

Course Description (Practical Org Pharm Che III) (Practical)

Performance review of higher education institution (assessment of the academic program)

This course description summarizes the key characteristics and anticipated learning objectives for students, assessing their utilization of available learning resources, and must be aligned with the program description.

1. Educational Institution	Al-Zahrawi University College
2. University Department / Center	Pharmacy
3. Course Name / Code	Practical Org Pharm Chem III (Practical)
4. Programs in which it is included	Bachelor of Pharmacy
5. Available Forms of Attendance	Daily Attendance
6. Semester / Year	second Semester, Fourth Stage ٢٠٢٥-٢٠٢٦
7. Total Number of Study Hours	30 hours
8. Date of preparing this description	2025-2026
9. Course Objectives: 1. Synthesis and Purification: Students will learn to synthesize important pharmaceutical compounds such as carboxylic acid, ascorbic acid, phenol derivative, and paracetamol, as well as master purification techniques like recrystallization. 2. Analytical Skills: Develop proficiency in assaying pharmaceutical products, including both known and unknown samples of drugs. 3. Advanced Organic Reactions: Gain hands-on experience with complex organic reactions such as Cannizzaro reaction , Assay of Ascorbic acid and synthesis of phenol and paracetamol. 4. Pharmaceutical Relevance: Understand the practical applications of organic chemistry in pharmaceutical production by synthesizing and analyzing common drugs and their precursors.	
1. Learning Outcomes, Teaching and Learning Methods, and Evaluation	

A. Knowledge and Understanding

1. Organic Synthesis Principles: Students will comprehend the fundamental principles and mechanisms behind organic synthesis reactions, particularly those relevant to pharmaceutical compounds such as carboxylic acid, Ascorbic acid, phenol derivative and their precursors.
2. Purification Techniques: Gain in-depth understanding of various purification methods, with a focus on recrystallization, as applied to pharmaceutically important compounds like carboxylic acid and ascorbic acid
3. Analytical Methods: Develop a thorough understanding of analytical techniques used for assaying pharmaceutical products, including the ability to analyze both known and unknown samples of common drugs like carboxylic acid and ascorbic acid.
4. Pharmaceutical Relevance: Acquire knowledge about the practical applications of organic chemistry in the pharmaceutical industry, understanding the significance of each synthesized compound and its role in drug development or as an intermediate in drug synthesis.

B. Subject-Specific Skills

1. Organic Synthesis Techniques: Students will gain proficiency in executing various organic synthesis reactions, including Cannizzaro reaction and how can obtained carboxylic acid and its alcohol from 2 mole of aldehyde , assay of ascorbic acid and its applications . (phenol synthesis), and paracetamol synthesis.
2. Purification and Isolation Methods: Develop hands-on skills in purification techniques, with a strong emphasis on recrystallization, as applied to various pharmaceutical compounds such as Carboxylic acid , phenol , and ascorbic acid.
3. Analytical and Assay Procedures: Master the practical skills required for assaying pharmaceutical products, including the ability to analyze both known and unknown samples of common drugs using appropriate analytical methods.
4. Multi-Step Synthesis: Acquire the ability to perform complex, multi-step organic syntheses, as demonstrated in the preparation of phenol through a series of reactions .

Teaching and Learning Methods

1. Inquiry-Based Learning: Implement inquiry-based approaches where students are given opportunities to design their own experiments or modifications to existing procedures. For example, after learning the basic synthesis of phenol, students could be challenged to propose and test methods for improving yield or purity.
2. Collaborative Learning: Incorporate group work and peer-to-peer learning activities. Students can work in pairs or small teams on complex multi-step syntheses like the preparation of Paracetamol, encouraging discussion, problem-solving, and shared responsibility for laboratory outcomes.
3. Technology-Enhanced Learning: Integrate digital tools and resources to support learning. This could include using molecular modeling software to visualize reaction mechanisms, online pre-lab quizzes to ensure preparedness, or digital lab notebooks for data collection and analysis. These tools can enhance understanding of organic chemistry concepts and improve data management skills.

C. Evaluation Methods

1. Practical Assessments: Evaluate students' laboratory skills, techniques, and ability to synthesize and purify compounds through hands-on practical exams. This could include tasks such as synthesizing carboxylic acid or phenol, performing recrystallization, or conducting assays on unknown samples.
2. Lab Reports: Assess students' understanding of experimental procedures, data analysis, and

scientific writing through comprehensive lab reports. These reports should cover the synthesis, purification, and analysis of compounds like Ascorbic acid, phenol, and carboxylic acid and its salt containing drugs.

3. Continuous Assessment: Implement ongoing evaluation through pre-lab quizzes, post-lab discussions, and periodic theoretical tests to assess students' preparation, comprehension of underlying principles, and ability to apply knowledge to practical scenarios in organic pharmaceutical chemistry.

D. Thinking Skills

1. Analytical Reasoning: Students will develop the ability to interpret experimental results, analyze data from assays of known and unknown samples, and draw logical conclusions about the purity and identity of synthesized compounds.
2. Problem-Solving: Enhance skills in troubleshooting experimental procedures, optimizing reaction conditions, and addressing challenges that may arise during multi-step syntheses like the preparation of phenol derivative drugs.
3. Critical Evaluation: Cultivate the ability to critically assess the quality of synthesized products, the efficiency of purification methods, and the accuracy of analytical techniques used in pharmaceutical compound assays.
4. Process Optimization: Develop the capacity to think strategically about improving synthetic routes, enhancing yield and purity, and streamlining analytical procedures for pharmaceutical compounds like carboxylic acid and phenol derivative drugs.

E. General and Transferable Skills

1. Develop proficiency in laboratory techniques applicable to various scientific and industrial settings.
2. Enhance time management and organizational skills through conducting multi-step syntheses and analyses.
3. Improve scientific communication abilities through writing comprehensive lab reports and discussing results.
4. Cultivate teamwork and collaborative problem-solving skills during group laboratory activities.

11. Course Structure					
Weeks	Hours	Required Learning Outcomes	Unit Name / Course or Topic	Learning Methods	Evaluation Method
1	2	Knowledge	Cannizaro reaction Part 1	Blackboard and Screen Presentations	Daily exam and oral questions
2	2	Knowledge	Cannizaro reaction Part 2	Blackboard and Screen Presentations	Daily exam and oral questions
3	2	Knowledge	Cannizaro reaction unknown sample	Blackboard and Screen Presentations	Daily exam and oral questions
4	2	Knowledge	Re-crystallization of Benzoic acid	Blackboard and Screen Presentations	Daily exam and oral questions
5	2	Knowledge	Synthesis of Ascorbic acid	Blackboard and Screen Presentations	Daily exam and oral questions
6	2	Knowledge	Assay of Ascorbic acid (known sample)	Blackboard and Screen Presentations	Daily exam and oral questions
7	2	Knowledge	Assay of Ascorbic acid (Unknown sample)	Blackboard and Screen Presentations	Daily exam and oral questions
8	2	Knowledge	Synthesis of Phenol	Blackboard and Screen Presentations	Daily exam and oral questions
9	2	Knowledge	Assay of Phenol (known sample)	Blackboard and Screen Presentations	Daily exam and oral questions
10	2	Knowledge	Assay of Phenol (Unknown sample)	Blackboard and Screen Presentations	Daily exam and oral questions
11	2	Knowledge	Synthesis of chlorobutanol	Blackboard and Screen Presentations	Daily exam and oral questions
12	2	Knowledge	Assay of chlorobutanol (known sample)	Blackboard and Screen Presentations	Daily exam and oral questions

13	2	Knowledge	Assay of chlorobutanol (unknown sample)	Blackboard and Screen Presentations	Daily exam and oral questions
14	2	Knowledge	Synthesis of Paracetamol	Blackboard and Screen Presentations	Daily exam and oral questions
15	2	Knowledge	Assay of Paracetamol (known sample)	Blackboard and Screen Presentations	Daily exam and oral questions

12. Infrastructure	
Required Readings:	References: Lab Handbook for Practical Organic Pharmaceutical Chemistry Adopted by the Department
Special Requirements (Workshops, Journals, Software, Websites):	Electronic Websites: PubChem for chemical information and properties Royal Society of Chemistry's ChemSpider American Chemical Society's resources for organic chemistry
Social Services (Guest Lectures, Professional Training, Field Studies, Others)	Organizing workshops and courses for graduates:

13. Admission:	
Prerequisites	Admission according to the central plan
Minimum Number of Students	/
Maximum Number of Students	Admission exceeds the capacity plan

Name of the Instructor: Eessa Hamad Abboud.