

Course syllabus

Certificate course in non conventional energy

18-19

Objectives :

1. Understand the significance of non-conventional energy sources in addressing global energy challenges.
2. Differentiate between conventional and non-conventional energy sources, and explain the advantages and limitations of non-conventional energy.
3. Explain the principles of solar energy conversion and demonstrate knowledge of solar photovoltaic (PV) and solar thermal systems.

Module I

- 1. Introduction to Non-Conventional Energy (2 hours)
 - Definition and significance of non-conventional energy
 - Comparison with conventional energy sources
 - Renewable energy and its types

Module II

- 2. Solar Energy (6 hours)
 - Solar radiation and its measurement
 - Solar energy technologies: Photovoltaics (PV) and solar thermal
 - Solar PV systems: Components, working principles, and applications
 - Solar thermal systems: Types, working principles, and applications
 - Solar energy integration and storage technologies

Module III

- 3. Wind Energy (6 hours)
 - Wind energy basics: Wind formation, speed, and direction
 - Wind turbines: Types, components, and working principles
 - Wind energy conversion systems
 - Wind energy assessment and site selection
 - Grid integration and power management of wind farms

Module IV

- 4. Biomass Energy (4 hours)
 - Introduction to biomass as a renewable energy source
 - Biomass conversion technologies: Thermochemical and biochemical processes
 - Biomass resources and availability
 - Biogas production and utilization

- Biomass power generation and cogeneration

Module V

- 5. Hydropower (4 hours)
 - Introduction to hydropower and its significance
 - Types of hydropower systems: Conventional and small-scale
 - Hydropower potential and site selection
 - Components of a hydropower system: Dams, turbines, and generators
 - Environmental and social considerations in hydropower

Module VI

- 6. Geothermal Energy (4 hours)
 - Geothermal energy basics: Earth's heat and geothermal resources
 - Geothermal power generation: Binary, flash, and dry steam systems
 - Geothermal heat pumps: Heating and cooling applications
 - Geothermal resource assessment and exploration
 - Environmental impacts and sustainability of geothermal energy

Module VII

- 7. Ocean Energy (4 hours)
 - Introduction to ocean energy: Tidal, wave, and ocean thermal energy conversion (OTEC)
 - Tidal energy generation and technologies
 - Wave energy conversion devices
 - OTEC systems: Working principles and challenges
 - Environmental considerations and future prospects

Outcome

- Students will explore the principles, technologies, and environmental aspects of solar, wind, biomass, hydropower, geothermal, and ocean energy.
- Can gain an insight into the significance of non-conventional energy in addressing global energy challenges.
- Students will also analyse the integration, storage, and sustainability aspects of non-conventional energy sources
- They will be equipped with the necessary knowledge and critical thinking skills to understand, evaluate, and contribute to the development of renewable energy systems for a sustainable future.