Universitat de les Illes Balears

Teaching guide

Academic year	2015-16
Subject	20394 - Sustainability and Energy Management in Construction
Group	Group 6, 2S, GEED, GEEI
Teaching guide	B
Language	English

Subject identification

Subject	20394 - Sustainability and Energy Management in Construction
Credits	2.4 de presencials (60 hours) 3.6 de no presencials (90 hours) 6 de totals (150 hours).
Group	Group 6, 2S, GEED, GEEI (Campus Extens)
Teaching period	Second semester
Teaching language	English

Professors

Lecturers	**Horari d'atenció als alumnes**					
	Starting time	**Finishing time**	**Day**	**Start date**	**Finish date**	**Office**
Andreu Antoni Moià Pol andreu.moya@uib.es	You need to book a date with the professor in order to attend a tutorial.					
Rashid Nazmitdinov - rashid.nazmitdinov@uib.es	11:00	12:00	Monday	01/02/2016	30/06/2016	F.318 (concertar antes via e-mail)

Contextualisation

Sustainability and energy management in buildings is a subject that aims to explain the current problem of excessive energy consumption in buildings. It will provide the basic knowledge how we can reduce a consumption of energy to be more efficient. This course provides the base from which to build a career in facilities management.The student will learn various efficient ways to design buildings with almost zero CO2 emissions, according to new European standards. The student will gain an understanding of the importance of facilities management to business organizations and operations, while also learning strategies for internal marketing at national, regional and municipal levels.

Requirements

Professors

Dr. R.G. Nazmitdinov is Associate Professor, a member of Atomic, Molecular and Nuclear Physics research group of the Department of Physics. Expert in Nuclear Physics and Nanophysics, and applications of nanosystems in the field of photovoltaics. Since 1974 he was working at the Joint Institute for Nuclear Research (Dubna, Russia), University of the Witwatersrand (Johanesburg, South Africa), Max-Planck Institute for Complex Sytems (Dresden, Germany), and in 2002 he has joined the Physics Department of UIB. He is author and coauthors of more than 140 research papers in the field of nuclear physics, nonlinear optics, collective effects in many-body quantum systems. He has taught at UIB Atomic Physics, Quantum Many-Body Physics, Quantum Mechanics and Photonics (at Dubna University, Russia).

Dr. Andreu Moià Pol is Associate Professor, member of the Department of Mechanical Engineering Department of Physics and Engineering Research Group Building and Energy Management. Expert in Energy

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Efficiency and Certification of Buildings, Facilities and Renewable Energy. He is currently a director of the Chair Sampol and Graduate Certification, Efficiency and Energy Management. It was high school teacher of drawing, he served as Project Manager and liberal professional in the design and execution of installations in buildings from 1998 to 2001, he worked at la Conselleria Environment as Director of the Office Reduction waste from 2001 to 2002 and since 2002 is Professor of EPS and has collaborated with numerous companies and public administrations through cooperation agreements.

Essential requirements

It is recommended to have basic technical training in order to correctly follow the subject. Especially, it would be useful to have a training as a graduate in Physics and Mathematics.

Recommendable

It recommended to have taken courses in Fundamentals of Installation, Installation I and II.

Skills

This course will develop two particular skills, while will continue to improve the other skills acquired in the subjects Installation I and II .

Specific

* * CE2-11 Ability to apply the techniques and procedures to evaluate the energy Efficiency of buildings. * CE3-2 Ability to apply specific regulations to facilities in the process of construction of buildings.

Generic

* G1. Ability to work in a team..

Transversal

* CI-5 Ability for information management..

Basic

* You may consult the basic competencies students will have to achieve by the end of the degree at the following address: http://www.uib.eu/study/grau/Basic-Competences-In-Bachelors-Degree-Studies/

Content

Directive 2002/91 EC Energy Efficiency in Building and Directive 2010/31 / EU Energy Efficiency in Buildings have approved a design and a remodel of existing energy building consumption as a main strategic line. In addition these directives have been transposed in different laws and royal decrees, including Royal Decree 235/2013 of 5 April, which approved the basic procedure for certifying the energy efficiency of buildings.

Theme content

1. Introduction to basic principles of energy and construction.

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Major tourist consumptions in buildings, and residential services. Demand reduction: The building surface. Thermal insulation. Passive Solar Energy. Fundamentals of Green Buildings.

2. Normatives

Technical Building Code. Chapters Energy Saving: CTE-DB-HE (1-5). Directives 2002/91 / EC and 2010/31 / EU Energy Efficiency in Building. Royal Decree 235/2013 of 5 April, the basic procedure for certifying the energy efficiency of buildings.

3. Reduction of the energy demands for buildings. The building surface.

The thermal envelope of buildings. Demand reduction: the building surface. Passive Solar Energy. Fundamentals of Green Building. Official program leader: Limitation of Energy Demand and the verification of complement CTE-DB-HE1.

4. Energy Certification. Label.

Energy certification of buildings, simplified procedures and Cermis CE3X; general procedure for homes and small / medium-tertiary Calener VYP.

5. Reducing consumption.

Reducing consumption: efficiency of the facilities. Energy management. Improving energy efficiency label.

6. Renewable Energy.

Introduction to Renewable Energy, integrated in buildings. Solar Energy. Thermal and Photovoltaics. Biomass. Geothermal, aerothermal. Wind. Other sources.

Teaching methodology

The learning activities are divided into two groups: activities in the classroom, and independent activities (learning). The classroom activities will include lectures, practical sessions, laboratory sessions, discussion sessions, and presentation of work during examinations. The minimum required attendance to the classroom will be 80%.

In-class work activities

Modality	Name	Typ. Grp.	Description	Hours
Theory classes	Lectures	Large group (G)	The aim is that students acquire basic knowledge in order to obtain the necessary skills to develop projects. The theoretical sessions will introduce important ingredients of the course. The methodology consists in exposing of the course content combining theuse of lectures, audiovisual resources, and online tools. CE2-11 Ability to apply the techniques and procedures to evaluate the energy efficiency of buildings.	30
Practical classes	Practices and visits	Medium group (M)	The course will include the practical sessions in the computer room to learn simulation tools. The Lab sessions will be done in the laboratory student center to evaluate how theoretical and practical concepts are met inpractical modules. By solvingproblems, the student becomesaware on tecnhiques presented the theory classes.There will be also field trips within the available time and resources.	30

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Modality	Name	Typ. Grp.	Description	Hours
			CE3-2 Ability to apply specific regulations to facilities in the process of construction of buildings. CE2-11 Ability to apply the techniques and procedures to evaluate the energy efficiency of buildings.	

At the beginning of the semester a schedule of the subject will be made available to students through the UIBdigital platform. The schedule shall at least include the dates when the continuing assessment tests will be conducted and the hand-in dates for the assignments. In addition, the lecturer shall inform students as to whether the subject work plan will be carried out through the schedule or through another way included in the Campus Extens platform.

Distance education work activities

Modality	Name	Description	Hours
Individual self-study	Exàmen.	Assimilation of the theoretical course. To deepen the obtained knowledge, the students should consult the bibliography given in the course. They should solve individual assignments.	30
Group self-study	Tasks	The proposed methodology consists of major facilities and concepts that occur in each subject. There are four parts: analysis of the relevant regulations; identifying the parts that comprise the installation; calculation methodology of the installation; preparation of plans and material chart to assess the savings for the whole building; obtaining the certificate of energy efficiency of a home.	60

Specific risks and protective measures

The learning activities of this course do not entail specific health or safety risks for the students and therefore no special protective measures are needed.

Student learning assessment

Lectures

Modality	Theory classes
Technique	Short-answer tests **(retrievable)**
Description	The aim is that students acquire basic knowledge in order to obtain the necessary skills to develop projects. The theoretical sessions will introduce important ingredients of the course. The methodology consists in exposing of the course content combining theuse of lectures, audiovisual resources, and online tools. CE2-11 Ability to apply the techniques and procedures to evaluate the energy efficiency of buildings.
Assessment criteria	Acquired theoretical knowledge and ability to use them in solving simple exercises.

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CE2-11, CE3.

Final grade percentage: 20%

Practices and visits

Modality	Practical classes
Technique	Papers and projects **(retrievable)**
Description	The course will include the practical sessions in the computer room to learn simulation tools. The Lab sessions will be done in the laboratory student center to evaluate how theoretical and practical concepts are met inpractical modules. By solvingproblems, the student becomesaware on tecnhiques presented the theory classes.There will be also field trips within the available time and resources. CE3-2 Ability to apply specific regulations to facilities in the process of construction of buildings. CE2-11 Ability to apply the techniques and procedures to evaluate the energy efficiency of buildings.
Assessment criteria	The proposed methodology developed for installations that occur in each subject. This development consists of four parts: analysis of relevant legislation; identification of parts consisting of the installation; calculation methodology of the installation; drawing graphic material to evaluate energy consumption in buildings. CE2-11, CE3.2.

Final grade percentage: 20%

Exàmen.

Modality	Individual self-study
Technique	Short-answer tests **(retrievable)**
Description	Assimilation of the theoretical course. To deepen the obtained knowledge, the students should consult the bibliography given in the course. They should solve individual assignments.
Assessment criteria	The preparation and analysis of the work done during the year. Written reports regarding the correct use of the concepts and procedures of the course, as well as personal contributions to reflect the acquisition of various specific and generic competences of the matter is evaluated. The presentation of reports according to the structure and quality of a work is also evaluated. CE2-11, CE3.2.

Final grade percentage: 20%

Tasks

Modality	Group self-study
Technique	Papers and projects **(non-retrievable)**
Description	The proposed methodology consists of major facilities and concepts that occur in each subject. There are four parts: analysis of the relevant regulations; identifying the parts that comprise the installation; calculation methodology of the installation; preparation of plans and material chart to assess the savings for the whole building; obtaining the certificate of energy efficiency of a home.
Assessment criteria	The proposed development methodology consists of the main premises and concepts that occur in each subject. This development consists of four parts: analysis of relevant legislation; identifying the parts that comprise the installation; calculation methodology of the installation; preparation of maps and graphic material to assess the savings for the whole building; obtaining the certificate of energy efficiency of a home.

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CE2-11, CE3.2, CE, G1 and CI-5.

Final grade percentage: 40%

Resources, bibliography and additional documentation

The course has material and lecture notes across campus wide, though also advisable to use basic bibliography for the better understanding of the facilities.

Basic bibliography

1. Andreu Moià Pol i Victor Martínez Moll.
Una passa cap a la sostenibilitat d'Instal·lacions Turístiques.
ENERGIA. Fundació ECCA. CAIB.
2.F. Kreith
Principles of Sustainable Energy Systems.
CRC Press, 2014.
3.F.M. Vanek, L.D. Albright, L.T. Angenent
Energy Systems Engineering
Evaluation and Implementation
The MgGraw-Hill companies, 2012

Complementary bibliography

EFICIENCIA ENEGÉTICA EN EDIFICIOS. Certificación y Auditorías Energéticas. Francisco J. Rey y Eloy Velasco.Ed. Thomson. ISBN. 84-9732-419-6

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