



UNIVERSITY OF  
**PATRAS**  
ΠΑΝΕΠΙΣΤΗΜΙΟ ΠΑΤΡΩΝ

DEPARTMENT OF PHARMACY

SCHOOL OF HEALTH SCIENCES

UNIVERSITY OF PATRAS  
SCHOOL OF HEALTH SCIENCES  
DEPARTMENT OF PHARMACY  
POSTGRADUATE PROGRAM: **DRUG DESIGN AND DEVELOPMENT**

COURSE TITLE: PHARMACEUTICAL ANALYSIS - BIOSPECTROSCOPY  
CODE: DPHA\_3

**PHARMACEUTICAL ANALYSIS - BIOSPECTROSCOPY  
COURSE OUTLINE**

**1. GENERAL**

<b>SCHOOL</b>	HEALTH SCIENCES		
<b>ACADEMIC UNIT</b>	DEPARTMENT OF PHARMACY		
<b>PARTICIPATING INSTITUTIONS</b>	-		
<b>TITLE of POSTGRADUATE PROGRAM</b>	DRUG DESIGN AND DEVELOPMENT		
<b>LEVEL</b>	POSTGRADUATE		
<b>COURSE CODE</b>	DPHA-3	<b>SEMESTER</b>	A'
<b>COURSE TITLE</b>	PHARMACEUTICAL ANALYSIS - BIOSPECTROSCOPY		
<b>INDEPENDENT TEACHING ACTIVITIES</b>	<b>WEEKLY TEACHING HOURS</b>	<b>CREDITS</b>	
Courses	5	8	
<b>COURSE TYPE</b>	Special Background		
<b>PREREQUISITE COURSES</b>	None		
<b>LANGUAGE of INSTRUCTION and EXAMINATIONS</b>	Greek		
<b>COURSE OFFERED to ERASMUS STUDENTS</b>	No		
<b>COURSE (URL)</b>	<a href="http://www.pharmacy.upatras.gr/images/DS/DPHA_3_EN.pdf">http://www.pharmacy.upatras.gr/images/DS/DPHA_3_EN.pdf</a>		

**2. LEARNING OUTCOMES**

<b>Learning Outcomes</b>
<p>The student will be introduced to Spectroscopic and Separation Techniques of Instrumental Analysis with emphasis on the relevant analytical techniques used in Pharmacopoeias for the control of raw drug materials, excipients and finished drug products as well as in the analysis of biological fluids. Specifically, upon successful completion of the course the student is expected to have developed level 7 skills in the following topics:</p> <ol style="list-style-type: none"> <li>Ability to select and use the appropriate analytical spectroscopical technique for the identification and quantification of individual components of liquid or solid samples according to the nature of the analyte.</li> <li>Ability to select the select and develop the appropriate separation technique for separation of a mixture of compounds and composition analysis with the purpose of identification and quantification of the individual components of a liquid or solid sample.</li> </ol>

**General Competences**

- Search for, analysis and synthesis of data and information, with the use of the necessary technology
- Working independently
- Team work
- Decision-making
- Production of new research ideas

**3. SYLLABUS****LECTURES**

1. Characteristics of analytical methods - Standard solutions - Validation process - Critical regulatory requirements from the Pharmacopoeia
2. Visible-UV spectroscopy: introduction, electromagnetic spectrum, absorption laws and limitations, instrument design and operating principle, chromophore concept, fluorescence.
3. IR, ATR and micro-IR spectroscopy: basics - molecular vibrations, vibrational frequency, factors affecting vibrational frequencies, sampling techniques, instrumentation, spectrum interpretation, FT-IR, theory and applications.
4. Raman and micro-Raman spectroscopy: Fundamentals - sampling techniques, instrumentation, spectrum interpretation, theory and applications.
5. Fluorescence spectroscopy: Fundamentals, instrumentation, spectrum interpretation, theory and applications.
6. Cyclic dichroism: Fundamentals, instrumentation, spectrum interpretation, theory and applications.
7. Mass Spectrometry: Theory, ionization techniques: electron ionization, chemical ionization, field ionization, fast atom bombardment, plasma ejection, fragmentation process: analysis, spectrum interpretation and applications of structure identification and determination.
8. Sample preparation for separation techniques
9. Electrophoresis: Theory, various techniques (e.g. on paper, on gel, capillary electrophoresis, etc.) and experimental setups.  
Applications in drug analysis.
10. Thin layer chromatography: Theory, simple and automated experimental setups and applications.
11. Liquid and gas chromatography (LC and GC): theory, basic instrumentation and different detection techniques and modes with emphasis on mass spectrometry.  
Applications in pharmaceutical analysis.

## 4. TEACHING and LEARNING METHODS - EVALUATION

<b>DELIVERY</b>	Face to face										
<b>USE of INFORMATION and COMMUNICATIONS TECHNOLOGY</b>	Learning process support through the e-class platform										
<b>TEACHING METHODS</b>	<table> <thead> <tr> <th><i>Activity</i></th> <th><i>Semester Workload</i></th> </tr> </thead> <tbody> <tr> <td>Interactive teaching</td> <td>65</td> </tr> <tr> <td>Study and Analysis of Bibliography</td> <td>70</td> </tr> <tr> <td>Project</td> <td>65</td> </tr> <tr> <td><b>Course Total (25 hours of work-load per ECTS credit)</b></td> <td><b>200</b></td> </tr> </tbody> </table>	<i>Activity</i>	<i>Semester Workload</i>	Interactive teaching	65	Study and Analysis of Bibliography	70	Project	65	<b>Course Total (25 hours of work-load per ECTS credit)</b>	<b>200</b>
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Interactive teaching	65										
Study and Analysis of Bibliography	70										
Project	65										
<b>Course Total (25 hours of work-load per ECTS credit)</b>	<b>200</b>										
<b>STUDENT PERFORMANCE EVALUATION</b>	<p>Language of Evaluation: Greek</p> <p>1. Written final examination (80%) including</p> <ul style="list-style-type: none"> <li>- Short development questions</li> <li>- Questions of a critical nature</li> <li>- Problem solving</li> </ul> <p>2. Assignment - Presentation of an analytical problem from the international literature (20%)</p>										

## 5. RECOMMENDED BIBLIOGRAPHY

**Suggested Bibliography:**

1. ΕΝΟΡΓΑΝΗ ΑΝΑΛΥΣΗ, ΘΕΜΙΣΤΟΚΛΗΣ Π. ΧΑΤΖΗΓΩΑΝΝΟΥ, ΜΙΧΑΗΛ Α. ΚΟΥΠΠΑΡΗΣ , 2014
2. ΕΝΟΡΓΑΝΗ ΧΗΜΙΚΗ ΑΝΑΛΥΣΗ, Ι. ΠΑΠΑΔΟΓΙΑΝΝΗΣ-Β. ΣΑΜΑΝΙΔΟΥ, 2<sup>η</sup> Έκδοση, Θεσσαλονίκη, 2011.
3. Φαρμακευτική ανάλυση, D.G. WATSON, , Επιμέλεια Ελληνικής Έκδοσης: Μ. Κουμπάρης, Εκδόσεις Παρισιάνου, 2011.
4. ΘΕΜΕΛΙΩΔΕΙΣ ΑΡΧΕΣ ΑΝΑΛΥΤΙΚΗΣ ΧΗΜΕΙΑΣ, ΣΚΟΟΓ, D. A. Skoog, D. M. West, F. James Holler, S. R. Crouch, Επιμέλεια Ελληνικής Έκδοσης: Μ. Ι. Καραγιάννης, Κ. Η. Ευσταθίου, Εκδόσεις Κωσταράκη, 2016