



Jordan University of Science and Technology
Faculty of Pharmacy
Applied Cosmetic Sciences Department

AC103 Analytical Chemistry (Practical) - JNQF Level: 7
Second Semester 2025-2026

Course Catalog
<p>1 Credit Hours. This practical course trains students to perform basic laboratory experiments in analytical chemistry using both classical and instrumental methods to determine the identity and concentration of chemical substances. It includes hands-on applications of qualitative and quantitative analysis such as titration, precipitation, and extraction, focusing on analyzing raw materials and finished cosmetic products. The course also enhances students' skills in handling laboratory instruments, sample preparation, and documenting results according to quality and safety standards. The course introduces what AI means in analytical and instrumental analysis and how it can support data processing and result interpretation.</p>
Teaching Method: On Campus

Text Book	
Title	Analytical chemistry
Author(s)	Gary D. Christian
Edition	7th Edition
Short Name	Ref#1
Other Information	

Course References

Short name	Book name	Author(s)	Edition	Other Information
Ref #2	Determination of Sun Protection Factor (SPF) for Various Sunscreens by UV Spectrophotometry	Nalanda Baby R, Subhadip Chakraborty	1st Edition	
Ref#4	https://orangedatamining.com/widget-catalog/unsupervised/PCA/	Orange software	1st Edition	

Ref#3	Artificial Intelligence as a Scientific Copilot in Analytical Chemistry: Transforming How We Write, Review, and Publish	Adrin Fuente-Ballesteros, Victoria Samanidou, Seyed Mosayeb Daryanavard, Ana M. Ares, and Jos? Bernal	1st Edition	
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Instructor	
Name	Dr. Rand Al-Waqfi
Office Location	P1L4
Office Hours	
Email	raalwaqfi@just.edu.jo

Class Schedule & Room
<p>Section 1: Lecture Time: Mon : 14:30 - 16:30 Room: LAB</p> <p>Section 2: Lecture Time: Wed : 14:30 - 16:30 Room: LAB</p>

Tentative List of Topics Covered		
Weeks	Topic	References
Week 1	Introduction to Analytical Chemistry & Cosmetic QC	From Ref#1
Week 3	Vitamin C in a serum (iodometric titration)	From Ref#1
Week 2	Calibration of Volumetric Glassware	From Ref#1
Week 4	Buffer Preparation and pH Measurement	From Ref#1
Week 5	pH and Buffer Capacity of Cosmetic Products	From Ref#1
Week 6	UV-Vis Spectrophotometry-I Beer-Lambert Law	From Ref#1
Week 7	UV-Vis Quantification of a SPF value (Mansur equation)	From Ref #2
Week 8	Heavy Metal Screening (Limit Test)	From Ref#1
Week 9	Saponification Value for Lipstick	From Ref#1
Week 10	Introduction to AI in Analytical chemistry	From Ref#3
Week 11	UV-Vis Spectral Classification using PCA	From Ref#4
Week 12	AI-Assisted Scientific Report Writing	From Ref#3

Mapping of Course Outcomes to Program Outcomes and NQF Outcomes	Course Outcome Weight (Out of 100%)	Assessment method

Explain the principles of solution preparation, stoichiometric calculations, dilution schemes, and good laboratory practice required for quantitative analysis of cosmetic formulations [1L7K1]	15%	
Perform classical quantitative analytical techniques, including acid/base and redox titrations, to determine concentrations of cosmetically relevant analytes in a quality-control context. [1L7K1]	20%	
Apply statistical and numerical calculations to assess accuracy, precision, and uncertainty in analytical measurement data. [1L7S1]	20%	
Explain the theoretical basis of pH, buffer systems, and quality-control concepts relevant to the analytical evaluation of cosmetic products. [1L7S1]	15%	
Document and communicate analytical results in structured laboratory reports that follow scientific conventions, cosmetic regulatory standards, and ethical laboratory practices using digital tools. [1L7C1]	20%	
Apply basic artificial intelligence and chemometric tools to analytical chemistry data for trend analysis and quality-control decision-making in cosmetic analysis. [1L7C1]	10%	

Relationship to NQF Outcomes (Out of 100%)		
L7K1	L7S1	L7C1
35	35	30

Evaluation	
Assessment Tool	Weight
Mid-Term Exam	25%
In-Lab evaluation	5%
Reports	20%
Final exam	50%

Policy

<p>GenAI use Policy</p>	<p>Gen AI tools (such as ChatGPT or similar systems) may be used for clarification of concepts, brainstorming ideas, or improving understanding of course material. However, Gen AI tools are not considered reliable academic sources and must not replace independent critical thinking, research, or original writing.</p> <p>Permitted Uses</p> <p>Students may use Gen AI tools for the following purposes: Clarifying difficult concepts or terminology. Generating study questions for revision. Brainstorming ideas before drafting assignments. Improving grammar after completing their own original draft. Any use of Gen AI must support not substitute the student's own intellectual work.</p> <p>Prohibited Uses</p> <p>The following uses are strictly prohibited: Submitting assignments, essays, reports, or projects generated fully or partially by Gen AI. Copying, paraphrasing, or slightly modifying AI-generated content and presenting it as original work. Using AI tools to complete assessments intended to measure individual knowledge and skills. Assignments that are pre-made, generated, or copied from AI systems constitute a breach of academic integrity.</p> <p>Academic Integrity</p> <p>Submitting AI-generated work as one's own is considered academic misconduct. Such actions violate university academic integrity policies and may result in disciplinary action, including grade penalties, assignment failure, course failure, or further institutional consequences.</p> <p>Student Responsibility</p> <p>Students are responsible for ensuring that all submitted work reflects their own understanding, analysis, and academic effort. When in doubt about acceptable AI use, students must consult the course instructor before submission.</p> <p>Policy Acknowledgment</p> <p>By remaining enrolled in this course and submitting assignments, students acknowledge that they understand and agree to comply with this Gen AI policy.</p>
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