ETY303 - Physical- Chemistry I

COURSE OUTLINE

(1) GENERAL

SCHOOL	SCHOOL OF ENGINEERING		
ACADEMIC UNIT	DEPARTMENT OF MATERIALS SCIENCE AND ENGINEERING		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	ETY303	**SEMESTER**	3
COURSE TITLE	Physical-Chemistry I		

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	4	4
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)	

(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*

Physical Chemistry is a general education course and a strong basis for students' smooth progress towards completing their studies. The material of the course aims at the development of scientific methodology and scientific critical thinking. Knowledge of the content of the course is not an end in itself but rather a means of interpreting the physicochemical processes, as well as the possibility of acquiring exploratory and combinatorial thinking which students will be called upon to integrate and adapt to the physical-chemistry of materials. The aim of the course is also the development of reflection and the student's practice in thinking in the language of Science, to observe and not to see, to interpret phenomena and not to memorize theories.
The Physics Chemistry I course is enhanced by the establishment of the laboratory course. During the 3rd semester, in parallel with the course of Physical-Chemistry I, ten selected experimental exercises are carried out, representing all the chapters.

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

• Understand the role of computers in simulating chemical processes and data analysis.
• express the ideas quantitatively (without being overshadowed by the complexity of mathematics) concerning the behavior of molecules and systems in order to be able to deal with experimental testing.
• distinguish the usefulness of mathematics in Physical Chemistry and be inspired by the charm of their application.
• thinks and reflects on the language of science, avoiding the simple memorization of knowledge.
• Understand his substantial and smooth path in the following years of his studies by integrating the knowledge of Physical Chemistry in Physical Chemistry of materials (eg good interpretation of phase diagrams in metallurgy, ceramic materials, etc.)

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…*
	…….

- *Promotion of free, creative and inductive thinking*
- *ii. Adaptation to new situations*
- *iii. Teamwork*
- *iv. Search, analyze and compose data and information, using the necessary technologies*

(3) SYLLABUS

The course includes theoretical lessons and laboratory exercises. The course content is concentrated in the following sections:
Physical-Chemistry I, is a required general education course, is taught in the 3rd semester of studies and deals with the concepts of thermodynamics. The material of the first ten chapters taught is divided into two main sections.

1. The laws of thermodynamics and its applications.
2. Phase changes.
3. The Third Section of Electrochemistry is taught to some extent through the Physical-chemistry Laboratory with the help of selected representative exercises which give the teacher the opportunity to explain and to the learner to understand and become familiar with the concepts of Electrochemistry and its applications.
4. Detailed lessons: Situations of matter. Molecular Interactions. Statutory equations of real gases (deviations from ideal behavior). Thermodynamics. First Law. Concepts, applications. The first Law in action: Thermo-chemistry. Second law. Basic principles, applications. Change of state: Natural transformations of pure substances, Natural transformations of simple mixtures, Law of phases, Chemical reactions. Electrochemistry: ions and electrodes. Electro-chemical elements.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face-to-face
USE OF INFORMATION AND	The use is selective for decoding and interpreting mainly

<table>
<tr><td>COMMUNICATIONS TECHNOLOGY
Use of ICT in teaching, laboratory education, communication with students</td><td>graphical representations and shapes, for processing experimental measurements or for simulating molecular motions and vibrations in the molecule itself, as well as obtaining molecular vibration spectra. Students are trained in various programs (eg quantum problem solving programs, simulation programs, and experimental data processing), on the occasion and with the help of theoretical laboratory exercises within the physical-Chemistry laboratory.</td></tr>
<tr><td>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</td><td>
<table>
<tr><th>Activity</th><th>Semester workload</th></tr>
<tr><td>Lectures</td><td>39</td></tr>
<tr><td>Laboratory practice</td><td>13</td></tr>
<tr><td>The student’s study hours</td><td>48</td></tr>
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<tr><td>Course total</td><td>100</td></tr>
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<tr><td>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.</td><td>LANGUAGE OF EVALUATION: Greek

METHOD OF EVALUATION:

(i) Written examination at the end of the semester (60%)
(ii) Written work (two intermediate exams, 40%)
(iii) Laboratory exercises</td></tr>
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(5) ATTACHED BIBLIOGRAPHY

-Suggested bibliography:

- P.W. Atkins
- Laidler/ Meiser