

# **UNIVERSIDAD DE CASTILLA - LA MANCHA**

# **GUÍA DOCENTE**

#### 1. General information

Course: ENERG <sup>\</sup> Type: ELECTI\	( CERTI	FICATION AND RENEWABLE END		Code: 59339 ECTS credits: 4.5					
Degree: 315 - UN	DERGR	ADUATE DEGREE IN BUILDING	ENGINE	ERING		Academic year: 2021-22			
Center: 308 - SC	HOOL P	OLYTECHNIC OF CUENCA				Group(s): 30			
Year: 4						Dur	ation: C2		
Main language: Spanish						Second language:			
Use of additional English Friendly: Y									
Web site: Bilingual: N									
Lecturer: JOAQUIN FUENTES D	EL BUF	RGO - Group(s): 30							
Building/Office	Department		Phone numbe	r Email			Office hours		
Escuela Politécnica. Despacho 2.03	INGENI EDIFIC <i>I</i>	ERÍA CIVIL Y DE LA ACIÓN	4838	joad	joaquin.fuentes@uclm.es				
Lecturer: VICTOR JOSE PEREZ ANDREU - Group(s): 30									
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### 2. Pre-Requisites

It is recommended that the student enrolls in the subject that has passed the following subjects:

Mathematics Fundamentals I

- Mathematics Fundamentals II
- Physics Fundamentals I
- Physics Fundamentals II
- Architectural Drawing I
- **Construction Materials**
- Construction I
- Construction II
- Construction III
- **Building Facilities I**

Building Facilities II

## 3. Justification in the curriculum, relation to other subjects and to the profession

The Technical Building Code includes the provision of renewable energy installations in the building. Thus, sanitary hot water production (DHW) installations with solar thermal energy are mandatory in all types of buildings that have DHW consumption and, depending on the size and use of the building, the production of electrical energy with photovoltaic solar installations.

On the other hand, as of the approval of the RD 47/2007 and the subsequent modification and update with the RD 235/2013, the basic procedures have been established for the certification of the energy efficiency of new buildings as well as of existing buildings. With the last royal decree, it is mandatory to carry out the certification of the energy efficiency of buildings at the project, finished building and existing buildings.

This normative reality comes from European directives which include the need to reduce the energy consumption of buildings, in order to reduce the environmental impact of their use, as well as to minimize the economic cost in certain types of services (heating, sanitary hot water, etc.).

With this background, this subject aims to cover these new challenges that society imposes on the Building Engineer in terms of knowledge of renewable energy and certification of the energy efficiency of buildings.

4. Degree competences a	chieved in this course
Course competences	
Code	Description
E42	Knowledge of complementary subjects, both technological and humanistic, oriented to a certain specialization of open, multidisciplinary nature and with direct application in the professional field of a Building Engineer, open and sensitive to changes and new professional challenges that may arise.
G01	Ability for analysis and synthesis
G03	Ability to manage information
G05	Decision making
G06	Critical thinking
G07	Teamwork
G12	Autonomous learning
G18	Initiative and entrepreneurial spirit
G21	Command of Information and Communication Technologies (ICT)
G22	Correct oral and written communication

# Course learning outcomes

### Description

Complement the basic and specific training oriented to a certain specialization of open, multidisciplinary nature and with direct application in the professional field. Evaluation of the socio-environmental impact of the building to become aware of working in an integrated field, being sensitive to the possibility to participate in multidisciplinary initiatives with application of their specific professional capacity.

Acquisition of practical skills directly in companies or institutions.

Acquire knowledge and skill in the use of computer tools that give the student a greater operational capacity of the knowledge acquired. Possibility of autonomously expanding these advances through the search for new applications or with the development of those already acquired.

Experience human and professional relationships in the business and institutional environment.

#### Additional outcomes

- Know and identify the systems that make up the solar thermal and photovoltaic installations. - Understand the physical phenomena that govern the operation of the facilities. - Know the different components and basic elements that constitute the facilities as well as their intrinsic functioning. - Know the materials used in the realization of solar thermal and photovoltaic installations, studying their characteristics and the properties related to the application that is being given. - Know the systems of execution of the facilities, as well as their control and the maintenance tasks of the same. - Know and use the standards that govern the design, calculation, execution and control of the facilities. - Apply calculation methods in the sizing and evaluation of solar thermal and photovoltaic facilities. - Know and apply the simplified and general procedures for the realization of the energy certification of buildings. - Use measuring devices applied to the control and verification of the facilities, as well as shandle tools. - Develop the ability to observe and analyze facilities in the assembly phase or already executed, to increase the practical continuous training and the critical sense necessary for professional development. Know the fundamental aspects of isolated small wind turbine for electrical energy installations.

Know the fundamental aspects of geothermal energy installations.

Know the regulations regarding the energy certification of buildings. Apply general and simplified procedures for the realization of energy certification of new and existing buildings.

#### 6. Units / Contents

## Unit 1: Energy certification of buildings

- Unit 1.1 Energy certification of existing buildings
- Unit 1.2 Energy certification of new buildings
- Unit 1.3 Environmental management of buildings in BIM context

#### Unit 2: Solar thermal facilities.

Unit 2.1 Solar thermal facilities. Generalities and schemes.

Unit 2.2 Radiation and shadows.

- Unit 2.3 Collector subsystem.
- Unit 2.4 Hydraulic subsystem.
- Unit 2.5 Exchange and accumulation subsystem.
- Unit 2.6 Control and regulation subsystem.
- Unit 2.7 Sizing.

#### Unit 3: Isolate photovoltaics system.

Unit 3.1 Components of photovoltaic solar energy installations.

Unit 3.2 Sizing of isolate photovoltaic solar energy installations.

Unit 4: Heatpump and Geothermal installations.

### Unit 5: Installations of small wind turbine.

ADDITIONAL COMMENTS, REMARKS

The order in which the subjects are taught, as well as their extension, will depend on the real hours available during the academic course.

	Juology						7. Activities, Units/Modules and Methodology								
Training Activity	Methodology	Related Competences (only degrees before RD 822/2021)	ECTS	Hours	As	Com	Description								
Class Attendance (theory) [ON-SITE]	Lectures	E42 G01 G05 G06 G21 G22	0.42	10.5	Ν	-									
Problem solving and/or case studies [ON-SITE]	Problem solving and exercises	E42 G01 G05 G06 G21	0.59	14.75	N	-									
Computer room practice [ON-SITE]	Practical or hands-on activities	E42 G01 G05 G06 G07 G12 G17 G21 G22	0.73	18.25	N	-									
Project or Topic Presentations [ON- SITE]	Self-study	G01 G03 G05 G06 G07 G12 G18 G21 G22	0.06	1.5	Y	N	Oral presentation of topics (POT).								
Practicum and practical activities report writing or preparation [OFF-SITE]	project-based learning	E42 G01 G03 G05 G06 G07 G12 G21 G22	0.48	12	Y	Ν	Preparation and delivery of an energy certification for the energy rehabilitation project of an existing building, a new building or another type of configuration (CE); a technical project of a solar thermal installation (PTST) and a technical project of a photovoltaic solar installation (PTSF).								
Other off-site activity [OFF-SITE]	Problem solving and exercises	E42 G01 G05 G06 G12	1.14	28.5	Y	N									
Study and Exam Preparation [OFF-SITE]	Self-study		0.76	19	Ν	-									
Practicum and practical activities report writing or preparation [OFF-SITE]	project-based learning	E42 G01 G03 G05 G06 G07 G12 G18 G21 G22	0.32	8	Y	Ν									
Total:				112.5											
Total credits of in-class work: 1.8						Total class time hours: 45									
Total credits of out of class work: 2.7							Total hours of out of class work: 67.5								

As: Assessable training activity

Com: Training activity of compulsory overcoming (It will be essential to overcome both continuous and non-continuous assessment).

8. Evaluation criteria and Grading System								
Evaluation System	Continuous assessment	Non-continuous evaluation*	Description					
Oral presentations assessment	10.00%	10.00%	A study of some of the aspects related to solar thermal and photovoltaic systems should be carried out, delivering in class the documentation with the recommended bibliography and make a PowerPoint presentation of 5 to 10 minutes with the most important aspects of the subject.					
			The energy certification of a building, home or business place, the project of a solar thermal installation and the project of a photovoltaic					

Practicum and practical activities reports assessment	90.00%	90.00%	solar installation will be carried out. The quality, correctness and adequacy of the solution proposed in the technical documentation requested will be evaluated.
Total:	100.00%	100.00%	

According to art. 4 of the UCLM Student Evaluation Regulations, it must be provided to students who cannot regularly attend face-to-face training activities the passing of the subject, having the right (art. 12.2) to be globally graded, in 2 annual calls per subject, an ordinary and an extraordinary one (evaluating 100% of the competences).

### Evaluation criteria for the final exam:

### Continuous assessment:

During the development of the subject a score of 0 to 10 points will be obtained in each of the following activities: the Oral Presentation of Themes (POT), the Energy Certification (CE), the Technical Project of a Solar Thermal Installation (PTST) and the Technical Project of a Photovoltaic Solar Installation (PTSF).

The previous grades will be saved for the ordinary and extraordinary calls.

The Final Rating (CF) will be given by the following expression: CF = 0.50 \* CE + 0.10 \* POT + 0.30 \* PTST + 0.10 \* PTSF

In case of not obtaining the final grade CF = 5.0 points, the ordinary examination will consist in making a memory of an energy certification of a new, existing or commercial building.

## Non-continuous evaluation:

The student, who justifiably cannot attend the training activities regularly, must communicate it to the lecturer of the subject at the beginning of the semester and may carry out the activities and present them in the ordinary or extraordinary exams period, at a time agreed with the professor.

# Specifications for the resit/retake exam:

The Final Rating (CF) will be given by the following expression: CF = 0.50 \* CE + 0.10 \* POT + 0.30 \* PTST + 0.10 \* PTSF

In case of not obtaining the final grade CF = 5.0 points, the ordinary examination will consist in making a memory of an energy certification of a new, existing or commercial building. Specifications for the second resit / retake exam:

The examination of the special call for completion will consist of making a technical report of some of the practices delivered during the course (CE, PTST, PTSF).

Not related to the sylabalization of buildings           General comments about the planning: The torics asigned and temporary distribution will depend on the real hours available during the Academic Course.           Virit (de 5): Energy certification of buildings           Class Admathane (theory) (PRESENCIAL)[Loctures]         3           Class Admathane (theory) (PRESENCIAL)[Loctures]         12.25           Project or Topic Presentation (PRESENCIAL)[Self-staudy]         12           Project or Topic Presentation (PRESENCIAL)[Self-staudy]         5.5           Virit (de 5): Softer thermal facilities.         Hours           Class Admathane (theory) (PRESENCIAL)[Self-staudy]         5.5           Virit (de 5): Softer thermal facilities.         Hours           Class Admathane (theory) (PRESENCIAL)[Self-staudy]         5.6           Virit (de 5): Softer thermal facilities.         Hours           Class Admathane (theory) (PRESENCIAL)[Self-staudy]         5.6           Project or Topic Presentations (PRESENCIAL)[Self-staudy]         5.4           Project or Topic Presentations (PRESENCIAL)[Self-staudy]         5.4           Project or Topic Presentations (PRESENCIAL)[Self-staudy]         5.6           Project or Topic Presentations (PRESENCIAL)[Self-staudy]         5.6           Virit Ge 6): Isofate photocolatics as statule or topic or topic presentations (PRESENCIAL)[Self-staudy]         5.6	9. Assignments, course calendar and important dates	
Hours         hours           General comments about the planning: The hours available during the Actamet Course.         Image: Advance about the planning: The hours available during the Actamet Course.           Class Admetance (theory) (PRESENCUL), Exclure)         3           Class Admetance (theory) (PRESENCUL), Exclure)         3           Class Admetance (theory) (PRESENCUL), Exclure)         75           Project or Topic Presentations (PRESENCUL), Exclure)         75           Project or Topic Presentations (PRESENCUL), Exclure)         55           Unit 2 (de 3). Societal advinits argonization (AUTONCMA), [project-based learning)         12           Other of the activity (AUTONCMA), [Problem solving and exercises)         5           Problem and presentations (theory) (PRESENCUL), [Problem solving and exercises)         9           Problem and presentations (theory) (PRESENCUL), [Problem solving and exercises)         9           Problem and presentations (theory) (PRESENCUL), [Problem solving and exercises)         5           Problem and presentations (theory) (PRESENCUL), [Problem solving and exercises)         5           Problem and presentations (theory) (PRESENCUL), [Problem solving and exercises)         5           Problem and presentations (theory) (PRESENCUL), [Problem solving and exercises)         5           Problem and presentations (theory) (PRESENCUL), [Problem solving and exercises)         5           Problem a	Not related to the syllabus/contents	
General comments about the planning: The hours asigned and temporary distribution will depend on the real hours available during the Academic Course.           Activities         Hours           Class Attendance (theory) [PRESENCIAL][Lacktres]         3           Chart of the SPERENCIAL [Class and the integration (AUTONOMA[project-based learning)]         12           Project or Topic Presentations (PRESENCIAL][Class and varicises]         55           Start of the SPERENCIAL [Class and varicises]         56           Class Attendance (theory) [PRESENCIAL [Class and varicises]         56           Class Attendance (theory) [PRESENCIAL [Class and varicises]         56           Class Attendance (theory) [PRESENCIAL [Class and varicises]         56           Start of and activity (LUTONOMA] (Problem solving and exercises]         56           Start of and class and varicises ary start.         57           Project or topic Presentations [PRESENCIAL [Class thatdy]         56           Project or topic Presentations [PRESENCIAL [Class thatdy]         56           Start of and class and varicises attatint (PRESENCIAL [Class thatdy]         56	Hours hours	
Unit 1 (69 5): Energy certification of buildings         Hours           Class Adminance (theory) [PRESENCIAL]]Practical or hands on activities)         18 25           Project or Topic Presentations [PRESENCIAL]]Practical or preparation [AUTONOMA][project based learning]         12           Cherr of-this activities report writing or preparation [AUTONOMA][project based learning]         12           Cherr of-this activities report writing or preparation [AUTONOMA][project based learning]         5.5           Study and Exam Preparation [AUTONOMA][Column and exercises]         5.5           Problem solving and consectivities work with a sercises]         5           Problem solving and overcises]         9           Problem solving and overcises]         5           Problem solving and overcises]         5           Unit 3 (de 5): Solving over writing or preparation [AUTONOMA][project based learning]         5           Unit 3 (de 5): Solving and exercises]         5           Problem solving and overcises]         5           Unit 3 (de 5): Solving constructives system.         5           Activities         Names           Class Admonance (theory) [PRESENCIAL][Lectures]         Names           Problem solving and exercises]         5           Unit 3 (de 5): Solving constructives system.         25           Class Admonance (theory) [PRESENCIAL][Lectures]	General comments about the planning: The hours asigned and temporary distribution will depend on the real hours available during the	Academic Course.
Activities     Hours       Class Alterdance (herony) [PRESENCIAL][Lectures]     3       Computer room practice [PRESENCIAL][Product or hands on advities]     18, 25       Project or Toolp Presentations [PRESENCIAL][Products or advities]     75       Practicum and practical advities report writing or preparation [AUTONCMA[[project-based learning]     12       Other of site advity [VUTONCMA[[Self-study]     5.5       Study and Exam Preparation [AUTONCMA[[Self-study]     5.5       Unit 2 (d 5); Sofar thermal facilities.     Hours       Class Attendance (theory) [PRESENCIAL][Lectures]     3       Project or Topic Presentation [PRESENCIAL][Editures]     5       Class Attendance (theory) [PRESENCIAL][Editures]     5       Unit 2 (d 5); Sofar thermal facilities.     9       Project or Topic Presentation [PRESENCIAL][Editures]     5       Unit 3 (d 5); Isofate photovoltatic as system.     5       Activities     Hours       Class Attendance (theory) [PRESENCIAL][Editures]     5       Unit 3 (d 5); Isofate photovoltatic as system.     5       Activities     Hours       Class Attendance (theory) [PRESENCIAL][Editures]     6       Unit 3 (d 5); Isofate photovoltatic as system.     5       Class Attendance (theory) [PRESENCIAL][Editures]     15       Project or Topic Presentations [PRESENCIAL][Editures]     15       Unit 3 (d 5); Isofate	Unit 1 (de 5): Energy certification of buildings	
Class Attendance (theory) [PRESENCIAL]]Lectures]     3       Computer compusition (PRESENCIAL]]Self-study)     75       Project or Topic Presentations [PRESENCIAL][Self-study]     5.5       Stady and Exam Preparation (AUTONOMA][sroject-based learning]     12       Other off site activity [AUTONOMA][srolem solving and exercises]     5.5       Stady and Exam Preparation (AUTONOMA][self-study]     5.5       Class Attendance (theory) [PRESENCIAL][Lectures]     8       Problem solving and/or case studies [PRESENCIAL][Lectures]     9       Problem solving and/or case studies [PRESENCIAL][Lectures]     5       Other off site activity [AUTONOMA][Self-study]     5.4       Other off site activity [AUTONOMA][Self-study]     5.4       Virial Self S: Discolation photocontaics system.     5       Activities     16     5       Other off site activity [AUTONOMA][Self-study]     5.4       Virial Self S: Discolation photocontaics system.     5       Activities     15     5       Virial Self S: Discolation photocontaics system.     5       Activities     25       Class Attendance (theory) [PRESENCIAL][Self-study]     25       Other off site activity [AUTONOMA][Self-study]     3.6       Problem solving and corcetes]     3.6       Problem solving and corcetes]     5       Study and Exam Preparation [AUTONOMA][Self-study]	Activities	Hours
Computer noom practice (PRESENCOLL)[Endited)         12           Project or Topic Presentations (PRESENCOLL)[Endited)         55           Statum and practical advivies report writing or preparation (AUTONOMA[project based learning)         55           Unit 2 (65): Stoter thermal facilities.         Hours           Class Altendance (theory) [PRESENCIAL][Endited)         5           Diver of the advivity (AUTONOMA[Problem solving and exercises)         5           Project or Topic Presentation (PRESENCIAL][Problem solving and exercises]         9           Project or Topic Presentation (AUTONOMA[Self-study)         5           Diver of this advivity (AUTONOMA[Problem solving and exercises]         5           Study and Exam Preparation (AUTONOMA[Self-study)         5           Diver of this advivity (AUTONOMA[Problem solving and exercises]         5           Class Alterian (PRESENCIAL][Lectures]         5           Class Alterian (PRESENCIAL][Lectures]         2           Problem solving and/or case studies (PRESENCIAL][Problem solving and exercises]         3           Class Alterian (PRESENCIAL][Lectures]         2           Problem solving and/or case studies (PRESENCIAL][Problem solving and exercises]         5           Solving and/or case studies (PRESENCIAL][Problem solving and exercises]         5           Other of this advive) (PRESENCIAL][Lectures]         2	Class Attendance (theory) [PRESENCIAL][Lectures]	3
Piojet or Topic Presentations (PRESENCIAL)[Self-study]         75           Practicum and practicul advites report writing or preparation (AUTONOMA)[project-based learning]         12           Other of this activity (AUTONOMA)[Self-study]         5.5           Study and Exam Preparation (AUTONOMA)[Self-study]         5.5           Activities         Nors           Class Attendance (theory) (PRESENCIAL][Lectures]         8           Problem solving and/or case studies (PRESENCIAL][Self-study]         5           Other of this activity (AUTONOMA)[Self-study]         5           Other of this activity (AUTONOMA)[Self-study]         5           Virg de 5): Polate photorolates system.         5           UTA 2 (de 5): Solute photorolates system.         2           Virg de 5): Polate photorolates system.         2           Uta 3 (de 5): Polate photorolates system.         2           Uta 4 (de 5): Polate photorolates system.         3           Uta 3 (de 5): Polate photorolates system.         3           Uta 4 (de 5): Polate photorolates actudide services         5 <t< td=""><td>Computer room practice [PRESENCIAL][Practical or hands-on activities]</td><td>18.25</td></t<>	Computer room practice [PRESENCIAL][Practical or hands-on activities]	18.25
Practicum and practical advilves report witting or preparation [AUTONOMA][project-based learning] 12   Other of this advitvily [AUTONOMA][Potbern solving and exercises] 5.5   Study and fram Preparation [AUTONOMA][Self-study] 3   Class Attendance (theory) [PRESENCIAL][Forbiern solving and exercises] 9   Project or Topic Presentations [PRESENCIAL][Forbiern solving and exercises] 5.5   Study and Exam Preparation [AUTONOMA][Self-study] 5.4   Project or Topic Presentations [PRESENCIAL][Forbiern solving and exercises] 5.4   Study and Exam Preparation [AUTONOMA][Self-study] 5.4   Practicum and practical advitvies report writing or preparation [AUTONOMA][project-based learning] 5.4   Vertis (de 5): Solate photovilatics system. 4   Vertis (de 5): Solate photovilatics system. 5   Vertis (de 5): Solate photovilatics system. 2   Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises] 3.75   Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises] 3.6   Vertis (de 5): solate photovilatics system. 2   Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises] 3.6   Vertis (de 5): solate photovilatics system. 3.6   Vertis (de 7): S	Project or Topic Presentations [PRESENCIAL][Self-study]	.75
Other disite activity (AUTONOMA)[Roberns onlying and exercises]     5.5       Variat 2 (de 5): Solar thermal facilities.     Hours       Activities     Nous       Class Attendance (theory) [PRESENCIAL][Inclures]     3       Problem solving and/or case studies [PRESENCIAL][Inclures]     5.5       Other dista activity (AUTONOMA)[Selt-study]     5.4       Other dista activity (AUTONOMA)[Selt-study]     5.4       Variat 2 (de 5): Isolate photovolatics system.     5.4       Activities     Nous       Class Attendance (theory) [PRESENCIAL][Inclures]     5.4       Practoum and practical advities report writing or preparation [AUTONOMA][Inclures]     5.4       Practoum and practical advities report writing or preparation [AUTONOMA][Inclures]     2       Problem solving and/or case studies [PRESENCIAL][Inclures]     3.75       Problem solving and/or case studies [PRESENCIAL][Inclures]     3.6       Practoum and practical advities report writing or preparation [AUTONOMA][Selt-study]     3.6       Other dista activities report writing or preparation [AUTONOMA][Selt-study]     3.6       Class Attendance (theory) [PRESENCIAL][Inclures]     1.5       Study and Exam Preparation [AUTONOMA][Selt-study]     3.6       Class Attendance (theory) [PRESENCIAL][Inclures]     1.5       Problem solving and/or case studies [PRESENCIAL][Inclures]     1.5       Problem solving and/or case studies [PRESENCIAL][Inclur	Practicum and practical activities report writing or preparation [AUTÓNOMA][project-based learning]	12
Shudy and Exam Preparation (AUTONOMA[Self-study]     5.5       Activities     Hours       Class Alteridance (theory) [PRESENCIAL][Lectures]     3       Problem solving and/or case studies [PRESENCIAL][Solf-study]     5.5       Other ofist activity (AUTONOMA[Self-study]     5.4       Other ofist activities (theory) [PRESENCIAL][Lectures]     7       Other ofist activity (AUTONOMA[Self-study]     2.5       Other ofist activity (AUTONOMA[Self-study]     3.6       Practicum and practical activities report writing or preparation [AUTONOMA][project based learning]     3       Other ofist activity (AUTONOMA[Self-study]     2.5       Other ofist activity (AUTONOMA[Self-study]     2.5       Other ofist activity (AUTONOMA[Self-study]     3.6       Other ofist activity (AUTONOMA[Self-study]     3.6       Other ofist activity (AUTONOMA[Self-study]     3.6       Other ofist activity (AUTONOM	Other off-site activity [AUTÓNOMA][Problem solving and exercises]	5.5
Unit 2 (de 3): Solar thermal facilities.     Hours       Class Attendance (theory) [PRESENCIAL][Loctures]     3       Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]     9       Priotet or Topic Presentations [PRESENCIAL][Problem solving and exercises]     5       Other of site activity (AUTONOMA][Problem solving and exercises]     5       Variation and practical activities report writing or preparation [AUTONOMA][project-based learning]     5       Unit 3 (de 5): Isolate photovatalse system.	Study and Exam Preparation [AUTÓNOMA][Self-study]	5.5
Activities     Hours       Class Attendance (theory) [PRESENCIAL][Incohem solving and exercises]     3       Problem solving and/or case studies [PRESENCIAL][Solt-study]     5       Other of the activity [AUTONOMA][Solt-study]     5.4       Study and Exam Preparation [AUTONOMA][Solt-study]     5.4       Practicum and preparation [AUTONOMA][Solt-study]     5.4       Practicum and preparation [AUTONOMA][Solt-study]     5.4       Practicum and preparation [AUTONOMA][Solt-study]     5.4       Class Attendance (theory) [PRESENCIAL][Lectures]     6       Class Attendance (theory) [PRESENCIAL][Problem solving and exercises]     3.75       Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]     3.6       Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]     3.6       Variat of a Si statum preparation [AUTONOMA][Problem solving and exercises]     3.6       Variat of a Si statum     5.5     5.6       Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]     3.6       Variat of a Si statum     1.5     5.6       Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]     1.5       Class Attendance (theory) [PRESENCIAL][Problem solving and exercises]     1.5       Class Attendance (theory) [PRESENCIAL][Problem solving and exercises]     2.7       Unit 3 (de 5): Instatuation of anal Wind turbine.     <	Unit 2 (de 5): Solar thermal facilities.	
Class Attendance (theory) [PEESENCIAL][Lectures]     3       Problem solving and/or case studies [PEESENCIAL][Poblem solving and exercises]     9       Project or Topic Presentations (PRESENCIAL][Self-study]     15       Study and Exam Preparation [UTONOMA][Self-study]     54       Practicum and practical activities report writing or preparation [AUTONOMA][project-based learning]     5       Activities     Hours       Class Attendance (theory) [PRESENCIAL][Self-study]     2       Project or Topic Presentations [PRESENCIAL][Foblem solving and exercises]     3.75       Project or Topic Presentations [PRESENCIAL][Foblem solving and exercises]     5       Study and Exam Preparation [AUTONOMA][self-study]     3.6       Problem solving and or case studies [PRESENCIAL][Foblem solving and exercises]     5       Study and Exam Preparation [AUTONOMA][self-study]     3.6       Practicum and practical activities report writing or preparation [AUTÓNOMA][project-based learning]     3       Problem solving and/or case studies [PRESENCIAL][Foblem solving and exercises]     1.5       Study and Exam Preparation [AUTÓNOMA][Eroblem solving and exercises]     1.5       Problem solving and exercises]     1.5       Study and Exam Preparation [AUTÓNOMA][Froblem solving and exercises]     1.5       Problem solving and/or case studies [PRESENCIAL][Foblem solving and exercises]     1.5       Study and Exam Preparatins [AUTÓNOMA][Froblem solving and exercises]     1	Activities	Hours
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Project or Topic Presentations (PRESENCIAL)[Self-study)     5       Other off-site activity (AUTONOMA)[Problem solving and exercises]     54       Study and Exam Preparation (AUTONOMA)[Self-study]     54       Practicul activities report writing or preparation (AUTONOMA][project-based learning]     5       Activities     Hours       Class Attendance (theory) [PRESENCIAL][Exctures]     2       Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]     3.75       Study and Exam Preparation [AUTONOMA][Self-study]     3.6       Practicul and practical activities report writing or preparation [AUTONOMA][project-based learning]     3       Unit 4 (de 5): Heatpurp and Geothermal Installations.	Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	9
Other of site activity [AUTONOMA][Poblem solving and exercises]     15       Study and Exam Preparation [AUTONOMA][Study]     54       Practicum and practical activities report writing or preparation [AUTONOMA][project-based learning]     5       Class Attendance (theory) [PRESENCIAL][Itestures]     2       Class Attendance (theory) [PRESENCIAL][Study]     25       Problem solving and/or case studies [PRESENCIAL][Study]     25       Other off-site activity [AUTONOMA][Problem solving and exercises]     3.6       Study and Exam Preparation [AUTONOMA][Study]     36       Practicum and practical activities report writing or preparation [AUTONOMA][problem solving and exercises]     3.6       Variation and precision (theory) [PRESENCIAL][Itestures]     3       Class Attendance (theory) [PRESENCIAL][Itestures]     1.5       Practicum and practical activities report writing or preparation [AUTONOMA][project-based learning]     3       Unit 4 (de 5): Heatigump and Geothermal installations.     Hours       Class Attendance (theory) [PRESENCIAL][Itestures]     1.5       Problem solving and exercises]     1.5       Other off-site activity [AUTONOMA][Studies molying and exercises]     2.7       Unit 5 (de 5): Installations of small wind turbine.     Hours       Class Attendance (theory) [PRESENCIAL][Problem solving and exercises]     1       Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]     5       <	Project or Topic Presentations [PRESENCIAL][Self-study]	.5
Study and Exam Preparation [AUTONUMA][Self-study]     5.4       Practicum and practical activities report writing or preparation [AUTONUMA][project-based learning]     5       Unit 3 (de 5): Isolate photovoltatics system.     Hours       Class Attendance (theory) [PRESENCIAL][cutures]     2       Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]     3.75       Project or Topic Presentations [PRESENCIAL][Self-study]     25       Other off-site activity [AUTONUMA][Problem solving and exercises]     3.6       Practicum and practical activities report writing or preparation [AUTONUMA][project-based learning]     3       Unit 4 (de 5): Heatpurp and Geothermal Installations.	Other off-site activity [AUTÓNOMA][Problem solving and exercises]	15
Practicum and practical activities report writing or preparation [AUTÓNOMA][project-based learning]       5         Unit 3 (de 5): Isolate photovoltaics system.       Hours         Class Attendance (theory) [PRESENCIAL][Lectures]       2         Problem solving and/or case studies [PRESENCIAL][Self-study]       25         Other off-site activity (AUTÓNOMA][Self-study]       3.6         Practicum and practical activities report writing or preparation [AUTÓNOMA][project-based learning]       3.6         Value 4 Example       Hours         Class Attendance (theory) [PRESENCIAL][Self-study]       3.6         Practicum and practical activities report writing or preparation [AUTÓNOMA][Self-study]       3.6         Practicum and practical activities report writing or preparation [AUTÓNOMA][Project-based learning]       3         Unit 4 (de 5): Heatury and Gecates the Study       3.6         Practicum and practical activities report writing or preparation [AUTÓNOMA][Problem solving and exercises]       1.5         Other off-site activity [AUTÓNOMA][Problem solving and exercises]       1.5         Other off-site activity [AUTÓNOMA][Problem solving and exercises]       1.5         Other off-site activity [AUTÓNOMA][Problem solving and exercises]       5         Study and Exam Preparation [AUTÓNOMA][Problem solving and exercises]       5         Other off-site activity [AUTÓNOMA][Problem solving and exercises]       5	Study and Exam Preparation [AUTÓNOMA][Self-study]	5.4
Unit 3 (de 5): Isolate photovoltaics system.       Hours         Activities       Ihours         Class Attendance (theory) [PRESENCIAL][Lectures]       2         Problem solving and/or case studies [PRESENCIAL][Self-study]       3.75         Order off-site activity [AUTONOMA][Self-study]       25         Other off-site activity [AUTONOMA][Self-study]       3.6         Practoum and practical activities report writing or preparation [AUTONOMA][project-based learning]       3         Unit 4 (de 5): Heatpump and Geothermal installations.       Hours         Class Attendance (theory) [PRESENCIAL][Problem solving and exercises]       1.5         Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]       1.5         Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]       1.5         Other off-site activity [AUTONOMA][Self-study]       2.7         Unit 5 (de 5): Installations of small wind turbine.       Hours         Class Attendance (theory) [PRESENCIAL][Problem solving and exercises]       5         Other off-site activity [AUTONOMA][Self-study]       2.7         Unit 5 (de 5): Installations of small wind turbine.       Hours         Class Attendance (theory) [PRESENCIAL][Problem solving and exercises]       5         Other off-site activity [AUTONOMA][Problem solving and exercises]       5         Other off-sit	Practicum and practical activities report writing or preparation [AUTÓNOMA][project-based learning]	5
Activities     Hours       Class Attendance (theory) [PRESENCIAL][Problem solving and exercises]     3.75       Project or Topic Presentations [PRESENCIAL][Self-study]     25       Other off-site activity [AUTÓNOMA][Self-study]     3.6       Practicum and practical activities report writing or preparation [AUTÓNOMA][project-based learning]     3.6       Practicum and practical activities report writing or preparation [AUTÓNOMA][project-based learning]     3.6       Class Attendance (theory) [PRESENCIAL][Lectures]     1.5       Class Attendance (theory) [PRESENCIAL][Problem solving and exercises]     1.5       Other off-site activity [AUTÓNOMA][Problem solving and exercises]     2.7       Other off-site activity [AUTÓNOMA][Problem solving and exercises]     2.5       Other off-site activity [AUTÓNOMA][Problem solving and exercises]     5.0       Other off-site activity [AUTÓNOMA][Problem solving and exercises]     1.8       Global activity     1.5	Unit 3 (de 5): Isolate photovoltaics system.	
Class Attendance (theory) [PRESENCIAL][Lectures]     2       Problem solving and/or case studies [PRESENCIAL][Self-study]     25       Other off-site activity (AUTONOMA][Self-study]     3.6       Practicum and practical activities report writing or preparation [AUTÓNOMA][groject-based learning]     3.6       Practicum and practical activities report writing or preparation [AUTÓNOMA][groject-based learning]     3.6       Unit 4 (de 5): Heatpump and Geothermal installations.     Hours       Activities     Hours       Class Attendance (theory) [PRESENCIAL][Problem solving and exercises]     1.5       Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]     1.5       Other off-site activity [AUTONOMA][Self-study]     2.7       Unit 4 (de 5): Installations of small wind turbine.     Hours       Activities     Hours       Class Attendance (theory) [PRESENCIAL][Problem solving and exercises]     1       Study and Exam Preparation [AUTÓNOMA][Self-study]     2.7       Unit 5 (de 5): Installations of small wind turbine.     Hours       Activities     Hours       Class Attendance (theory) [PRESENCIAL][Problem solving and exercises]     5       Other of-site activity [AUTÓNOMA][Self-study]     1       Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]     5       Other of-site activity [AUTÓNOMA][Self-study]     1.8       Global activity	Activities	Hours
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]     3.75       Project or Topic Presentations [PRESENCIAL][Self-study]     25       Other off-site activity [AUTONOMA][Self-study]     3.6       Practicum and practical activities report writing or preparation [AUTONOMA][project-based learning]     3       Unit 4 (de 5): Heatpump and Geothermal Installations.     Hours       Activities     Hours       Class Attendance (theory) [PRESENCIAL][Problem solving and exercises]     1.5       Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]     1       Study and Exam Preparation [AUTONOMA][Problem solving and exercises]     1       Study and Exam Preparation [AUTONOMA][Problem solving and exercises]     1       Study and Exam Preparation [AUTONOMA][Problem solving and exercises]     1       Study and Exam Preparation [AUTONOMA][Problem solving and exercises]     1       Study and Exam Preparation [AUTONOMA][Problem solving and exercises]     1       Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]     2       Study and Exam Preparation [AUTONOMA][Problem solving and exercises]     2       Study and Exam Preparation [AUTONOMA][Problem solving and exercises]     2       Study and Exam Preparation [AUTONOMA][Problem solving and exercises]     2       Study and Exam Preparation [AUTONOMA][Self-study]     1.8       Global activity     1.5	Class Attendance (theory) [PRESENCIAL][Lectures]	2
Project or Topic Presentations [PRESENCIAL][Self-study]     25       Other off-site activity [AUTÓNOMA][Forblem solving and exercises]     5       Study and Exam Preparation [AUTÓNOMA][Self-study]     36       Practicum and practical activities report writing or preparation [AUTÓNOMA][project-based learning]     3       Unit 4 (de 5): Heatpump and Geothermal installations.     Hours       Class Attendance (theory) [PRESENCIAL][Lectures]     1.5       Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]     1.5       Other off-site activity [AUTÓNOMA][Problem solving and exercises]     2.7       Unit 5 (de 5): Installations of small wind turbine.     Hours       Activities     Hours       Class Attendance (theory) [PRESENCIAL][Lectures]     1       Problem solving and/or case studies [PRESENCIAL][Lectures]     1       Problem solving and/or case studies [PRESENCIAL][Lectures]     1       Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]     5       Other off-site activity [AUTÓNOMA][Self-study]     1.8       Global activitis     1.8       Global activitis     Nours       Project or Topic Presentations [PRESENCIAL][Self-study]     1.5       Practicum and practical activities report writing or preparation [AUTÓNOMA][project-based learning]     12       Practicum and practical activities report writing or preparation [AUTÓNOMA][project-based learning]	Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	3.75
Other off-site activity (AUTONOMA][Problem solving and exercises]       5         Study and Exam Preparation [AUTÓNOMA][Self-study]       3.6         Practicum and practical activities report writing or preparation [AUTÓNOMA][project-based learning]       3         Unit 4 (de 5): Heatpump and Geothermal installations.       Hours         Class Attendance (theory) [PRESENCIAL][Lectures]       1.5         Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]       1.5         Other off-site activity [AUTÓNOMA][Problem solving and exercises]       1.5         Unit 5 (de 5): Installations of small wind turbine.       2.7         Activities       Hours         Class Attendance (theory) [PRESENCIAL][Problem solving and exercises]       5         Other off-site activity [AUTÓNOMA][Self-study]       2.7         Unit 5 (de 5): Installations of small wind turbine.       Hours         Class Attendance (theory) [PRESENCIAL][Problem solving and exercises]       5         Other off-site activity [AUTÓNOMA][Problem solving and exercises]       2         Study and Exam Preparation [AUTÓNOMA][Self-study]       1.8         Global activity       Nours         Problem solving and/or case studies [PRESENCIAL][Self-study]       1.5         Proteum and practical activities report writing or preparation [AUTÓNOMA][Project-based learning]       1.5         Pract	Project or Topic Presentations [PRESENCIAL][Self-study]	.25
Study and Exam Preparation [AUTONOMA][Self-study]       3.6         Practicum and practical activities report writing or preparation [AUTÓNOMA][project-based learning]       3         Activities       Hours         Class Attendance (theory) [PRESENCIAL][Lectures]       1.5         Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]       1.5         Other off-site activity [AUTÓNOMA][Problem solving and exercises]       2.7         Unit 5 (de 5): Installations of small wind turbine.       Hours         Activities       Hours         Class Attendance (theory) [PRESENCIAL][Lectures]       1         Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]       5         Other off-site activity [AUTÓNOMA][Problem solving and exercises]       5         Other off-site activity [AUTÓNOMA][Problem solving and exercises]       5         Other off-site activity [AUTÓNOMA][Problem solving and exercises]       2         Study and Exam Preparation [AUTÓNOMA][Self-study]       1.8         Global activities       Properation [AUTÓNOMA][Self-study]       1.5         Practicum and practical activities report writing or preparation [AUTÓNOMA][Sroject-based learning]       1.5         Practicum and practical activities report writing or preparation [AUTÓNOMA][Project-based learning]       1.5         Practicum and practical activities report writing or pre	Other off-site activity [AUTONOMA][Problem solving and exercises]	5
Practicum and practical activities report writing or preparation [AUTONOMA][project-based learning]       3         Unit 4 (de 5): Heatpump and Geothermal installations.       Hours         Class Attendance (theory) [PRESENCIAL][Lectures]       1.5         Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]       1.5         Other off-site activity [AUTÓNOMA][Problem solving and exercises]       1         Study and Exam Preparation [AUTÓNOMA][Self-study]       2.7         Unit 5 (de 5): Installations of small wind turbine.       Hours         Activities       Hours         Class Attendance (theory) [PRESENCIAL][Problem solving and exercises]       5         Other off-site activity [AUTÓNOMA][Self-study]       2         Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]       5         Other off-site activity [AUTÓNOMA][Problem solving and exercises]       5         Other off-site activity [AUTÓNOMA][Self-study]       1.8         Global activity       Project or Topic Presentations [PRESENCIAL][Self-study]       1.5         Practicum and practical activities report writing or preparation [AUTÓNOMA][project-based learning]       12         Practicum and practical activities report writing or preparation [AUTÓNOMA][project-based learning]       28.5         Class Attendance (theory) [PRESENCIAL][Problem solving and exercises]       28.5	Study and Exam Preparation [AUTONOMA][Self-study]	3.6
Unit 4 (de 5): Heatpump and Geothermal installations.         Activities       Hours         Class Attendance (theory) [PRESENCIAL][Lectures]       1.5         Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]       1.5         Other off-site activity [AUTONOMA][Problem solving and exercises]       1         Study and Exam Preparation [AUTÓNOMA][Self-study]       2.7         Unit 5 (de 5): Installations of small wind turbine.       Hours         Activities       Hours         Class Attendance (theory) [PRESENCIAL][Lectures]       1         Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]       5         Other off-site activity [AUTÓNOMA][Problem solving and exercises]       2         Study and Exam Preparation [AUTÓNOMA][Problem solving and exercises]       2         Study and Exam Preparation [AUTÓNOMA][Self-study]       1.8         Global activity       1.5         Activities       hours         Project or Topic Presentations [PRESENCIAL][Self-study]       1.5         Practicum and practical activities report writing or preparation [AUTÓNOMA][Project-based learning]       12         Practicum and practical activities report writing or preparation [AUTÓNOMA][Project-based learning]       8         Other off-site activity [AUTÓNOMA][Problem solving and exercises]       28.5	Practicum and practical activities report writing or preparation [AUTONOMA][project-based learning]	3
ActivitiesHoursClass Attendance (theory) [PRESENCIAL][Lectures]1.5Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]1Other off-site activity [AUTÓNOMA][Problem solving and exercises]1Study and Exam Preparation [AUTÓNOMA][Self-study]2.7Unit 5 (de 5): Installations of small wind turbine.ActivitiesHoursClass Attendance (theory) [PRESENCIAL][Lectures]Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]Other off-site activity [AUTÓNOMA][Self-study]Other off-site activity [AUTÓNOMA][Self-study]ActivitiesMoursClass Attendance (theory) [PRESENCIAL][Problem solving and exercises]Study and Exam Preparation [AUTÓNOMA][Self-study]1.8Global activityActivitiesNoursClass Attendance (theory) [PRESENCIAL][Self-study]1.8Global activityActivitiesNoursClass Attendance (theory) [PRESENCIAL][Self-study]1.5Product colspan="2">Problem solving and exercises]1.8Other off-site activity [AUTÓNOMA][Self-study]1.5Product colspan="2">Product colspan="2">Colspan="2">Product colspan="2">Product colspan="2">Product colspan="2">Product colspan="2">Product colspan="2	Unit 4 (de 5): Heatpump and Geothermal installations.	
Class Attendance (theory) [PRESENCIAL][Lectures]       1.5         Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]       1.5         Other off-site activity [AUTÔNOMA][Problem solving and exercises]       2.7         Unit 5 (de 5): Installations of small wind turbine.       Hours         Activities       Hours         Class Attendance (theory) [PRESENCIAL][Lectures]       1         Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]       5         Other off-site activity [AUTÔNOMA][Self-study]       1.8         Class Attendance (theory) [PRESENCIAL][Problem solving and exercises]       2         Study and Exam Preparation [AUTÔNOMA][Self-study]       1.8         Close activity [AUTÔNOMA][Self-study]       1.8         Clobal activity       Activities         Project or Topic Presentations [PRESENCIAL][Self-study]       1.5         Practicum and practical activities report writing or preparation [AUTÔNOMA][project-based learning]       12         Practicum and practical activities report writing or preparation [AUTÔNOMA][project-based learning]       28.5         Class Attendance (theory) [PRESENCIAL][Lectures]       10.5         Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]       28.5         Class Attendance (theory) [PRESENCIAL][Lectures]       10.5         Problem sol	Activities	Hours
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]       1.5         Other off-site activity [AUTÓNOMA][Self-study]       2.7         Unit 5 (de 5): Installations of small wind turbine.       Hours         Activities       Hours         Class Attendance (theory) [PRESENCIAL][Lectures]       1         Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]       5         Other off-site activity [AUTÓNOMA][Self-study]       2         Study and Exam Preparation [AUTÓNOMA][Self-study]       1.8         Global activity       Activities       hours         Activities       1.8       1         Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]       2         Study and Exam Preparation [AUTÓNOMA][Self-study]       1.8         Global activity       1.5         Activities       hours         Project or Topic Presentations [PRESENCIAL][Self-study]       1.5         Practicum and practical activities report writing or preparation [AUTÓNOMA][project-based learning]       12         Practicum and practical activities report writing or preparation [AUTÓNOMA][project-based learning]       28.5         Class Attendance (theory) [PRESENCIAL][Lectures]       10.5         Problem solving and/or case studies [PRESENCIAL][Lectures]       10.5 <td< td=""><td>[Class Attendance (theory) [PRESENCIAL][Lectures]</td><td>1.5</td></td<>	[Class Attendance (theory) [PRESENCIAL][Lectures]	1.5
Other off-site activity [AU TONOMA][Problem solving and exercises]       1         Study and Exam Preparation [AUTÓNOMA][Self-study]       2.7         Unit 5 (de 5): Installations of small wind turbine.       Hours         Activities       Hours         Class Attendance (theory) [PRESENCIAL][Lectures]       1         Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]       5         Other off-site activity [AUTÓNOMA][Self-study]       1.8         Global activity       Activities         Robal activity       hours         Activities       hours         Project or Topic Presentations [PRESENCIAL][Self-study]       1.8         Global activity       1.5         Practicum and practical activities report writing or preparation [AUTÓNOMA][project-based learning]       12         Practicum and practical activities report writing or preparation [AUTÓNOMA][project-based learning]       8         Other off-site activity [AUTÓNOMA][Problem solving and exercises]       28.5         Class Attendance (theory) [PRESENCIAL][Lectures]       10.5         Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]       14.75         Computer room practice [PRESENCIAL][Problem solving and exercises]       14.75         Computer room practice [PRESENCIAL][Problem solving and exercises]       19 <t< td=""><td>Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]</td><td>1.5</td></t<>	Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	1.5
Study and Exam Preparation [AUTONOMA][Self-study]       2.7         Unit 5 (de 5): Installations of small wind turbine.       Hours         Activities       Hours         Class Attendance (theory) [PRESENCIAL][Lectures]       1         Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]       .5         Other off-site activity [AUTÓNOMA][Problem solving and exercises]       2         Study and Exam Preparation [AUTÓNOMA][Self-study]       1.8         Global activity       1.8         Global activity       1.5         Project or Topic Presentations [PRESENCIAL][Self-study]       1.5         Practicum and practical activities report writing or preparation [AUTÓNOMA][project-based learning]       12         Practicum and practical activities report writing or preparation [AUTÓNOMA][project-based learning]       8         Other off-site activity [AUTÓNOMA][Problem solving and exercises]       28.5         Class Attendance (theory) [PRESENCIAL][Lectures]       10.5         Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]       14.75         Computer room practice [PRESENCIAL][Practical or hands-on activities]       19         Study and Exam Preparation [AUTÓNOMA][Self-study]       19	Other off-site activity [AU IONOMA][Problem solving and exercises]	1
Unit 5 (de 5): Installations of small wind turbine.       Hours         Activities       1         Class Attendance (theory) [PRESENCIAL][Lectures]       1         Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]       .5         Other off-site activity [AUTÓNOMA][Problem solving and exercises]       2         Study and Exam Preparation [AUTÓNOMA][Self-study]       1.8         Global activity       Activities         Activities       hours         Project or Topic Presentations [PRESENCIAL][Self-study]       1.5         Practicum and practical activities report writing or preparation [AUTÓNOMA][project-based learning]       12         Practicum and practical activities report writing or preparation [AUTÓNOMA][project-based learning]       8         Other off-site activity [AUTÓNOMA][Problem solving and exercises]       28.5         Class Attendance (theory) [PRESENCIAL][Lectures]       10.5         Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]       14.75         Computer room practice [PRESENCIAL][Problem solving and exercises]       14.75         Study and Exam Preparation [AUTÓNOMA][Problem solving and exercises]       19         Total horas: 112 5       Total horas: 112 5	Study and Exam Preparation [AU I ONOMA][Self-study]	2.7
ActivitiesHoursClass Attendance (theory) [PRESENCIAL][Lectures]1Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises].5Other off-site activity [AUTÓNOMA][Problem solving and exercises]2Study and Exam Preparation [AUTÓNOMA][Self-study]1.8Global activity1.5ActivitieshoursProject or Topic Presentations [PRESENCIAL][Self-study]1.5Practicum and practical activities report writing or preparation [AUTÓNOMA][project-based learning]12Practicum and practical activities report writing or preparation [AUTÓNOMA][project-based learning]8Other off-site activity [AUTÓNOMA][Problem solving and exercises]28.5Class Attendance (theory) [PRESENCIAL][Lectures]10.5Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]14.75Computer room practice [PRESENCIAL][Proclem solving and exercises]14.75Study and Exam Preparation [AUTÓNOMA][Self-study]19Total horas:112.5	Unit 5 (de 5): Installations of small wind turbine.	
Class Attendance (theory) [PRESENCIAL][Lectures]       1         Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]       .5         Other off-site activity [AUTÓNOMA][Problem solving and exercises]       2         Study and Exam Preparation [AUTÓNOMA][Self-study]       1.8         Global activity          Activities       hours         Project or Topic Presentations [PRESENCIAL][Self-study]       1.5         Practicum and practical activities report writing or preparation [AUTÓNOMA][project-based learning]       12         Practicum and practical activities report writing or preparation [AUTÓNOMA][project-based learning]       8         Other off-site activity [AUTÓNOMA][Problem solving and exercises]       28.5         Class Attendance (theory) [PRESENCIAL][Lectures]       10.5         Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]       14.75         Class Attendance (theory) [PRESENCIAL][Problem solving and exercises]       14.75         Computer room practice [PRESENCIAL][Practical or hands-on activities]       18.25         Study and Exam Preparation [AUTÓNOMA][Self-study]       19         Total horas: 112 5       Total horas: 112 5	Activities	Hours
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]       .5         Other off-site activity [AUTÓNOMA][Problem solving and exercises]       2         Study and Exam Preparation [AUTÓNOMA][Problem solving and exercises]       1.8         Global activity       1.8         Activities       hours         Project or Topic Presentations [PRESENCIAL][Self-study]       1.5         Practicum and practical activities report writing or preparation [AUTÓNOMA][project-based learning]       12         Practicum and practical activities report writing or preparation [AUTÓNOMA][project-based learning]       8         Other off-site activity [AUTÓNOMA][Problem solving and exercises]       28.5         Class Attendance (theory) [PRESENCIAL][Lectures]       10.5         Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]       14.75         Computer room practice [PRESENCIAL][Practical or hands-on activities]       18.25         Study and Exam Preparation [AUTÓNOMA][Self-study]       19         Total horas: 112 5       Total horas: 112 5	Class Attendance (theory) [PRESENCIAL][Lectures]	1
Other oth-site activity [AUTONOMA][Problem solving and exercises]       2         Study and Exam Preparation [AUTÓNOMA][Self-study]       1.8         Global activity       hours         Activities       hours         Project or Topic Presentations [PRESENCIAL][Self-study]       1.5         Practicum and practical activities report writing or preparation [AUTÓNOMA][project-based learning]       12         Practicum and practical activities report writing or preparation [AUTÓNOMA][project-based learning]       8         Other off-site activity [AUTÓNOMA][Problem solving and exercises]       28.5         Class Attendance (theory) [PRESENCIAL][Lectures]       10.5         Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]       14.75         Computer room practice [PRESENCIAL][Practical or hands-on activities]       19         Study and Exam Preparation [AUTÓNOMA][Self-study]       19	Problem solving and/or case studies [PHESENCIAL][Problem solving and exercises]	.5
Study and Exam Preparation [AUTONOMA][Self-study]       1.8         Global activity       hours         Activities       hours         Project or Topic Presentations [PRESENCIAL][Self-study]       1.5         Practicum and practical activities report writing or preparation [AUTÓNOMA][project-based learning]       12         Practicum and practical activities report writing or preparation [AUTÓNOMA][project-based learning]       8         Other off-site activity [AUTÓNOMA][Problem solving and exercises]       28.5         Class Attendance (theory) [PRESENCIAL][Lectures]       10.5         Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]       14.75         Computer room practice [PRESENCIAL][Practical or hands-on activities]       18.25         Study and Exam Preparation [AUTÓNOMA][Self-study]       19         Total horas: 112 5       Total horas: 112 5	Other off-site activity [AU IONOMA][Problem solving and exercises]	2
Clobal activity       hours         Activities       1.5         Project or Topic Presentations [PRESENCIAL][Self-study]       1.5         Practicum and practical activities report writing or preparation [AUTÓNOMA][project-based learning]       12         Practicum and practical activities report writing or preparation [AUTÓNOMA][project-based learning]       8         Other off-site activity [AUTÓNOMA][Problem solving and exercises]       28.5         Class Attendance (theory) [PRESENCIAL][Lectures]       10.5         Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]       14.75         Computer room practice [PRESENCIAL][Practical or hands-on activities]       18.25         Study and Exam Preparation [AUTÓNOMA][Self-study]       19         Total horas: 112 5       12	Study and Exam Preparation [AUTONOMA][Self-study]	1.8
Activities       hours         Project or Topic Presentations [PRESENCIAL][Self-study]       1.5         Practicum and practical activities report writing or preparation [AUTÓNOMA][project-based learning]       12         Practicum and practical activities report writing or preparation [AUTÓNOMA][project-based learning]       8         Other off-site activity [AUTÓNOMA][Problem solving and exercises]       28.5         Class Attendance (theory) [PRESENCIAL][Lectures]       10.5         Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]       14.75         Computer room practice [PRESENCIAL][Practical or hands-on activities]       19         Study and Exam Preparation [AUTÓNOMA][Self-study]       19	Global activity	<u>.</u>
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Orass Auteridation (inteory) [FRESENCIAL][Lectures]       10.5         Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]       14.75         Computer room practice [PRESENCIAL][Practical or hands-on activities]       18.25         Study and Exam Preparation [AUTÓNOMA][Self-study]       19         Total horas: 112 5		28.5
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AGUER, MARIO; JUTGLAR, LUIS; MIRANDA, ANGEL L.	El Ahorro Energético: Estudios de Viabilidad Económica.	Librería Díaz de Santos.			Especializada
ALONSO	Sistemas fatavaltaisos, introducción al diseño y dimensionado de instalaciones de energía solar fatavaltaiso	Era Solar			Básica
ABELLA, M.					Dasica
ASII	Guia ASII de la energia solar térmica.	ASII	MADRID	2010	Básica
ATECYB	Fundamentos de energía solar para ACS y climatización. Buenas prácticas	ATECYR	Madrid	2016	Dasica
ATECYR	Guia tecnica de agua caliente sanitaria central	IDAE	MADRID	2009	
CENSOLAR	Sistemas solares térmicos	CENSOLAR			Básica
Castro, M.;	Sistemas de bombeo eólicos y fotovoltaicos	PROGENSA		2002	Básica
et al.		lunto do Costillo			
Ente		v León.			
Regional de	Energia solar tármica : manual del provectista	Consejería de		2002	Básica
de Castilla y		Industria,		2002	Dasica
León, D.L		Comercio y Turismo			
FUENTES,		i dilottio			
A.;	Prácticas de energía solar fotovoltaica. Edita:	CENSOLAR			Básica
ALVAREZ,					
	Instalaciones de Energía Solar Térmica. Pliego de Condiciones Técnicas de Instalaciones de Baja Temperatura.				_ / .
IDAE	Edita:	IDAE			Basica
IDAE	Instalaciones de energía solar fotovoltaica. Pliego de condiciones técnicas de instalaciones aisladas de red.	IDAE			Básica
	Instalaciones de energía solar fotovoltaica. Pliego de condiciones técnicas de instalaciones conectadas a red.	IDAE.			Básica
F. SANTOS					
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CRESPO	Energias Renovables para el Desarrollo	Paraninto			Especializada
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CÁAMAÑO-	Cuaderno de campo de electrificacion rural fotovoltaica	Progensa			Basica
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Ministerio		Ministerio de			
de Industria, Turismo v	Procedimiento Simplificado para Certificación de Viviendas que Cumplen Estrictamente los Requisitos del CTE-	Industria, Turismo	1		Básica
Comercio.		y Comercio.			
Méndez					
Muñiz, J.M.;	Energía solar fotovoltaica 2ª Ed.	FC Editorial	Madrid	2007	
García, R.					
Méndez					
Muñiz, J.M.;	Energía solar térmica	FC Editorial	Madrid		
García, R.					
PEREDA	Provesto y sélevie de instalacionas colores térmisos				Fanasializada
SUQUET, P.	Proyecto y calculo de instalaciones solares termicas.				Especializada
Pareja	Energía solar fotovoltaica. Cálculo de una instalación aislada. 2ª Ed.	Marcombo	Barcelona	2010	
QUILES.					
P.V.	DTIE 8.04 : energía solar térmica. Casos prácticos	ATECYR		2010	Básica
REY					
MARTINEZ,	Fficiencia enernática en edificios. Certificación y auditorías enernáticas	Paraninfo			Fenecializada
VELASCO		Taranino			Lopecianzada
GÓMEZ, E.					
	Còdigo Tècnico de la Edificación Desumentes Reseasedes par el Ministerio de Industrio, Turiame y Compania				Básica Básica
	Documentos neconocidos por el ministerio de industria, runismo y Comercio http://www.minetur.gob.es/energia/desarrollo/eficienciaenergetica/certificacionenergetica/documentosreconocidos/	paginas/document	tosreconocidos a	spy	Dasica
	Orden FOM/1635/2013, de 10 de septiembre, por la que se actualiza el Documento Básico DB-HE "Ahorro de	g		-4-	
	Energía", del Código Técnico de la Edificación, aprobado por Real Decreto 314/2006, de 17 de marzo.				
	Procedimiento básico para la certificación de eficiencia energética de edificios de nueva construcción (R.D.				Básica
	erreuro). Real Decreto 235/2013, de 5 de abril, por el que se aprueba el procedimiento básico para la certificación de la				
	eficiencia energética de los edificios				
	Real Decreto 238/2013, de 5 de abril, por el que se modifican determinados artículos e instrucciones técnicas del				
	Reglamento de Instalaciones Termicas en los Editicios, aprobado por Real Decreto 1027/2007, de 20 de julio.		Madrid	2010	
	http://www.mincotur.gob.es/energia/desarrollo/EficienciaEnergetica/RITE/Reconocidos/Reconocidos/Gu%C3%ADa	107L 1s%20t%C3%A9cr	nicas/Guia Clima	tizaci	on Bomba.odf