



Course guide

310746 - 310746 - Virtual Representation of BIM Models and Heritage Surveys

Last modified: 15/05/2023

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). (Optional subject).	
Academic year: 2023	ECTS Credits: 3.0	Languages: Catalan, Spanish, English

LECTURER

Coordinating lecturer: Gustavo de Gispert Irigoyen

Others:

PRIOR SKILLS

- Having developed projects with BIM methodology, having knowledge of its fundamentals and applications to improve the design, construction and maintenance process of a building.
- Have concerns in the study and conservation of historical heritage.
- Interest in the virtual development of the construction project.

REQUIREMENTS

Medium knowledge of modeling in Revit

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:

FE-02. FE-2 Knowledge of the infographic and cartographic procedures and methods in the construction field.

Transversal:

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.

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.

TEACHING METHODOLOGY

Inverted classroom. A theoretical concept will be published on the Atenea Campus that will be developed in the form of classroom practice. The teacher will give guidelines for the practice 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 it for questions or to improve the objectives of each activity.

LEARNING OBJECTIVES OF THE SUBJECT

- Manipulate projects based on BIM and on heritage survey with Terrestrial Laser Scanner and photogrammetry.
- Expand knowledge in the field of 3D, file formats, models and materials, and how to make them compatible with different programs.
- Know and use tools that allow us to clearly communicate the ideas that are projected, with fast and striking techniques, in the field of interactive virtual environments (VR).

STUDY LOAD

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

Total learning time: 75 h

CONTENTS

Heritage surveying and virtual reality (VR)

Description:

Introduction to the Asset Survey. The potential of working with 3D surveys, coming from laser scanner and photogrammetry surveys, will be taught. What models it generates, what is HBIM and how the models should be edited, so that they meet the requirements to be used in an interactive application.

Specific objectives:

Know modeling techniques with terrestrial laser scanner (TLS) and photogrammetry.

Related activities:

A01-A02-A03-A04-A05

Full-or-part-time: 12h

Practical classes: 12h

BIM Virtual Representation

Description:

BIM project. It will explain how to work with BIM in heritage projects. We will also delve into the characteristics of BIM models as structured 3D models, differentiating them from other modeling techniques and how these models can be exchanged with virtual reality engines and generate architectural visualizations, as a working and diffusion tool. The 3D Models based on BIM will be optimized for the creation of a VR platform, focusing on the correction of UV maps, the topology of the 3D models, materials and textures, taking into account the updating of the models in the evolution of the project, in the list of the programs used. We will introduce a higher level of realism with lighting through textures, allowing us a more fluid interaction between the scenes and content created.

Specific objectives:

Expand techniques for project communication.

Related activities:

A06-A07-A08-A09-A10-A11

Full-or-part-time: 14h

Practical classes: 14h



GRADING SYSTEM

Continuous evaluation based on weekly activities and 7 projects (PBL):

- 10% - Weekly activities
- 20% - P01
- 05% - P02
- 05% - P03
- 05% - P04
- 05% - P05
- 10% - P06
- 40% - P07

EXAMINATION RULES.

Weekly activities and periodic projects will have deadlines for scoring.

BIBLIOGRAPHY

Basic:

- Kensek, K.M.; Noble, D.E.. Building information modeling: BIM in current and future practice.. Indianapolis: Wiley, 2014. ISBN 978-1118766309.
- Deutsch, R. BIM and integrated design: strategies for architectural practice. Boston: The American Institute of Architects, 2011. ISBN 9780470572511.
- Interreg. Digital solutions in the field of cultural heritage. A Policy Brief from the Policy Learning Platform on Environment and resource efficiency. European Union, European Regional Development Fund, 2018.
- McGinnis R.. Islands of Stimulation: Perspectives on the Museum Experience, Present and Future. N. Levent and A. Pascual-Leone (eds.), The Multisensory Museum: Cross-disciplinary Perspectives on Touch, Sound, Smell, Memory, and Space, Plymouth, Roman & Littlefield, 319-329.. 2014.
- Three-dimensional model of an ancient Egyptian falcon mummy skeleton..
- Coloma, E. Definir BIM, model, representació i vista. BARcelona: Departament d'Expressió Gràfica Arquitectònica I, Secció de Geometria Descriptiva, ETSAB, UPC, 2010. ISBN 9788495249524.
- Fontal, Olaia. La educación patrimonial. Teoría y práctica para el aula, el museo e internet. Gijón: Trea, 2003. ISBN 84-9704-099-6.
- Evaluation of touchable 3D-printed Replicas in Museums. Curator: The Museum Journal, 60, 4, 445-465..
- Petrelli, D. C. Integrating material and digital: a new way for cultural heritage. interactions: new visions of human-computer interaction, 20 (4), 58- 63.. 2013.
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- Heritage Recording and 3D Modeling with Photogrammetry and 3D Scanning. 3D Optical Metrology (3DOM) Research Unit, Bruno Kessler Foundation (FBK), 1104-1138..
- The Multisensory museum : cross-disciplinary perspectives on touch, sound, smell, memory, and space. Lanham, Maryland : Rowman & Littlefield..
- Hardin, Brad y McCool, Dave. Bim and Construction Management: Proven Tools, Methods, and Workflows. Second Edition por John Wiley & Sons Inc. , 2015.
- Augmented Reality in Heritage Apps:Current Trends in Europe.
- The Future Landscape of 3D in Museums. In: N. Levent and A. Pascual-Leone. U The Multisensory Museum: Cross-disciplinary Perspectives on Touch, Sound, Smell, Memory, and Space (str. 331 - 340). Lanham, Maryland : Rowman & Littlefield..
- Coloma, E.. Tecnologia BIM per al disseny arquitectònic/Director: Joaquim Regot Marimón. . : Universitat Politècnica de Catalunya. Escola Tècnica Superior d'Arquitectura de Barcelona. Departament de Expressió Gràfica Arquitectònica I,, 2011.

RESOURCES

Other resources:

<https://www.autodesk.com/education/free-software/recap-pro>
>https://adsk-recap-public.s3.amazonaws.com/Getting_Started_Guide_ReCap_Photo.pdf ><https://enscape3d.com/>
><https://www.unrealengine.com/en-US/twinmotion/plugins> ><https://unity.com/es/products/reflect>
><https://www.autodesk.com/education/free-software/revit> ><https://unity3d.com/es/get-unity/download>
><https://unity3d.com/es/learn/tutorials> ><https://www.danielgm.net/cc/> ><http://www.meshlab.net>



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