29724 - Thermal Engineering

Información del Plan Docente

Academic Year	2017/18
Faculty / School	110 - Escuela de Ingeniería y Arquitectura
Degree	330 - Complementos de formación Máster/Doctorado 434 - Bachelor's Degree in Mechanical Engineering
ECTS	6.0
Year	XX
Semester	Indeterminate
Subject Type	Compulsory, ENG/Complementos de Formación
Module	---

1.General information

1.1.Introduction

1.2.Recommendations to take this course

1.3.Context and importance of this course in the degree

1.4.Activities and key dates

2.Learning goals

2.1.Learning goals

2.2.Importance of learning goals

3.Aims of the course and competences

3.1.Aims of the course

3.2.Competences

4.Assessment (1st and 2nd call)

4.1.Assessment tasks (description of tasks, marking system and assessment criteria)

5.Methodology, learning tasks, syllabus and resources

5.1.Methodological overview

The methodology followed in this course is oriented towards achievement of the learning objectives. It is based on participation and the active role of the student favors the development of communication and decision-making skills. A wide range of teaching and learning tasks are implemented, such as lectures, guided assignments, laboratory sessions, autonomous work, and tutorials.

29724 - Thermal Engineering

Students are expected to participate actively in the class throughout the semester.

Classroom materials will be available via Moodle. These include a repository of the lecture notes used in class, the course syllabus, as well as other course-specific learning materials.

Further information regarding the course will be provided on the first day of class.

5.2.Learning tasks

The course includes 6 ECTS organized according to:

- Lectures (1.8 ECTS): 45 hours.

- Laboratory sessions (0.6 ECTS): 15 hours.

- Guided assignments (0.4 ECTS): 10 hours.

- Autonomous work (2.8 ECTS): 70 hours.

- Tutorials (0.4 ECTS): 10 hours.

Lectures: the professor will explain the theoretical contents of the course and solve illustrative applied problems. These problems and exercises can be found in the problem set provided at the beginning of the semester. Lectures run for 3 weekly hours. Although it is not a mandatory activity, regular attendance is highly recommended.

Laboratory sessions: sessions will take place every 2 weeks (5 sessions in total) and last 3 hours each. Students will work together in groups actively doing tasks such as practical demonstrations, measurements, calculations, and the use of graphical and analytical methods.

Guided assignments: students will complete assignments, problems and exercises related to concepts seen in laboratory sessions and lectures. They will be submitted at the beginning of every laboratory sessions to be discussed and analyzed. If assignments are submitted later, students will not be able to take the assessment test.

Autonomous work: students are expected to spend about 70 hours to study theory, solve problems, prepare lab sessions, and take exams.

Tutorials: the professor's office hours will be posted on Moodle and the degree website to assist students with questions and doubts. It is beneficial for the student to come with clear and specific questions.

5.3.Syllabus

PART I- HEAT PRODUCTION

1 - Solar collectors

29724 - Thermal Engineering

2 - Thermochemistry of Combustion. Boliers

PART II - HEAT TRANSFER

1 - Introduction to heat transfer

Heat Conduction

2 -Fundamentals of heat transfer by conduction: Fourier's Law, Heat Conduction Equation.

3 -Steady one-dimensional heat conduction. Fins.

4 -Steady two-dimensional and three-dimensional heat conduction. Numerical methods.

5 -Transient heat conduction.

Convection

6 -Fundamentals of convection.

7 -External forced convection.

8 -Internal forced convection.

9 -Heat exchangers.

10 -Natural convection.

11 -Boiling and condensation.

Radiation heat transfer

12 - Fundamentals of thermal radiation.

13 - Radiation heat transfer.

5.4.Course planning and calendar

For further details concerning the timetable, classroom and further information regarding this course please refer to the "Escuela de Ingeniería y Arquitectura " website (https://eina.unizar.es/)

29724 - Thermal Engineering

5.5.Bibliography and recommended resources

[BB: Basic Bibliography / BC: Additional Bibliography]

- engel, Yunus A.. Fundamentals of thermal-fluid sciences / Yunus A. Çengel, Robert H. Turner . Boston, Massachusetts [etc.] : McGraw-Hill, cop. 2001
- engel, Yunus A.. Transferencia de calor y masa : un enfoque práctico / Yunus A. Çengel ; revisor técnico Sofía Faddeva . - 3ª ed. México D. F. : McGraw-Hill Interamericana, cop. 2007
- [BB] Introduction to thermal systems engineering : thermodynamics, fluid mechanics, and heat transfer / Michael J. Moran ... [et al.] [New York] : John Wiley & Sons, cop. 2003
- [BB] Marín Herrero, José María. Transferencia de calor / Jose Mª Marín y Carlos Monné . - 1ª ed. Zaragoza : Kronos, 1998
- [BB] Mills, Anthony F.. Transferencia de calor / Anthony F. Mills ; versión en español de Sergio de Régules Ruiz-Funes ; con la colaboración técnica de Eduardo Muñoz Tomás y Víctor Hugo del Valle Muñoz Barcelona [etc.] : Irwin, D.L. 1995
- [BB] Ragland, Kenneth W.. Combustion engineering / Kenneth W. Ragland, Kenneth M . Bryden . 2nd ed. Boca Raton [etc.] : CRC Press, 2011
- [BB] Turns, Stephen R.. Thermal-fluid sciences : an integrated approach / Stephen R. Turns New York : Cambridge University Press, 2006
- [BC] Incropera, Frank P.. Fundamentos de transferencia de calor / Frank P. Incropera, David P. DeWitt . - 4a ed. México : Prentice Hall, 1999