Universitat de Lleida

DEGREE CURRICULUM

SERVICES III

Academic year 2015-16

ENERGY FACILITIES III 2015-16

Subject's general information

Subject name	SERVICES III
Code	102313
Semester	2nd Q Continuos Evaluation
Typology	Optional
ECTS credits	6
Theoretical credits	0
Practical credits	0
Office and hour of attention	To be specified the first day of class.
Department	Informàtica i Enginyeria Industrial
Teaching load distribution between lectures and independent student work	60 h of lectures (40%) 90 h independent student work (60%)
Modality	Presencial
Important information on data processing	Consult this link for more information.
Language	English. The student can answer the assessment tests in English, Spanish or Catalan.
Degree	Mechanical Engineering
Distribution of credits	Dr. Marc Medrano Martorell 3,6 ECTS Josep Eras Vila 2,4 ECTS
Office and hour of attention	To be specified the first day of class.
E-mail addresses	mmedrano@diei.udl.cat

ENERGY FACILITIES III 2015-16

Dr. Marc Medrano Martorell
Josep Eras Vila

Subject's extra information

Subject that requires continuous work throughout the semester in order to achieve the prposed objectives. It is recommended to visit frequently the site of the subject on the Virtual Campus, since most of the information and annoucements can be found there. This is a subject that belongs to module "Optional Formation", namely the subject "Services".

Learning objectives

- • Be able to find, understand and synthesize information in a foreign language
  • To Provide students with the basic knowledge to analyze energy systems from different points of view, energy, exergetic and economical.
  • To introduce students to energy systems for capturing solar radiation

Competences

University of Lleida strategic competences

- UdL2 Command of a foreign language..

Cross-disciplinary competences

- EPS4. To have the skills required to undertake new studies or improve the training with self-direction.
- EPS9. Capacity for unidisciplinary and multidisciplinary teamwork.

Specific competences

- GEM-EPS31. Capacity to design HVAC installations (heating, ventilation and air conditioning).
- GEM-EPS32. Applied knowledge to distributed energy generation and energy use.
- GEM-EPS33. Capacity of analysis of energy systems, optimization and integration

Subject contents

1 - Introducction

2 - Energy analysis

3 - Exergy analysis

4 - Economic analysis

5 - Solar thermal facilities

Solar radiation

Solar thermal energy

Methodology

The methodological axes of the course will be divided into:

1.-Theoretical sessions where the professor will present theoretical contents needed for the acquisition of knowledge and for the proper development of the practical sessions.

2.-Practical sessions where students will be central part of the training process.

Development plan

The development plan will follow the order of the contents.

Week	Day	Topic
1	8-feb	Subject presentation
	11-feb	1. Introduction to EES
2	15-feb	1. Introduction
	18-feb	2. Energy Analysis
3	22-feb	2. Energy Analysis (problems)
	25-feb	2. Energy Analysis
4	29-feb	2. Energy Analysis (problems)
	3-mar	Preliminar presentations projects
5	7-mar	2. Energy Analysis (problems)
	10-mar	3: Exergy Analysis
6	14-mar	3: Exergy Analysis (problems)
	17-mar	3: Exergy Analysis (problems)
	21-28 mar	HOLIDAY: Easter
7	31-mar	3: Exergy Analysis (problems)
8	4-apr	3: Exergy Analysis
	7-apr	3: Exergy Analysis (problems)
9	11-15 apr	Partial exams (on the 14th at 6 pm)
10	18-apr	4. Econonic analysis
	21-apr	FESTA MAJOR Estudiantat (no class)
11	25-apr	4. Econonic analysis
	28-apr	4. Econonic analysis (Problems)
12	2-may	5. Solar Radiation
	5-may	Oral Presentations of projects
13	9-may	5. Solar Radiation
	12-may	5. Solar Radiation (problems)
14	16-may	5. Solar Thermal Energy
	19-may	5. Solar Thermal Energy (problems)
15	23-may	5. Solar Thermal Energy
	26 may	5. Solar Thermal Energy (problems)
	30 may-3 jun	Final exam (31 of May at 3pm)

	20-28 jun	Recovery exam (28 June at 3 pm)

Evaluation

ACTIVITY OF EVALUATION 1: FIRST PARTIAL (individual, written)

- 15%

- Grade ≥ 3

ACTIVITY OF EVALUATION 2: PRESENTATION EXERGY ASSIGMENT (individual, oral)

- 25% (10% MID TERM PRESENTATION, 15% FINAL PRESENTATION)

ACTIVITY OF EVALUATION 3: REPORT EXERGY ASSIGMENT (written, group)

- 25%

- Group activity

ACTIVITY OF EVALUATION 4: SECOND PARTIAL (individual, written)

- 15%

- Grade ≥ 3

ACTIVTY OF EVALUATION 5: FOLLOW UP OF SUBJECT VIA FLIPPED LEARNING

- 20%

Bibliography

References

- Bejan, 'Thermal Design Optimization', 1996. Ed. John Wiley & Sons, Inc. ISBN: 0-471-58467-3
- R.F. Boehm, 'Developments in the Design of Thermal Systems', 1997, Ed. Cambridge University Press. ISBN: 0-521-46204-5
- T.J. Kotas, 'The Exergy Method of Thermal Plant Analysis', 1985, Ed. Butterworth. ISBN: 0-408-01350-8
- Y. Jaluria, 'design and Optimization of Thermal Systems', 1998
- G.V.Reklaitis, 'Balances de Materia y Energía', 1986, Nueva Editorial Interamericana. ISBN: 968-25-1146-1
- J.F. Ahern, 'The Exergy Method of Energy Systems Analysis', 1980, Ed. John Wiley & Sons, Inc.
- E.Buatas Costa, 'Manual de Conservación de la Energía', Ed. Gestión y Planificación Integral, S.A. ISBN: 8-485-82700-7
- L. Cabeza, M. Medrano, I. Martorell, 'Gestió de sistemes energètics – Fred i calor industrial –', Quaderns EPS
- L. Cabeza, I. Martorell, 'Producció de l'energia tèrmica – Fred i calor industrial –', Quaderns EPS - Núm. 93.