UNIVERSITAT POLITÈCNICA DE CATALUNYA BARCELONATECH

Course guide
310072 - 310072 - Bioclimatic Building Construction

Last modified: 15/05/2023

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 2015). (Optional subject).

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

LECTURER

Coordinating lecturer: ANTONIO CABALLERO MESTRES

Others: ORIOL PARIS VIVIANA

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
1. FB-5 Knowledge of the theoretical basis and the basic principles applied to the construction, of the fluid mechanics, the hydraulics, the electicity and electromagnetism, the calorimetry and thermal comfort, and the acoustics.
2. 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.
3. 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.

Transversal:
4. 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.
5. EFFICIENT ORAL AND WRITTEN COMMUNICATION. Communicating verbally and in writing about learning outcomes, thought-building and decision-making. Taking part in debates about issues related to the own field of specialization.
6. 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.
7. 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

It is pretended that the student acquires appropiate intelectual tools to be able to propose a reduction of the energy demand of the buiding, according to the architecture and the location, more suitable depending on the architectural functionality and the use. For this reason the percentage between practices and tutorials, and theories, depends on the module.

LEARNING OBJECTIVES OF THE SUBJECT

It is pretended that the student acquires appropiate intelectual tools to be able to propose a construction of low energy demand according to the architecture defined by the functional programme, the location and the environment. For this reason the percentage between the practices and tutorials and the theory depends on the module.

At the end of the subject the students should be able to:

. Determine criteria for the choice of passive systems of thermal, acoustic and light environmental control.
. Explain the meaning of a good or bad location, shape and use of a building depending on the economic/environmental parameters and not the economic opportunities.
. Use the natural means of environmental control as the main conditioning system.

STUDY LOAD

Type	Hours	Percentage
Hours large group	12,0	16.00
Hours medium group	9,0	12.00
Self study	45,0	60.00
Hours small group	9,0	12.00

Total learning time: 75 h

CONTENTS

C1 CLIMATE, LIGHT AND SOUND

Description:
In this content the students work:

CLIMATES
1. Air, humidity and wind.
2. Light and radiation.
3. Architectural sound and acoustics.

Related activities:
Activity 1.

Full-or-part-time: 25h
Theory classes: 8h
Practical classes: 2h
Self study : 15h

C2 CLIMATE AND TYPOLOGIES OF BUILDING CONSTRUCTION

Description:
In this content the students work:

CLIMATE AND CONSTRUCTION TYPOLOGIES
1. The building and the interior and exterior space.
2. The building and the architectural typologies.
3. The building and the Environmental Control Systems.

Related activities:
Activity 2.

Full-or-part-time: 25h
Theory classes: 6h
Practical classes: 2h
Guided activities: 2h
Self study : 15h

C3 INFORMATIC SIMULATIONS

Description:
In this content the students work:

COMPUTER SIMULATIONS
1. Criteria and modelling hypothesis.
2. Interpretation of the data.
3. Computer software.

Related activities:
Activity 3.

Full-or-part-time: 25h
Theory classes: 2h
Practical classes: 6h
Guided activities: 2h
Self study : 15h

ACTIVITIES

A1 GROUP TESTS OF CONTINUOUS EVALUATION

Description:
In groups of 3 to 4 members and at class, there will be done an exercise when the topic CLIMATES is finished with a wording which will demand to apply most of the specific learning objectives of the topic. Subsequently there will be done a coevaluation between groups, with the help of a table with the corection criteria (rúbrica), while the professor corrects the exercise in the blackboard.

Specific objectives:
At the end of the activity, the students should be able to:

1. Define the climatic determinants and how they affect the building.
2. Rationalization depending on the use, functional programme and the environment.
3. Use of modelling computer software of the demands.

Material:
Self-learning questionnaire with multiple choice and notes of the topic available (PowerPoint) in ATENEA.

Delivery:
Exercise of each one of the group members with the corresponding coevaluation and the common report of the group.
Return, with the corresponding feedback of the professor, during the next session and general reflection at class about the most common mistakes and the learning objectives associated which should be reinforced.
It represents a part of the continous evaluation 35%.

Full-or-part-time: 4h
Practical classes: 2h
Self study: 2h

A2 INDIVIDUAL TESTS OF CONTINUOUS EVALUATION

Description:
Individual fulfilment at class of an exercise of the topic DEMAND, CONSUMPTION AND USE which will cover all the specific learning objectives of the topic, with a wording related with some content of environmental interest or quotidian life.
Correction by the faculty.

Specific objectives:
At the end of the activity the students should be able to:

1. Fix the demands of the building and do consumption regressions.
2. Connect the functional efficiency and quantify it according to the building life.
3. Argue the good or bad location of a building depending on the economic/environmental parameters and not the economic opportunities.

Material:
Series of self-learning with multiple choice and notes of the topic available (PowerPoint) in ATENEA.
Following official resolution with correction criteria (rúbrica) available by the virtual campus ATENEA.

Delivery:
Resolution of the exercise by the student, which the professor will return corrected the next week so that the student can compare it with the official resolution. It represents a part of the continous evaluation 35%.

Full-or-part-time: 8h
Practical classes: 4h
Self study: 4h

A3 GROUP TESTS OF CONTINUOUS EVALUATION

Description:
Individual realisation at class of an exercise of the topic COMPUTER SIMULATIONS which will cover all the specific learning objectives of the topic, with a wording related with some topic of environmental interest or quotidian life.
Correction by the faculty.

Specific objectives:
At the end of the activity the students should be able to:

1. To model a building to calculate the energy demand by means of computer software.
2. Understand the data obtained with the programme.
3. Propose improvements to reduce the demand.

Material:
Self-learning questionnaire with multiple choice and notes of the topic available (PowerPoint) in ATENEA.

Delivery:
Resolution of the exercise by the student, which the professor will return corrected the next week so that the student can compare it with the official resolution. It represents a part of the continous evaluation 30%.

Full-or-part-time: 12h
Practical classes: 8h
Self study: 4h

GRADING SYSTEM

As it is a continous evaluation it is considered each module with its own evaluation and with this percentage.

Module 1: 35%
Module 2: 35%
Module 3: 30%

EXAMINATION RULES.

All the exams will be done with all the material used during the course.

BIBLIOGRAPHY

Basic:

- Neila González, Francisco Javier. Arquitectura bioclimática : en un entorno sostenible. Madrid: Munilla-lería, 2004. ISBN 8489150648.
- Serra Florensa, Rafael. Arquitectura y climas [on line]. Barcelona: Gustavo Gili, 1999 [Consultation: 25/05/2017]. Available on: http://site.ebrary.com/lib/upcatalunya/detail.action?docID=10675446.
- Köster, Helmut. Dynamic daylighting architecture. Basics systems, projects. Basilea: Birkhäuser, 2004. ISBN 376436730X.
- Behling, Sophia ; Behling, Stefan. Sol power: la evolución de la arquitectura sostenible. Barcelona: Gustavo Gili, 2002. ISBN 9688873969.
- Dunnett, Nigel ; Kingsbury, Noel. Toits et murs végéteaux. Rodez: Rouergue, 2008. ISBN 9782841569540.
- Olgyay, Victor. Arquitectura y clima : manual de diseño bioclimático para arquitectos y urbanistas. 2a ed. Barcelona: Gustavo Gili, 2002. ISBN 8425214882.

RESOURCES

Other resources:
Campus magazine
Audiovisual material
Informatics material
Links:
www.icaen.es
www.idae.es
www.idescat.es
www.iea.org
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