1. Introduction to Renewable Energy System

This module introduces the main forms of renewable energy, focusing on the technology and resource assessment associated with each. The module also introduces aspects of energy management. Towards the end of the teaching period a detailed overview on the energy landscape and market in Oman will be presented and discussed to identify the maturity, size, suitability of different energy sources, contribution to GDP, etc. in Oman’s energy sector.

1. Research and Project Management

This module provides the state-of-the-art of executing research methods and the use of main research tools. In addition, the module introduces the principles of project management. The module covers all research aspects, including, literature review, citation, and data reporting. It will also demonstrate the originality and creativity in analyzing data obtained. For the part concerning project and business management, the modules will cover project management techniques, decision making and quality management.

1. Environmental Impact Analysis

This course introduces the theory and practice of environmental impact assessment (EIA), the systematic identification and evaluation of the potential effects on the physical, biological, cultural socioeconomic components of the environment of proposed actions – projects, plans, programs, legislation. The object of the EIA is to encourage consideration of the environment in the planning and decision-making process to arrive at actions that avoid or minimize adverse impacts on the environment. EIA is now mandated by legislation in the 100 countries around the world. With encouragement from ISO 14000, the practice of EIA is expanding into the corporate world to evaluate the environmental aspects of the business operations. This course will explore the need for environmental impact assessments, the different types of assessments, and the regulatory and technical requirements of preparing an assessment. This course will include a series of student presentation.

1. Transport Phenomena

This module teaches advanced levels of fluid mechanics, heat and mass transfer and principles of thermodynamics required to fully examine the transport phenomena occurring in renewable energy systems. It covers laminar and turbulent fluid flow, conduction and diffusion, convective transport of heat and mass, radiation, and thermodynamic laws and their applications. This module provides students with the tools and know-how to tackle relatively advanced engineering problems related to transport phenomena.

1. Wind and Hydro Energy Systems

This module provides an insight in production and use of renewable energy. It covers an introduction to wind turbines, hydro, tidal and wave energy systems. This module gives more detailed understanding of all aspects of the wind energy industry but particularly wind farm and wind turbine design in addition to hydro energy that involves the movement of water, kinetic energy of flowing water that can be captured and turned into electricity. Beside the technical aspects, also environmental and economic aspects are treated. A guest speaker from wind and hydro energy industry will be invited to deliver a talk and shares experience and knowledge with students.

1. Solar Energy Systems

The module discusses solar PV and thermal energy systems. It covers the materials selection, efficiency, characterization, and design of PV solar cells. ​​The modelling, simulation, and optimization of solar systems and concentrating solar power systems are covered. This module contains a site visit to a solar energy facility in Oman where students can observe the system, installation, and operation.

1. Energy Conversion

This course covers thermodynamics, chemistry, flow and transport process concepts as applied to energy systems. Topics includes analysis of energy conversion the thermochemical, thermomechanical, electrochemical, and photelectric process in existing and future power and transportation systems with emphasis on efficiency, environmental impact and performance. Systems utilizing fossil fuels, hydrogen, nuclear and renewable resources, over a range of sizes and scales are discussed. Applications include fuel reforming, hydrogen and systematic fuel production, fuel cells and batteries, combustion, hybrids, catalysis, supercritical and combines cycles, photovoltaic, etc. The course also deals with different forms of energy storage and transmission and optimal source utilization and fuel life cycle analysis.

1. Energy Economics and Sustainability

The module examines the role of energy in the economy, economic methods of assessing and modelling energy, the economics of various sources of energy, electricity markets, and other key topics in energy economics. Various sources of energy will each be studied, as will energy efficiency, security, efficiency and sustainability. The module will examine key challenges and opportunities in the energy sector in the region and worldwide.

1. Thesis

A research-based thesis course that offers students the opportunity to work on a comprehensive, individual project outlined in the project specification and will write and submit a thesis on the subject of the research. Topic is to be agreed in consultation with a supervisor. The project should demonstrate an appropriate level of professional competence in the practical development (laboratories and/or site facilities) of a suitable application that meets the complexity for results to be published for an expert audience.