ETY105 - Laboratory of General Chemistry

COURSE OUTLINE

(1) GENERAL

SCHOOL	SCHOOL OF ENGINEERING		
ACADEMIC UNIT	DEPARTMENT OF MATERIALS SCIENCE AND ENGINEERING		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	ETY105	**SEMESTER**	1
COURSE TITLE	Laboratory of General 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**
Laboratory exercises, Lectures	4	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	YES
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*

- **Learning outcomes:**

In this Laboratory the aim is to learn the methods of laboratory chemical analysis related to the determination of atomic weight, acid-base titration, hydrolysis, oxidation and reduction, the activity of metals and electronegativity, the chemical equilibrium, the chemical reactions, galvanic elements, and molecular and crystalline standards. These exercises are internationally and widely accepted and known and are taught in the first semester of studies in the Departments of Chemistry and Chemical Engineering.

- **Skills** (ie problem solving, transferring existing knowledge and acquired skills to new situations):

This Laboratory is the first laboratory of the students of the Department at the University, and thus plays a role, that of their introduction and initiation in the chemical laboratory and in the

learning of laboratory chemical analysis methods as a cornerstone of Materials Engineering. Understanding the simple experiments of general and inorganic chemistry is a prerequisite for further investigation and interpretation of the complex problems of Engineering and Materials Science after their studies, until the last year and their dissertation. For this reason, the Laboratory has been placed in the Curriculum in the 1st semester. Many of the exercises taught in this Laboratory will be encountered again in subsequent workshops (in another form, of course) or courses, and so their reference to this Lab is absolutely necessary to be able, in the coming semesters, to they can follow and understand the concepts they will then learn. Thus, regarding the ability of *Analysis*, the student must be able (ie, expected to be able) to distinguish the distinct components of the knowledge acquired from this laboratory and to fully understand the organizational structure as taught in this course; regarding the ability of *Composition*, the student must be able (that is, expected to be able) to create, compose, organize but also to propose and revise this knowledge, not only per se from the same course, but mainly by using data from other courses in the same year, but also to be excellently prepared to do the same in subsequent years but also in practical exercises in older years; and regarding the ability in *Assessment*, the student must be able (that is, expected to be able) to make evaluative judgments regarding this knowledge, in the sense of comparison, drawing conclusions, of their judgment, evaluation and support, especially in the practice of his profession, as a Materials Engineer, when it will require the use of this knowledge.

- **Competences**: (ie a combination of understanding and application):

Regarding *Understanding*, the student must be able (that is, expected to be able) to distinguish, explain, evaluate and conclude the value and importance of the above knowledge from each Laboratory Exercise as necessary basic concepts of Chemistry and the Principles of Chemistry for its introduction to them and especially for the importance of Chemistry in the field of Materials Engineering, and regarding the *Application*, the student must (ie must be able) to use this knowledge beyond the narrow context of this course, and specifically in the context of the challenges it will face in practicing the profession of Materials Engineer, in industry or in research.

The teaching of the course, in the Laboratory, with questions and discussion during it as well as with assignments given (as homework) as well as the evaluation of the students are done in such a way as to satisfy all the above learning outcomes, one by one and in a completely distinct way, ie exactly what the student is expected to be able to do when he / she successfully completes this course, as well as the knowledge he / she will acquire.

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…*
	…….

- 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
- Production of new research ideas
- Respect for the natural environment
- Criticism and self-criticism

- Production of free, creative and inductive thinking

(3) SYLLABUS

The course includes theoretical lessons and laboratory exercises. The course content is concentrated in the following sections:
Laboratory exercises:
1. Experimental determination of atomic weight of a metal.
2. Titration of strong acid with strong alkali solutions.
3. Hydrolysis.
4. Oxide-reduction reactions.
5. Electronegativity of metals.
6. Chemical Equilibrium.
7. Spectroscopic techniques.
8. Molecular and crystal models.
9. Kinetics of chemical reactions.
10. Batteries (galvanic cells).

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face-to-face in the Laboratory and in the classroom before entering the Laboratory to teach the theory of each laboratory exercise.
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*	

Activity	*Semester workload*
Laboratory exercises	39
Teaching	13
Homework (analysis of experimental results)	30
Non-directed study for studying and preparing next laboratory exercise to successfully pass the test on the previous and the forthcoming laboratory exercise, including the safety measures in the laboratory.	30
Non-directed study for final exams preparation	38
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,*	LANGUAGE OF EVALUATION: Greek METHOD OF EVALUATION: (i) Performance in the Laboratory (accuracy of the

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.*	obtained results, diligence, following the safety measures). (ii) On a weekly basis, tests with short-answer questions on previous laboratory exercises and the forthcoming laboratory exercise. (iii) On a weekly basis, written report with the analysis and discussion of the experimental results obtained in the previous laboratory exercise. (iv) Final written examination.

(5) ATTACHED BIBLIOGRAPHY

-Suggested bibliography (in Greek):

- M. Louloudi, S. Hatzikakou, S. Hatziliadis, Laboratory Exercises of General and Inorganic Chemistry, (960-90958-0-1, ISBN 148946), Ioannina, 2000.
- P. Akrivos, P. Karagiannidis, Laboratory Exercises of General and Inorganic Chemistry, (960-4315560, ISBN 11008), Ziti Ed., Thessaloniki, 2000.
- N. Andrikopoulos, laboratory Exercises of general Chemistry (960-87371-4-1, ISBN 13973), Ed. A Mpistikea.

-Related academic journals:

This Laboratory discipline is introductory and generic and therefore, there are not specific scientific journals on it.