Semester:	7				
Course Code:	ME5080				
Course Name:	Energy Technology				
Credits Value:	3 (Notional hours: 150)				
Pre-requisites:	CE3040				
Core/ Optional:	Optional				
Hourly Breakdown	Lectures (hours)	Tutorials (hours)	Practical classes (hours)	Assignments (hours)	Independent Learning & Assessment (hours)
	34	04		18	94

Course Aim: This course will provide exposure to different energy technologies and their availability and implications to the society so that they will be able to take into account socio economic/ecological/environmental impacts in the design of energy conversion systems.

Intended Learning Outcomes:

On successful completion of the course, the students should be able to;

- **discuss** the rational use of energy for the sustainable development of the society
- **describe** fossil fuel and nuclear energy conversion technologies
- **discuss** the rational use of different types of renewable energy systems and estimate the sizing of such systems for selected applications
- **minimize** usage and wastage of energy through energy management principles.
- **formulate** activity plans for energy audit and energy management exercises

Course Content:

- **Introduction:** Sources of energy, energy reserves, economics, world energy scenario, energy crisis in 1970s, present energy mix and future trends, energy geo-politics, climate change
- **Fossil fuels:** Natural gas/oil rig, oil refineries, coal mine operation, clean coal technology, gas/oil-fired power station plant design concepts, environmental impact
- **Nuclear energy:** Fundamentals of nuclear fission, concepts of fission, control and types of power plants.
- **Renewable energy:** Hydropower: resource assessment and planning, plant design, selection of turbines. Solar energy: resource assessment; orientation of devices, solar PV developments, solar thermal collectors, solar thermal/concentrated plant design. Wind energy: wind resource assessment, turbine siting, Betz efficiency, wind turbine design fundamentals, wind turbine control, offshore turbines. Marine renewable energy: wave energy, tidal stream/barrage energy, salinity gradient, Ocean Thermal Energy Conversion (OTEC). Bio-mass, geo-thermal, hydrogen,

batteries and Energy Storage systems(ESS)

- **Energy efficiency**: heat exchangers, waste heat recovery, Combine Heat and Power (CHP), space heating/cooling, Energy management and auditing, Field visit

Teaching/ Learning Methods:

Classroom lectures, tutorials and in-class exercises and assignments

Assessment Strategy:

Continuous Assessment 40%		**Final Assessment** 60%		
Details:		Theory (%)	Practical (%)	Other (%) (Project)
Assignments/Quizzes	20%	60%		
Mid Semester Examination	20%			

Recommended Reading:

- Vaughn Nelson, Introduction to Renewable Energy (2011), (second edition) CRC press, BOCA Ratton, London
- Craig B. Smith and Kelly E. Parmenter (2016). Energy Management Principles(Second Edition). Elsevier, Amsterdam, Netherlands
- Steven G. Penoncello (2015).Thermal Energy Systems: Design and Analysis(First Edition).CRC Press, Florida, United States