

## EN1600 Renewable Energy

**Professor:** Jean-Claude Vannier

**Language of instruction:** French – **Number of hours:** 36 – **ECTS:** 3

**Prerequisites:** Basic knowledge and skills in electricity, heat transfer, and system controls

**Period:** S8 Elective 11 March to June IN28IE4, SEP8IE4

### Course Objectives

The aim of the course is to present the potentialities of energy systems based on the use of renewable sources. The first part is dedicated to the presentation of the different devices used to produce energy from renewable sources. The second part will focus on the integration, control and management of energy for different cases. Transportation energy systems, power networks and isolated independent systems will be studied as applications. The basis for elements and methods of energy conversion and storage will be presented as well.

### On completion of the course, students should be able to

- ◇ gain an in-depth understanding of the behavior of the different components interacting in the generation, conversion, control and management of the renewable energy source
- ◇ estimate the main issues of renewable energy integration in electrical power networks
- ◇ solve simple design and sizing problems for renewable energy installation systems
- ◇ estimate their economic impact

### Course Contents

- ◇ Power systems, electrical machines, converters
- ◇ Renewable sources of energy, wind, solar systems, biomass, biofuels
- ◇ Integration of renewable energy on electrical power networks
- ◇ Economics of renewable energy
- ◇ Battery, kinetic storage, supercapacitors, hydraulics systems

### Course Organization

Lectures: 24 hr, Tutorials: 9 hr, Exam: 3 hr

### Evaluation

One 3.0-hr written exam, all documents and non-communicating computer allowed.