

Course Description
(*Inorganic Pharmaceutical Chemistry I*) (theoretical)

نموذج وصف المقرر

**Review the performance of the higher education institution
((review of the academic program))**

وصف المقرر

This course description provides a summary of the most important characteristics of the course and the learning outcomes expected of the student to achieve, proving whether he has made the most of the available learning opportunities and must be linked to the program .description

1. Educational Institution	Al-Zahrawi University - Ministry of Higher Education and Scientific Research
2. College	Pharmacy college
3. Course Name / Code	<i>Inorganic Pharmaceutical Chemistry I</i> (Theoretical)
4. Programs in which it is included	Bachelor of Pharmacy
5. Available Forms of Attendance	Daily Attendance
6. Semester / Year	First Semeste, Third Stage (2025-2026)
7. Total Number of Study Hours	4 hours per week for each group
8. Date of preparing this description	2025-2026
9. Course Objectives: Acquire knowledge of fundamental theories and applications of inorganic chemistry within the pharmaceutical context. Understand the atomic and molecular structures, and the principles of complexation in pharmaceuticals. Evaluate the biological and pharmaceutical roles of essential, trace, and non-essential ions. Gain comprehensive knowledge of inorganic therapeutic agents, including gastrointestinal agents, topical agents, dental agents, radiopharmaceuticals, and radio opaque contrast media.	
1. Learning Outcomes, Teaching and Learning Methods, and Evaluation Students will learn core pharmaceutical inorganic chemistry principles. Teaching involves lectures, problem-solving sessions, and interactive discussions. Evaluation is through exams, quizzes, and assignments, assessing knowledge and application skills.	

A. Knowledge and Understanding

Students will gain a comprehensive understanding of the core principles of inorganic chemistry and their relevance to pharmaceutical science. They will understand the mechanisms of action for various inorganic agents (e.g., antacids, radiopharmaceuticals).

B. Subject-Specific Skills

Students will develop skills in applying chemical principles to predict the behavior of inorganic pharmaceutical compounds and ions in the human body.

Teaching and Learning Methods

1. **Interactive Lectures:** Used to deliver fundamental concepts regarding atomic structure, complexation, and the physiological roles of inorganic ions in the human body.
2. **Structural Visualization:** Integration of molecular visualization software (such as PyMOL) to help students examine the 3D structures, coordination geometry, and binding of metal complexes and trace elements.
3. **Clinical Case Discussions:** Focused on the practical application, therapeutic uses, and mechanisms of action of specific inorganic agents, such as antacids, radiopharmaceuticals, and contrast media.
4. **Problem-Solving Sessions:** Designed to develop analytical thinking by presenting scenarios related to the toxicity of non-essential ions and the chemical behavior of gastrointestinal acidifying agents.

C. Evaluation Methods

1. **Written Examinations (Midterm and Final):** Comprehensive closed-book exams designed to assess the students' grasp of inorganic theories, the biological roles of ions, and their pharmaceutical applications.
2. **Quizzes:** Regular, short assessments to gauge ongoing student understanding of specific weekly modules, such as dental agents or atomic structure.
3. **Assignments:** Tasks requiring students to evaluate clinical scenarios involving trace element deficiencies or heavy metal toxicity, bridging theoretical chemistry with clinical outcomes.
4. **Class Participation:** Assessing student engagement and critical thinking during interactive case studies and structural visualization exercises.

D. Thinking Skills

1. Students will develop critical thinking skills necessary for analyzing and solving complex problems related to drug synthesis, drug action, and structure-activity relationships.
2. They will learn to apply problem-solving strategies to organic reactions, mechanisms, and spectroscopic data interpretation, fostering a deeper understanding of chemical phenomena.
3. The course will encourage students to think creatively and reason through plausible solutions in the context of organic chemistry problems, similar to the diagnostic approach

used in medicine

e. General and Transferable Skills

- 1. Students will enhance their communication skills through presentations and group discussions, enabling them to convey complex scientific information clearly and concisely.**
- 2. The course will foster analytical and problem-solving skills by engaging students in activities that require them to interpret data, evaluate scientific literature, and develop solutions to organic chemistry-related problems.**
- 3. Students will develop time management and organizational skills, essential for managing workload and meeting deadlines, alongside improving their ability to work collaboratively in teams to solve problems**

Weeks	Unit Name / Course or Topic	Required Learning Outcomes	Learning Methods	Evaluation Method
1	Introduction to the Course	Understand the scope and importance of inorganic chemistry in pharmacy.	Lectures, discussions	Quizzes
2	Atomic and molecular structure /complexation	Explain atomic structure and the basics of chemical complexation.	Lectures, problem-solving	Quizzes, exams
3	Atomic and molecular structure / complexation (Continued)	Apply complexation principles to pharmaceutical formulations.	Lectures, discussions	Online Quiz
4	Essential and trace ions	Identify the physiological roles of essential and trace ions.	Lectures	Quizzes, exams
5	Non-essential ions	Understand the impact and toxicity of non-essential ions in the body.	Lectures, case studies	Quizzes
6	Gastrointestinal agents: acidifying agents	Describe the mechanism and clinical use of acidifying agents.	Lectures, demonstrations	Quizzes, exams
7	Antacids	Classify antacids and explain their chemical mechanisms.	Lectures, problem-solving	Quizzes
8	Protective adsorbents + Topical agents	Evaluate the applications of protective adsorbents and topical agents.	Lectures, discussions	Exams
9	Open Schedule /	Assess comprehensive	Review	Midterm

	Midterm Exam	understanding of weeks 1-8.	sessions	Exam
10	Dental agents + Radiopharmaceutical preparations	Explain the pharmaceutical applications of dental agents and radiopharmaceuticals.	Lectures, examples	Quizzes, exams
11	Open Schedule / Continuing Radiopharmaceuticals	Deepen understanding of radiopharmaceutical dispensing and safety.	Lectures	Quizzes
12	Radio opaque and contrast media	Understand the chemical properties and uses of contrast media in imaging.	Lectures, visual aids	Exams
13	Open Schedule / Review	Review core course concepts.	Discussions	Participation
14	Open Schedule / Final Preparations	Prepare for final assessments.	Problem-solving	Final Exams

11. Infrastructure	
Required Readings:	Wilson and Gisvold Textbook of Organic Medicinal and Pharmaceutical Chemistry, Delgado JN, Remers WA, (Eds); Latest edition (Recommended to add an Inorganic equivalent such as <i>Block, Roche, Soine, and Wilson's Inorganic Medicinal and Pharmaceutical Chemistry</i>).
Special Requirements (Workshops, Journals, Software, Websites):	• Software: Molecular modeling and visualization tools (e.g., PyMOL) for analyzing chemical complexation and atomic structures. • Websites: Access to scientific chemical databases such as PubChem, DrugBank, and ChemSpider for retrieving chemical properties, safety data, and clinical profiles of inorganic drugs. • Journals: Recommended reading from peer-reviewed publications such as the <i>Journal of Inorganic Biochemistry</i> and the <i>European Journal of Medicinal Chemistry</i> to expose students to current pharmaceutical research.
Social Services (Guest Lectures, Professional Training, Field Studies, Others)	Organizing seminars on laboratory safety, specifically focusing on the safe disposal and environmental management of heavy metals and non-essential ions used in pharmacy.

12.	
Prerequisites	
Minimum Number of Students	100
Maximum Number of Students	200

Name of the Instructor: Ahmed Sabeeh Mohammed