



Course guide

310731 - 310731 - Advanced Techniques in Graphic Expression

Last modified: 06/06/2024

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

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

Academic year: 2024 **ECTS Credits:** 3.0 **Languages:** Catalan, Spanish, English

LECTURER

Coordinating lecturer: GUSTAVO DE GISPert IRIGOYEN

Others:

PRIOR SKILLS

This subject is framed within the 2019 curriculum, and its aim is to increase knowledge in BIM procedures and other graphic scopes, after the student has learned about various similar tools throughout the career, with which the student is expected to already have a medium level knowledge of Revit and Navisworks.

REQUIREMENTS

Medium level knowledge of Revit and Navisworks
Have a personal computer to install Autodesk Revit and Navisworks programs.

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:

1. FE-2 Knowledge of the infographic and cartographic procedures and methods in the construction field.
2. FE-27 Ability to apply the necessary advanced tools for the resolution of the parts which the technical project implies and its management.

Transversal:

3. EFFECTIVE USE OF INFORMATION RESOURCES - Level 2. Designing and executing a good strategy for advanced searches using specialized information resources, once the various parts of an academic document have been identified and bibliographical references provided. Choosing suitable information based on its relevance and quality.
4. SELF-DIRECTED LEARNING - Level 2: Completing set tasks based on the guidelines set by lecturers. Devoting the time needed to complete each task, including personal contributions and expanding on the recommended information sources.

TEACHING METHODOLOGY

Flipped classroom. A theoretical concept will be published on the Atenea Campus that will be developed in the form of a classroom activity. The teacher will give guidelines for carrying out the activity and will guide the student in achieving the objectives of each session. The convenience of the student studying and practicing the activity before attending class will be encouraged so that they can use the class for questions or to improve the objectives of each activity.



LEARNING OBJECTIVES OF THE SUBJECT

- Create a project in Revit.
- Create and classify parametric families in the BIM environment.
- Obtain geographic information to complete projects in a BIM environment.
- Use photorealistic rendering techniques in a BIM production environment.
- Know and use virtual reality (VR) techniques for their analysis and problem solving of the construction project in buildings.
- Diversify the project management tools in buildings under the BIM methodology.
- Complement BIM production with programming methods.

STUDY LOAD

Type	Hours	Percentage
Hours small group	12,0	16.00
Hours large group	18,0	24.00
Self study	45,0	60.00

Total learning time: 75 h

CONTENTS

01-Revit Project

Description:

Modeling in Revit of a directed project.

Related activities:

A00-A01-P01

Full-or-part-time: 8h

Practical classes: 8h

02-Families

Description:

Modeling in Revit of parametric families and material management.

Related activities:

B01-P02

Full-or-part-time: 6h

Practical classes: 6h

03-Georeferencing and terrain

Description:

Georeferencing of models with capture of cadastral and cartographic data, and location of buildings on existing terrains modifying their morphology according to the project.

Related activities:

C01-P03

Full-or-part-time: 2h

Practical classes: 2h



04-Render & VR

Description:

Find options to obtain photorealistic images and analyze enhancement Plug-Ins for VR.

Related activities:

D01-P04

Full-or-part-time: 2h

Practical classes: 2h

05-Project management with Navisworks

Description:

Analyze the project as BIM Manager, 4D, 5D, 6D and 7D management.

Related activities:

E01-P05

Full-or-part-time: 4h

Practical classes: 4h

06-Dynamo

Description:

Visual programming to improve the efficiency of the BIM methodology.

Related activities:

F01-P06

Full-or-part-time: 4h

Practical classes: 4h

ACTIVITIES

A00-Introduction to Revit, work environment.

Description:

We introduce Revit as a BIM tool for project development. We will identify the composition of the design environment according to different possibilities of graphical consultation of models.

Specific objectives:

- Open a project modeled in Revit.
- Identify the different sections of the work environment.
- Visualize the model in different ways and know the possibilities of the different views.
- Know the types of work files.

Material:

Guided instructions and support websites.

Delivery:

Delivery of guided work as class attendance.

Full-or-part-time: 2h

Theory classes: 2h



A01 Apartment for two

Description:

The drawing of house sketches and their subsequent pass to a dimensioned plan is an exercise that will be carried out when developing many of the skills that a Technical Architect acquires with the degree. This first exercise does not intend to study the construction project in depth, in terms of process and materials, but rather to try to accustom the student to the use of BIM tools for daily use, which entails a certain rigor compared to other drawing methods.

Specific objectives:

- Start an architectural project in Revit.
- Model basic walls and floors.
- Add Doors and windows.
- Add furniture.
- Add dimensions to the model.
- Search for external libraries.
- Modify existing model.
- Produce a 2D floor plan with sheet.
- Create new views and plans.
- Organize the project browser.
- Create rooms.
- Create data tables.
- Produce various floor plans with diverse information.

Material:

Guided instructions and support websites.

Delivery:

Delivery of guided work as class attendance.

Full-or-part-time: 6h

Theory classes: 6h



B01-Modeling in Revit of parametric families and materials management

Description:

One of the pillars of the modeling of any program within the BIM methodology, in our case Revit, is that they are based on parametric objects. This allows, not only to have information associated to objects, which feeds the database that ultimately includes the model, but to make these objects graphically versatile, and therefore, in their representation and dimensions, achieving, with a definition (family), to have a large range of similar objects.

Specific objectives:

- Manage family templates.
- Model shapes.
- Manage and create type and instance parameters.
- Create and adapt materials.
- Nest families.
- Classify families.
- Manage parametric dimensions.
- Nest family parameters.
- Parameterize arrays.
- Manage the re-nesting of families.
- Apply conditional formulas.
- Adapt a family to an existing multi-type product.
- Generate the technical file of a family.

Material:

Guided instructions and support websites.

Delivery:

Delivery of guided work as class attendance.

Full-or-part-time: 6h

Theory classes: 6h

C01-Georeferencing and terrain manipulation

Description:

Georeferencing of models with capture of cadastral and cartographic data, and location of buildings on existing terrains modifying their morphology according to the project.

Specific objectives:

- Extract geo-referenced parcel data from the Cadastre.
- Extract geo-referenced parcel data from the Cartographic Institute.
- Coordinate graphic information from different sources to georeference a project.
- Generate and manipulate a terrain.

Material:

Guided instructions and support websites.

Delivery:

Delivery of guided work as class attendance.

Full-or-part-time: 2h

Theory classes: 2h



D01-Render & VR

Description:

In communicating a project according to which actors, it is necessary not only that the technical information, both graphic and documentary, be accurate, but being able to interact emotionally with the space we develop by adding virtual realism to a proposal, or finished project, during or while its realization.

Specific objectives:

- Control the sun lighting.
- Manipulate rendering parameters.
- Get photorealistic images.
- Create a virtual tour.
- Conduct a solar study.
- Use a rendering plug-in.

Material:

Guided instructions and support websites.

Delivery:

Delivery of guided work as class attendance.

Full-or-part-time: 2h

Theory classes: 2h

E01-Project manage

Description:

Through the Naviswoks program we will take on the role of BIM manager.

Specific objectives:

- Manage Naviswoks files.
- Navigate the model to obtain and report information.
- Look for construction design problems.
- Manage planning as a BIM manager.

Material:

Guided instructions and support websites.

Delivery:

Delivery of guided work as class attendance.

Full-or-part-time: 4h

Theory classes: 4h



F01-Visual Programming

Description:

When commercial programs are not enough to complete a BIM management and development, a group of tools emerge that work to complete these programs based on custom programming. This programming can be based on conventional languages or more intuitive methods close to users who are not experts in code programming. Dynamo is a visual language that links to Revit to give us access to this type of development.

Specific objectives:

- Know the basics of visual programming.
- Perform basic visual scripts in Dynamo.
- Query information from a Revit model from Dynamo
- Use a third party program.
- Load of development packages.

Material:

Guided instructions and support websites.

Delivery:

Delivery of guided work as class attendance.

Full-or-part-time: 4h

Theory classes: 4h

P01-Revit housing project

Description:

Make a Revit model of one level home in a storey building, that exists or invented by the student.

Specific objectives:

Those of the corresponding activities

Material:

The corresponding activities

Delivery:

Revit file and Sheet Plans with:
Dimensions, according to indications.
Rooms, with legend of uses.
Areas, with table of rentable and gross building areas, and totals.
Doors and windows, with graphic details and list of elements.

Full-or-part-time: 9h

Self study: 9h



P02-Family Project

Description:

Make a family in Revit proposed by the student:
It must have at least one level of nesting.
It has to have parameters to control some dimension.
It has to have parameters to control the materials.
It has to have some parameter dependent on a formula.

Specific objectives:

Those of the corresponding activities

Material:

The corresponding activities

Delivery:

Revit file of the family.
A color image of the family embedded in a model.
Descriptive report of the family.

Full-or-part-time: 9h

Self study: 9h

P03-Project of location and georeferencing.

Description:

Georeferencing of a project with capture of cadastral and cartographic data, and location on an existing plot.

Specific objectives:

Those of the corresponding activities

Material:

The corresponding activities

Delivery:

Project Revit file.
Site sheet with plan, section, data table and orthophoto image.

Full-or-part-time: 4h 30m

Self study: 4h 30m

P04-VR

Description:

Make rendered views with interior and exterior lighting according to weather conditions.

Specific objectives:

Those of the corresponding activities

Material:

The corresponding activities

Delivery:

Images and project according to specifications.

Full-or-part-time: 4h 30m

Self study: 4h 30m



P05-Navisworks Manage

Description:

Analyze projects as BIM Manager to extract information.

Specific objectives:

Those of the corresponding activities

Material:

The corresponding activities

Delivery:

3D project views, sections, incidents, etc. in web format.

Full-or-part-time: 9h

Self study: 9h

P06-Dynamo

Description:

Look for visual programming modules in Dynamo and incorporate them into a known project to see their advantages.

Specific objectives:

Those of the corresponding activities

Material:

The corresponding activities

Delivery:

Report file.

Dynamo file.

Project Revit file.

Full-or-part-time: 4h 30m

Self study: 4h 30m

GRADING SYSTEM

The evaluation of the student will be continued with activities and 6 graded deliveries:

20% - Delivery of weekly activities (9/12).

20% - Project P01

20% - Project P02

10% - Project P03

10% - Project P04

10% - Project P05

10% - Project P06

This subject will have a re-evaluation period after the final exam period.



RESOURCES

Hyperlink:

- CTE - Código técnico de la Edificación. Resource

Other resources:

Revit and Navisworks are one of the most used programs for creating and managing architectural models under the BIM methodology. Any doubt about any tool or procedure available in them, finds multiple resolution guides, in the Internet search engines.