Course guide
210324 - EGRA - Renewable Energies in Architecture

Last modified: 14/12/2023

Unit in charge: Barcelona School of Architecture
Teaching unit: 753 - TA - Department of Architectural Technology.

Degree: DEGREE IN ARCHITECTURE STUDIES (Syllabus 2014). (Optional subject).

Academic year: 2023 **ECTS Credits:** 4.0 **Languages:** Catalan, Spanish

LECTURER

Coordinating lecturer: CARLOS ALONSO MONTOLÍO

Others: Segon quadrimestre:
CARLOS ALONSO MONTOLÍO - Grup: 2SMI

TEACHING METHODOLOGY

The course covers the explanation of theoretical content and the development of analytical exercises and a design proposal with corrections in class.

LEARNING OBJECTIVES OF THE SUBJECT

Architecture must be fully aware of its environmental needs and must respond to a design that is adequate to the increasingly sustainable human environment plants.

In this sense, the course Renewable Energies in Architecture delves into the environmental challenges of architecture and is focused on energy issues, of major importance, not only to benefit from natural energies but also for good integration of these energies into the buildings.

Natural environmental control in architecture can be done passive systems or by active systems. Passive systems are those that are directly related to the design of the architecture, taking full advantage of the energy performance of the environment. Active systems are those that transform natural energies into energy at the service of architecture. This is the case of renewable energies such as solar thermal, photovoltaic, wind and geothermal, which will be analyzed in depth in this programe.

The presence and integration in the architectural design of those elements that generate energy through renewable sources will allow the project to be supplied with energy during the necessary periods. The subject Renewable Energies in Architecture will address the architecture project from the climatic point of view, in order to obtain a comfortable result that requires the least amount of energy for its operation.

The objectives of the course are:

- Master the techniques of natural and artificial conditioning in architecture, with the ability to choose the most appropriate energy systems for specific cases of buildings and their surroundings.
- Design the general characteristics of these systems and integrate them formally and technically into the global concept of the architectural work.

STUDY LOAD

Type	Hours	Percentage
Hours large group	44,0	44.00
Self study	56,0	56.00

Total learning time: 100 h

CONTENTS

Introduction to sustainability

Description:
Introduction to sustainability

Full-or-part-time: 2h
Theory classes: 2h

Energies in Architecture

Description:
Energies in Architecture

Full-or-part-time: 2h
Theory classes: 2h

Solar radiation and sun exposure

Description:
Solar radiation and sun exposure

Full-or-part-time: 2h
Theory classes: 2h

Thermal balance and variability

Description:
Thermal balance and variability

Full-or-part-time: 2h
Theory classes: 2h

Passive winter and summer systems

Description:
Passive winter and summer systems

Full-or-part-time: 2h
Theory classes: 2h

Solar thermal and photovoltaic integration in architecture

Description:
Solar thermal and photovoltaic integration in architecture

Full-or-part-time: 2h
Theory classes: 2h

Solar thermal energy at low temperature

Description:
Solar thermal energy at low temperature

Full-or-part-time: 2h
Theory classes: 2h

Photovoltaic solar energy

Description:
Photovoltaic solar energy

Full-or-part-time: 2h
Theory classes: 2h

Photovoltaic calculation

Description:
Photovoltaic calculation

Full-or-part-time: 2h
Theory classes: 2h

Integration of photovoltaics and solar thermal in the envelope

Description:
Integration of photovoltaics and solar thermal in the envelope

Full-or-part-time: 2h
Theory classes: 2h

GRADING SYSTEM

Students will have to carry out in class and at home analysis exercises and design proposals for the theoretical content of the subject. A final paper will complete the assessment in the case of insufficient assessment.

Continuous assessment
Continuous assessment will be based on the work carried out by the student during the academic year, through the submission of assignments or the performance of written and/or oral tests, according to the criteria and timetable established.

Final assessment
If the continuous assessment is not positive, a second assessment may be carried out, which will consist of a final overall test in the established methodology according to the criteria of the lecturer in charge (written or oral test and/or submission of assignments).

Telematic continuous assessment
In online teaching situations, continuous assessment will be carried out synchronously and asynchronously, by the methods established by the University and the School, with a periodic record of academic activity by submitting assignments, forums, questionnaires or any other means provided by the Atenea platform, or the alternative tools provided to the teaching staff. In situations in which this telematic teaching takes place when faceâ□□toâ□□face teaching has
already begun, or for nonâ□□academic reasons, any alterations to the weightings or regular teaching control systems will be communicated in detail to all students on the Atenea platform for every subject.

Final telematic assessment
If the continuous telematic assessment is not positive, a second assessment may be carried out consisting of a final overall test in telematic format to be established in accordance with the criteria of the lecturers in charge and the ICT resources and tools provided by the University or the School. The measures for adapting to distance teaching will be implemented in accordance with ICT security and personal data protection criteria to ensure compliance as regards Personal Data

Protection legislation (RGPD and LOPDGDD).

BIBLIOGRAPHY

Basic:
- Rosas Casals, M; Cendra Garreta, J. Energia solar tèrmica. 2a Ed.. Barcelona: Edicions UPC, 2005.
- MARTÍN VIDE, J.. Apaga la luz: el libro sobre el cambio climático. Editorial Da Vinci, 2010.
- OLGYAY, V.. Arquitectura y clima: manual de diseño bioclimático para arquitectos y urbanistas. Barcelona: Gustavo Gili, 1998.
- AA.VV.. Vitrubio ecológico. Principios y práctica del proyecto arquitectónico sostenible. Barcelona: Gustavo Gili, 2010.
- SERRA, R.. Arquitectura y climas. Barcelona: Gustavo Gili, 1999.
- Markvart, T.; Castañer, L.. Practical Handbook of Photovoltaics. Fundamentals and Applications.. Oxford, UK: Elsevier, 2003.
- MAZRIA, E.. El libro de la energia solar pasiva. 2a Ed.. México D.F.: Gustavo Gili, 1985.
- SERRA, R.; COCH, H.. Arquitectura y energia natural. Barcelona: Edicions UPC, 1995.
- Castañer, L.. Energía Solar Fotovoltáica. Barcelona: Edicions UPC, 1992.