



Universitat de Lleida

GUÍA DOCENTE
**INSTALACIONES AUXILIARES
EN LA IA**

Coordinación: FONS SOLE, ESTANISLAU

Año académico 2017-18

Información general de la asignatura

Denominación	INSTALACIONES AUXILIARES EN LA IA			
Código	102591			
Semestre de impartición	2o Q(SEMESTRE) EVALUACIÓN CONTINUADA			
Carácter	Grado/Máster	Curso	Carácter	Modalidad
	Grado en Ingeniería Agraria y Alimentaria	3	OBLIGATORIA	Presencial
Número de créditos ECTS	9			
Grupos	1GG			
Créditos teóricos	0			
Créditos prácticos	0			
Coordinación	FONS SOLE, ESTANISLAU			
Departamento/s	TECNOLOGIA D'ALIMENTS			
Información importante sobre tratamiento de datos	Consulte este enlace para obtener más información.			
Idioma/es de impartición	Catalan: 50% Spanish: 50%			
Horario de tutoría/lugar	<p>Nom: (coordinador) ESTANISLAU FONS I SOLÉ Centre: ESCOLA TÈCNICA SUPERIOR D'ENGINYERIA AGRÀRIA (ETSEA) Departament: TECNOLOGIA D'ALIMENTS Despatx: 2.2.13 Horari consulta: Dimarts, 12-14 h Telèfon: 973702519</p> <p>Nom: TOMÁS RAMO Centre: ESCOLA TÈCNICA SUPERIOR D'ENGINYERIA AGRÀRIA (ETSEA) Departament: TECNOLOGIA D'ALIMENTS Despatx: 2.12 Horari consulta: A concretar Telèfon:</p> <p>Nom: JAVIER ARANTEGUI Centre: ESCOLA TÈCNICA SUPERIOR D'ENGINYERIA AGRÀRIA (ETSEA) Departament: TECNOLOGIA D'ALIMENTS Despatx: 2.2.13 Horari consulta: A concretar Telèfon: 973702595</p>			

Teaching staff	E-mail addresses	Credits taught by teacher	Office and hour of attention
ARANTEGUI JIMENEZ, JAVIER	arante@tecal.udl.cat	4	Appointments: Contact by email to agree a date Desp. 2.2.13
FONS SOLE, ESTANISLAU	estanislaui.fons@udl.cat	4	Building 2, office 2.13, ETSEA. At agreed times.
RAMO APARICIO, TOMAS	tramo@tecal.udl.cat	1	Building 2, office 2.12, ETSEA. At agreed times.

Información complementaria de la asignatura

Subject throughout the curriculum;

The subject "Auxiliary facilities for the food industry", provides expertise and calculation tools for the design and selection of common facilities in a food industry as facilities: cold, heat generation , steam, control and regulation, among others.

The skills taught in this course are necessary for a better use of materials to design processing plants, and Final Projects related to food production processes that take place in the food industry.

Recommendations

It is advisable to have studied and assimilated properly subjects "Fundamentals of Food Engineering" and "Food Industry" for the first half.

Objetivos académicos de la asignatura

- Apply technology and engineering necessary for the proper functioning of the food industry.
- Calculate and design of auxiliary facilities generation and application of cold.
- Dissent generation facilities, distribution and application of heat.
- Projecting generation facilities, distribution and application of steam.
- Designing installations driving liquid.
- Sizing fire-fighting facilities.
- Designing auxiliary facilities of automation and control industry.

Competencias

CB1. Students must demonstrate to have and to understand the bases of knowledge in a study field that arises from general secondary education, and that is taught at a level including knowledge at the frontiers of its own field of study.

CB2. Students have to be able to apply their knowledge in a professional way and must be able to develop competences in elaborating and defending arguments and problem solving within their own study field.

CB3. Students must be able to gather and interpret relevant data (normally within their own study field), in order to make judgements including relevant social, scientific and ethical issues.

CB4. Students must be able to transmit ideas, problems and solutions both to specialised and non-specialised audiences.

CB5. Students must acquire enough abilities as to face further studies with a high degree of autonomy.

CG1. Capacity to preview and outline projects that can be included within the agrifood industry. (extractive, fermentative, dairy, canning, packinghouses, meat, fish, salted products and, in general, any other that manufactures, transforms, cans, handles and distributes food products)

CG6. Capacity for managing all kinds of agrifood industries, with knowledge of new technologies, and quality processing.

CG8. Capacity to solve problems with creativity, initiative, methodology and critical reasoning.

CG10. Capacity to search and apply legislation and regulations affecting its own field.

CG12. Capacity for working in multidisciplinary and multicultural teams.

CG13. Correctness in oral and written expression

Specific competences

CEIAA1. Food technology and engineering: Modelling and optimization.

CEIAA2. Food industries engineering. Equipment and machinery for agrifood industries. Process automation and control. Facilities and buildings engineering.

CEMC9. Decision making using tools available for multidisciplinary groups.

CEIAA1. Food technology and engineering: Food Technology. Processing in the agrifood industries.

Contenidos fundamentales de la asignatura

PART 1: Refrigeration

1.1 Production of cold. Refrigeration systems and cycles.

Generalities. Applications in various industries alimentàries.- cold production systems. Compression System mecànica.- absorption system. Other production systems defred. Thermodynamic diagrams. Refrigeration cycle theory. Real refrigeration cycle. Effects of overheating vapor and liquid subcooling.

1.2 Thermal loads

Introduction. Procedure for calculating thermal loads. Examples of different cases. Consult sources.

1.3 Complex refrigerators. Chambers.

Complex refrigerators. Design aspects constructiu.- regulatory aspects. Isolation chambers. Basic properties of

insulating materials. Top insulating materials. Waterproof Materials steamed. Materials hermetic gases. Insulation mounting systems: traditional and integral. Fundamentals of calculating the thickness of insulation.

1.4.- Refrigerants.

Fluids Refrigeration. Definition. Refrigerating fluids. Generalities. Historical. Classification and nomenclature. Characteristics of refrigerating fluids. Comparison between the refrigerants. Refrigerating fluids. Facilities indirect.

1.5.- Compressors.

Generalities. Type compressors. Classification. Reciprocating compressors. Rotary compressors. Compressors spiral. Centrifugal compressors. Regulation of capacity. Lubrication. Power required in the compressor. Yields. Selection compressor.- sizing the compressor. Installations centralized / decentralized.

1.6. Evaporators.

Depending on the evaporators. Type evaporators. Feeding of evaporators. Methods. Building design. Application of cooling air and liquids. Thaw the evaporator. Sistemas. Cooling capacity. Thermal. Selection of the evaporator.

1.7.- Condensers.

Function condensers. Type condensers. Classification. Air condensers. Water condensers. Atmospheric.- Condensers Evaporative Condensers. Capacitance. Surface. Selection of the condenser. Cooling Towers. Concepts range and approach.

1.8.- Automation. Regulation and control of the refrigeration system.

Introduction. Cyclical operation of the refrigeration system. Automation. Principles of operation. Automatic Controls: Pressure switches, valves termòstats.- expansion. Type. Other automation.

1.9. Pipes and ancillary elements.

Design Considerations pipe. Pipe Sizing: suction and discharge of liquid. Plotting pipes. Accessories and auxiliary elements in refrigeration circuits.

1.10.- schemes subject to storage facilities.

Schemes refrigerators. Symbolism and regulations. Examples of different schemes refrigerators. Distribution ground storage facilities.

PART 2: HEAT GENERATION SYSTEMS

2.1. Fuels.

Origins of fuel. Characteristics of fuel. Features termotècniques fuel. Chemical composition of fuels. Calorific value of the fuel.

2.2 Theory of combustion.

Combustion. Definition. Combustion reactions. Combustion air. Combustion products. Theory flame. Combustion parameters. Calculations.

2.3 Boilers.

Boilers. Generalities. Definitions. Parts of a boiler. Pirotubulars constructive arrangements in boilers. Acuotubulars constructive arrangements in boilers. Vertical Boilers. Boilers instantaneous vaporization. Security in a boiler.

2.4 Burners.

Function and classification of burners. Vaporització.- burners burners spraying direct mechanical pressure. Mechanical spray burners centrifugation. Burners Burners auxiliar.- spraying fluid emulsion. Technical regulations.

Item 2.5 Distribution of steam.

Introduction. Design Considerations pipe dimensioning vapor.- steam pipes. Return condensats.- trap. Type. Selection. Steam pipe insulation.

PART III: INSTRUMENTS AND PROCESS CONTROL

Item 3.1 General Introduction

Brief history of process control. Context of the discipline and its relationship with the food industry. Qualitative description of an example of food processing and control systems. General concepts. Problems.

Item 3.2 Instrumentation Industry

Some definitions of instrumentation. A little instrumentation. Measuring devices (sensors). Transmission lines. Final control elements.

Item 3.3 How to tackle the dynamics of a system

An example of a dynamic system. Laplace transform as a useful tool. Transfer function. Transformed some unique features. Back in real time. Expansion in partial fractions. Problems.

Topic 3.4.- first-order linear systems

Definition of linear system of first order. In response to a step input. Answer built momentum. Response to a sinusoidal function. Problems.

Item 3.5. Second order linear systems

Definition of second-order system. In response to a step input. Linearization. Delays. issues

Item 3.6 Control actions

Description of a control loop. Proportional control (P). Control + Proportional Integral (PI). Proportional Control + derivatives (PD). Control Proportional + Integral + derivative (PID). issues

Topic 3.7.- feedback control for linear systems

Action proportional control. Integral control action. Derivative control action. Control actions combined. Influence of arrears. Introduction to the design of control systems by feedback. issues

3.8.- Stability analysis systems

Definition of stability. Characteristic equation. Method Routh-Hurwitz. Root locus method. Harmonic analysis of linear systems. Bode plots. Stability criterion

Bode. issues

3.9.- Empirical methods and semi-empirical

Method of trial and error. Methods sole criterion. Method integral approach over time. Method Cohen and Coon. Ziegler and Nichols method. issues

3.10.- Implementation of control loops in plants

PART 4: OTHER AUXILIARY SYSTEMS

4.1 Management of liquid.

Pipes. Pumps. Tanks for liquids. Calculation of fluid distribution networks.

4.2 Management of solids.

Warehouses. Transport of particulate solids. Transposrt packaging materials.

4.3 Fire protection systems.

Fire load. Calculations and regulations. Prevention devices and fire fighting ..

4.4.- Materials.

Materials for packaging. Building materials equipment food. Building materials for local production and food handling ..

practical activities

Practices in classroom (cases and problems)

Case solving problems and on various specific aspects of the calculation and selection of equipment and ancillary facilities in the food industry.

Working

It consists of a personal work on the design, calculation and selection of the elements of a refrigeration system that applies to preserve and / or treat certain foodstuffs (such as: meat, fruit, vegetables, wine, etc.) or any other type of auxiliary facilities in the food industry.

Visits

Visit industries viewing by students auxiliary facilities existing in them.

Ejes metodológicos de la asignatura

Tipus d'activitat	Descripció	Activitat presencial alumne		Activitat no presencial alumne		Avaluació	Temps total
		Objectius	Hores	Treball alumne	Hores	Hores	Hores/ECTS
Lliçó magistral	Classe magistral (Aula. Grup gran)	Explicació dels principals conceptes	42	Estudi: Conèixer, comprendre i sintetitzar coneixements	80		122h/4.88
Problemes i casos	Classe participativa (Aula. Grup gran)	Aplicació dels conceptes teòrics impartits a les classes magistrals	30	Resoldre problemes i casos	24	6	54h/2.16
Visita	Visites a indústries	Coneixement in situ de sistemes auxiliars	6	Informe sobre cada visita	12		18h/0.72
Activitats dirigides	Treball del alumne (individual o grup)	Redacció d'un càlcul d'una instal·lació auxiliar completa	6	Redactar memòria	20		26h/1.24
Totals			84		141	6	225h/9ECTS

Observacions

S'han considerat 25 hores d'activitat total per crèdit ECTS.

Sistema de evaluación

Típus d'activitat	Activitat d'Avaluació		Pes qualificació
	Procediment	Número	
Lliçó magistral	Proves escrites sobre la teoria del programa de l'assignatura	3	70
Problemes i casos	Lliuraments o proves escrites sobre problemes i casos	3	15
Visita	Informe tècnic sobre visites a instal·lacions	2	10
Activitat dirigida	Entrega del Treball de l'alumne	1	5
TOTAL			100

Observacions

A efectes de la qualificació final, per tal de superar l'assignatura caldrà haver obtingut una nota igual o superior a 4 punts a les diferents proves escrites. El promig haurà de ser igual o superior a 5 punts.

Bibliografía y recursos de información

La bibliografia de les matèries tecnològiques requereix una revisió contínua. No obstant això, se citen alguns manuals el contingut dels quals és adequat per al nivell que es pretén de l'estudi dels sistemes auxiliars a les indústries alimentàries.

Bibliografia bàsica

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