UNIVERSITY OF PATRAS
SCHOOL OF HEALTH SCIENCES
DEPARTMENT OF PHARMACY
UNDERGRADUATE STUDIES' COURSES

COURSE DESCRIPTION: **ANALYTICAL CHEMISTRY**
COURSE CODE: **PHA-A21-NEW**

ANALYTICAL CHEMISTRY
COURSE DESCRIPTION

1. GENERAL

SCHOOL	HEALTH SCIENCES		
SEPARTMENT	PHARMACY		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	**PHA-A21-NEW**	**SEMESTER OF STUDIES**	**2nd**
COURSE TITLE	ANALYTICAL CHEMISTRY		

INDEPENDENT TEACHING ACTIVITIES	**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
Lectures	4	5
Tutorial	2	
Laboratory courses	4	

COURSE TYPE	Scientific Field course
PREREQUISITE COURSES:	-
TEACHING AND ASSESSMENT LANGUAGE:	Greek
THE COURSE IS OFFERED TO ERASMUS STUDENTS	Yes [Instructed/Guided self study in english for Erasmus+ Students]
COURSE WEBPAGE (URL)	http://www.pharmacy.upatras.gr/images/DS/PHA-A21-EN.pdf

2. LEARNING OUTCOMES

Learning Outcomes
This course aims at acquiring knowledge, skills and competences related to Level 6 of the European Qualifications Framework for Lifelong Learning: Specifically, upon successful completion of the course, the students are expected to: 1. have valid knowledge and comprehension of the fundamental principles of Qualitative and Quantitative Analytical Chemistry 2. have acquaintance with the basic strategies of inorganic analysis and be in a position to plan new ones on demand. 3. have acquired laboratory skills concerning the basic techniques in the field, like preparation of solutions and buffers, precipitation, volumetric analysis
GENERAL ABILITIES
Data and information searching, analysis and combination, using the appropriate technologies and databases Individual work Respect and protection to the natural environment

3. COURSE CONTENT

Lectures

Introduction to Analytical Chemistry - Chemistry of Solutions
- -Syllabus Concepts & Methods of Analysis
- -Qualitative & Quantitative Analysis in Aqueous Chemistry
- -Definitions, Applications

Inorganic Qualitative Semi-Microanalysis
- - Analytical Reagents in Inorganic Qualitative Analysis
- - Testing Methods
- - Cation Analysis - Fresenius System
  - -Reactions of selected Elements & Cations
  - -Separation & Identification of Cation Groups I, II, III, IV and V
- -Anion Analysis
  - - Methods of exclusion - Incompatible Anions.
  - - Reactions of characteristic anions of biological interest

Inorganic Quantitative Analysis
- - Characteristics of Analytical Methods (standard solutions, linear region finding, quantification and detection limits, repeatability, accuracy, expression of results)
- - Description of different types of chemical reagents and basic glassware and instruments - Calibration of volumetric utensils.
- - The scales: precision and weighing errors.
- - Laboratory safety: Basic rules. Good laboratory practice
- - Basic techniques necessary in the chemical laboratory (sampling, solubilization, heating of solutions, filtration, washing and transfer of sediment, drying, burning, sediment formation and contamination, crystalline sedimentation techniques, titration)
- - Gravimetric analysis (introduction-general analysis course-expression of results)
  - - Determination of iron and aluminum
- - Volumetric analysis (introductory concepts, primary and secondary standard solutions, titration, equivalent and end point titration, Different endpoint finding techniques)
  - -Acid-Base titrations. (Determination of sodium carbonate. Analysis of a mixture of carbonates and bicarbonates)
  - - Redox volumetric analysis. (Determination of oxalate with permanganate)
  - - Iodimetry-Iodometry (Copper determination)
  - - Precipitation volumetric analysis (Determination of chloride and silver)
  - - Complexometric titrations. Ethylene diamine tetraacetic acid (EDTA) chelating agent. Determination of water' hardness

Laboratory Exercises

Introduction to the Chemical Laboratory - Instrument & Glass Handling - Safety Regulations and Measures - Precautions

General Chemistry Exercises
- - Preparation of Solution-Dilution-pH Measurement
- - Complexes: Preparation of Cu $(NH3)_4$ $SO_4 \bullet H_2O$, Preparation of $Ni(DMG)_2$
- - Alums: Preparation & Analysis of K-Al alum

Qualitative analysis
- - Cations Analysis
  - - Analysis of I Analytical Group (Known & Unknown Sample), Systematic Cation Analysis
- - Cations Analysis, Determination of SO_3^{2-}

Quantitative analysis -Volumetric Analysis
- - Acid-Base Titrations
  - -Determination of Na_2CO_3 (Known - Unknown)
  - -Determination of aspirin in commercial tablets
- - Complexometric Reactions
  - - Water Hardness Determination (Known & Unknown Sample)

4. TEACHING AND LEARNING METHODS - ASSESSMENT

Teaching method	Face to face
Use of information and communication technologies	• The teaching and learning process is supported by the Upatras e-class platform. The teaching material (lectures, tutorials, laboratory experimental protocols) is uploaded and stored on the e-class and it is freely accessible to all students. • Teaching process is supported by Information and Communication Technologies (ICTs).
Teaching organization	***Teaching Method*** — ***Semester Workload*** Lectures — 52 Laboratory Work + Tutorials — 36 Un-supervised study — 37 ***Total number of hours for the Course*** **(25 hours of work-load per ECTS credit) — 125**
STUDENT ASSESSMENT	Assessment language: Greek 1) Assessment of learning of laboratory skills and methods by oral and written tests during laboratory sessions and final written exams with questions of development, judgment and solving of problems 2) Final Written Exams: Multiple choice questions, short answer questions and matching questions. Grade of #1 counts for 40% of the final grade.

5. RECOMMENDED LITERATURE

Suggested Books: (in greek)

1. Θ. Π. Χατζηιωάννου. Χημική Ισορροπία και Ανόργανη Ποιοτική Ημιμικροανάλυση. 6η έκδοση. Ε. Χατζηιωάννου. Αθήνα 1993
2. Θ. Π. Χατζηιωάννου. Εργαστηριακαί Ασκήσεις Ποσοτικής Αναλυτικής Χημείας 7η έκδοση Ε. Χατζηιωάννου. Αθήνα 1990
3. Ι. Στράτης, Γ. Ζαχαριάδης, Α. Βουλγαρόπουλος. Εργαστηριακές Μέθοδοι Ποσοτικής Χημικής Ανάλυσης. 1η έκδοση. Εκδόσεις Ζήτη Πελαγία και Σία Ο.Ε.. Αθήνα 2000
4. Δ.Γ. Θέμελης, Γ.Α. Ζαχαριάδης. ΑΝΑΛΥΤΙΚΗ ΧΗΜΕΙΑ.Εκδόσεις ΖΗΤΗ, Θεσσαλονίκη 1997
5. Σ. Λιοδάκης. Αναλυτική Χημεία: Θέματα και Προβλήματα. Εκδόσεις Παπασωτηρίου. Αθήνα 2001.