

Module Outline of CHEMISTRY LABORATORY (ETHEX)

1. GENERAL

SCHOOL	SCHOOL OF SCIENCE AND TECHNOLOGY		
PROGRAMME	Studies in Natural Sciences		
LEVEL OF STUDIES	Level 6 of the Hellenic and European Qualifications Framework		
MODULE CODE	ETHEX (ETHEXI and ETHEXII)	YEAR	2 nd and 3 rd
MODULE TITLE	CHEMISTRY LABORATORY		
INDEPENDENT TEACHING ACTIVITIES <i>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</i>		HOURS	CREDITS
Weekly workload distance learning: 9-10 hours x 26 weeks Weekly workload in person learning: 40 hours x 2 weeks		336 (28 hours/ECTS)	12 ECTS
MODULE TYPE <i>Compulsory/Elective/ Mandatory Optional</i>	Compulsory of 2 cycles		
MODULE DESCRIPTION <i>general background, special background, specialised, general knowledge, skills development</i>	general background, skills development		
PREREQUISITE MODULES	Simultaneous attendance or completion of FYE22 module is required for ETHEXI and simultaneous attendance or completion of FYE30 module is required for ETHEXII		
LANGUAGE OF INSTRUCTION and EXAMINATIONS	Greek		
IS THE MODULE OFFERED TO ERASMUS STUDENTS	No		
MODULE WEBSITE (URL)	ETHEXI https://www.eap.gr/en/undergraduate/studies-in-natural-sciences/studies-in-physical-sciences-topics/#ethehi ETHEXII https://www.eap.gr/en/undergraduate/studies-in-natural-sciences/studies-in-physical-sciences-topics/#ethehii The Module has its own space in the digital learning environment of HOU (https://study.eap.gr/login/index.php) with controlled access (using a code) for students and Teaching Staff.		

2. LEARNING OUTCOMES

Learning outcomes

The learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the Module 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

Knowledge:

Upon successful completion of the Module, students are expected to:

- state laboratory safety rules
- describe and understand basic principles and laws of Chemistry
- state the factors that determine the route of chemical reactions
- describe basic laboratory techniques and equipment used in chemical experiments
- recognize and describe the instrumentation and basic principles of operation of various scientific instruments used in Chemistry

Skills:

Upon successful completion of the Module, students are expected to:

- handle laboratory equipment, such as glassware, scientific instruments and other laboratory devices related to Chemistry
- handle chemicals and chemical reagents
- synthesize and characterize chemical compounds
- perform basic laboratory procedures, such as weighing, preparation of solutions, centrifugation, filtration, extraction, titration, recrystallization, distillation, etc.
- perform measurements of physicochemical parameters
- prepare laboratory reports and scientific reports
- collaborate effectively in small groups to carry out experimental activities

Competences:

Upon successful completion of the Module, students are expected to:

- apply laboratory safety rules
- apply theoretical knowledge of Chemistry in practical experiments
- evaluate and statistically process experimental results, identifying possible sources of error
- conduct experiments related to the subjects of Chemistry, specifically Inorganic Chemistry, Organic Chemistry, Physical Chemistry and Analytical Chemistry
- determine various experimental quantities in the above subjects
- perform qualitative and quantitative analyses
- implement experimental protocols in Chemistry
- develop scientific thinking in combination with experimental methodology
- analyze and interpret experimental results using appropriate calculations and graphs

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 Module aim?

<i>Search for, analysis and synthesis of data and information, with the use of the necessary technology</i>	<i>Project planning and management</i>
<i>Adapting to new situations</i>	<i>Respect for difference and multiculturalism</i>
<i>Decision-making</i>	<i>Respect for the natural environment</i>
<i>Working independently</i>	<i>Showing social, professional and ethical responsibility and sensitivity to gender issues</i>
<i>Team work</i>	<i>Criticism and self-criticism</i>
<i>Working in an international environment</i>	<i>Production of free, creative and inductive thinking</i>
<i>Working in an interdisciplinary environment</i>	
<i>Production of new research ideas</i>	

The general skills that the students will acquire are:

- Search for, analysis and synthesis of data and information, with the use of the necessary technology
- Adapting to new situations
- Decision-making
- Working independently
- Production of free, creative and inductive thinking

3. SYLLABUS

Purpose of Module

The purpose of ETHEX is the laboratory training of the program students in the principles, methods, scientific instruments and applications of General and Inorganic Chemistry, Analytical Chemistry, Physical Chemistry and Organic Chemistry. It aims at the significant hands on familiarization of the student with the laboratory and experimental equipment related to the above covered subjects and at its proper and effective use. It also aims to understand the basic principles, concepts and phenomena of Chemistry through the application of the theoretical knowledge acquired in the implementation of specific experimental protocols.

Subjects covered

- General and Inorganic Chemistry
- Analytical Chemistry
- Physical Chemistry
- Organic Chemistry

4. TEACHING and LEARNING METHODS - EVALUATION

DELIVERY <i>Face-to-face, Distance learning, etc.</i>	- Distance teaching and learning with five (5) Group Counseling Meetings (GCMs) of 2-hour duration during the academic year - 5-day in-person laboratory training with eight hours of daily laboratory practice per laboratory cycle (I and II). - Personal communication and feedback (advisory role of Adjunct Faculty).												
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY <i>Use of ICT in teaching, laboratory education, communication with students</i>	<u>During GCMs and teaching the following are used:</u> - Remote meetings tools (webex, Teams), - Presentation software (PowerPoint, educational video - animations etc.), - Specialized software/databases for the subjects under study (e.g. tools for statistical processing of data, creation of graphs, etc.). In addition, students - use office automation tools, web browsers and e-reader for digital books. - watch electronic educational material (webcasts and experiment videos) which are posted on the educational platform <u>Communication with the students is supported by:</u> - The digital platform of HOU (https://study.eap.gr/login/index.php) (course information, educational material posts, announcements, messages, examination results, user groups, discussion forums etc.). - e-mail												
TEACHING METHODS <i>The manner and methods of teaching are described in detail.</i> <i>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.</i> <i>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</i>	<table border="1"> <thead> <tr> <th>Activity</th><th>Year Workload</th></tr> </thead> <tbody> <tr> <td>10 GCMs (x 2 hours)</td><td>20</td></tr> <tr> <td>10 days of in person laboratory training and examination (x 8 hours)</td><td>80</td></tr> <tr> <td>Individual Study time</td><td>136</td></tr> <tr> <td>Self-evaluation activities - quizzes (10x10 hours)</td><td>100</td></tr> <tr> <td>Total Workload</td><td>336</td></tr> </tbody> </table>	Activity	Year Workload	10 GCMs (x 2 hours)	20	10 days of in person laboratory training and examination (x 8 hours)	80	Individual Study time	136	Self-evaluation activities - quizzes (10x10 hours)	100	Total Workload	336
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Total Workload	336												
STUDENT PERFORMANCE EVALUATION <i>Description of the evaluation procedure</i> <i>Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written</i>	Students' evaluation – Grade assessment of a Module: - Five (5) multiple-choice (quiz) educational activities (Q) in each cycle, the average of which participates in the final grade of each cycle of the module with a weighting factor of 30%. - In-person laboratory training in each cycle at the end of the academic year. The average score in the in-person laboratory exercises (E) of each cycle participates in the final grade of each cycle of the module with a weighting factor of 70%.												

<i>work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other</i> <i>Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</i>	The score of the Qs is activated only with an average score equal to or above the base (≥ 5) and provided that more than half of the Qs per laboratory cycle have been completed. The Final Grade of the module is obtained as the average of the final grades of the two cycles of the module. The detailed evaluation method is posted in the Laboratory Regulation in the module website. Language of evaluation: Greek
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5. ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

Chemistry Laboratory Exercises, Volume 1, Hellenic Open University, Patras 2003.
 Chemistry Laboratory Exercises, Volume 2, Hellenic Open University, Patras 2008.
 Atomic Structure, Periodic Table, Properties of Atoms, Hellenic Open University, Patras 2008.
 Chemical Bond, Hellenic Open University, Patras 2008.
 Chemistry of Aqueous Solutions, Hellenic Open University, Patras 2008.
 The Representative Elements and Their Compounds, Hellenic Open University, Patras, 2008
 Transition Elements and Coordination Compounds, Hellenic Open University, Patras 2008.
 Chemical Thermodynamics, Hellenic Open University, Patras 2008.
 Chemical Kinetics, Part 1, Hellenic Open University, Patras 2008.
 Chemical Kinetics, Part 2, Hellenic Open University, Patras 2008.
 Electrochemistry, Hellenic Open University, Patras 2008.
 Statistical Thermodynamics, Hellenic Open University, Patras 2001.
 Spectroscopy, Hellenic Open University, Patras 2001.
 Homologous Series, Stereochemistry and Mechanisms of Organic Reactions, Volume A, Hellenic Open University, Patras 2002.
 Homologous Series, Stereochemistry and Mechanisms of Organic Reactions, Volume B, Hellenic Open University, Patras 2001.
 Spectroscopy of Organic Compounds, Hellenic Open University, Patras 2000.
 Biomolecules: Structure and Functionality, Hellenic Open University, Patras 2000.

- Related academic journals:

Journal of the American Chemical Society (JACS)
 Angewandte Chemie International Edition
 Nature Chemistry
 Chemical Science
 Inorganic Chemistry (American Chemical Society)
 Inorganic Chemistry Frontiers (Royal Society of Chemistry)
 Dalton Transactions (Royal Society of Chemistry)
 Journal of Chemical Education (American Chemical Society)
 Journal of Physical Chemistry
 Physical Chemistry Chemical Physics
 ChemPhysChem
 The Journal of Organic Chemistry
 Organic Letters
 European Journal of Organic Chemistry
 Organic & Biomolecular Chemistry
 Tetrahedron
 Current Organic Chemistry
 Analytical Chemistry
 Analytica Chimica Acta
 Talanta