COURSE OUTLINE

1. GENERAL

SCHOOL	Food and Nutritional Sciences		
ACADEMIC UNIT	Food Science & Human Nutrition		
LEVEL OF STUDIES	Bachelor		
COURSE CODE	1075	SEMESTER	8th
COURSE TITLE	Physical Properties of Foods		
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**
Lectures and laboratory experiments		5 (3+2)	5
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		5	5
COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Specialised general Knowledge		
PREREQUISITE COURSES:	Food Engineering, Food Preservation		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	https://oeclass.aua.gr/eclass/courses/587/		

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*

Upon successful completion of the course, the student will be able to:

- Recognize the basic Physical Properties of Foods and analyse their fundamental concepts
- Apply the principles of Physical Properties in the design and development of foods (Formulation engineering), in new technologies such as nanotechnology and in the pretreatment, processing and storage of biological materials
- Master the use of the methodology and experimental testing equipment with respect to Physical Properties of Foods

- Correlate objective tests such as those with physical properties with subjective ones such as sensorial tests
- Solve problems concerning the Physical Properties of Foods

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*
Teamwork	*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…*

- Retrieve, analyse and synthesize data and information
- Team working
- Working independently

3. SYLLABUS

The course material includes the: thermal, mass, structural, optical, rheological, electrical and acoustic ones.

1. Introduction. Course structure and objectives.
2. Applications of physical properties in food processing. Examples.
3. Thermal properties. Theory, methodology, applications (Lab. 1)
4. Structural Properties. Theory, methodology, applications. (Lab. 2)
5. Density, Porosity. Theory, methodology, applications (Lab. 3)
6. Rheological properties I. Theory, methodology, applications. Viscosity and viscoelasticity. Components' selection upon their viscosity
7. Rheological properties II. Texture. Sensorial and fundamental definitions. Examples (Lab.4)
8. Optical properties. Theory, methodology, applications. (Lab.5)
9. Water activity. Theory, methodology, applications (Lab. 6)
10. Mass transfer properties. Theory, methodology and applications
11. Acoustic properties. Theory, methodology, applications.
12. Electrical properties. Theory, methodology, applications
13. Examples of food quality evaluation using combined physical properties data. Case studies. Sensorial vs. fundamental characteristics (Lab.7-8)

The above lectures will be complemented with laboratory experiments on the following topics:

1. Thermal conductivity measurements in different products
2. Geometric properties (shape measurements)
3. Density- porosity determination in several foods (dry foams, bulk density)
4. Texture measurements (e.g. foamy structures, fruits, candies)

5. Colour and structural parameters' measurements (bread, coloured candies)- Image analysis software
6. Diffusivity (mass transfer). Water activity measurements or moisture transfer in dried baked rolls
7. Quality evaluation upon physical properties characteristics (combined measurements). Sensory evaluation of specific foods. Example: Oral texture vs. fundamental values

4. TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	In class teaching (power point presentations) Face-to-face Labor exercises in teams
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	Specific Software for image analysis and sensorial attributes measurements e-class platform
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*	
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. Final written examination (50% of the final course grade) that includes: Short answer questions Judgment questions Graphs interpretation Short problems II. Laboratory performance (10%) III. Lab reports (20%) IV. Individual report (selected physical property) (20%)

Activity	***Semester workload***
Lectures	36
Laboratory meetings	24
Individual bibliographic report	10
Term papers/Lab reports in teams	20
Personal study	35
Course total	125

5. ATTACHED BIBLIOGRAPHY

Suggested bibliography:

- Lazou A. 2019. Physical Properties of Foods. ISBN. 9789600234978
- Singh P.R., Heldman D.R., Introduction to Food Engineering, 5TH edition. ISBN:978-0-12-398530-9
- Steffe J.1996. Rheological Methods in Food Process Engineering Freeman Press www.egr.msu.edu/~steffe/ ISBN 0963203614, 9780963203618
- Rao M.A. Rheology of Fluid and Semisolid Foods: Principles and Applications Aspen Publishers ISBN 0-8342-1264-1
- De-Wen Sun series editor 2012. Physical Properties of Foods - Novel Measurement Techniques and Applications Compemporary Food Engineering Series ISBN-10: 1439835365
- Moskowitz H.R. 1987. Food Texture: Instrumental and Sensory Measurement M. Dekker, New York
- MCKenna M., 2003, Texture in Food Volume I: Semi-solid foods, Texas, USA
- Kilcast D., Texture in Food, Volume II: Solid Foods, C.H.I.P.S., Texas, USA
- Figura L. and Teixeira A. 2007. Food Physics. Springer ISBN 3540341943, 9783540341949
- Rao, Rizvi and Datta 2010 (third ed.) Engineering Properties of Foods. Taylor & Francis. ISBN 0824753283, 9780824753283
- Karel M. & Lund D. B. Physical Principles of Food Preservation
- Sahin S. & Sumnu S. G. 2006. Physical Properties of Foods. Springer
- Shafiur Rahman 2010 (2nd edition) Food Properties Handbook Taylor & Francis 1420003097, 9781420003093

Related academic journals:

- Journal of Food Engineering
- Journal of Food Science. Special topic: Food Engineering, Materials Science, and Nanotechnology
- Journal of Texture Studies

Links

Ift.org