CORE SEMESTER LEARNING OUTCOMES

General learning outcomes for the core semester

The Core semester is organised to provide the students with sufficient technical background to follow any of the specialisation courses on offer, while also providing them with a good grounding in the energy sector.

- Sound understanding of the role of renewable energy technologies in the energy sector
- Basic technical knowledge on the different renewable energy technologies that are already contributing significantly to energy supply or that have grown strongly in recent years, covering the following aspects:
  - Evaluation of the resource
  - Introduction to the conversion process
  - Performance of systems in operation
  - Tools for simulation and sizing
- Understanding of the principles of an economic evaluation of the profitability and competitiveness of renewable energy projects.

CORE Foundation
At the completion of this topic the students should have a good overview of

- The fundamentals of energy concepts and power
- The fundamentals of heat transfer
- The fundamentals of fluids mechanics
- The fundamentals of electricity

CORE SOLAR learning outcomes
At the completion of this topic the students should know

- The fundamentals of the solar resource
- The fundamentals of solar thermal energy systems
- The fundamentals of photovoltaic cells and systems

At the completion of this topic the students should be able to

- Calculate the performance of solar thermal collectors
- Predict performance for various PV technologies
- Understand design principles for solar PV and thermal systems

CORE WIND learning outcomes
At the completion of this topic the students should know

- The fundamentals of the wind resource
• The fundamentals of wind turbine aerodynamics, design and control

At the completion of this topic the students should be able to

• Estimate the wind energy resource at a site
• Make predictions of turbine output
• Understand the basis of the design of a wind turbine rotor blade
• Evaluate the economics of a proposed installation and be aware of electrical connection procedures

**CORE BIOMASS learning outcomes**

At the completion of this topic the students should know

• The fundamentals of residual biomass and energy crops
• The fundamentals of biomass conversion processes and devices

At the completion of this topic the students should be able to

• Select appropriate methodologies from the range of different biomass energy technologies

**CORE WATER learning outcomes**

At the completion of this topic the students should know

• The fundamentals of the characteristics underpinning the resource for different water-powered renewables, e.g. hydro-power, tidal power or wave power
• The fundamentals of water-powered renewables systems

At the completion of this topic the students should be able to

• Assess the various water-powered renewable technologies in terms of economic potential
• Calculate the expected resource for particular water-powered schemes

**CORE INTRODUCTION TO SOCIO-ECONOMICS ISSUES learning outcomes**

At the completion of this topic the students should know

• The key issues affecting the economics of renewable energy sources
• The policy frameworks relevant to clean energy systems

At the completion of this topic the students should be able to

• Make informed critical judgements on future energy policy
• Undertake basic economic assessment calculations