



UNIVERSITY OF  
**PATRAS**  
ΠΑΝΕΠΙΣΤΗΜΙΟ ΠΑΤΡΩΝ

DEPARTMENT OF PHARMACY

SCHOOL OF HEALTH SCIENCES

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



COURSE DESCRIPTION: **SEPARATION METHODS - ELECTROANALYTICAL TECHNIQUES**  
COURSE CODE: **PHA-C21-NEW**

**SEPARATION METHODS - ELECTROANALYTICAL TECHNIQUES  
COURSE DESCRIPTION**

**1. GENERAL**

<b>SCHOOL</b>	HEALTH SCIENCES		
<b>SEPARTMENT</b>	PHARMACY		
<b>LEVEL OF COURSE</b>	UNDERGRADUATE		
<b>COURSE CODE</b>	<b>PHA-C21-NEW</b>	<b>SEMESTER OF STUDIES</b>	<b>6th</b>
<b>COURSE TITLE</b>	SEPARATION METHODS - ELECTROANALYTICAL TECHNIQUES		
<b>INDEPENDENT TEACHING ACTIVITIES</b>	<b>TEACHING HOURS PER WEEK</b>	<b>ECTS CREDITS</b>	
Lectures	4	6	
Laboratory practice	3		
<b>COURSE TYPE</b>	Scientific Field course		
<b>PREREQUISITE COURSES:</b>	-		
<b>TEACHING AND ASSESSMENT LANGUAGE:</b>	Greek		
<b>THE COURSE IS OFFERED TO ERASMUS STUDENTS</b>	Not offered		
<b>COURSE WEBPAGE (URL)</b>	<a href="http://www.pharmacy.upatras.gr/images/DS/PHA-C21-EN.pdf">http://www.pharmacy.upatras.gr/images/DS/PHA-C21-EN.pdf</a>		

**2. LEARNING OUTCOMES**

<b>Learning Outcomes</b>
<p>Student familiarizes himself with Electrochemical Instrumental Analysis Techniques and Separation Techniques with emphasis on the relevant analytical techniques used in Pharmacopoeia for the control of raw materials and excipients and formulations. Specifically upon successful completion of the course the student is expected to have developed level 6 skills in the following subjects:</p> <ul style="list-style-type: none"> <li>• Ability to choose the proper separation technique for separating solvent mixtures. Identification and quantification of the individual components of a liquid or solid sample using a variety of chromatographic techniques with emphasis on pharmaceutical formulations and samples of biological interest.</li> <li>• Ability to choose and use between potentiometric and voltammetric electro-analytical techniques for the identification and quantification of ions as well as pharmaceutically active compounds in preparations and samples of biological interest.</li> </ul>
<b>General Abilities</b>
<ol style="list-style-type: none"> <li>1. Data analysis using the necessary technologies</li> <li>2. Independent work</li> <li>3. Group work</li> </ol>

### 3. COURSE CONTENT

#### Lectures

#### Separation Techniques:

1. Extraction methods, countercurrent extraction
2. Liquid chromatography, theory of chromatography, mechanism of retention. Chromatography of partition, adsorption, ion exchange, affinity, exclusion, chiral. Instrumentation with emphasis to detectors. Applications on pharmaceutical analysis problems
3. Supercritical chromatography
4. Gas chromatography

#### Electrochemical and Bioelectrochemical methods of analysis:

1. Potentiometry: Ion selective and enzyme electrodes
2. Conductivity techniques
3. Amperometric techniques
4. Voltammetry with emphasis on Polarographic techniques and cyclic voltammetry

#### Laboratory Exercises

- Potentiometry: Quantitative determination of the active pharmaceutical ingredient «acetylsalicylic acid» in «Aspirin®» tablets.
- Potentiometry: Quantitative determination of the admixture (Cl-) in active pharmaceutical ingredient «Chlorothiazide».
- Voltammetry: Quantitative determination of the active pharmaceutical ingredient «Diazepam» with Differential Pulse Polarimetry.
- Ion Exchange: Determination of the NaCl concentration in saline.
- High Performance Liquid Chromatography: Separation and quantitative determination of the active ingredients of «Panadol Extra®» tablet.

### 4. TEACHING AND LEARNING METHODS - ASSESSMENT

<b>Teaching method</b>	In class and laboratory on hands training	
<b>Use of information and communication technologies</b>	Learning using e-class platform, Software for data acquisition, software for data processing	
<b>Teaching organization</b>	<b>Teaching Method</b>	<b>Semester Workload</b>
	Lectures	52
	Practical Lab Exercises	14
	Group class for data processing and lab reports	20
	Autonomous study	64
	<b>Total number of hours for the Course (25 hours of work-load per ECTS credit)</b>	<b>150</b>

<b>STUDENT ASSESSMENT</b>	<p>I. Final written examination (50%) including:</p> <ul style="list-style-type: none"><li>- Questions of brief development</li><li>- Questions for judgement</li><li>- Problem solving.</li></ul> <p>II. Laboratory exercises (50%) including.</p> <ul style="list-style-type: none"><li>- Lab experiments</li><li>- Group report on each experiment (data processing, discussion of results)</li><li>- Written exam</li></ul>
---------------------------	---

## 5. RECOMMENDED LITERATURE

### ***Suggested Books:***

1. Instrumental Analysis, Th. P. Chatzioannou and M. Koupparis , Athens 2014 (in Greek)
2. Instrumental Chemical Analysis, I .Papadogiannis and B. Samanidou, 2<sup>nd</sup> Ed. Thessaloniki, 2011 (in Greek).
3. Pharmaceutical Analysis, D.G. WATSON, Parisianos, 2011 (Translated in Greek by M. Koupparis et. al).
4. Principles of Instrumental Analysis, D. A. Skoog, F. James Holler, S. R. Crouch, Kostarakis, 2016 (Translated in Greek by M. Karagiannis and K. Eustathiou)