Course guide
210297 - IAT - Innovations in Architecture and Technology

Last modified: 15/07/2024

Unit in charge: Barcelona School of Architecture
Teaching unit: 753 - TA - Department of Architectural Technology.

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

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

LECTURER

Coordinating lecturer: ORIOL PONS VALLADARES

Others: Primer quadrimestre:
ORIOL PONS VALLADARES - 1SM

PRIOR SKILLS

Adquired during the different courses from first architectural degree year

REQUIREMENTS

Have successfully passed the first degree course in architecture studies at the ETSAB or equivalent.

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
EP19. Translation from Spanish slope
ET16. Translation from Spanish slope

Transversal:
CT1. Translation from Spanish slope
CT2. Translation from Spanish slope
CT4. Translation from Spanish slope
CT5. Translation from Spanish slope
CT6. Translation from Spanish slope

TEACHING METHODOLOGY

Active methodologies. Personalized learning, discussions, gamification, learning with real material, chalenge / project-based learning and visits.

LEARNING OBJECTIVES OF THE SUBJECT

That students:
- Get to know in a generic way the most recent and relevant innovations in architecture and technology, as well as real and practical cases of these novelties.
- Analyze and evaluate in detail the impact on the architecture of some real case/s of these innovations.
- Propose a future innovation or evolution of a current novelty in the coming years within the field of architecture and its technologies.

STUDY LOAD

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

Total learning time: 75 h

CONTENTS

General contents

Description:
This subject is organized into 10 sessions: 1) introduction to the subject and the syllabus; 2) innovative design and project strategies, from BIM to participatory design; 3) new prototyping systems, from the CNC to virtual mock-ups; 4) innovative test systems as laboratory as it is on site; 5) new materials, high-tech and low-tech; 6) Innovative on-site construction systems with robotization; 7) new off-site construction technologies such as 3D printing; 8) innovative restoration and rehabilitation systems such as the use of scanning and / or drones; 9) New environmental assessment systems such as life cycle tools combined with BIM; and 10) innovative sustainability assessment systems also combined with BIM and with sensitivity and uncertainty analysis. These tòpics will work on real cases and applications - such as the construction of the Sagrada Familia in Barcelona and competitive research projects - which will be updated over the years.

Full-or-part-time: 33h
Practical classes: 33h

GRADING SYSTEM

Continuous assessment
Continuous assessment will be based on the work that students will develop during the course in small groups of 2-3 people; and the summaries of the visits that will be made during the course to works, laboratories, industries of an innovative nature.
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).

BIBLIOGRAPHY

Basic:
- Awoyera, P. O., & Adesina, A.. "Plastic wastes to construction products: Status, limitations and future perspective.". Case Studies in Construction Materials [on line]. 2020, vol. 12 [Consultation: 10/03/2022]. Available on: https://www-sciencedirect-com.recursos.biblioteca.upc.edu/journal/case-studies-in-construction-materials.- Burry, Mark. Prototyping for architects. London: Thames & Hudson Ltd, 2016. ISBN 9780500343050.
- Escorsa, Pere; Valls, Jaume. Tecnología e innovación en la empresa [on line]. [2ª ed. ampl.]. Barcelona: Edicions UPC, 2003 [Consultation: 16/07/2021]. Available on: http://hdl.handle.net/2099.3/36718. ISBN 8483017067.
- Hebel, Dirk. Building from Waste: Recovered Materials in Architecture and Construction. Boston: Basel: Birkhauser, 2014. ISBN 3038215848.
- Pan, M. "A framework of indicators for assessing construction automation and robotics in the sustainability context". Journal of Cleaner Production [on line]. 2018, vol. 182, p. 82-95 [Consultation: 16/07/2021]. Available on: https://doi.org/10.1016/j.jclepro.2018.02.053.- Eco-efficient construction and building materials : life cycle assessment (lca), eco-labelling and case studies. Philadelphia, PA: Woodhead Pub, 2014.
- Sagrada Familia : Gaudí's unifinished [sic] masterpiece : geometry, construction and site. Shenzhen: Oscar Riera Ojeda, 2014. ISBN 9789881225245.
- Sebestyén, Gyul. New architecture and technology. Oxford: Architectural Press, 2003. ISBN 0750651644.
- Smith, Ryan E.. Prefab architecture: a guide to modular design and construction [on line]. Hoboken, N.J: Wiley, 2010 [Consultation: 16/07/2021]. Available on: https://ebookcentral.proquest.com/lib/upcatalunya-ebooks/detail.action?docID=698719. ISBN 9780470275610.
- Staib, Gerald.. Components and systems: modular construction, design, structure, new technologies [on line]. Basel; Boston: Birkhäuser, cop. 2008 [Consultation: 16/07/2021]. Available on: https://doi.org/10.11129/detail.9783034615662. ISBN 9783764386566.
- Watts, Andrew. Modern Construction Handbook [on line]. 4th ed. rev. Basel: Birkhäuser, 2016 [Consultation: 16/07/2021]. Available on: https://doi.org/10.1515/9783035617085. ISBN 3035609594.

Complementary:
- New perspective in industrialisation in construction: a state-of-the-art report. Zurich: ETH, 2009. ISBN 9783906800172.

RESOURCES

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