SUBJECT TEACHING GUIDE

G1968 - Graphic Modelling (BIM)

First Degree in Civil Engineering

Academic year 2025-2026

1. IDENTIFYING DATA					
Degree	First Degree in Civil Engineering			Type and Year	Compulsory. Year 2
Faculty	School of civil Engineering				
Discipline	GRAPHIC MODELS IN ENGINEERING				
Course unit title and code	G1968 - Graphic Modelling (BIM)				
Number of ECTS credits allocated	6	Term		Semester based (2)	
Knowledge Field	Architecture, construction, building and urban planning, civil engineering				
Web					
Language of instruction	Spanish	English Friendly	No	Mode of delivery	Face-to-face

Department	DPTO. INGENIERIA GEOGRAFICA Y TECNICAS DE EXPRESION GRAFICA
Name of lecturer	CESAR ANTONIO OTERO GONZALEZ
E-mail	cesar.otero@unican.es
Office	E.T.S. de Ingenieros de Caminos, Canales y Puertos. Planta: + 2. DESPACHO PROFESORES (2034)
Other lecturers	CRISTINA MANCHADO DEL VAL BORJA ARROYO MARTINEZ PEDRO LASTRA GONZALEZ

4. OBJECTIVES
1. BIM METHODOLOGY. Students acquire theoretical and practical knowledge on the fundamental elements used under the BIM methodology, namely: BIM Objectives, Uses, Processes, and Requirements. They can also both associate and distinguish between a project developed under the traditional methodology and one developed under the BIM methodology.
2. PARAMETRIC MODELING. Students acquire theoretical and practical knowledge of the fundamental elements on which parametric models are developed. Consequently, they are capable of developing their own parametric objects in AEC (Architecture, Engineering, and Construction) and integrating them into commonly used software in that field.
3D MODELING FOR CIVIL ENGINEERING. Students acquire theoretical and practical knowledge of the fundamental elements used to develop a 3D model in the field of civil engineering. This requires mastery of basic professional techniques, as well as some of their derived BIM uses (mainly 2D measurements and drawings).
4. 3D MODELING FOR AEC. Students acquire theoretical and practical knowledge of the fundamental elements used to develop a 3D model in the field of infrastructure and facilities. This requires mastery of basic professional techniques, as well as some of the derived BIM uses (mainly 2D measurements and plans).

6. SUBJECT PROGRAM	
CONTENTS	
1	BIM METHODOLOGY: The methodological elements that constitute a BIM Execution Plan (BIM Objectives, Uses, Processes, and Requirements) are analyzed. Necessary information level. LOD. LOI. Links. Classification. GubimClass, UniClass. File coding. Model decomposition, project typologies, and disciplines. Federation and Coordination. Coordinate systems. The Common Data Environment (CDE). ISO 19650-1. Information states. Information flows. Roles and responsibilities. The infrastructure lifecycle. EIR, PIR, AIR. Other BIM elements.
2	PARAMETRIC MODELING. Geometric and dimensional constraints. Parameterization in Inventor. Exporting and importing parameter files. Assemblies in Inventor. Parameterization in Revit. Family master templates. User parameters. Development of families and types commonly used in civil engineering.
3	3D CIVIL MODELING. Work templates and main settings. Regulations: Spanish Work Kit. Surfaces, Grading, Alignments, Profiles and Visualizations, Assemblies and Subassemblies, Linear Works, Parameters and Derived Elements, Cross Sections, Volumetric Calculations, Plans, Pipe Networks, ODTs, I/O to IFC.
4	REVIT MODELING AND COORDINATION. Templates, units, and master settings. Grids and levels. Views and sections. Loaded, pre-installed, and user-created families. 3D modeling: foundations, beams, columns, basic structural systems, footings, roofs, common architectural elements. Materials. Lists of materials. Project parameters and shared parameters. Coordinate systems and associated characteristic points. Linking, georeferencing. Drawings.

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
BLOCK 1. 3D MODELLING (CIVIL3D AND REVIT). LABORATORY EXAM	Laboratory evaluation	No	Yes	50,00
PARAMETRIC DESIGN (INVENTOR AND REVIT). PRACTICAL WORK AND ORAL/WRITTEN DEFENSE BIM METHODOLOGY PRACTICAL WORK AND ORAL/WRITTEN DEFENSE	Work	No	Yes	30,00
MONITORING AND CONTINUOUS ASSESSMENT 20% MARK	Others	No	No	20,00
TOTAL				100,00

Observations

THE FINAL MARK IS DONE ACCORDING TO THIS FORMULA::

0.5*(MARK OF CIVIL3D & REVIT) + 0.3*(MARK OF PARAMETRIC DESIGN & BIM METHODOLOGY) + 0.2 * (MONITORING)

ASK THE PROFESSOR IN CHARGE ANYTHING YOU NEED TO KNOW.

Observations for part-time students

SAME AS FULL TIME STUDENTS

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

AutoDesk Civil 3D 2024, Essentials. Imperial Units. Learning guide. 2023. Ed. Ascent. Center for Technical Knowledge.

AutoDesk Revit 2025, Fundamentals for Structure. Metric Units Learning guide. 2024. Ed. Ascent. Center for Technical Knowledge.

S. Walts, T Sabat. AutoDesk Civil 3d 2025 Unleashed. Ed. Packt Pub. 2024.

AutoDesk Revit 2024, Collaboration Tools. Learning guide. 2024. Ed. Ascent. Center for Technical Knowledge.

C. Otero. Asignatura G1968 Modelado Gráfico (BIM). Aula Virtual Universidad de Cantabria