Universitat de Lleida

DEGREE CURRICULUM

REFURBISHING 1

Coordination: RINCÓN VILLARREAL, LÍDIA

Academic year 2019-20

REFURBISHING I 2019-20

Subject's general information

Subject name	REFURBISHING 1
Code	101428
Semester	1st Q(SEMESTER) CONTINUED EVALUATION
Typology	

Degree	Course	Character	Modality
Bachelor's Degree in Architectural Technology and Building Construction	4	OPTIONAL	Attendance-based

Course number of credits (ECTS)	6
Type of activity, credits, and groups	

Activity type	PRAULA	TEORIA
Number of credits	3	3
Number of groups	1	1

Coordination	RINCÓN VILLARREAL, LÍDIA
Department	COMPUTER SCIENCE AND INDUSTRIAL ENGINEERING
Teaching load distribution between lectures and independent student work	60 h of lectures (40%) 90 h of independent student work (60%)
Important information on data processing	Consult this link for more information.
Language	English
Distribution of credits	Lídia Rincón Villarreal: 6 credits
Office and hour of attention	CREA building, 1.04. Appointment by e-mail.

REFURBISHING I 2019-20

Teaching staff	E-mail addresses	Credits taught by teacher	Office and hour of attention
RINCÓN VILLARREAL, LÍDIA	lidia.rincon@udl.cat	7,2	

Subject's extra information

Subject that is taught in English.

The subject is part of the Refurbishment option line and aims to train the student in the energy renovation of existing buildings. Theory is alternated with practical exercises and the realization of a project on a real case of energy renovation of a building, linked to the program of the UdL "Classrooms against poverty". The theoretical examinations are of mandatory attendance.

It is highly recommended to have approved and achieved favorable results in subjects Materials 1 and 2 and Systems and Types of Construction.

It is considered highly recommended to course the list of subjects of specialization, namely Rehabilitation 1, 2 and 3.

Learning objectives

- To develop a renovation project of an existing building considering all the aspects that comprise refurbishment and precisely defined performed interventions.
- To know, know how to interpret, develop and apply the general rule that orders the field of refurbishment and restoration monumental in terms of local, national and international (sectorial regulations Heritage & Rehabilitation).
- To develop an implementation of proposals for energy refurbishment about the project specialization.
- To be able to discern about most suitable energy renovation measures in relation to the development of a constructive refurbishment process.
- To critically evaluate the thermal performance, acoustic and lighting in existing buildings, based on the recognition of materials, building systems and elements that comprise it.
- To develop a rehabilitation project of an existing building using the necessary tools, CAD drawing programs, budgets and measurements programs, data processing programs, writing papers and presentations.
- To develop presentations and subsequent evolutionary advancement of the practice of course, valued in the whole evolution.
- To learn to develop themselves in public presentation to the rest of the group and teachers in the development of the previous point.

Competences

University of Lleida strategic competences

- UdL2 Command of a foreign language.

Degree-specific competences

- GEE12. Manufactured or traditional constructive systems and materials knowledge, its varieties and physics and mechanical characteristics that define them.
- GEE13. Capacity to adapt the materials of construction to the typology and use of buildings; manage the reception and the quality control of the materials, its use in the building works, the execution control of the units of work and the performance of tests and final proofs.
- GEE15. Aptitude to identify the elements and constructive systems, define their function and compatibility, and his use in the building process. Pose and solve constructive details.
- GEE17. Capacity to give advice on the causes and evidences of the building injuries, to be able to offer solutions to avoid or amend their pathologies, and analyse the life cycle of the elements and constructive systems.
- GEE18. Aptitude to take part in the rehabilitation, restoration and conservation of the built heritage.

- GEE21. Capacity to apply technical rules to the building process, and produce documents of technical specification of the procedures and constructive methods of buildings.
- GEE23. Aptitude for the pre-dimensioning, design, calculation and test of structures and to manage its execution.
- GEE24. Capacity to constructively develop the facilities of the building, control and schedule its execution and verify the service reception test, as well as his maintenance.
- GEE25. Capacity to schedule and manage the building process, the work teams, and the technical and human means for maintenance and execution.
- GEE29. Aptitude to analyse, design and execute solutions that allow the universal access to buildings and surroundings.

Cross-disciplinary competences

- EPS3. Capacity to convey information, ideas, problems and solutions to both a specialized and no specialized public.
- EPS7. Capacity to work in situations with a lack of information and/or under pressure.
- EPS8. Capacity of planning and organizing the personal work.
- EPS9. Capacity for unidisciplinary and multidisciplinary teamwork.
- EPS13. Capacity to consider the socioeconomic context as well as the sustainability criteria in engineering solutions.

Subject contents

Theory:

1. The importance of energy efficiency in building renovation:

- Energy consumption of the building stock in Europe and Spain.
- Future perspective for building renovation.
- Social housing renovation against energy poverty
- Legislation. Social investment in building renovation.

2. Bioclimatic architecture in building renovation.

- Fundamental concepts of bioclimatic architecture applied to the building renovation: site, climate, orientation, solar radiation, shape factor.
- Bioclimatic design in vernacular architecture.

3. Passive design in renovation projects:

- Basic principles of passive design in winter and summer conditions.
- Refurbishment of buildings with passive design principles.
- Practical case examples.

4. Renovation measures to improve the energy efficiency in buildings:

- Improving the thermal behavior of the building's envelope.
- Thermal insulation, thermal mass.
- Materials use and its technical application.
- Solar control elements.
- Case examples of energy renovation of existing buildings.

5. Energy certification of existing buildings.

- Use of software CE3X.
- Laboratory Tests: Infiltrations, U-value, thermography.

Practice:

A. Energy renovation project 1: design.

- Using passive design principles to improve the thermal comfort of the building.
- Program distribution based on bioclimatic criteria.
- Methodology of work: analysis, inspection, data collection, relation of passive strategies, design proposal.

B. Energy renovation project 2: materials.

- Improving thermally the envelope of the building by acting on its envelope.
- Calculate the thermal transmittance of the envelope of the building.
- Work on constructive details.
- Methodology of work: analysis, inspection, data collection, tests, relation of improving measures, materials renovation proposal.

C. Exercises at class.

- Reading of articles.
- Written test.
- Drawing plans and constructive details.
- Laboratory tests.

Methodology

The course is divided into lectures and workshops. The lectures aim to introduce various concepts and scientific and technological knowledge that will enable the student to achieve the objectives and specific competencies to the subject. Independent work and teamwork will be essential for students to develop these skills and apply them to practical cases. During the course of the semester, students will carry out a renovation project where apply the skills taught during the lectures. The project will be supervised by teachers throughout the semester.

Types of classes:

- Lectures: Presentation and discussion of case examples of reference.
- Workshop: Regular supervision sessions of the various phases of the work. Public meetings scheduled for exhibition and critical work.

Development plan

Week	Methodology	Contents	Activities	Hours at class	Hours of autonomous work
1	Lecture and exercices	1. The importance of energy efficiency in building renovation	Reading of documents.	4	6
2-3	Lecture and exercices	2. Bioclimatic architecture.	Bioclimatic design in vernacular architecture.	8	12
4-5	Lecture and exercices	3. Passive design in renovation projects.	Passive design in building renovation. Learning from a case study.	8	12
6-8	Lecture and exercices	A. Energy renovation project 1: Passive design principles.	Project design. Plans drawing. Project presentation	12	18
9		1st EXAM	Individual study	2	3
10-11	Lecture and exercices	4. Renovation measures to improve the energy efficiency in buildings	Energy efficient renovation of existing buildings. Constructive details.	8	12
12-13	Lecture and exercices	5. Energy certification of existing buildings.	Use of software CE3X. Laboratory Tests: Infiltrations, U-value, thermography.	8	12
14-15	Lecture and exercices	B. Energy renovation project 2: Improving thermally the envelope of the building.	Project design. Drawing of constructive details.	8	12
16-17		2nd evaluation	Individual study	2	3
19		Recovery activities	Individual study		

Evaluation

Evaluation activities	%	Date
Theory written test 1	20%	Week 9
Theory written test 2	20%	Week 16
Exercices continuous evaluation	20%	Along the semester

Project 1	20%	Weeks 6-8
Project 2	20%	Weeks 1-15
Recovery activities: 1 theory written test	40%	Week 19

Bibliography

- Arquitectura bioclimática en un entorno sostenible. F.Javier Neila González. Ed. Munilla-lería.
- Un Vitruvio Ecológico. Principios y práctica del proyecoarquitectónico sostenible. Ed. Gustavo Gili, 2007.
- The solar house. Passive heating and cooling. Daniel D.Chiras. Ed. Chelsea Green Publising Company, 2002.
- Rafael Serra Florensa. Les energies a l'arquitectura.Edicions UPC. ETSAB. 1991.
- Granados Menéndez, Helena. Rehabilitación energética de edificios. Madrid :Tornapunta, 2010.
- Coscollano Rodríguez, José. Ahorro energético en la construcción yrehabilitación de edificios. Madrid : International Thomson, cop. 2002.
- 'Diccionari visual de la construcció'[Recurselectrònic]. 3a ed. Barcelona: Generalitat de Catalunya. Departament dePolítica Territorial i Obres Públiques, 2001. ISBN 84-393-5046-5. Available at:: http://territori.gencat.cat/es/01_departament/documentacio/general/terminologia_tecnica/diccionari_visual_de_la_construccio/index.html
- CTE (Código Tècnico de la Edificación). Available at: http://www.codigotecnico.org