ISEL
INSTITUTO SUPERIOR DE ENGENHARIA DE LISBOA

ISEL ADEM
Área Departamental de Engenharia Mecânica

Sheet course ()

Course	MSc IN MECHANICAL ENGINEERING		
Unit	Refrigeration	Mandatory	☒
		Optional	☐
Unit scientific area	Thermofluids and Energy	Category	B

Unit category: B - Basic; C - Core Engineering; E - Specialization; P - Complementary.

Year: 1st	Semester: 1st		ECTS: 6,5			
Contact time	Total:	T:	TP: 67,5	PL:	S:	OT:

T - Lectures; TP - Theory and practice; PL - Lab Work; S - Seminar; OT - Tutorial Guidance.

Unit Director	Title	Position
Nuno Paulo Ferreira Henriques	Master of Science	Associate Professor

Learning Objectives (knowledge, skills and competences to be developed by students)

(max. 1000 characters)

- Refrigeration systems require engineering analysis of all components, piping and vessel design to accomplish the desired results...
- Applies the principles of refrigeration and works with different industrial refrigerants designing a safe plant to protect employees and public
- Chooses the most efficient refrigerant system according to the great variety of installations and their safety
- Works with technical charts, for equipment selection and satisfactory system performance at the major applications in food processing and preservation

Syllabus

(max. 1000 characters)

1. Reciprocating compressors, Screw compressors. Performance. Capacity regulation.
2. Condensers. Air cooled, Shell and tube. Evaporative condensers. Performance and selection.
3. Evaporators. Air coils and liquid chillers. Defrost methods
4. Load calculations. Cold rooms. Freezing tunnels. Ice plants

5. Evaporating and discharge temperature and refrigerating capacity.

6. Liquid recirculation systems. Low pressure receivers. Control level

7. Valves and refrigerant controls. Capilars and expansion valves, solenoid valves, pressure regulating valves, liquid level valves. Thermostats and pressure controls.

8. Refrigerant piping. Dimension and materials.

9. Mechanical failures in refrigerant plants. Maintenance

10. Refrigeration systems operation.

11. Components of absorption systems.

Demonstration of consistency of the syllabus with the objectives of the course

(max. 1000 characters)

The contents of the programme are designed according to the objectives of the curriculum unit.
The approach to the subjects of the programme guarantee the balance in the suitable number of lectures as well as the pratical tasks and activities.
The notes of lectures, as well as the bibliography, are provided by the teacher.

Teaching methodology (evaluation included)

(max. 1000 characters)

Teaching methodologies

Use of teaching aids from DEM. The materials are supported with powerpoints, catalogs and technical consultation to "sites" of the manufacturers of refrigeration equipment.

Use of Refrigeration Laboratory for testing for the performance Installation Refrigerated in didactic panel.

The evaluation methodology consists of:

Preparation of a report on the test of the performance of didactic panel

Practical work with the calculation of a cold room and sizing of refrigerant circuits

A final examination

Final note: 15% report + 35% practical work + 55% final exam.

Demonstration of consistency of teaching methods with the learning objectives of the course (max. 3000 characters)
This is a course that aims to develop students' skills at the project facilities Refrigeration, following the rules of the updated and regulatory constraints with a large practical component. Will be given the theoretical knowledge, functional, dimensional and practical on major equipment comprising circuitry refrigerators, including calculus and their selection. Study on main systems of expansion of the refrigerator fluid, control valves, tanks, pumps Refrigerant recirculation, isolation valves implementation, retention and accessories. Study of the main techniques used in defrosting evaporators. Will be conducted heat balances and sizing cold rooms, and their promenores constructive organization central Refrigeration and scaling circuits which interconnect the different components. Study of automatic control systems for industrial refrigeration, including the characterization and complication of the principal organs of control and safety of the installation. Study refrigerators complete circuits typically used in cold rooms, cooling tunnels, rooms miscarriage, hypermarkets, food, drinks, laboratory, hospitals,etc. ..

Main Bibliography (max. 1000 characters)
ASHRAE Handbooks. Refrigeration ASHRAE Handbooks. Systems and Equipment DOSSAT, R. Principles of Refrigeration RAPIN, P. Instalations Frigorifiques STOECKER, W. Industrial Refrigeration