



UNIVERSITY OF NICOSIA

ΠΑΝΕΠΙΣΤΗΜΙΟ ΛΕΥΚΩΣΙΑΣ

Course Code PHAR-240	Course Title Pharmaceutical Chemistry I/ Φαρμακευτική Χημεία Ι	Credits (ECTS) 6
Department Life & Health Sciences	Semester Fall	Prerequisites PHAR150,151
Type of Course Required	Field Pharmacy	Language of Instruction Greek/English
Level of Course 1 st Cycle	Year of Study 2 nd year	Lecturer Christos Petrou/ Maria Leigh
Mode of Delivery face-to-face	Work Placement N/A	Co-requisites

Objectives of the Course:

The aims of this module are to enable students to:

- consolidate functional group chemistry in the context of drug activity
- understand the structure and reactivity of organic molecules, including heterocycles, in relation to their pharmaceutical applications
- appreciate the techniques for structural elucidation of molecules of pharmaceutical interest and to understand the theoretical basis of these techniques
- understand how stereochemical factors and small molecule/macromolecule interactions affect pharmacological activity
- study of the important inorganic compounds that are useful in Pharmacy
- study of the periodic system of elements in relation to their chemical, biologic and toxicological properties.
- Study the bioinorganic active compounds
- study the chemistry of vitamins

Learning Outcomes:

After completion of the course students are expected to:

- describe aspects of the synthesis and reactivity of organic molecules of pharmaceutical interest
- describe the general properties of drug molecules. In particular, it presents some important characteristics of drugs such as selectivity and highlights the role of various chemical bonds and groups in the action of drugs. An important objective of the course is to transfer knowledge of the phenomenon of xenobiotic metabolism and the effects of the activity and toxicity of these.
- understand the concept of inorganic drug, including chemical properties and biological role as well as knowledge and ability of the composition, purity control identification, control content of preparations containing inorganic drugs, the

mechanism of action at the molecular level, drug use and adverse events.

- Skills: Familiarity with basic concepts: a) biological activity metal - metalloid non-metals, b) inorganic compounds with pharmaceutical interest, c) interaction with biological targets and d) checks identification - purity - content .
- The course aims to Equally important goals and issues of chemical / molecular terms and pharmacodynamic chemotherapeutic drugs, general anesthetics and drug-drug interactions and drug - food.

Course Contents:

Chemical bonding, properties of drug molecules and drug action: covalent, covalent bond, hydrogen bond, van der Waals forces, lipophilic interactions. Selectivity principles based on differences in morphology, biochemistry and distribution.

Introduction to Functional Groups in Medicinal Chemistry

Introduction to the chemistry of vitamins. Classification and study of the aliphatic vitamins (ascorbic acid, pantothenic acid), inositol, retinol, vitamin D, calciferol, Vitamin D), aromatic vitamins: vitamins K, menadione, menadiol diphosphate, dicumarol, p-aminobenzoic acid), heterocyclic (tocopherols, vitamin E, lipoic acid, rutin, nicotinic acid, nicotinamide, pyridoxine hydrochloride, thiamine, folic acid, biotin, riboflavin, vitamin B2, cyanocobalamin, vitamin B12). Studying the composition, their general characteristics, how to identify them and quantify them, and their importance in health, uses hypervitaminosis and their competitors.

Pharmacological and toxicological activity, metal - metalloid non-metals, inorganic compounds of pharmaceutical interest: composition / origin authentication - purity - content, properties, molecular action, uses, adverse chemical reactions and interpretation thereof. Group I Lithium. Lithium carbonate, sodium carbonate, sodium bicarbonate, sodium sulfate, sodium thiosulfate, sodium citrate, sodium borate (borax), sodium fluoride, sodium chloride, sodium phosphate, biphasic, sodium dihydrogen phosphate. Potassium iodide, potassium permanganate and potassium chloride. Group II. Magnesium oxide, magnesium carbonate, light magnesium sulfate, magnesium stearate, magnesium trisilicate, magnesium hydroxide, magma or milk of magnesia, magnesium chloride. Calcium. Dibasic calcium phosphate, tribasic calcium phosphate, calcium chloride, calcium gluconate, calcium sulfate, calcium hydroxide, calcium hydroxide solution, Calcium Pharmacology. Barium: Barium sulphate. Group III boron, boric acid. Aluminum, aluminum hydroxide, silica, aluminum hydroxide dry gel. Group IV Carbon, Silicon, bentonite, kaolin, purified talc. Lead. Group V Nitrogen. Nitrous oxide, concentrated ammonia, dilute ammonia solution, ammonium carbonate, ammonium chloride. Arsenic trioxide, toxicity of arsenic compounds and antidotes, antimony pharmacology. Bismuth. Group VI Oxygen. Distilled water. Hydrogen peroxide. Precipitated sulfur. Group VII halogens. Hydrochloric acid. Iodine, tincture of iodine. Manganese as a trace element subgroup IB Copper. Role of copper in the body. Copper sulphate. Silver compounds. Sub-group IIB Zinc. Zinc Oxide. Zinc as a trace element. Interaction of zinc - vitamins. Mercury. Mercuric oxide yellow, mercury. Mercuric cyanide. Group VIII Iron. Iron as a trace element. Ferrous gluconate, Ferrous sulphate.

Bioinorganic Medicinal Chemistry: Complex compounds with pharmaceutical use.

Laboratory (indicative):

Exercise 1: Synthesis of vorax;
Exercise 2: Synthesis of calcium monophosphate;
Exercise 3: Titration of iodine and sodium iodine in tincture
Exercise 4: Titration of ferrus sulfate
Exercise 5: Recrystallisation of an organic compound
Exercise 6: Titration of ascorbic acid

Learning Activities and Teaching Methods:

Lectures, class discussion, assignments, laboratory

Assessment Methods:

Final Examinations, Course work

Required Textbooks/Reading:

Authors	Title	Publisher	Year	ISBN
Αθηνά Γερονικάκη	Οργανική Φαρμακευτική Χημεία: Βιταμίνες	Σύγχρονη Παιδεία		
Αθηνά Γερονικάκη	Ανόργανη Φαρμακευτική Χημεία	Σύγχρονη Παιδεία		
Thomas L. Lemke	Review of Organic Functional Groups: Introduction to Medicinal Organic Chemistry,	Wolters Klowver	Fifth Edition	

Reccomended Textbooks

Authors	Title	Publisher	Year	ISBN
Gareth Thomas	Fundamentals in Medicinal Chemistry	Wiley		
T. Lemke	Foyes Principles in Medicinal Chemistry	Wolters Klowver		
Graham Patrick	An Introduction to Medicinal Chemistry	Oxford University Press		
G.R. Chatwal; M. Arora	Pharmaceutical Chemistry, 1: Inorganic	Himalaya Publishers		EBOOK
Nadendla, Rama Rao New Age International	Principles of Organic Medicinal Chemistry	New Age		EBOOK