



T-104
2022

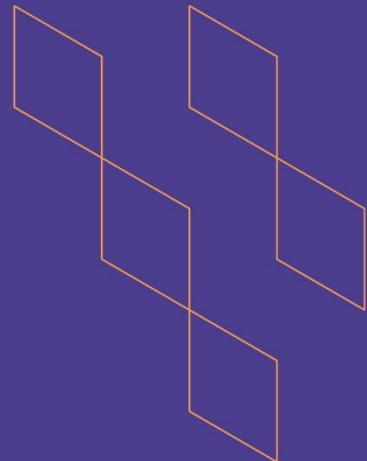
Course Specification





T-104
2022

Course Specification



Course Title:	Instrumental Analysis for Pharmaceutical Preparations
Course Code:	PHC 511
Program:	Pharmaceutical Sciences
Department:	Pharmaceutical chemistry
College:	Pharmacy
Institution:	Najran University
Version:	CS-V1
Last Revision Date:	20-12-2023



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A. General information about the course:

Course Identification	
1. Credit hours:	3 hours (2+1)
2. Course type	
a.	University <input type="checkbox"/> College <input checked="" type="checkbox"/> Department <input type="checkbox"/> Track <input type="checkbox"/> Others <input type="checkbox"/>
b.	Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered:	9 th level / fifth year
4. Course general Description	
This course focuses on describing and explaining theoretical background and principles that are used for quantitative instrumental analysis of substances including fundamentals of different methodologies such as photoluminescence, Raman spectroscopy, atomic spectroscopy, electrochemistry, gas chromatography and mass spectroscopy in combination with HPLC and GC as well as their instrumentation and applications	
5. Pre-requirements for this course (if any): PHC 411	
6. Co- requirements for this course (if any): None	
7. Course Main Objective(s)	
1- Explain the main principles and fundamentals of the quantitative instrumental analysis of substances such as chromatography, photoluminescence, Raman spectroscopy atomic spectroscopy, and electrochemistry 2- Apply the different types of analysis professionally 3- Demonstrate practical skills for preparation of standards and operating instruments	

B. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1.	Traditional classroom	30	100
2.	E-learning	0	0
3.	Hybrid <ul style="list-style-type: none"> Traditional classroom E-learning 		
4.	Distance learning		

2. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	30
2.	Laboratory/Studio	30
3.	Field	
4.	Tutorial	
5.	Others (specify) homeworks and assignments	40
	Total	100

C. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	Describe the theoretical background and principles underlying quantitative instrumental analysis of chemical compounds	K3	Lectures	Theoretical exams Assignment
1.2				
...				
2.0	Skills			
2.1	Plan strategies for the creative solutions of analytical problems	S1	Lectures, Problems Solving	Theoretical exams
2.2	Demonstrate pharmaceutical calculation, isolation, and drug development skills using advanced techniques, tools and instruments as well as results interpretation	S3	Practical work	Observation card or Work Place-Based Assessment (WPBA) Practical Exam (OSPE)
2.3	Communicate clearly and effectively with professionals, administrative staff and supportive personnel	S5	Seminars Practical work	Assignment Laboratory reports
3.0	Values, autonomy, and responsibility			
3.1	Work independently and professionally with independent thinking	V4	Practical work	Work Place-Based Assessment (WPBA) Practical Exam



Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
3.2	Demonstrate accountability, confidence, and Use properly the chemicals according to the rules of good laboratory practice	V4	Practical work	Practical Exam
...				

D. Course Content

No	List of Topics	Contact Hours
1.	<u>Luminescence spectroscopy</u> 1- Theory of fluorescence, phosphorescence and chemoluminescence 2- Factors affecting fluorescence and phosphorescence 3- Relation between fluorescence and molecular structure 4- Bases of quantitation Applications	6
2.	<u>Flame emission spectroscopy (FES)</u> 1. Fundamentals of light absorption by atoms 2. Factors affecting flame emission 3. Linear relationship for quantitative analysis 4. Instrumentation of flame photometry Application of flame photometry in pharmaceutical analysis	3
3	<u>Atomic absorption spectroscopy (AAS),</u> 1. Theory and instrumentation, 2. Application of AAS in the pharmaceutical analysis 3. Interferences in AAS and flame photometry High energy excitation sources: Plasma and laser	3
4	<u>Chromatographic analysis</u> 1. Theory of separation 2. Mechanisms of separations	2
5	<u>HPLC chromatographic analysis</u> 3. Types of mobile and stationary phases 4. Instrumentation 5. Chromatographic performance parameters calculations Applications	4





6	<u>Gas Chromatography (GC)</u> a- Definitions of all parts of GC (Instrumentation) b- Modes of separation analysis by using GC c- GC detectors d- Pyrolysis GC e- Qualitative and quantitative analysis by using GC. Chromatographic parameters of GC analysis	4
7	<u>Mass spectrometry (MS)</u> a. Theory of MS b. Mass interpretation of MS spectrum and structural elucidation c. Application of MS in pharmaceutical analysis Mass fragmentation pattern	5
6	<u>Raman Spectroscopy</u>	3
7		
Total		30
<u>Practical sessions</u>		
<u>List of experiments in this course</u> Lab 1 Introduction to laboratory health and safety procedures and tools names Lab 2 Determination of Na ⁺ ions by flame Lab 3. Determination of Pb ²⁺ ions by AAS Lab 4. Determination of quinine by FS Lab 5. Determination of paracetamol by HPLC method Lab 6. GC Determination of methanol and ethanol Lab 7. Determination of paracetamol using MS Lab 8. Interpretation of MS spectra Lab 9. Data Analysis using excel software Lab 10. Statistics in laboratory Revision Final practical exam on week number 14		
		30

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quiz #1	6	10%
2.	Midterm exam	9	20%
3.	Individual assignments	12	5%
4.	Lab. practical quiz or Lab report	12	5%



No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
5.	Observation card in lab	2-13	10%
6.	Final practical Exam	15	10%
7.	Final exam	16	40%
8.			

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.)



E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	<ol style="list-style-type: none"> 1. Vogel's Quantitative chemical Analysis, 7th Edition, 2009 2. Analytical Chemistry by Christian, G.D. 7th Edition, John Wiley and Sons: New York, 2014.
Supportive References	<ol style="list-style-type: none"> 1. Analytical Chemistry by Christian, G.D. 7th Edition, John Wiley and Sons: New York, 2014 2. Power point slides
Electronic Materials	www.dlaf.nu.edu.sa
Other Learning Materials	Excel software for calculations and drawing

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	<p>Suitable lecture room equipped with data show and internet and sufficient number of seats.</p> <p>Suitable laboratories equipped with health and safety tools, internet and sufficient number of seats.</p>
Technology equipment (projector, smart board, software)	Computers, data show, sound systems and internet
Other equipment (depending on the nature of the specialty)	<ol style="list-style-type: none"> 1. Volumetric flasks of different volumes 2. Water bath 3. Hot plates 4. Automatic pipettes 5. Ultrasonic instrument 6. pH meters 7. Atomic absorption spectrometer 8. Flame photometer 9. Fluorescence spectrophotometer 10. HPLC-MS instrument 11. GC instruments

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
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Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Head of departments and students	Indirect Questionnaires (indirect)
Effectiveness of students assessment	Faculty members and students	Indirect Questionnaires (indirect)
Quality of learning resources	Students	Questionnaires (Indirect)
The extent to which CLOs have been achieved	Student peer reviewer	Direct Indirect
Other		

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

Assessment Methods (Direct, Indirect)

G. Specification Approval Data

COUNCIL /COMMITTEE	Pharmaceutical Chemistry Department Council
REFERENCE NO.	Council No.
DATE	20-12-2023