

Course guide 210307 - PASA - Architectural Design and Sustainability: Environmental Assessment in the Design Process

Last modified: 14/12/2023

Academic year: 2023	ECTS Credits: 4.0	Languages: Catalan, Spanish	
Degree:	DEGREE IN ARCHITECTURE STUDIES (Syllabus 2014). (Optional subject).		
Teaching unit:	735 - PA - Department of	Architectural Design.	

LUIS BERIAIN SANZOL

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LECTURER

Unit in charge:

Coordinating lecturer:

Others:	Primer quadrimestre:
	LUIS BERIAIN SANZOL - Grup: 1ST

REQUIREMENTS

DESIGN V - Prerequisite DESIGN VI - Prerequisite

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:

EP14. Translation from Spanish slope EP19. Translation from Spanish slope EP2. Translation from Spanish slope EP9. Translation from Spanish slope

Generical:

CG5. Translation from Spanish slope CG7. Translation from Spanish slope

Transversal:

CT2. Translation from Spanish slope

Basic:

CB3. Translation from Spanish slope



TEACHING METHODOLOGY

In-Class Activity

3 Hours per week

Lecture / presentation method 0,7 Collaborative sessions 0,3 Practical lessons 0,3 Cooperative learning 0,4 Project-based learning 0,8 Case study 0,3 Teamwork 0,2

Out-of-class activities:

Autonomous work 56 hours/semester

LEARNING OBJECTIVES OF THE SUBJECT

An architectural design brings together technological, economic, social and environmental aspects - and their corresponding cultural implications - to guide the transformation of the environment in a symbiotic way between humanity and nature.

"Architectural Design and Sustainability. Environmental Assessment Within the Design Process" complements the design subjects taught in the last two years of the degree in Architecture at the ETSAB and incorporates aspects such as ecological footprint, energy efficiency, the reduction of non-renewable resources and the impact on the health of users.

The subject is carried out in collaboration with the GBCe Green Building Council Spain, an association to which the UPC belongs as an associated academic institution. GBCe is part of the WGBC World Green Building Council.

Its main aims are:

• To know the international frameworks on sustainability and connect them with the discipline of architecture:

- Sustainable Development Goals SDG and its Targets from the United Nations 2030 Agenda
- IPCC Reports of the Intergovernmental Panel on Climate Change
- Ecological footprint concept according to Global Footprint Network

• To become familiar with sustainability standards and certifications and the regulatory framework of professional practice regarding environmental aspects and understand the theoretical concepts that underlie its operation to use them as powerful tools for architectural design.

• To learn a simplified methodology of VERDE environmental assessment of buildings certification. VERDE is developed by GBCe - Green Building Council Spain. HADES VERDE 2.1. tool is used.

• To consider environmental aspects as design material that must be incorporated from the preliminary analysis of the site to the construction, maintenance and deconstruction of the building.

• To outline a method for formulating the environmental objectives of the design based on both external and internal constraints and to ensure compliance with these objectives throughout the design stages.

• To evaluate the environmental implications of design decisions.

• To reflect on the relationship between design decisions and their consequences at a global level, understanding architectural design, not as an autonomous but as interconnected discipline, and with great impact on the environment.

This is a subject of the Department of Architectural Design. To avoid the repetition of the contents taught in other optional subjects of other Areas of Knowledge and other Departments, of which it may be complementary, the subject focus on concept designs, not construction designs and its calculations.



STUDY LOAD

Туре	Hours	Percentage
Hours large group	40,0	40.00
Self study	60,0	60.00

Total learning time: 100 h

CONTENTS

INTRODUCTION

Description:

INTRODUCTION

- Ecological Footprint
- Definitions of Sustainability
- Embedded Energy (EE) and Operational Energy (OE)
- Passive Architecture
- Live Cycle Analysis (LCA) of materials
- Comfort and Healthy Indoor Spaces
- The pro-sustainability standards and certifications
- Official frameworks of the European Union (NZEB Directives, LEVELS Program)
- Standards on Energy Efficiency (PASSIVHAUS)
- Standards on Global Environmental Assessment (BREEM, LEED, GREEN, DGNB)
- Standards on Bioconstruction (BAUBIOLOGIE)
- The transformation of the architectural design under contemporary sustainability requirements.

Full-or-part-time: 20h Theory classes: 9h Guided activities: 6h Self study : 5h

SUSTAINABLE DEVELOPMENT GOALS AND THEIR TARGETS FOR THE UN 2030 AGENDA

Description:

- SUSTAINABLE DEVELOPMENT GOALS AND THEIR TARGETS FOR THE UN 2030 AGENDA
- Contributions of architectural design to the SDGs and their Targets for 2030.
- SDG 3. GOOD HEALTH AND WELL-BEING
- SDG 6. CLEAN WATER AND SANITATION
- SDG 7. AFFORDABLE AND CLEAN ENERGY
- SDG 9. INDUSTRY, INNOVATION AND INFRASTRUCTURE
- SDG 11. SUSTAINABLE CITIES AND COMMUNITIES
- SDG 12. RESPONSIBLE CONSUMPTION AND PRODUCTION
- SDG 15. LIFE ON LAND

Full-or-part-time: 12h

Theory classes: 3h Guided activities: 3h Self study : 6h



ENVIRONMENTAL ASSESSMENT METHODOLOGY WITH DESIGN ANALYSIS AND IMPROVEMENTS.

Description:

ENVIRONMENTAL ASSESSMENT METHODOLOGY WITH DESIGN ANALYSIS AND IMPROVEMENTS

- Conditioning factors (Design as analysis)
- External environmental parameters
- Internal environmental requirements
- Environmental objectives
- Environmental strategies (Design as a pre-vision)
- Environmental solutions (Design as instruction)
- Initial Environmental Assessment
- Proposals for Improvement and Improved Environmental Assessment

Full-or-part-time: 17h

Theory classes: 4h Guided activities: 4h Self study : 9h



Description: A. ENVIRONMENTAL ASSESSMENT BY AREAS
• A1 ENERGY
- DESIGN OF PASSIVE MEASURES - DESIGN OF ACTIVE MEASURES - RENEWABLE ENERGY
• A2 MATERIALS AND CIRCULAR ECONOMICS
- LIFE CYCLE ANALYSIS OF MATERIALS (LCA) - SELECTION OF SUSTAINABLE MATERIALS
• A3 WATER

ENVIRONMENTAL ASSESSMENT OF THE ARCHITECTURAL DESIGN THROUGH VERDE (GBCe) METHOD.

- WATER CONSUMPTION
- USE OF NON-DRINKING WATER
- A4 QUALITY OF THE INTERIOR ENVIRONMENT
- INDOOR AIR QUALITY (IAQ)
- COMFORT: HYGROTHERMIC, VISUAL, ACOUSTIC ...
- A5 ADAPTATION TO CLIMATE CHANGE
- SCENARIO 2050
- IMPROVEMENT OF THE BUILDING ENVIRONMENT
- IN. ENVIRONMENTAL ASSESSMENT BY IMPACTS
- IN 01 Climate Change
- IN 02 Emissions to the atmosphere, land and water
- IN 03 Depletion of non-renewable energy
- IN 04 Drinking water depletion
- IN 05 Depletion of natural resources
- IN 06 Waste generation
- \bullet IN 07 Impact on the neighborhood
- IN 08 Health and comfort
- IN 09 Economic aspects of the outcome

Full-or-part-time: 51h Theory classes: 9h Guided activities: 6h Self study : 36h

ACTIVITIES

ENVIRONMENTAL ANALYSIS OF STUDENTS'S FORMER DESIGN

Full-or-part-time: 5h Practical classes: 2h 30m Self study: 2h 30m



GRADING SYSTEM

EVALUATION SYSTEM

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 faceâutoatational face teaching has already begun, or for nonâutacademic 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:

- Edwards, Brian. Guía básica de la sostenibilidad. 2a ed. rev. y ampl. Barcelona [etc.]: Gustavo Gili, 2008. ISBN 9788425222085.

- Ching, Frank; Shapiro, Ian. Arquitectura ecológica : un manual ilustrado. Barcelona: Gustavo Gili, cop. 2015. ISBN 9788425227431.

- Un Vitruvio ecológico : principios y práctica del proyecto arquitectónico sostenible. Barcelona: Gustavo Gili, DL 2007. ISBN 9788425221552.

- Roulet, Claude-Alain. Santé et qualité de l'environnement intérieur dans les bâtiments. Lausanne: Presses polytechniques et universitaires romandes, cop. 2004. ISBN 2880745470.

- Olgyay, Victor. Arquitectura y clima : manual de diseño bioclimático para arquitectos y urbanistas. Barcelona: Gustavo Gili, DL 1998. ISBN 8425214882.

- Koch-Nielsen, Holger. Stay cool : a design guide for the built environment in hot climates. London: James & James, cop. 2002. ISBN 1902916298.

- Pedro Gadanho. Climax Change. How architecture must transform in the age of ecological emergency. New York, Barcelona: Actar Publishers, 2022. ISBN 9781948765671.

Complementary:

- Wassouf, Micheel. Passivhaus : de la casa pasiva al estándar : la arquitectura pasiva en climas cálidos = da casa passiva à norma : a arquitectura passiva em climas quentes. Barcelona: Gustavo Gili, cop. 2014. ISBN 9788425224522.

- Rudofsky, Bernard. Architecture without architects : a short introduction to Non-Pedigreed architecture. Albuquerque [NM]: University of New Mexico, 1965. ISBN 0826310044.

- García-Germán, Javier. De lo mecánico a lo termodinámico : por una definición energética de la arquitectura y el territorio.



Barcelona: Gustavo Gili, cop. 2010. ISBN 9788425223471.

RESOURCES

Other resources:

App HADES VERDE version 2.1. "Sustainable Building Design Aid Tool". April 2019, GBCe Green Building Council Spain / Ministerio de Fomento - Spain Gob.

The materials and documents of the subject may be written indistinctly in any languages of instruction.