Course guide
310754 - 310754 - Circular Architecture

Last modified: 08/02/2024

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

Degree: BACHELOR'S DEGREE IN ARCHITECTURAL TECHNOLOGY AND BUILDING CONSTRUCTION (Syllabus 2019). (Optional subject).

Academic year: 2023 **ECTS Credits:** 3.0 **Languages:** Catalan, Spanish

LECTURER

Coordinating lecturer: Paris Viviana, Oriol

Others: Paris Viviana, Oriol
Alfaro Garrido, Licinio José

PRIOR SKILLS

Knowledge of climate, technology and construction

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
FB-05. FB-5 Knowledge of the theoretical basis and the basic principles applied to the construction, of the fluid mechanics, the hydraulics, the electricity and electromagnetism, the calorimetry and thermal comfort, and the acoustics.
FE-04. FE-4 Knowledge of the materials and traditional or prefabricated construction systems used in construction, their varieties and physical and mechanical features which define them.
FE-07. FE-7 Ability to identify the constructive elements and systems, define its function and compatibility, and its implementation to construction in the construction process. Plan and solve constructive details.
FE-05. FE-5 Ability to adapt the construction materials to the typology and use of the building, manage and run the receipt and quality control of the materials, its implementation in the construction, the control of execution of the construction units and the realization of trials and final tests.

Transversal:
02 SCS N3. SUSTAINABILITY AND SOCIAL COMMITMENT - Level 3. Taking social, economic and environmental factors into account in the application of solutions. Undertaking projects that tie in with human development and sustainability.
04 COE N3. EFFICIENT ORAL AND WRITTEN COMMUNICATION - Level 3. Communicating clearly and efficiently in oral and written presentations. Adapting to audiences and communication aims by using suitable strategies and means.
07 AAT. SELF-DIRECTED LEARNING. Detecting gaps in one's knowledge and overcoming them through critical self-appraisal. Choosing the best path for broadening one's knowledge.
05 TEQ. TEAMWORK. Being able to work as a team player, either as a member or as a leader. Contributing to projects pragmatically and responsibly, by reaching commitments in accordance to the resources that are available.
06 URI. EFFECTIVE USE OF INFORMATION RESOURCES. Managing the acquisition, structure, analysis and display of information from the own field of specialization. Taking a critical stance with regard to the results obtained.

TEACHING METHODOLOGY

'' Learning by doing ''. It is intended that the student acquire his own intellectual tools so as to be able to propose a reduction in the cost of emissivity of the building, according to the use, the material and the construction systems used. That is why the percentage between; practical and tutorials, and theoretical, depends on the module

LEARNING OBJECTIVES OF THE SUBJECT

Acquire your own intellectual tools so as to be able to propose a building with low environmental impact according to the architecture defined in terms of the functional program, the place and the environment, applying concepts of bioclimatism and passive systems as well as construction systems with low environmental impact.

Learn the project strategies that allow minimizing the environmental impacts of architecture both in use and in construction, applying concepts of circularity in the closure of energy and material flows.
Apply concepts of bioclimatism and passive systems as well as construction systems with low environmental impact.

STUDY LOAD

Type	Hours	Percentage
Self study	45,0	60.00
Hours large group	30,0	40.00

Total learning time: 75 h

CONTENTS

CIRCULAR ECONOMY

Description:
Introduction to the environmental impacts of architecture and the circular economy.
Bases of language and material environmental impacts to architecture.
Conditions for Circular Architecture

Full-or-part-time: 1h
Practical classes: 1h

CLIMATE AND BUILDING TYPES

Description:
Prioritize the concepts and evaluation criteria of the natural means of thermal, light and acoustic environmental control.
Analyze the climate of the area, the place, the formal configuration of the building and its use in order to propose measures that improve the energy performance of the building.
CLIMATES
• Air, Humidity and Wind
• Light and Radiation
• Sound and Architectural Acoustics
CLIMATE and building typologies
• The building and the interior and exterior space
• The building and the architectural typology
• The building and Environmental Control Systems
computer simulations
• Criteria and Hypothesis of modeling with TCQi
• Interpretation of data

Full-or-part-time: 9h 40m
Theory classes: 4h 50m
Guided activities: 4h 50m

ENVIRONMENTAL IMPACT OF MATERIALS

Description:
Introduction to the environmental impacts of architecture and the circular economy
Bases of language and material environmental impacts to architecture
Examples: first case studies, impact distribution results (quantities, energy and emissions)
Work premises: THE CIRCULAR ECONOMY
• The building is not a finite object
• Buildings must be understood as a 'material bank'
• Apply 'utility rental' rather than 'resource purchase' strategies.

Full-or-part-time: 8h 40m
Theory classes: 4h 20m
Guided activities: 4h 20m

BASIC CONCEPTS FOR SUSTAINABILITY

Description:
Development of basic concepts for sustainability. Critical analysis.
The impact depends more on the use, than on the material itself.
theory Concepts
1. The use of space (frequency and intensity)
2. The strategy. The strategy is fundamental can be the basis for the change of environmental impact
3. Buying resources vs. rental of utilities
4. The functional utility of the elements (environmental impact vs utility)
5. Functional specialization and robust functional elements of construction
6. Optimization (efficiency) and functional specialization. The limits of optimization
7. Efficiency efficacy effectiveness. Three ways to achieve the same goal.
8. Reversibility. Design for dissassembling
9. Reuse, manufacture and recycle
10. Transport and its influence - km 0 resources? are there?
11. Durability vs environmental impact (maintenance)
12. Durability and material sacrifice (strategic design)

Full-or-part-time: 6h 40m
Theory classes: 3h 20m
Guided activities: 3h 20m

PROJECT ANALYSIS

Description:
PROJECT analysis applying the concepts studied. Another way of looking at it. Study of cases
Analysis of CONSTRUCTIVE SOLUTIONS applying the Concepts studied. Another way to see it
Study of cases

Full-or-part-time: 4h
Theory classes: 2h
Guided activities: 2h

GRADING SYSTEM

BIBLIOGRAPHY

Basic:
- Behling, Sophia y Stefan. Sol power: la evolución de la arquitectura sostenible.
- Serra Florensa, Rafael. Arquitectura y climas.
- Stewart Brand. How buildings learn : what happens after they're built.
- Paul Hawken, Amory B. Lovins, L. Hunter Lovins. Natural Capitalism: Creating the Next Industrial Revolution.
- Köster, Helmut. Dynamic daylighting architecture. Basics systems, projects.
- Victor Olgyay. Arquitectura y Climas .
- Ray C. Anderson . Mid-course Correction: Toward a Sustainable Enterprise :The Interface Model.
- Dunnett, Nigel, y Nöel Kingsbury. Toits et murs végéteaux.
- Andrea Deplazes. Construir la arquitectura.
- Beatriz Garzon. Arquitectura Bioclimatica.
- Michael Braungart, William McDonough. Cradle to Cradle: Remaking the Way We Make Things.
- Andrea Deplazes. Constructing Architecture: Materials, Processes, Structures.
- Bjorn Berge. The Ecology of Building Materials.
- F.Javier Neila Gonzalez. Arquitectura Bioclimatica.
- Peter Rice. Un ingeniero imagina.
- Michael Wassouf. De la casa pasiva al estándar Passivhaus.
- John Fernandez . Material Architecture.
- Michael Braungart, William McDonough. The Upcycle: Beyond Sustainability--Designing for Abundance.
- Meg Calkins . Materials for Sustainable Sites: A Complete Guide to the Evaluation, Selection, and Use of Sustainable Construction Materials.