PHYSICAL CHEMISTRY

COURSE OUTLINE

1. GENERAL

SCHOOL	FOOD AND NUTRITIONAL SCIENCES		
ACADEMIC UNIT	FOOD SCIENCE AND HUMAN NUTRITION		
LEVEL OF STUDIES	*Undergraduate*		
COURSE CODE	**3360**	**SEMESTER**	**2nd**
COURSE TITLE	PHYSICAL CHEMISTRY		
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 & laboratory exercises		5	5
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*	Skills development, general background		
PREREQUISITE COURSES:			
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	https://w1.aua.gr/etda/en/courses/physical-chemistry/		

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 course is a basic introductory course in the subject of Physical Chemistry.

The course material aims to introduce students to the basic concepts of the gas state of matter, Thermodynamics, solutions, phases, Chemical Kinetics and Photochemistry.

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

- Distinction between ideal and real gases.
- Temperature, energy, work, heat.
- ΔH, ΔS, ΔG, heat capacity and chemical potential: definition and utility.
- Joule-Thompson coefficient
- Thermometric scales
- Solutions: Characteristics and formation of solutions, Mechanisms of formation of liquid solutions, Thermodynamic properties of ideal solutions, Volatility
- Distillation: what to expect when performing a distillation, process optimization.
- Aggregate properties: what are the expected results
- Understanding the concept of phase
- Interpretation of phase diagrams
- Understanding the phenomenon of distribution
- Extraction, process optimization
- Chemical Kinetics: rate, order of reaction, half-life, Kinetic relationships of chemical reactions and physicochemical changes, Determination of reaction order, Rate theories, Catalysts and their applications
- Understanding the interactions between light and matter
- Photochemical reactions

In addition to a critical understanding of basic principles and theories of Physical Chemistry, students will also acquire knowledge that includes elements from ongoing research studies on the subject. As a result, they will be able to understand the phenomena and techniques that characterize the study, processing and technology of Food and be able to apply their knowledge to new research works and effectively resolve relevant issues.

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*
	Showing social, professional and ethical

Working independently *Team work* *Working in an international environment* *Working in an interdisciplinary environment* *Production of new research ideas*	*responsibility and sensitivity to gender issues* *Criticism and self-criticism* *Production of free, creative and inductive thinking* *……* *Others…* *……*

- Retrieve, analyze and synthesize data and information, with the use of necessary technologies
- Future research
- Make decisions
- Work autonomously
- Work in teams
- Be critical and self-critical

3. SYLLABUS

- Gases (Gas laws. Ideal and not ideal behaviour of gasses)
- Thermodynamics (Zero and First Laws of Thermodynamic,cp, cv)
- Thermodynamics (Second and Third Laws of thermodynamics, enthalpy, entropy)
- Thermodynamics (Free energy, chemical potential)
- Solutions (Terms, concentration, Types)
- Solutions (Liquid solutions, distillation)
- Colligative properties
- Phase equilibrium
- Partition law of Nernst
- Chemical kinetics (rate, order)
- Chemical kinetics (kinetical equations)
- Chemical kinetics (kinetic theories, Catalysis)
- Photochemistry

4. TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face-to-face (Direct) learning, lab experiments
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	Power point presentations, laboratory education, communication with the students via the open e-class
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***
Lectures	39
Laboratory practice	26
Private studying	34
laboratory essays writing	26
Course total	**125**

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.

FOR THEORY
I. Written Examination in Greek that includes right or wrong questions, short answer questions etc

FOR LABORATORY
I. Written Examination in Greek that includes right or wrong questions, short answer questions, problem solving (80%)
II. Laboratory reports on the performed exercises (20%)

5. ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

Lecture Notes for physical chemistry, V. Evageliou (AUA)
Laboratory Notes for food physical chemistry, V. Evageliou (AUA)

The students also select one of the following books:
1. Abbreviated Physical chemistry, Giannakoudakis & Giannakoudakis, Zitis pubications, 1996
2. Physical chemistry, Katsanos N., Papazisis publications, 2024

- Related academic journals: