

Course:	L025 - Food Quality and Nutrition
Degree:	Bachelor
Curriculum Unit:	2095007 - Process in Food Industries
Scientific field:	Industrial Engineering
ECTS^(*):	5
Curriculum year:	2nd
Curriculum semester:	1st
Frequency Regime:	Mandatory
Teacher(s):	Raquel de Pinho Ferreira Guiné
Contact hours ^(**):	T - 30; TP - 30
Total work time (hours):	138

(*) - ECTS - European Credit Transfer and Accumulation System

(**) – T- Theoretical; TP- Theoretical/Practical; LP- Lab Practice; S- Seminars; I- Internships; TU - Tutorials; O- Other (Evaluations)

Objectives / Competences

With the knowledge provided in this course it is intended that the student can understand the background of the key unit operations that comprise the manufacturing processes in the food industry, particularly with regard to operations primarily of physical nature.

After the course the student will possess the following skills:

- Optimize conditions for use of equipment;
- Solve malfunctioning problems;
- Designing pieces of equipment for the manufacturing facility improvements;
- Designing new production lines and / or unit operations.

Syllabus

PART I - MECHANICAL PROCESSES

Introduction / Speed of particles moving in a fluid / Sedimentation / Filtration / Centrifugation / sieving / Size reduction of solid particles / Mixing and agitation

PART II - HEAT TRANSFER

Theory of heat transfer / Heat exchangers

PART III - CONVENTIONAL THERMAL PROCESSES

Introduction / Bleaching / Pasteurization / Sterilization by heat / Evaporation / Drying / Freezing / Lyophilization / Extrusion / Oven cooking / Frying

PART IV - CONTACT PROCEDURES IN BALANCE

Introduction / Absorption of gases / Extraction and washing / Distillation / Crystallization / Use of membranes / Ion exchange

PART V - EMERGING TECHNOLOGIES

Forms of radiant energy heating / Heating by microwaves / Infrared radiation / Radio frequency heating / Ohmic heating / High pressure processing / Pulsed electric fields / High intensity pulsed light / Ultrasound / Irradiation

Teaching methodologies and evaluation criteria

In the theoretical lectures will be presented by the teacher the fundamental concepts of the phenomena involved in the operations of the food industry and in theoretical-practical classes problems will be solved on different topics.

It is privileged to carry out group work and presentation in the respective context of the classroom before other colleagues.

New technologies are used in the classroom, using powerpoints and presentation with data show, and contact with students is privileged by use of "e-learning" through Moodle.

Evaluation:

It is planned a continuous assessment during the semester, which includes components: 1. Preparation of a work in groups and 2. Individual Assessment: class participation, expression of interest and monitoring.

Furthermore, the student will do a final exam.

Short bibliography

Barbosa-Cánovas, G.V.; Veja-Mercado, H. (2000) Desidratación de Alimentos. Editorial Acríbia, S.A.: Zaragoza.

Daufin, G.; René, F.; Aimar, P. (1998) Les Séparations par Membran dans Les Procédés de L'industrie Alimentaire. Tec & Doc Lavoisier: Paris.

Dincer, I. (2003) Refrigeration Systems and Applications. John Wiley & Sons: New York.

Heldman, D.R.; Hartel, R.W. (1997) Principles of Food Processing. Chapman & Hall: New York.

Acríbia, S.A.: Zaragoza.

Miller, R.B. (2005) Electronic Irradiation of Foods. An Introduction to the Technology. Springer Science: New York.

Smith, P.G. (2003) Introduction to Food Process Engineering. Kluwer Academic/Plenum Publishers.

Sun, D.-W. (2005) Emerging Technologies for Food Processing. Elsevier Academic Press: London.

Toledo, R.T. (2007) Fundamentals of Food Process Engineering. 3^a Ed., Springer Science: New York.