Course Title	**Pharmacognosy I**				
Course Code	PHA 311				
Course Type	Compulsory				
Level	BSc (Level 1)/ MPharm (Level 2)				
Year / Semester	3nd / 5th				
Teacher's Name	Dr George Albert Karikas				
ECTS	6	Lectures / week	3	Laboratories/week	2
Course Purpose	The aim of this course is a solid introduction into the pilar subject of Pharmacognosy. Other aims are to explain the role, biosynthesis, the biological, toxicity and pharmacological properties of compounds present in pharmaceutical plants, according to their chemical classification, in terms of structural- bioactivity relationships, and their role in synthesis of new therapeutic drugs. Overall, this course will act as an introduction to the following semester Pharmacognosy II.				
Learning Outcomes	By the end of this course, the students should be able to: • Identify bioactive compounds and their biosynthesis • Recognise the purpose of bioactive compounds in nature • State the use of natural products in Pharmacy and Medicine • Distinguish the important role of synthetic compounds as environmental pollutants, • Recognise the plant chemical constituents, as a potential source of therapeutic agents				
Prerequisites	PHA107	Corequisites	None		
Course Content	Theory: -Branches of Pharmacognosy, relations with other scientific areas • Historical review • Role of natural bioactive compounds • Uses of natural products in pharmaceuticals in pharmacotherapy, in relation to their biological actions . Plant tissue cultures - cell cultures • Biosynthetic pathways. Chemical communication in Nature (animal and plant semiochemicals, applications). Chemoprotective ingredients				

	• Chemistry, biosynthesis and biological actions, of primary-secondary metabolites by chemical category: • Lipids • Carbohydrates (derivatives, antibiotics) • Amino acids-Proteins (β-lactam antibiotics, peptide antibiotics) • Anthraquinones • Phenols, glycosides • Flavonoids • Terpenes: Monoterpenes, Diterpenes, Triterpenes, Steroids, Saponins, Cannabinoids • Cardiac, cyanogenic glycosides, thioglycosides • Alkaloids (piperidine/pyridine, imidazole, tropane, quinoline, isoquinoline, indole) • Purines, • Vitamins, • Allergens, Counterfeits. Combinatorial chemistry. Virtual libraries. **Laboratory experiments/exercises:** Isolation and chemical identification of plant constituents: 1. Isolation and testing of the bioactivity (antioxidant activity) of betalains from the species Beta vulgaris L. (beetroot) 2. Isolation of purines (alkaloids) from tea leaves 3. Isolation and qualitative determination of chlorophylls and total carotenoids from castor oil leaves (Ricinus communis) 4. Microscopic observation and chemical properties of starch and cellulose. 5. Chemical study of hesperidin (hydrolysis reaction) 6. Isolation of lycopene from tomato pulp (powerful antioxidant) 7. Chromatography of carbohydrates in TLC
Teaching Methodology	Teaching methodology includes lectures on the theoretical background and laboratory exercises / experiments to better understand and embed theory. Detailed lecture notes are presented with image-rich material and short animations to help understand better several biological processes. During the lecture, a discussion is carried out so as students are encouraged to answer questions and draw their own conclusions. As part of the developing students' skills, laboratory exercises are carried out by the students themselves in the Laboratory of Biochemistry and Molecular Biology with the proper laboratory equipment and under the supervision of teaching personnel. Appropriate preparation and demonstration by the

	laboratory personnel precedes each laboratory exercise. Assessment of laboratory exercises is performed by submitting laboratory reports or filling out special forms / questionnaires by each student.
Bibliography	(a) Textbooks: • Hardback Progress in the Chemistry of Organic Natural Products, Edited by A. Douglas Kinghorn Springer Nature Switzerland AG, 2019 • Χημεία Φυσικών Προϊόντων, Stephen P. Stanforth, Εκδόσεις Παρισιάνου, 2010 • Φαρμακευτικά Προϊόντα Φυσικής Προελεύσεως, Gunnar Samuelsson, Πανεπιστημιακές Εκδόσεις Κρήτης, 2010 • Medicinal natural products: a biosynthetic approach, P.M. Dewick, Published by Wiley, 2008 (b) References: • Εφαρμοσμένη Βιοχημεία, Γ.Α.Καρίκα, Εκδόσεις Οδυσσέας, 2019 • Pharmacognosy, GE Trease and WC Evans, Bailliere Tindall, 2010 • Χημικές ενώσεις του μήνα, Θ. Βαλαβανίδης, Κ. Ευσταθίου, 2006-2010 • Karikas, G.A. Anticancer and chemopreventing natural products: Some biochemical and therapeutic aspects. Journal of B.U.ON. 15 (4), 627, 2010 • Hypericum Essential Oils-Composition and Bioactivities: An update (2012-2022).Grafakou ME, Barda C, Karikas G.A., Skaltsa H. *Molecules*, 27(16), 5246. (2022) • Cajamolides A-N: Cytotoxic and anti-inflammatory sesquiterpene lactones from *Calea jamaicensis*. Grafakou Maria Eleni, Christina Barda, Karikas G.A, Heilmann Joerg, Skaltsa Helen. *Bioorganic Chemistry*. 116, 105351, (2021)
Assessment	• Course work 40% (midterm exam 10%, lab 20%, small project) • Final Examinations 60%; 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 10% of the overall grade, (b) the laboratory reports during the semester, it accounts for 20% of the overall grade, and (c) individual work on a small project which includes literature review and (d) a written final exam, which examines all modules of the course, and it accounts for 60% of the overall grade. Students are prepared for the above written exams by discussion, questions/answers, pros/cons and problem solving assignments, design assignments, literature reviews, case studies, paper reviews, reports, presentations etc. 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.

Language	Greek, English