes, activated sludge process, plug flow reactors, anaerobic fixed film reactor, UASB reactor, anaerobic fluidized bed reactor, estimation of methane yield, anaerobic digestion system for MSW, Vermi-composting, different designs of biogas plants for animal waste, Biogas for engine applications

VI. **Liquid Bio Fuels: :** Liquid biofuels, non-edible oilseeds, oil extraction, preprocessing, transesterification, biodiesel, characterization of liquid fuels, production of syngas from biomass, production of methanol from syngas, production of ethanol from ligno-cellulosic biomass, Liquid biofuels applications

Evaluation/Assessment scheme:

1. Quizzes – 40% (one at the end of each module)
2. End semester exam – 60% (at the end of course)

Learning outcomes:

At the end of the course the student will be able to:

- Learn evolvement of wind technologies and modern technologies
- Analyse wind energy project and its manufacturing
- Calculate Bioenergy and Identify the best solution
- Quantify the amount of Energy produced
- Translate theories into practice