COURSE OUTLINE

1. GENERAL

SCHOOL	FOOD AND NUTRITIONAL SCIENCES		
ACADEMIC UNIT	FOOD SCIENCE AND HUMAN NUTRITION		
LEVEL OF STUDIES	BACHELOR OF SCIENCE		
COURSE CODE	**3585**	**SEMESTER**	6TH
COURSE TITLE	Laboratory of food engineering		

INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*	**WEEKLY TEACHING HOURS**	**CREDITS**
Laboratory exercises	4	4
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Field of Science
PREREQUISITE COURSES:	Mathematics, Principles of Food Engineering, Unit Operations in Food Processing, Plant Design and Equipment for the Food Industries, Food Preservation
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	NO
COURSE WEBSITE (URL)	

2. LEARNING OUTCOMES

Learning outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.
Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

The learning objectives of this module are the following:

1. Teaching of main principles of basic unit operations employed in industrial food processes
2. Carry out practical work in the laboratory in order to learn the main operational characteristics of various unit operations employed in industrial food processes
3. Processing of data and numerical estimation of specific parameters based on the data that will be collected during the operation of each unit operation
4. Applications and examples of operation of different equipment using case-specific examples of food processes

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology	*Project planning and management*
Adapting to new situations	*Respect for difference and multiculturalism*
Decision-making	*Respect for the natural environment*
Working independently	*Showing social, professional and ethical responsibility and sensitivity to gender issues*
Team work	*Criticism and self-criticism*
Working in an international environment	*Production of free, creative and inductive thinking*
Working in an interdisciplinary environment	*……*
Production of new research ideas	*Others…*
	…….

- Search, analyze and synthesize data and information
- Assays carried out in groups of students

3. SYLLABUS

Learning and practice in the following laboratory exercises:

Exercise 1. Determination of heat penetration parameters (*f* and j values). Calculation of required time for commercial sterilization.

Exercise 2. Food refrigeration. Cooling Circuit.

Exercise 3. Rheology and viscosity. Effect of temperature on food viscosity.

Exercise 4. Fluidization of a bed of solid particles with air. Calculation of fluidization onset velocity and pressure drop vs. air speed.

Exercise 5. Concentration by evaporation. Mass and energy balances. Calculation of overal heat transfer coefficient.

Exercise 6. Food freezing. Determination of initial freezing point, surface heat transfer coefficient and freezing times.

Exercise 7. Heat exchangers. Calculation of overal heat transfer coefficient and temperature difference vs. heat exchange surface.

Exercise 8. Pumps. Study of rotary pumps.

Exercise 9. Membrane separation. Application to juice concentration.

4. TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Laboratory: Practical case study in the laboratory regarding the operation of various units.
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	

TEACHING METHODS

The manner and methods of teaching are described in detail.
Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.

The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS

Activity	***Semester workload***
Laboratory classes	36
Group assay	40
Autonomous study	24
Total contact hours and training	***100***

STUDENT PERFORMANCE EVALUATION

Description of the evaluation procedure

Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other

Specifically-defined evaluation criteria are given, and if and where they are accessible to students.

I. Performance during the laboratory exercise implementation (20-40%)
II. Technical report (20-40%)
II. Oral examination (20-40%)

5. ATTACHED BIBLIOGRAPHY

1) Cortez Vieira MM, and Ho P (eds), 2008. Experiments in Unit Operations and Processing of Foods. Volume 5 of ISEKI-Food series, Springer, pp. 210.
2) Rizvi, SSH, Gauri S. Mittal GS, 1992. Experimental Methods in Food Engineering, Springer, pp.289.
3) Singh PR and Erdogdu F, 2004. Virtual Experiments in Food Processing, RAR Press, pp. 126.
4) McCabe, Smith and Harriott, 2002. Unit Operations of Chemical Engineering, 6th edition, Tziola Puplications, Thessaloniki, Greece, 2015 (Greek translation).
5) Singh, P.R. and Heldman, D.R., 2014. Introduction to Food Engineering. 5th Edition. Sientific Puplications Parisianou, Athens, Greece, 2019 (Greek translation).