Thermal systems design

Academic Year: (2022 / 2023) **Review date: 12-01-2023**

Department assigned to the subject: Thermal and Fluids Engineering Department

Coordinating teacher: SOBRINO FERNANDEZ, CELIA

Type: Compulsory ECTS Credits : 3.0

Year : 3 Semester : 2

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Thermodynamics
Heat transfer

OBJECTIVES

After finalizing successfully this course the students will be able to :
- Understand the key aspects and concepts of HVAC systems employing vapor-compression systems and freezing chambers.
- Apply their knowledge to calculate thermal loads problems vapor-compression systems for buildings using established methods;
- Apply their knowledge to develop designs to meet defined and specified requirements according to the technical building code, HVAC systems requirements and freezing chambers requirements.
- Select and use appropriate equipment, tools and methods in the field of HVAC systems and freezing chambers.
- Evaluate the environmental impact of HVAC systems in the building sector.

DESCRIPTION OF CONTENTS: PROGRAMME

1. Thermal loads. Freezing chambers. Regulations. Technical building Code. Regulation of thermal installations of buildings. Energy and buildings. Energy demand and energy consumption. Energy certification of buildings.
2 Vapor-compression. Vapor-compression cycle. Cascade and multistage vapor-compression systems. Heat pumps. Refrigeration. Components of a vapor-compression system.
3. HVAC systems. Types of HVAC systems. Psychrometrics . Air systems analysis.
4. Refrigerants. Environmental impact.

LEARNING ACTIVITIES AND METHODOLOGY

The learning methodology includes:
- Lectures covering the main topics of the course. In order to facilitate the learning process the student will receive support material and information to let them focus on the relevant topics.
- Resolution of problems at class with the student´s participation, to consolidate their newly acquired knowledge.
- Exercises solved by the student to self-assess their knowledge and acquire the necessary skills.
- Computer sessions: Team-work and preparation of reports.
  - Calculation of thermal loads
  - Vapor-compression cycles.

ASSESSMENT SYSTEM

A continuous evaluation system will be carried out where the following will be evaluated.

a) Laboratory sessions
b) Partial exam

% end-of-term-examination:	60
% of continuous assessment (assigments, laboratory, practicals…):	40

BASIC BIBLIOGRAPHY

- Frank P IncroperaT, David P. Witt, Theodore L. Bergman, Adrienne S Lavine Principles of heat and

mass transfer, Wiley, 2013

- Jose Manuel Pinazo Ojer Manual de climatización. Tomo II. Cargas Térmicas, Universidad Politécnica de Valencia, 1995
- Michael J. Moran, Howard N.Shapiro Fundamentals of Engineering Thrmodynamics, John Wiley&Sons,InC, 2004
- T. A. Reddy, J. F. Kreider, P.S. Curtis, A. Rabl Heating and cooling of buildings, CRC Press, 2017
- W.F. Stoecker, J.W. Jones Refrigeration and Air Conditioning, McGraw-Hill, 1982

ADDITIONAL BIBLIOGRAPHY

- Atecyr Fundamentos de climatización, Atecyr, 2019
- Carrier Manual de aire acondicionado, Marcombo, 2017
- G. H. Hundy, A. R. Trott, T. C. Welch Refrigeration and Air-Conditioning, Elsevier, 2008
- W.F. Stoecker Industrial refrigeration handbook, McGraw-Hill, 1998

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