COURSE OUTLINE

(1) GENERAL

SCHOOL	PHYSICAL SCIENCES		
ACADEMIC UNIT	PHYSICS		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	**215**	**SEMESTER**	**6,8**
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**
	4	4
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*	*general background, specialised general knowledge*
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 II provides a strong and critical background on important physical chemistry concepts from chemist's point of view. At the end of the semester the student will be able to

- know the electromagnetic spectrum and the importance of particle-wave theory of light in medicine or analytical techniques
- apply the atomic theory in order to predict stable (non-radioactive) or unstable (radioactive) isotopes
- describe the electronic configuration of atoms and its relation to chemical reactivity
- know the dependence of melting/boiling point on pressure (Clausius-Clapeyron equation) and its practical applications
- know the wide range of application of the kinetic theory of gases through numerous working examples
- apply the thermodynamic and kinetics criterion in chemical reactions
- apply the principles of electrochemistry in electrolysis (prediction of products-

Faraday's law) and galvanic cells (batteries: voltage and energy value)

- know the molecular orbital theory as a powerful tool for predicting new compounds
- predict the molecular geometry of polyatomic molecules

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…*
	…….

Stimulation of creative thinking
Connection of theory with practical applications

(3) SYLLABUS

Introduction. Light and atoms: nature of light, electromagnetic spectrum, atoms-isotopes, belt of nuclear stability. Atomic orbitals and electronic structure: quantum theory approach, Aufbau principle, para-/dia-magnetism of ions, atomic radius-Slater's rules. Solids-liquids-gases: boiling/melting point, Clausius-Clapeyron equation, kinetic theory of gases, escape velocity, Graham's law, density of gases. Chemical thermodynamics: change of free energy ΔG in chemical reactions-thermodynamic criterion-examples. Chemical kinetics: reaction rate, collision theory, activation energy, Arrhenius equation, integrated rate laws. Electrochemistry: introduction to electrochemical cells, electrolytic cells-products of electrolysis-Faraday's lawindustrial applications, galvanic cells-electrochemical potentials-batteries. Spectroscopy: mass, vibrational, nuclear magnetic resonance, color theory

of transition metals. Molecular orbitals: molecular orbital theory for diatomic molecules, bond order, para-/dia-magnetism. Molecular geometry: Lewis structure, VSEPR theory, hybridization. Atomic orbitals symmetry and chemical reactions- Woodward-Hoffmann rules.

(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 education, communication with students*	
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.*	Final writing test at the end of semester (questions and problems solving)

Activity	***Semester workload***
Lectures	39
Tutorials	13
Student's study hours	30
Exam	3
Course total	***85***

(5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

- Related academic journals:

-General Chemistry, Darell Ebbing & Steven Gammon, Greek translation Publisher TRAVLOS & SIA OE (2002)

-Physical Chemistry-Basic approach, Written in Greek, N. A. Katsanos, 3rd edition, Publisher PAPAZISI (1990)

-SOLVED PROBLEMS IN GENERAL AND INORGANIC CHEMISTRY: atomic structure-chemical bonding- molecular geometry, Written in Greek, N. Klouras, Publisher PAPAZISI (1985)

-Chemistry & Chemical Reactivity, Kotz & Purcell, 2nd edition, Saunders College Publishing (1991)