

TECNOLOGÍA ENERGÉTICA

ENERGY TECHNOLOGY

SUBJECT ORGANIZATION

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Lecturers

- **Juan Carlos Ramos González, Ph.D.**
Location: “Multiusos” Building, Floor 0,
Office M-7. Phone Ext.: 2434.
Attention to students: Monday 12.00 - 13.30.
Any other day by arrangement via email.
- **Assistant: Eduardo Martínez.**
Mechanical Engineer.
Location: “Multiusos” Building, Floor 0, Ph.D.
Students Room.

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Classes Timetable

- **Tuesday: 16.30 - 17.50.**
- **Wednesday: 16.30 - 17.50.**
- **Friday: 18.10 - 19.30.**

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Syllabus

- **Lesson 3. Wind Energy.**
- **Lesson 4. Solar Thermal Energy.**
- **Lesson 5. Solar Photovoltaic Energy.**
- **Optional Exercise: Design and Optimization of a Hybrid Power System by means of software HOMER.**
- **Lesson 1. Heat Exchangers.**
- **Tema 2. Cogeneración.**

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Classes Planning

- Lesson 3: 6.5 hours of theoretical lessons. Days: September 2, 6, 7, 13 and 14.
- Lesson 4: 6.5 hours of theoretical lessons and 2.5 hours of problems resolution. Days: September 16, 20, 21, 23, 27, 28 and 30.
- Lesson 5: 5.5 hours of theoretical lessons and 2 hours of problems resolution. Days: October 4, 5, 7, 11, 14 and 18.
- HOMER software explanation and resolution of one example: 5.5 hours in Computer room. Days: October 19, 21, 26 and 28.
- Lesson 1: 8 hours of theoretical lessons and 4 hours of problems resolution. Days: November 2, 8, 9, 11, 15, 16, 18, 22 and 23.
- Tema 2: 4 horas de clase de teoría y 2 horas de clase de problemas. Días: 25, 29 y 30 de noviembre y 2 de diciembre.

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Methodology and Course Organization (I)

- The subject are explained by means of slide presentations and explanations on the blackboard.
- All the subject are not included in the slides.
- Mainly the mathematical developments will be done on the blackboard.
- El Tema 2 se imparte en castellano, las transparencias y las explicaciones de clase.
- Lessons 1, 3, 4 and 5 are in English, the slides and the classroom explanations.

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Methodology and Course Organization (II)

- **Lessons with Problems:**
 - Lesson 1. Heat Exchangers.
 - Tema 2. Cogeneración.
 - Lesson 4. Solar Thermal Energy.
 - Lesson 5. Solar Photovoltaic Energy.
- **Formulas used to solve the problems of Lessons 1, 4 and 5 are provided in the Textbook and can be used during the Exam.**
- **Tables and Figures to solve problems of Lesson 1 are also provided.**

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Methodology and Course Organization (III)

- **The Textbook available at “Reprografía” includes, by order:**
 - Formulas of Lessons 1, 4 and 5.
 - Problems of Lessons 1, 2, 4 and 5. Solutions of the Problems. Solutions of the previous academic years Exams (wordings in web page).
 - Slide presentations of Lessons 1, 2, 3, 4 and 5.
- **Everything is available in the subject web page.**

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Bibliografy

- **Lesson 1. Heat exchangers:**
 - Mainly Chapter 11 from Incropera.
- **Rest of Lessons:**
 - There is no one only main book.
 - Dispersed.
 - The subject of each Lesson has been extracted from several books.
 - Titles specified in the last slides of each Lesson.
- **Also available in the web page.**

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Visits to Power Stations

- **We will visit one or two Power Stations:**
 - Combine Cycle Power Station of Bizkaia Energía at Amorebieta (Vizcaya).
 - Nuclear Power Station of Nuclenor at Santa María de Garoña (Burgos).
- **Details and all the information about these visits will be given later.**

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Evaluation (I)

- **Compulsory part:**
 - Lesson 1. Heat Exchangers: ≈ 25 points for the total mark. 1 theoretical question (≈ 7 points) and 1 problem (≈ 18 points) in the final exam.
 - Tema 2. Cogeneración: ≈ 15 puntos de la nota total. 1 pregunta de teoría (≈ 7 puntos) y 1 problema (≈ 8 puntos) en el examen final.
 - Lesson 3. Wind Energy: ≈ 15 points for the total mark. Several theoretical questions in the final exam.
 - Lesson 4. Solar Thermal Energy: ≈ 25 points for the total mark. Several theoretical questions in the final exam (≈ 10 points). 1 problem during the year (≈ 15 points).
 - Lesson 5. Solar Photovoltaic Energy. ≈ 15 points for the total mark. 1 or 2 theoretical questions (≈ 5 points) and 1 problem (≈ 10 points) in the final exam.

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Evaluation (II)

- **Compulsory part:**
 - Total mark = $25 + 15 + 15 + (10 + 15) + 15 = 95$ points = **15** points of the Thermal Solar Energy Problem + 80 points of the Final Exam. Pass: 47 total points with 40 points in the Final Exam.
- **Optional part:**
 - Exercise in groups about Design and Optimization of a Hybrid Power System by means of software HOMER.
 - Groups of 2 - 3 students.
 - Mark: 35 points for the total mark.
 - Total mark = $15 + 80 + 35 = 130$ puntos. Pass: 60 total points with 25 points in the Final Exam (of 80) but only one Lesson with 0 points in the Final Exam.

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Evaluation (III)

- Exams dates:
 - 1st examination session: Tuesday, December 20th 2011.
 - 2nd examination session: Wednesday, June 20th 2012.
- There will be no special exam by any reason (Erasmus).