Course Title	**Inorganic and Bioinorganic Pharmaceutical Chemistry**				
Course Code	PHA302				
Course Type	Compulsory				
Level	BSc (Level 1)/ MPharm (Level 2)				
Year / Semester	2rd / 3rd Semester				
Teacher's Name	Dr Panagiotis Theodosis-Nompelos				
ECTS	6	Lectures / week	3	Laboratories/week	2
Course Purpose	The aim of this subject is the study of important inorganic compounds that are used in Pharmacy or have toxicological or are of special pharmaceutical interest. Another aim is the study of the periodic system of elements in relation to their chemical, biologic and toxicological properties. Further aims are the acquisition of knowledge on the role of various metals in the organism, such as trace elements, as well as the role of heavy metals as constituents of chemicals and drugs. The study of synthesis, properties and actions of a number of metal ligands and their role as drugs or antidotes is also one of the main aims of this course.				
Learning Outcomes	The student should be able to explain and evaluate the following: Part 1 General Bioorganic (Medicinal) Chemistry - Role of inorganic elements in cell - organism Inorganic Pharmaceutical Chemistry, Inorganic Pharmaceuticals as Therapeutic Agents. Quantitative analysis – purity analysis of substances. Uses - Applications - Doses. Mechanisms of action of inorganic drugs Part 2 Elements and compounds Pharmaceutical Chemistry of Alkali Pharmaceutical Chemistry of Alkaline Soils Pharmaceutical chemistry of barium and aluminum Pharmaceutical Chemistry of Silicon and Carbon Pharmaceutical Chemistry of Nitrogen Compounds Pharmaceutical Chemistry of phosphorus, arsenic, antimony, bismuth Pharmaceutical Chemistry of oxygen, sulfur and selenium Part 3 Elements and compounds Pharmaceutical Chemistry of Halogens: Fluorine, Chlorine, Bromine, Iodine Pharmaceutical Chemistry of Copper, Silver, Mercury Pharmaceutical Titanium Chemistry Pharmaceutical Helium Chemistry Part 4 Pharmaceutical Chemistry of minerals such as aluminum, magnesium, silicon				

	Part 5 Metal poisons and their treatment Organic ligands - metal poisoning antidotes, BAL, EDTA, penicillamine, diferiprone, desferoxamine.		
Prerequisites	PHA106	Corequisites	None
Course Content	Theory: Bioorganic (Medicinal) Chemistry - Role of inorganic elements in cell - organism Inorganic Pharmaceutical Chemistry, Inorganic Pharmaceuticals as Therapeutic Agents. Quantitative analysis – purity analysis of substances. Uses - Applications - Doses. Mechanisms of action of inorganic drugs Pharmaceutical Chemistry of Alkali Pharmaceutical Chemistry of Alkaline Soils Pharmaceutical chemistry of barium and aluminum Pharmaceutical Chemistry of Silicon and Carbon Pharmaceutical Chemistry of Nitrogen Compounds Pharmaceutical Chemistry of phosphorus, arsenic, antimony, bismuth Pharmaceutical Chemistry of oxygen, sulfur and selenium Pharmaceutical Chemistry of Halogens: Fluorine, Chlorine, Bromine, Iodine Pharmaceutical Chemistry of Copper, Silver, Mercury Pharmaceutical Chemistry of Titanium Pharmaceutical Chemistry of Helium Pharmaceutical Chemistry of minerals such as aluminum, magnesium, silicon Metal poisons and their treatment Organic ligands - metal poisoning antidotes, BAL, EDTA, penicillamine, diferiprone, desferoxamine. **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 the following: 1. Preparation of boric acid 2. Quantity and purity analysis of borax 3. Quality and quantity analysis of copper sulphate 4. Quantity analysis of magnesium sulfate 5. Quality and quantity analysis of iron sulphate-II 6. Preparation and structure analysis of cooper (II) with penicillamine		

	7. Determination of nickel (II) EDTA complex stoichiometry 8. Preparation of cis and trans Pt (II) complexes 9. Quality and quantity analysis of phenolic compounds after their complexation with Fe (III)
Teaching Methodology	Teaching methodology includes lectures, case studies and problem solving tutorials- to offer the theoretical background, and laboratory exercises in order to better understand the concepts of Pharmaceutical Chemistry. PowerPoint is used during lectures. Tutorials and case studies are also included. Methods such as discussion, questions/answers, pros/cons, brainstorming and debates are used to enhance student's participation. Recent research findings are presented in the course content. The laboratory part of the course is conducted in the Pharmaceutical Lab with the appropriate laboratory equipment and under the supervision of the lab instructor. Appropriate preparation and demonstration by the laboratory supervisor precedes each laboratory exercise. Assessment of laboratory includes the submission of laboratory report at the end of each lab exercise by each student.
Bibliography	Textbooks: 1) Σημειώσεις Βιοανόργανης (Φαρμακο)χημείας και Ανόργανης Φαρμακευτικής Χημείας», Π.Ν. Κουρουνάκης. Frederick University, 2019. 2) "Pharmaceutical Chemistry – Inorganic" Himalaya Publishing House, G.R. Chatwal, 5th ed. 2017. 3) Ανόργανη Φαρμακευτική Χημεία, Α. Γερονικάκη. Εκδόσεις σύγχρονη παιδεία, 2008 References: 1) «Κεφάλαια Βιοανόργανης Φαρμακοχημείας», Ε. Χιωτέλλης, Δ. Παπαγιαννοπούλου, Τμήμα εκδόσεων Α.Π.Θ., 2015. 2) "Metallotherapeutic Drugs and Metal based Diagnostic Agents", eds.: M. Gielen, E.R.T. Tiekink, John Wiley & Sons, 2005. 3) "Bioinorganic Chemistry, a short course", R.M. Roat-Malone, Wiley Interscience, 2002.
Assessment	Mid Term Exam 30% Lab Reports/Examination 20% Final Examination 50% Course evaluation is based on the following: (a) a written examination during the semester which examines specific modules of the course and it accounts for 30% of the total grade (b) laboratory reports, in which students present the collected and analysed experimental data as well as their conclusions, derived from theory and the experimental data. (c) a final written examination which examines all modules of the course material and it accounts for 50% of the total grade. Students are prepared for the above written exams over the theoretical and practical background in the classroom and with additional exercises given to them for further practice. For the better comprehension of the subject frequent revisions are performed at regular intervals. Questions of gradual difficulty apply to the evaluation of the mid-term and

	final examination. There may be multiple choice or right/wrong questions with

	justification of the answers or issue analysis and problem solving questions may be applied in order to evaluate the knowledge and perception of the student on the subject. For the evaluation of laboratory exercise reports, the following criteria shall be taken into account, with ratios varying according to the laboratory exercise: (a) data collection (b) data analysis (c) application of theory to draw conclusions The above criteria and assessment tools, as well as their weight, are communicated to the students, and are formulated in such a way in order to maximize the expected learning outcomes as well as the quality of the course.
Language	Greek, English