Syllabus – Elective Course

Course title:

Energy Transition and Renewable Energies

Credits:

6 ECTS

Teaching language:

English

Target students:

Undergraduate students from all study areas with an interest in/who would like to learn renewable energies.

Teacher in charge of the course:

Prof. Dhaker ABBES (Junia, Université Catholique de Lille)

COURSE PRESENTATION

Prerequisite:

To take this course, the students should have a good university level and should normally have completed at least one semester at university. They must have some ability to work as a group and be able to communicate easily in English at a standard university level. In other respects, the course is intended to serve a mix of profiles and learning backgrounds for a more diverse international learning experience.

Content:

This course will provide students with fundamentals of energy and an overview of renewable energies and their applications.

Topics to be covered will normally include:

- Fundamentals of Energy
- Energy transition and Renewable Energy Sources
- Photovoltaic installation
- Solar Thermal Energy Systems
- Wind Energy Systems
- Biomass and other sources
- LCC and LCA of renewable energy sources
Learning Outcomes:

At the end of the course, the students should be able to:
- Assess renewable sources potentials.
- Evaluate the load of a building or a city.
- Choose the adequate source of energy according to the situation and to the load.
- Model, simulate, control and correctly connect an assembly of a wind turbine chain or a photovoltaic chain.
- Design of a standalone or a grid connected renewable energy system.
- Being able to tackle the issues related to renewable energy systems.
- Being able to make the difference between solar thermal energy and solar photovoltaic energy.
- Being able to make a technological survey and to innovate.
- To read and analyze the technical manual of a photovoltaic panel or a wind turbine.
- To be able to assess the economic and ecologic cost of a renewable energy-based solution
- Use of simulation tools: HOMER energy.

WORKLOAD

*French contact hours = 60 minutes (in some countries/institutions, 1 contact hour = 45-50 minutes)*

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<tr>
<th>Form</th>
<th>Number of hours</th>
<th>Comments</th>
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<tbody>
<tr>
<td>Face-to-face, in-class, on-site learning</td>
<td>21 hours</td>
<td>- Chapter 1: Fundamentals of Energy (3h)</td>
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<td>- Chapter 2: Renewable Energy Sources (3h)</td>
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<td>- Chapter 3: Photovoltaic installation (3h)</td>
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<td></td>
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<td>- Chapter 4: Solar Thermal Energy Systems (3h)</td>
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<td>- Chapter 5: Wind Energy Systems (3h)</td>
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<td>- Chapter 6: Biomass and other sources (3h)</td>
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<td>- Chapter 7: LCC and LCA of renewable energy sources (3h)</td>
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<tr>
<td>Tutorials and exercises</td>
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<td>Practical labs</td>
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<td>- Practical lab 1: Study of a photovoltaic system (3h)</td>
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<td>- Practical lab 2: Estimation of wind turbine energy (3h)</td>
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<td>- Practical lab 3: Dimensioning of a hybrid system</td>
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<td>Photovoltaic-Wind Turbine Connected to the Network with the HOMER software (3h)</td>
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<td>- Site visit 2 (3h)</td>
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<td>Approximate personal work / homework</td>
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<td>Student total workload</td>
<td>54 hours</td>
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EDUCATIONAL METHODS
Lecture, discussion, presentations, sharing of experiences, group work, guided visits, on-site education, tutorials, practical labs, mini projects

RESOURCES
All course materials will be supplied in class. References may be made to the following resources:

- L'autonomie énergétique : Une nouvelle politique pour les énergies renouvelables »- Hermann Scheer – Actes sud.
- « déchiffrer l'énergie » - Benjamin Dessus – Edition Belin
- Dhaker Abbes, Gérard Champenois, André Martinez, Benoit Robyns, Modeling and simulation of a photovoltaic system: An advanced synthetic study, Research paper, 3d International Conference on Systems and Control (ICSC13), 29 to October 31, 2013, in Algiers, Algeria.

ASSESSMENT

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<tr>
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<tr>
<td>Continuous assessment (20%)</td>
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<td>Quizzes, Presentations, Exercises</td>
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<tr>
<td>Final exam (60%)</td>
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<td>Examination covering all aspects of course</td>
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<tr>
<td>Practical labs (20%)</td>
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<td>Participation on and results of practical labs</td>
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This syllabus is based on information available at the time of publication (January 2024). Changes may occur.
For updated information about course content, please contact us: lilleprograms@univ-catholille.fr