

# New and renewable energies



ECTS credits  
2 credits



Semester  
Fall

## In brief

> **Course language:** French

## Presentation

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### Prerequisites

none

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### Learning objectives

The objective of this module on new and renewable energies is to provide an overview of the main processes envisaged to produce energy in the future, limiting itself to those processes for which fluid mechanics plays a predominant role, such as wind turbines or tidal turbines. This part of the course, which is less detailed than the corresponding parts of S8 Sustainable Energy at École Centrale de Marseille, is sufficient for students who do not intend to specialize in this field and especially for the many students who have completed their S8 in international mobility.

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### Description of the programme

The teachings of this module are divided into four sessions of four hours each, which are centered on, respectively, the socio-economic aspects and the stakes related in particular to global warming, wind turbines, renewable marine energies, as well as fuel cells and the hydrogen sector. As well as two other sessions, also four hours long, on system modeling and, more specifically, the Bond Graph method, which is very commonly used to analyze and optimize the operation of complex systems, such as those encountered in the field of renewable energy. Concrete cases are treated as examples.

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### Generic central skills and knowledge targeted in the discipline

Scientific and technical innovation.

Mastery of complexity and systems:

- \* Know how to analyze a problem related to energy and know how to propose adapted solutions in terms of renewable energies.
- \* Know how to interpret experimental results in order to optimize a choice or an operation.

Program management :

- \* Know how to manage the implementation of a program related to renewable energies (choice of the optimal technical/financial solution), as well as the management of its implementation (construction, technical follow-up, management of the people involved...)

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## How knowledge is tested

DS: proctored exam, 50%.

Project: writing oh a report, 50%.

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## Bibliography

1. Dauphin-Tanguy, G. (2000). *Les bond graphs*. Hermes Science Publications.
2. Gourières, L. D. (2008). *Les éoliennes : Théorie, conception et calcul pratique*. MOULIN CADIOU.
3. Sarlos, G., Haldi, P. A. & Verstraete, P. (2003). *Systèmes énergétiques : offre et demande d'énergie : méthodes d'analyse*. Presses polytechniques et universitaires romandes.

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## Teaching team

Fabien Anselmet (ECM)

Olivier Boiron (ECM)

Lili Kimmoun (ECM)

External teacher from the Ministry of the Environment

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## Sustainable Development Goal



Responsible consumption and production



Sustainable cities and communities

**Total des heures**

**24h**

CM	Master class	16h
TD	Directed work	8h