

Course Title	<b>Pharmacognosy II</b>				
Course Code	PHA 312				
Course Type	Compulsory				
Level	BSc (Level 1)/ MPharm (Level 2)				
Year / Semester	3 <sup>rd</sup> , 6 <sup>th</sup> Semester				
Teacher's Name	Dr George A. Karikas				
ECTS	6	Lectures / week	3	Laboratories/week	2
Course Purpose	The aim of this course is to further extend the knowledge acquired from the introductory course of Pharmacognosy I in an earlier semester. More specifically, aim is to study the most important plants and marine organisms used in Pharmacy, Pharmaceutical Industry and Cosmetics. Aim is also the knowledge of methods used for extraction and isolation of the active constituents from the pharmaceutical plants and herbal medicinal products. Students should also be familiar with the Cyprus and Greece medicinal plants.				
Learning Outcomes	<p>By the end of this course, the students should be able to:</p> <ul style="list-style-type: none"> <li>• Identify most of the known common pharmaceutical plants and the main chemical components of selected important medicinal and toxic plants;</li> <li>• Identify the characteristic phytochemical analytical methods for detecting the main chemical constituents of the medicinal plant parts, Distinguish the common adulterations of herbal medicinal products and the methods to control them;</li> <li>• Employ the methods for improving the quality of herbal medicinal products based on the conditions of cultivation (Good Cultivation Practice);</li> <li>• Employ basic principles for the safe use of plants</li> <li>• Explain the common interactions between plants/drugs</li> </ul>				
Prerequisites	PHA311	Corequisites	None		
Course Content	<p>Theory:</p> <ol style="list-style-type: none"> <li>1. Useful value of plants in therapy.</li> <li>2. Traditional therapeutics. Ethnopharmacology</li> <li>3. Herbal preparations, documentation, labeling and legislation of traditional medicines Species and choice of drugs. Roads, administration difficulties. Clinical studies. Pharmacognostic study and research methodologies</li> <li>4. Free radicals, antioxidants. Aromatic and medicinal plants of Cyprus. Uses of common and edible aromatic plants</li> </ol>				

5. EMA 46 selected medicinal plants of therapeutic and economic value (botanical description, phytogeography, active ingredients, mechanism of action, medicinal uses)

6. Functional foods and nutritional supplements

7. Drugs, which cause dependence in the CNS (eratives, opium, cannabis, cocaine, other psychoactive substances)

8. Plants as raw material for the discovery of bioactive therapeutic substances (anticancer, antimalarial, antiviral, antiasthmatic, Alzheimer's disease, antidiabetic)

9. Phytotherapy. Co-administration of herbal/prescription drugs. Effect on pharmacodynamics/pharmacokinetics. Toxic plants. Bioavailability of lipophilic molecules.

10. Bioactive natural products from marine organisms

11. Drug chemistry: Methods of extraction, isolation, chemical and biological identification of new bioactive molecules (solvents, chromatography, mass spectrometry, nuclear magnetic resonance, crystallography, biomethods).

Safe use of herbal medicinal products by the pharmacists and Regulatory Affairs: Directive of EU 2001/83 EC as amended by 2004/24/EC (European Medicines Agency - EMA) and its Committee responsible for Herbals (HMPC- Herbal Medicinal Products Committee).

#### **Laboratory experiments/exercises:**

As part of the course, laboratory exercises are carried out on the course material for a better deepening and consolidation of the theoretical part. Indicative exercises are:

1. Isolation of cinnamaldehyde from cinnamon bark

2. Isolation and quality control of anthraquinones from the fruit of the *Cassia angustifolia* plant

3. Isolation of phenolic compounds from the aerial part of *Thymus vulgaris* plant

4. Construction of gallic acid (GA) standard reference curve for the Folin- Ciocalteu test

5. Qualitative determination of cardenolides in the leaves of *Nerium oleander* L.

6. Isolation of caffeine from tea leaves

7. Final examination

Students also visit a botanical garden where they have the chance to observe plants of known pharmaceutical properties.

<p>Teaching Methodology</p>	<p>Teaching methodology includes lectures on theoretical background, and laboratory exercises to better apprehend the basic concepts of Pharmacognocny. The lesson uses PowerPoint presentations with detailed notes in order to help students better understand theory. Methods such as discussion, questions/answers, pros/cons, brainstorming, debates, and cooperative learning are used to enhance the student's participation. Recent research results are included and discussed in the course. The laboratory part is conducted in the Laboratory of Biochemistry supported by proper infrastructure/equipment and supervised by the lab instructor/professor. Appropriate preparation and demonstration by the laboratory supervisor precedes each laboratory exercise. Assessment of laboratory exercises is done based on laboratory reports submitted by each student at the end of each lab exercise.</p>
<p>Bibliography</p>	<p>(a) <u>Textbooks:</u></p> <ol style="list-style-type: none"> <li>1. "Drugs of Natural Origin: A Treatise of Pharmacognosy, Sixth Revised Edition", G. Samuelson and L. Bohlin, Swedish Pharmaceutical Press, 2010, and a Greek translation of an older edition, published by The University Press of Crete.</li> <li>2. "TREASE AND EVANS' Pharmacognosy" by W.C. Evans 2009, Ed Bailliere Tindall</li> <li>3. Medicinal natural products a biosynthetic approach 3rd ed. Paul M. Dewick. Published 2008 by Wiley in Hoboken</li> <li>4. "Pharmacognosy-Phytochemistry Medicinal plants" J. Bruneton Eds Intercept Ltd paris-NY 2001</li> </ol> <p>(b) <u>References:</u></p> <ul style="list-style-type: none"> <li>• Θέματα Φαρμακογνωσίας. Γ.Α.Καρίκα 2020</li> <li>• Ειδικά θέματα Χημείας βιοδραστικών φυσικών ενώσεων Γ.Α. Καρίκα, 2019</li> <li>• "Fundamentals of pharmacognosy and phytotherapy" M. Heinrich, J. Barnes, S. Gibbons, E. Williamson Ed. Churchill Livingstone-London 2018.</li> <li>• <a href="http://www.ema.eu.ema/index.jsp?curl=/pages/medicines/landing/herbalsearch">http://www.ema.eu.ema/index.jsp?curl=/pages/medicines/landing/herbalsearch</a></li> </ul>
<p>Assessment</p>	<p>Final Examinations 50%; Course work 50% (midterm 20%, small project 10%, lab 20%)</p> <p>The evaluation of the course is performed by (a) a written mid-term exam during the semester, which examines specific modules of the course and it accounts for 20% of the overall grade, (b) the laboratory reports during the semester, it accounts for 10% of the overall grade, (c) the laboratory exam which accounts for 10% of the grade, (d) a small project which accounts for 10% of the grade and (e) a written final exam, which examines all modules of the course, and it accounts for 50% of the overall grade.</p> <p>Students are prepared for the above written exams by discussion, questions/answers, pros/cons and problem solving assignments, design</p>

	<p>assignments, literature reviews, case studies, paper reviews, reports, presentations etc.</p> <p>The final assessment of the students is formative and summative and is assured to comply with the subject's expected learning outcomes and the quality of the course.</p>
Language	Greek, English