ISEL
INSTITUTO SUPERIOR DE ENGENHARIA DE LISBOA

ISEL ADEM
Área Departamental de Engenharia Mecânica

Sheet course ()

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

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

Year: 1st	Semester: 2nd		ECTS: 5,0			
Contact time	Total: 45	T:	TP: 45	PL:	S:	OT:

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

Unit Director	Title	Position
Luís Manuel Rodrigues Coelho	Ph.D.	Invited Assistant Professor

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

(max. 1000 characters)

This course establishes the fundamental concepts, theoretical and practical, of mechanical ventilation used in industry and commercial buildings.

The main goal of this course is to introduce the fundamental concepts that are on the base of practical application of mechanical ventilation for industry and commercial buildings.

It is intended students to acquire the necessary skills to conceive and design general or specific ventilation systems for industrial use or to guarantee the environmental conditions in spaces for human occupancy.

Syllabus

(max. 1000 characters)

FUNDAMENTAL CONCEPTS: Air flow and pressures in ducted systems. Total, velocity and static pressures. Methods of friction losses and static pressure regain. Air flow behaviour in supply and exhaust systems. Profiles of pressures.

FANS: Fan curves and system curves. Fan characteristic and operation point. Law's- changes of rotation, fluid density, and fan diameter. The main type of fans; axial and centrifugal. Speed control.

THE POLLUTION CONTROL: General dilution ventilation equation; steady-state and non steady-state concentration. Threshold limit values of chemical substances.

LOCAL EXHAUST HOODS: Minimum capture flow and velocity of a particle. Hood entry pressure losses. Typical

configuration hoods and design factors. Hot air and chemical tanks processes.

AIR CLEANING: Dust collection equipment. Gravity and sleeves separators. Dry centrifugal collectors. Electrostatic and carbon filters.

DESIGNE OF DUCTS: . Methods of equal friction, constant velocity and static regain.

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 practical tasks and activities.

The notes of lectures, as well as the bibliography, are provided by the teacher. The presentations are made having the support of Power Point..

Teaching methodology (evaluation included)

(max. 1000 characters)

Evaluation is based on:

Individual work – resolution of four technical questions (developing problem-solving strategies), and a final essay.

A final exam

An optional experiment in lab of an electric fan, which will be considered in the final evaluation

The final grade will be given as this:

55% the final exam

45% the other technical questions and final essay.

Demonstration of consistency of teaching methods with the learning objectives of the course

(max. 3000 characters)

The curricular unit aims the students to develope a specific project in the industrial exhaust ventilation domain, following the good practice guidelines and the optimal dimensioning of the aeraulic components,

fans, ducts and captation system.
The theoretical knowledge required for the project development is delivered to the students in an early phase of the curricular unit and the acquired competences are thoroughly assessed.

Main Bibliography

(max. 1000 characters)

Industrial Ventilation; A Manual of recommended practice; ACGIH.

Archibald Joseph Macintyre; Ventilação industrial e controle de poluição; Guanabara

Industrial Ventilation; A Manual of recommended practice; ACGIH.

Industrial Ventilation Design Guidebook; Howard D. Goodfellow; Esko Tahti