Course Title & Description of 1st Semester Courses of M.Sc. (Energy Studies and management)

Course title: Introduction to Energy Resources, Systems and Technologies

Course description:

This introductory course has been designed to get the students acquainted with different energy resources (non-renewable and renewable), reserves and their potentials, accounting of the energy, global and Indian energy demand and supply, impact of energy consumption on the environment, climate change assessment and global impact of climate change. Also, introduces students with different energy conversion technologies and their functioning.

Course objectives:

1. To get students understand and familiarity with different types of energies and their measurements, availability and potential.
2. To inculcate skills using different methods for energy accounting.
3. To introduce students with conversion technologies and systems that are used for converting non-renewable and renewable energy resources to useful heat and power.

Course title: Energy System Infrastructure and Operations

Course Description:

The structure of power systems and their operations are vital for system reliability, control, security and power quality. Further many countries, including India, are witnessing restructured electricity markets. In this deregulation process, it is important to focus on managerial as well as technical aspects of energy system infrastructure and their operations. This course is designed to educate students regarding various components of energy system infrastructure and how the power market is assisting in the reliable operation of the grid.

Course objectives:

- To familiarize students with basic principles of power system elements
- To understand the energy market and services offered by these energy markets.
- To understand operational planning activities like economic load dispatch, unit commitment and power flow
- To impart knowledge about transmission and distribution systems
- To understand ancillary services management and their categorization

Course title: Energy Conservation, Audit and Management

Course Description:

Energy Conservation has been identified as a key instrument to enhance energy security and reduce energy intensity as well as greenhouse emissions. Energy Audit helps to map the flow of energy across a process, identifying potential saving opportunities. Policy makers and technology providers have been working towards the cause of energy management and encourage its prudential use. This course is designed to educate students on the different dimensions of energy, its conservation, management and audit.

Course objectives:

- To impart knowledge in the domain of energy conservation
- To understand energy conservation measures across different consumer segments
- To inculcate knowledge and skills about assessing energy efficiency of an entity
- To understand Energy Audit procedure along with relevant technologies/tools
- To develop Energy Audit Report writing skills

Course Title & Description of 1st Semester Courses of M.Sc. (Energy Studies and management)

Course title: Climate Change and Energy Transition

Course Description:

Climate change has been identified as an existential threat to human society. A major reason for rising carbon emissions is attributed to use of fossil fuels for energy generation. Countries across the globe are working to reduce emission by decarbonizing their energy sector.

The first part of this course shall provide an overview on the global climate discourse, the UNFCCC Protocol, the Paris Climate Deal, role of agencies like IPCC, country specific NDCs and various data points. It shall cover the impact of different greenhouse gases in terms of their global warming potential, and fossil fuels related emission factors. It shall further discuss on the key mitigation and adaptation strategies.

The second part of the course covers energy transition, as a key mitigation strategy. This shall cover relevance, principles, procedure, activities on energy transition. It shall discuss about the concept of net zero and the strategies/ initiatives adopted globally as well as in India to achieve the same, which shall include renewables, energy efficiency and carbon reduction technologies. The section would have discussions on company specific NZE plans, concept of internal carbon pricing, with a focus on fossil intensive companies. The idea of 'Just Transition' shall also be discussed. Topics related to carbon credits, its process cum methodology, pricing structure, encompassing both national and international markets, shall also be covered.

Course objectives:

- Overview on Climate Change, related protocols, NDCs
- Greenhouse gases, GWP, emission factors, Emission Trajectory
- Climate change Mitigation and Adaption Strategies
- Understanding Energy transition, NZE, Decarbonization, Just Transition
- Energy transition tools – renewables, energy efficiency, carbon reduction technologies
- Corporate NZE Strategies, including Internal Carbon pricing
- Carbon Markets and Credit Schemes

Course title: Energy Science Lab

Course Description:

Laboratory experiments help in better understanding of the subjects discussed in the classes. The experiments based on basic principles related to energy stimulate students for further investigation and their application.

Course objectives:

- To provide hands-on experience on experimental setups related to basic electrical circuits
- To provide practical learning about the basic operation of electrical circuits and equipment
- To provide hands-on experience on experimental setups related to basic thermal science
- To provide practical learning about the basic operation of equipment used in determination of heat transfer coefficients, thermal mass transfer and related experiments

Fundamentals of Computer Programming: https://terisas.ac.in/uploads/NRG106.pdf

Introduction to Sustainable Development: https://terisas.ac.in/uploads/NRE165.pdf

Communication skills and technical writing: https://terisas.ac.in/uploads/NRE106.pdf