ETY304 - Laboratory of Physical Chemistry

COURSE OUTLINE

(1) GENERAL

SCHOOL	SCHOOL OF ENGINEERING			
ACADEMIC UNIT	DEPARTMENT OF MATERIALS SCIENCE AND ENGINEERING			
LEVEL OF STUDIES	UNDERGRADUATE			
COURSE CODE	ETY304	**SEMESTER**	3	
COURSE TITLE	Laboratory of 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			5	6
Add rows if necessary. The organization of teaching and the teaching methods used are described in detail at (d).				
COURSE TYPE *general background, special background, specialized general knowledge, skills development*	General Background			
PREREQUISITE COURSES:	-			
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	GREEK			
IS THE COURSE OFFERED TO ERASMUS STUDENTS	-			
COURSE WEBSITE (URL)	http://physchem.materials.uoi.gr/wp-admin/			

(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 goal of the Physical Chemistry Laboratory, through its operation and the training it provides to students on selected and representative laboratory exercises, is on the one hand to support the course of Physical Chemistry with an in-depth understanding of the basic principles and laws, on the other hand and the familiarization and reconciliation of the student with the laboratory environment. These exercises are internationally and widely accepted and well-known over time and are taught in the third semester of studies in the Departments of Materials Science as well as (several of them) in the Department of Chemistry (Department of Chemistry) of our University. The aim is also to develop the reflection and practice of the student to think in the language of Science, to observe and not to see, to interpret the phenomena and not to memorize theories. The aim is to develop his research disposition, his training in the correct presentation and processing of experimental results as well as in the protection and safe use of laboratory equipment. The form and content of these laboratory exercises have been organized based on the experience in the student laboratories and the evaluation of the current and future

direction of the field of Physical Chemistry of the materials.
Upon successful completion of the course the student will be able to:

• form the composition of the working group in order to achieve the maximum result.
• work in a team with a spirit of cooperation and creative coexistence.
• Handle and use the capabilities of the programs: ORIGIN, EXCEL, GaussView, HyperChem, ChemOffice, ChemDraw, etc.
• look for the relevant literature which becomes necessary for the comparison and confirmation of his experimental results.
• Understand differently and in depth the concepts of physicochemistry that are established through laboratory practice.
• judge, to compare and interpret phenomena.

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

• Search, analyze and synthesize data and information, using the necessary technologies
•Teamwork
• Promoting free, creative and inductive thinking
• Adaptation to new situations

(3) SYLLABUS

The laboratory exercises were chosen to be so representative that they highlight the value of the experimental method for knowing our physical world, and at the same time contribute to the understanding of the basic principles and laws of physicochemistry. The content of the laboratory exercises covers and supports to a great extent the material of Physical-Chemistry I and II.
1. Enthalpy of evaporation (1 component system).
2. Binary systems: Influence of temperature on the immiscibility gap between two liquids.
3. Ternary systems: phase diagram among partially miscible liquids.
4. Electrochemistry: conductivity of electrolyte solutions.
5. Thermal analysis: study of the urea-n-hexadecane system.
6. Kinetics: study of the kinetics of the structural transformation of cationic color-group in the presence of HO in aqueous solutions.
7. Absorption spectra (UV-Vis) of hydrocarbons and biomolecules.
8. Mass transport phenomena: viscosity measurements, solutions of macromolecules.
9. Electrochemistry: oxidation-reduction potential.
10. Thermodynamics of complex systems.
11. Theoretical quantum-mechanic computations by Huckel method.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory*	The use is selective for decoding and interpreting mainly graphic representations and shapes, for processing experimental measurements or for simulating molecular

education, communication with students	motions and vibrations in the molecule itself, as well as obtaining molecular vibration spectra.
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	26
Laboratory practice	39
The student's study hours	65
	20
Course total	150

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.*	LANGUAGE OF EVALUATION: Greek METHOD OF EVALUATION: (i) Written work for each laboratory exercise (ii) Oral examination in the laboratory (iii) Written examination at the end of the semester Written

(5) ATTACHED BIBLIOGRAPHY

-Suggested bibliography:

- Physical-Chemistry Laboratories -S. Skoulika
- R.J. Sime, Physical Chemistry, Methods-Techniques and Experiments, Saunders College Publishing, 1990