ETY408 - Physical- Chemistry II

COURSE OUTLINE

(1) GENERAL

SCHOOL	SCHOOL OF ENGINEERING		
ACADEMIC UNIT	DEPARTMENT OF MATERIALS SCIENCE AND ENGINEERING		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	ETY408	**SEMESTER**	4
COURSE TITLE	Physical-Chemistry II		

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 II course is enhanced by the establishment of the laboratory course.
Upon successful completion of the course the student will be able to:

- Responds to material classification by evaluating the characteristic suction strips of IR infrared spectra

• Interprets UV spectra and distinguishes between permissible electronic transmissions
• Distinguishes the maximum efficiency of a reaction from the speed of its evolution for receiving the product
• Adapts and utilizes the knowledge of kinetic polymerization in the following polymer courses and laboratories.
• Understand the role of computers in simulating chemical processes and data analysis.
• Quantitatively express ideas (without being overshadowed by the complexity of mathematics) about the behavior of molecules and systems so that they are able to cope with experimental testing.
• distinguish the usefulness of mathematics in Physical Chemistry and be inspired by the charm of their application.
• He thinks and thinks in the language of science, avoiding the simple memorization of knowledge.

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 II, is a required general education course, is taught in the 4rd semester of studies and deals with the concepts of Quantum Chemistry and Spectroscopy as well as the kinematics of chemical reactions. The chapters are taught in detail:

1. Quantum Theory: Introduction and basic principles. Techniques and applications.
2. Atomic structure and atomic spectra. Molecular structure. Molecular symmetry. Spectroscopy: rotation spectra. Vibration spectra. Electronic transitions. Magnetic resonance imaging. Molecules in motion.
3. Chemical reaction velocities. Reactions that approach the state of chemical equilibrium. Dependence of reaction speed on temperature and energy barriers. Successive reactions. Chain reactions. Photochemical reactions. Kinetic polymerization. Homogeneous catalysis.

(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>graphic 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 physics and 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