

Course guide

310183 - 310183 - Comprehensive Evaluation of Existing Buildings: Structural Analysis

Last modified: 04/07/2023

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

Degree: MASTER'S DEGREE IN DIAGNOSIS AND INTERVENTION TECHNIQUES IN BUILDING CONSTRUCTION (Syllabus 2020). (Compulsory subject).

Academic year: 2023 **ECTS Credits:** 5.0 **Languages:** Spanish

LECTURER

Coordinating lecturer: MARTA BATLLE BELTRÁN

Others: Crespiera Olle, Roma

REQUIREMENTS

Given that for the completion of the Master it is necessary to visit the buildings under study, it is essential that the student body has contracted the compulsory and automatic insurance at the time of enrollment. Those over 28 years of age do not have this university insurance so they must have their own.

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:

CE5MUDITIE. To describe the aspects of heat exchange, thermic perception, indoor air quality, ventilation, lighting conditions and noise control and propagation.

CE10MUDITI. To acquire an evaluation methodology starting from observed or measured data and from the results of the analysis processes with numerical support.

CE12MUDITI. To make decisions based on the analysis of the results.

CE14MUDITI. To apply the knowledge acquired for the elaboration of the corresponding rehabilitation projects.

Generical:

CG1MUDITIE. To apply the knowledge acquired in the complex problem's resolution in any sector of the existing building.

CG2MUDITIE. To use the tools for the research activities, as can be the data analysis and processing, as well as research techniques and methodology.

Transversal:

CT2MUDITIE. (ENG) Sostenibilitat i compromís social. Conèixer i comprendre la complexitat dels fenòmens econòmics i socials típics de la societat del benestar; tenir capacitat per relacionar el benestar amb la globalització i la sostenibilitat; aconseguir habilitats per utilitzar de forma equilibrada i compatible la tècnica, la tecnologia, l'economia i la sostenibilitat.

CT3MUDITIE. (ENG) Treball en equip. Ser capaç de treballar com a membre d'un equip interdisciplinari, ja sigui com un membre més o realitzant tasques de direcció, amb la finalitat de contribuir a desenvolupar projectes amb pragmatisme i sentit de la responsabilitat, assumint compromisos, tenint en compte els recursos disponibles.

TEACHING METHODOLOGY

Expository method / master lesson

Participatory exhibition class

Cooperative learning

Solving exercises and problems

Study of cases

LEARNING OBJECTIVES OF THE SUBJECT

At the end of the course, the student body will be able to:

Evaluate and verify compliance with the habitability, comfort and health benefits of the buildings.

Evaluate and verify compliance with the safety benefits for the use of buildings, as well as compliance with the relevant regulations according to use

Verify the quality of supplies and access to networks and detect conflicts that may cause injuries or damage to buildings

Evaluate the global behavior of building structures and identify the elements that require rehabilitation interventions.

STUDY LOAD

Type	Hours	Percentage
Hours large group	15,0	12.00
Hours small group	5,0	4.00
Self study	90,0	72.00
Guided activities	10,0	8.00
Hours medium group	5,0	4.00

Total learning time: 125 h

CONTENTS

Module 1 Habitability, comfort and health in buildings

Description:

This module lays the foundations for the analysis of buildings as a whole, following an iterative process, and from obtaining performance information of the different construction elements that make up the building, as well as the services and facilities that affect the habitability, comfort and health of its users. The results obtained throughout the process will allow the evaluation and verification of compliance with the habitability, comfort, accessibility, safety and health benefits of the building.

Specific objectives:

Relate social conditions with habitability, comfort and health in buildings

Interpret a plan for the investigation and analysis of environmental pollutants.

Evaluate the state of a building in terms of its habitability benefits.

Assess serious and / or extreme situations and propose emergency measures.

Assess different sampling systems and decide assessment criteria for an environmental quality and health research plan

Related competencies :

CT2MUDITIE. (ENG) Sostenibilitat i compromís social. Conèixer i comprendre la complexitat dels fenòmens econòmics i socials típics de la societat del benestar; tenir capacitat per relacionar el benestar amb la globalització i la sostenibilitat; aconseguir habilitats per utilitzar de forma equilibrada i compatible la tècnica, la tecnologia, l'economia i la sostenibilitat.

Full-or-part-time: 20h

Theory classes: 4h

Practical classes: 4h

Guided activities: 2h

Self study : 10h

Module 2 Security, use and accessibility

Description:

This module will develop the analysis of the building and the different construction elements that affect safety for use, accessibility and all services, following an iterative process based on obtaining performance information. The results obtained throughout the process will allow the evaluation and fulfillment of the security benefits for the use of the building, as well as the fulfillment of the pertinent regulations according to use (housing, public attendance, high occupancy, etc.).

Specific objectives:

Upon completion of the module, students will be able to:

Assess the breaches of the building in terms of safety of use according to current regulations.

Discerning serious and minor non-compliances in terms of safety of use in buildings

Design adaptation solutions to comply with the safety of use in public buildings.

Assess serious and / or extreme situations and propose emergency measures

Full-or-part-time: 20h

Theory classes: 4h

Practical classes: 4h

Guided activities: 2h

Self study : 10h

Module 3 Inspection and diagnosis of installations and systems

Description:

This module will provide tools and guides for the inspection and diagnosis of non-HVAC installations in buildings, from verifying the quality of supplies and access to networks, to detecting conflicts that may cause injuries or damage to buildings. Likewise, risk situations will be identified and possible provisional protection mechanisms or emergency measures will be established. Feasibility of the intervention in systems and compatibility with the existing building.

Specific objectives:

Assess the breaches of the building in matters of access and supply of services according to current regulations.

Discerning serious and minor non-compliances in terms of the conditions of the facilities in the buildings

Propose adaptation solutions for compliance with regulations related to supplies and facilities in buildings

Assess serious and / or extreme situations and propose emergency measures

Full-or-part-time: 20h

Theory classes: 4h

Practical classes: 4h

Guided activities: 2h

Self study : 10h



Module 4 Structural analysis and evaluation

Description:

This module will develop the analysis of the structure as a whole and of the different structural subsystems following an iterative process based on obtaining performance information and structural expertise. The results obtained throughout the process will make it possible to evaluate the overall behavior of the building structure and identify the elements that require rehabilitation interventions.

Specific objectives:

Interpret, evaluate and justify injuries related to the structural systems of buildings.

Direct, organize and execute processes for the assessment of the structural safety of buildings based on their own knowledge or with the collaboration of experts in structural calculation.

Write general recommendations for intervention and emergency measures.

Full-or-part-time: 52h 30m

Theory classes: 11h

Practical classes: 10h

Self study : 31h 30m

GRADING SYSTEM

Continuous assessment

Evaluation of general competences

Each Module will be evaluated individually.

Module 1: 10% of the Final Grade

Module 2: 10% of the Final Grade

Module 3: 10% of the Final Grade

Module 4: 40% of the Final Grade

Semester Compendium Exercise: 30% of the Final Grade

EXAMINATION RULES.

Individual tests, in pairs and group work

BIBLIOGRAPHY

Basic:

- Frías López, Elena; Queipo de Llano Moya, Juan. Mejora de las condiciones de accesibilidad en edificios existentes [on line]. Madrid: Instituto Eduardo Torroja de ciencias de la construcción. CSIC, 2014 [Consultation: 10/07/2020]. Available on: https://www.coam.org/store.web/CURSOS_IA/2014/CUR_PDF/1721.pdf.
- Espínola Jiménez, Antonio. Accesibilidad auditiva: pautas básicas para aplicar en los entornos [on line]. Granada: La Ciudad Accesible, 2015 [Consultation: 10/07/2020]. Available on: <http://hdl.handle.net/11181/5368>.
- Fundación ONCE, Consejo General de la Arquitectura Técnica de España. ¿Cómo gestionar la accesibilidad?: comunidades de propietarios [on line]. Madrid: Fundación ONCE. Vía Libre, 2018 [Consultation: 10/07/2020]. Available on: [http://riberdis.cedd.net/bitstream/handle/11181/5784/C%C3%B3mo gestionar la accesibilidad Comunidades de propietarios.pdf?sequence=1](http://riberdis.cedd.net/bitstream/handle/11181/5784/C%C3%B3mo%20gestionar%20la%20accesibilidad%20Comunidades%20de%20propietarios.pdf?sequence=1). ISBN 9788488934499.
- Institut Universitari d'Estudis Europeus, Universitat Autònoma de Barcelona. Libro verde de la accesibilidad en España : diagnóstico y bases para un plan integral de supresión de barreras [on line]. Madrid: Ministerio de Trabajo y Asuntos Sociales, Instituto de Migraciones y Servicios Sociales, 2002 [Consultation: 10/07/2020]. Available on: <http://hdl.handle.net/2072/4719>. ISBN 8484460487.
- Dirección General de Arquitectura, Vivienda y Suelo. Documento básico SUA: seguridad de utilización y accesibilidad [on line]. Madrid: Ministerio de Fomento. Dirección General de Arquitectura, Vivienda y Suelo, 2019 [Consultation: 10/07/2020]. Available on: <https://www.codigotecnico.org/index.php/menu-seguridad-utilizacion-accesibilidad.html>.
- Dirección General de Arquitectura, Vivienda y Suelo. Documento básico SI: seguridad en caso de incendio [on line]. Madrid: Ministerio de Fomento. Dirección General de Arquitectura, Vivienda y Suelo, 2019 [Consultation: 10/07/2020]. Available on: <https://www.codigotecnico.org/index.php/menu-seguridad-caso-incendio.html>.
- UNE-EN 15978: Sostenibilidad en la construcción. Evaluación del comportamiento ambiental de los edificios. Métodos de cálculo [on line]. Madrid: Asociación Española de Normalización y Certificación, 2012 [Consultation: 10/07/2020]. Available on: http://recursos.biblioteca.upc.edu/login?url=https://portal.aenormas.aenor.com/aenor/Suscripciones/Personal/pagina_per_sus.asp.
- Rodríguez Rodríguez, Francisco Javier. Guía acústica de la construcción. 2ª ed. Madrid: CIE Inversiones Editoriales Dossat 2000, 2008. ISBN 9788496437814.
- Carrión Isbert, Antoni. Diseño acústico de espacios arquitectónicos [on line]. Barcelona: Edicions UPC, 1998 [Consultation: 10/07/2020]. Available on: <http://hdl.handle.net/2099.3/36341>. ISBN 8483012529.
- Mañà i Reixach, Fructuós. Estructures a l'edificació. Barcelona: Edicions UPC, 2007. ISBN 9788483019504.
- Torroja, Eduardo. Razón y ser de los tipos estructurales. Madrid: Colegio de Ingenieros de Caminos, Canales y Puertos, 2007. ISBN 9788438003701.
- Argüelles Álvarez, Ramón. Estructuras de madera: diseño y cálculo. 2a ed. Madrid: Asociación de Investigación Técnica de las Industrias de la Madera y Corcho. AITIM, 2000. ISBN 8487381170.
- Construyendo bóvedas tabicadas : actas del Simposio Internacional sobre Bóvedas Tabicadas, Valencia 26, 27 y 28 de mayo de 2011. València: Universitat Politècnica de València, 2012. ISBN 9788483638729.
- Espasandín López, Jesús. Manual para el diseño, cálculo y construcción de apeos y refuerzos alternativos. Madrid: Munilla-Lería, 2002. ISBN 9788489150539.
- Reese, Megan L. Structural analysis and assessment of Guastavino vaulting = anàlisi estructural i avaluació de les voltes de Guastavino. Vilassar de Dalt: Ajuntament de Vilassar de Dalt, 2011. ISBN 9788460652250.
- Manual de geotècnia i patologia, diagnòsi i intervenció en fonaments. Barcelona: Col·legi d'Aparelladors i Arquitectes Tècnics de Barcelona, 1998. ISBN 8487104371.
- Guía de aplicación del DB-HR protección frente al ruido [on line]. Madrid: Instituto de Ciencias de la Construcción Eduardo Torroja, Ministerio de Ciencia y Innovación, 2016 [Consultation: 13/07/2020]. Available on: https://www.codigotecnico.org/images/stories/pdf/proteccionRuido/GUIADBHR_201612.pdf.
- Decret 141/2012 sobre condicions mínimes d'habitabilitat dels habitatges i la cèdula d'habitabilitat [on line]. Barcelona: Departament de Territori i Sostenibilitat. Secretaria d'Habitatge i Millora Urbana ; Agència de l'Habitatge de Catalunya, 2012 [Consultation: 13/07/2020]. Available on: http://territori.gencat.cat/web/.content/home/01_departament/normativa_i_documentacio/documentacio/habitatge_millora_urbana/habitatge/publicacions2/22_decret_141_2012/decret141_imp.pdf.
- El Síndrome del edificio enfermo: guía práctica para su evaluación [on line]. Madrid: Instituto Nacional de Seguridad e Higiene en el Trabajo, 1994 [Consultation: 13/07/2020]. Available on: <https://www.insst.es/documents/94886/96076/el+sindrome+del+edificio+enfermo/bc268bbc-7dd5-4036-83ed-762a1c9e7ea6>. ISBN 8474253934.
- Documento básico HR: protección frente al ruido [on line]. Madrid: Dirección General de Arquitectura, Vivienda y Suelo, 2019 [Consultation: 13/07/2020]. Available on: <https://www.codigotecnico.org/index.php/menu-proteccion-frente-ruido.html>.
- Brufau i Niubó, Robert. Rehabilitar con acero. Madrid: Asociación para la Promoción Técnica del Acero, 2010. ISBN 9788469230596.
- Documento básico HS: salubridad [on line]. Madrid: Dirección General de Arquitectura, Vivienda y Suelo, 2019 [Consultation: 13/07/2020]. Available on: <https://www.codigotecnico.org/index.php/menu-salubridad.html>.