



Course guide

330539 - DT - Thermal Design

Last modified: 18/05/2023

Unit in charge: Manresa School of Engineering
Teaching unit: 750 - EMIT - Department of Mining, Industrial and ICT Engineering.

Degree: BACHELOR'S DEGREE IN AUTOMOTIVE ENGINEERING (Syllabus 2017). (Optional subject).

Academic year: 2023 **ECTS Credits:** 3.0 **Languages:** Spanish

LECTURER

Coordinating lecturer: Felipe Blanch, Jose Juan De

Others: Felipe Blanch, Jose Juan De

TEACHING METHODOLOGY

Master class and problem solving
Reduced work, laboratory practice and evaluation activities

LEARNING OBJECTIVES OF THE SUBJECT

The course aims to provide basic knowledge about heat transfer mechanisms and thermal design in vehicles.

The different learning objectives include:

- Know the different mechanisms of heat transfer.
- Know the principles of thermal comfort.
- Know and apply thermal design techniques in vehicles.

STUDY LOAD

Type	Hours	Percentage
Hours small group	15,0	20.00
Self study	45,0	60.00
Hours large group	15,0	20.00

Total learning time: 75 h



CONTENTS

Introduction. Heat transfer mechanisms. Conduction, convection, radiation. One-dimensional models.

Description:

Introduction to the different mechanisms of heat transfer concept: conduction, convection and radiation. One-dimensional and combined models. Definitions.

Specific objectives:

Understanding of the main concepts of the different heat transfer mechanisms

Related activities:

Specific work on content (Activity 1)

Full-or-part-time: 10h

Theory classes: 2h

Laboratory classes: 2h

Self study : 6h

Heat Conduction

Description:

Heat transfer by conduction. General equation. Analytical and numerical resolution.

Specific objectives:

Understanding and analysis of conduction heat transfer mechanisms.

Related activities:

Specific work on content (Activity 2)

Full-or-part-time: 5h

Theory classes: 1h

Laboratory classes: 1h

Self study : 3h

Heat convection and fins.

Description:

Convection heat transfer. Combined methods of heat transfer: fins

Specific objectives:

Understanding and analysis of convection heat transfer mechanisms. Fins.

Related activities:

Specific work on content (Activity 3)

Full-or-part-time: 5h

Theory classes: 1h

Laboratory classes: 1h

Self study : 3h



Radiation

Description:

Radiation heat transfer

Specific objectives:

Understanding and analysis of the mechanisms of heat transfer by radiation.

Related activities:

Specific work on content (Activity 4)

Full-or-part-time: 5h

Theory classes: 1h

Laboratory classes: 1h

Self study : 3h

Comfort theory

Description:

Comfort theory

Specific objectives:

Understanding, analysis and application of the theory of comfort

Related activities:

Specific work on the contents (Activity 5)

Individual exam (Activity 6)

Full-or-part-time: 5h

Theory classes: 1h

Laboratory classes: 1h

Self study : 3h

Psychrometry

Description:

Psychrometry

Specific objectives:

Understanding, analysis and application of the psychrometry.

Related activities:

Specific work on content (Activity 7)

Full-or-part-time: 5h

Theory classes: 1h

Laboratory classes: 1h

Self study : 3h



Heat exchangers

Description:

Analytical methods for calculating heat exchangers. Radiators

Specific objectives:

Understanding, analysis and application of the calculation methods of heat exchangers. Especially from finned radiators.

Related activities:

Specific work on content (Activity 8)

Final presentation (Activity 9)

Full-or-part-time: 20h

Theory classes: 4h

Laboratory classes: 4h

Self study : 12h

Cold and heat generators in the cars.

Description:

Refrigerators and air conditioners.

Specific objectives:

Understanding, analysis and application of refrigerators and air conditioners.

Related activities:

Final evaluation (Activity 10)

Laboratory Practice (Activity 11)

Specific work on the contents (Activity 12)

Full-or-part-time: 20h

Theory classes: 4h

Laboratory classes: 4h

Self study : 12h

GRADING SYSTEM

Activity 01: 03,541 % grade

Activity 02: 03.541 % grade

Activity 03: 03,541 % grade

Activity 04: 03,541 % grade

Activity 05: 01,875 % grade

Activity 06: 25 % grade

Activity 07: 03,541 % grade

Activity 08: 03,541 % grade

Activity 09: 10 % grade

Activity 10: 30 % grade

Activity 11: 10 % grade

Activity 12: 01,875 % grade

BIBLIOGRAPHY

Basic:

- Welty, James R. Transferencia de calor aplicada a la ingeniería. México D.F.: Limusa, 1978. ISBN 968180628X.

- Illa i Alibés, Josep; Cuchí Oterino, J. C. Problemes de termotècnia. Vic: Eumo, 1990. ISBN 8476025580.