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

COURSE DESCRIPTION: **SPECTROSCOPY**
COURSE CODE: **PHA-C14-NEW**

SPECTROSCOPY
COURSE DESCRIPTION

1. GENERAL

SCHOOL	HEALTH SCIENCES		
SEPARTMENT	PHARMACY		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	**PHA-C14-NEW**	**SEMESTER OF STUDIES**	**5th**
COURSE TITLE	SPECTROSCOPY		

INDEPENDENT TEACHING ACTIVITIES	**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
Lectures	4	7
Laboratory practice	3	

COURSE TYPE	Scientific Field course
PREREQUISITE COURSES:	-
TEACHING AND ASSESSMENT LANGUAGE:	Greek
THE COURSE IS OFFERED TO ERASMUS STUDENTS	Not offered
COURSE WEBPAGE (URL)	http://www.pharmacy.upatras.gr/images/DS/PHA-C14-EN.pdf

2. LEARNING OUTCOMES

Learning Outcomes
Student familiarizes himself with the spectroscopic / spectrometric techniques (Raman, IR, UV / Vis, fluorescence spectrometry, NMR, MS, XRD) with emphasis on the analytical techniques that are mentioned in the Pharmacopoeia and used by pharmaceutical; companies for quality control of raw material, excipients and formulations. Specifically upon successful completion of the course the student is expected to have developed level 6 skills in the following subjects: Ability to choose and use the appropriate Spectroscopic / spectrometric technique for identification and quantification of liquid and/or solid samples with emphasis on pharmaceutical products and samples of biological origin.
General Abilities
1. Data analysis using the necessary technologies. 2. Independent work. 3. Group work.

3. COURSE CONTENT

1. Introduction to spectroscopic techniques for analysis
2. UV/Vis spectrometry
3. IR and Raman spectrometry
4. fluorescence spectrometry
5. Elemental Analysis techniques (Atomic Absorption and Emission spectrometry, ICP-MS, ICP-OES, XRF)
6. Nuclear magnetic resonance spectroscopy
7. Mass spectrometry: Ionization methods, explanation of mass spectra, connection to chromatography, detectors. Applications to pharmaceutical analysis
8. X-ray diffraction

Laboratory Exercises

- UV/Vis Spectrometry: Quantitative determination of active ingredients in pharmaceutical formulations: a) «acetylsalicylic acid» in «Aspirin®» tablets; b) «paracetamol» in «Depon®» tablets, c) «paracetamol» and «caffeine» in «Panadol Extra®» tablets, d) «caffeine» in «Caffeine Aguettant®» ampoules.
- Refractometry: a) Determination of sugar content in «Depon®» syrup, b) Determination of the refractive index of the active substance «Glucosamine Sulphate Sodium»
- Fluorimetry: Quantitative determination of the active ingredient «acetylsalicylic acid» in «Aspirin®» tablets
- Infrared spectrometry: Quantitative determination of the active ingredient «acetylsalicylic acid» in «Aspirin®» tablets
- (Proton) Nuclear Magnetic Resonance ^{1}H-NMR: ^{1}H-NMR spectrum acquisition for the active substance «paracetamol».

4. TEACHING AND LEARNING METHODS - ASSESSMENT

Teaching method	In a class	
Use of information and communication technologies	Learning using e-class platform, Software for data acquisition, software for data processing	
Teaching organization	***Teaching Method***	***Semester Workload***
	Lectures	52
	Practical Lab Exercises	26
	Experimental data processing (Department's computer room)	26
	Data Report	20
	Autonomous study	52
	Total number of hours for the Course **(25 hours of work-load per ECTS credit)**	**176**
STUDENT ASSESSMENT	I. Final written examination (50%) including: - Questions of brief development - Questions for judgement - Problem solving.	

	II. Laboratory exercises (50%) including. - Lab experiments - Group report on each experiment (data processing, discussion of results) - Written exam

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, 2nd 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. Efstathiou).