Course guide
210320 - SIEC - Introduction to Computational Analysis and Design Tools Seminar

Last modified: 14/12/2023

Unit in charge: Barcelona School of Architecture
Teaching unit: 752 - RA - Departamento de Representación Arquitectónica.

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

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

LECTURER

Coordinating lecturer: MARC ROCA MUSACH

Others: Primer quadrimestre:
MARIA MONTSERRAT FONT PERNIL - Grup: ARI
MARC ROCA MUSACH - Grup: ARI

PRIOR SKILLS

It is recommended to know Grasshopper3D and Rhinoceros3D software and to have a basic knowledge of parametric architecture.

REQUIREMENTS

It is necessary to be enrolled in the thematic studio "Arquitectura i re-invenció" to take this seminar. Optionally, it is recommended to have passed Architectural Representation 4.

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
EAB1. Translation from Spanish slope
EAB2. Translation from Spanish slope
EAB3. Translation from Spanish slope
EAB8. Translation from Spanish slope
EP4. Translation from Spanish slope
EP7. Translation from Spanish slope
EP8. Translation from Spanish slope

Transversal:
CT3. Translation from Spanish slope
CT4. Translation from Spanish slope
CT5. Translation from Spanish slope
CT6. Translation from Spanish slope

Basic:
CB2. Translation from Spanish slope
CB3. Translation from Spanish slope
CB4. Translation from Spanish slope
CB5. Translation from Spanish slope

TEACHING METHODOLOGY

The seminar is divided into 4 blocks that run in parallel with the development of the thematic studio's project:

1. URBAN SCALE ANALYSIS
2. ENVIRONMENTAL DESIGN TOOLS
3. REPRESENTATION AND MODELLING OF THE PROJECT

Each block consists of a theoretical introduction, the resolution of a guided practical exercise, the autonomous work of the students and a final evaluation.

Students must choose the topic of one of the blocks and work on it in relation to the project they develop in the studio. At the end of the course, they must submit and defend orally a report summarizing the application of the computational tools of analysis and design they have used in their personal project.

LEARNING OBJECTIVES OF THE SUBJECT

The aim of the course is to provide students with basic computational design and analysis tools that allow them to streamline the work process and take design decisions. Mainly, it will be used software Grasshopper3d, Rhinoceros3D and some of their plugins that will allow the resolution of each topic of the subject. Additional tools can be used in order to help student's work.

STUDY LOAD

Type	Hours	Percentage
Hours large group	33,0	44.00
Self study	42,0	56.00

Total learning time: 75 h

CONTENTS

INTRODUCTION TO COMPUTATIONAL DESIGN AND ANALYSIS

Description:
Introduction to computational design and analysis tools. Introduction to software Rhinoceros3D & Grasshopper3D.

Full-or-part-time: 7h
Theory classes: 4h
Self study : 3h

URBAN SCALE ANALYSIS

Description:
Use of computational analysis and design tools to know the characteristics of the environment and draw conclusions.

Full-or-part-time: 13h
Theory classes: 6h
Self study : 7h

ENVIRONMENTAL DESIGN TOOLS

Description:
Tools for analysis and representation of the bioclimatic operation of a building.

Full-or-part-time: 25h
Theory classes: 12h
Guided activities: 13h

REPRESENTATION AND MODELING OF THE PROJECT

Description:
Parametric tools for the representation of the graphic documentation of the architectural project and the formalization of models.

Full-or-part-time: 13h
Theory classes: 6h
Self study : 7h

FINAL REPORT

Description:
Students must choose the topic of one of the previous blocks and work on it in relation to the project they develop in the studio. At the end of the course, they must submit and defend orally a report summarizing the application of the computational tools of analysis and design they have used in their personal project.

Full-or-part-time: 17h
Theory classes: 2h
Self study : 15h

GRADING SYSTEM

50% exercises and evaluations of each block
50% summary report delivered at the end of the course and oral defence

It is compulsory to deliver the partial evaluations of each block and the final summary report to opt for the continuous assessment evaluation.

EXAMINATION RULES.

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:
- Payne, Andrew O.; Grasshopper Community. The Grasshopper Primer [on line]. 3a. [Consultation: 12/07/2021]. Available on: http://grasshopperprimer.com.

Complementary:
- Issa, Rajaa. Essential Mathematics for Computational Design [on line]. [Consultation: 30/06/2021]. Available on: https://www.rhino3d.com/download/rhino/6/essentialmathematics.
- Pottmann, Helmut. Architectural geometry. Exton, PA: Bentley Institute Press, 2007. ISBN 9781934493045.
- Tedeschi, Arturo. AAD_Algorithms-aided design : parametric strategies using Grasshopper. Brienza: Le Penseur, cop. 2014. ISBN 9788895315300.
- Issa, Rajaa. Essential Algorithms and Data Structures for Computational Design [on line]. [Consultation: 30/06/2021]. Available on: https://www.food4rhino.com/en/resource/essential-algorithms-and-data-structures-grasshopper.

RESOURCES

Computer material:
- https://www.rhino3d.com. Software Rhinoceros3D

Hyperlink:
- https://www.food4rhino.com. Food4Rhino. Plugin repository for Rhinoceros3D and Grasshopper3D.
- http://grasshopperdocs.com/. Grasshopper Docs. Community documentation for Grasshopper add-ons & plugins
- https://www.grasshopper3d.com/. Grasshopper3D

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