

The University of Jordan

Faculty: Pharmacy
Program: Pharmacy, PharmD

Department: Pharmaceutical Sciences

Applied Chromatography (1201522)

Credit hours	2	Level	5 th year	Pre-requisite	1201315
Coordinator/ Lecturer	To be assigned	Office number	According to the lecturer	Office phone	According to the lecturer
Course website	http://academic.ju.edu.jo/m.ALzweiri/Material/Forms/AllItems.aspx	E-mail	According to the lecturer	Place	3d floor

Office hours (coordinator)					
Day/Time	Sunday	Monday	Tuesday	Wednesday	Thursday
To be announced each semester on the door of instructor office					

Course Description

At the end of this course the student is expected to acquire basic and applied knowledge regarding chromatography and separation science. The student will realize the importance of chromatography in the different pharmaceutical fields; in drug discovery, drug identification, characterization and pharmacopoeial analysis. The proper selection of the best chromatographic technique and conditions to resolve certain separation problems will be covered and discussed. The course will also include some examples of common and recent applications of liquid and gas chromatography in pharmacy.

Learning Objectives

1. Understanding the definition, basics and types of separation and chromatographic techniques.
2. Understanding the importance and various applications of chromatography in pharmacy.
3. Recognizing the variables of chromatographic process and the best way and conditions to conduct in order to achieve the best results.
4. To get familiar with some common and specialized chromatographic techniques (e.g. hyphenated systems), methods, and official applications like pharmacopoeial drug analysis (identification, assay, related substances, etc.), method development, bioanalysis, drug discovery (preparative separation), and other pharmaceutical applications.

Intended Learning Outcomes (ILOs):

Successful completion of the course should lead to the following outcomes:

A. Knowledge and Understanding: Student is expected to

- A1. Acquaint knowledge of the science of separation and its roles in pharmacy and medicine.
- A2. Understand the principles, basics and variables of extraction processes.
- A3. Understand the principles, basics, variables and types of chromatography and its various techniques.

B. Intellectual Analytical and Cognitive Skills: Student is expected to

- B1. Recognize the types, process details and variables, and applications of extraction methods.
- B2. Recognize the types, process details and variables, and applications of chromatography and its various techniques.
- B3. Recognize the impact of variable chromatographic parameters and conditions on process performance and intended outputs.
- B4. Recognize the context of method validation and its importance, official requirements, methodology and conduction.

C. Subject-Specific Skills: Student is expected to

- C1. Be able develop, conduct and evaluate the different extraction techniques for analytical and preparative pharmaceutical applications.
- C2. Be able develop, conduct and evaluate the different chromatographic techniques for analytical - qualitative and quantitative - pharmaceutical applications.
- C3. Be able to evaluate and analyze the chromatographic outputs (e.g. chromatograms), to make reports and to take the decisions regarding the analytical method appropriateness.
- C4. Be able to apply the different official and nonofficial chromatographic methods for purpose of drug identification and assay, and to write the appropriate reports of the final results.
- C5. Make validation for developed chromatographic methods applied in pharmaceutical analysis.

D. Transferable Key Skills: Students is expected to

- D1. Work in a team as a work-group and discuss results with other colleagues.
- D2. Know how to conduct literature survey and to get the required information about for example chromatographic processes, analytical methods, problem solving and trouble shooting; as well as how to use the collected data, of others' research, to prepare a scientific report.

ILOs: Learning and Evaluation Methods

ILO/s	Learning Methods	Evaluation Methods
A. Knowledge and Understanding	Lectures and Discussions	Exam and Quiz
B. Intellectual Analytical and Cognitive Skills	Lectures and Discussions	Exam, Quiz
C. Subject-Specific Skills	Lectures, Discussions, and Assignments	Exam, Quiz, and Assignments
D. Transferable Key Skills	Discussions, Assignments and Presentation	Quiz and Assignments

Course Contents

<i>Content</i>	<i>Reference</i>	<i>Week</i>
Basics of organic and analytical chemistry	<i>4 and 5</i>	1
basic chromatographic techniques	<i>1-3 and 5-6</i>	2
HPLC instrumentation	<i>1-3</i>	3
HPLC instrumentation	<i>1-3</i>	4
HPLC instrumentation	<i>1-3</i>	5
HPLC instrumentation and MID exam	<i>1-3</i>	6
MID exam		6
van deemeter and resolution equation	<i>1-3 and 5-6</i>	7
selection the appropriate column	<i>1-3 and 5-6</i>	8
Quiz		8
column and mobile phase types for basic compounds	<i>1-3 and 5-6</i>	9
Column factors affecting peak shape	<i>1-3 and 5-6</i>	10
Column factors affecting peak shape	<i>1-3 and 5-6</i>	11
HPLC_detectors	<i>1-3 and 7</i>	12
HPLC_detectors	<i>1-3 and 7</i>	13
Validation and calibration	8	14
Validation and calibration	8	15
Final Exam		16

Projects and Assignments

Student should submit a report about specific topics, methods, techniques, and/or applications assigned to him/her during the course. He/She may be asked to present his/her report during lecture.

Evaluation

Evaluation	Point %	Date
Midterm Exam	40	6 th week
Quiz	10	8 th Week
Final Exam	50	16 th week

References:

Required Course Texts and Materials

- 1- Pharmaceutical analysis, A Textbook for Pharmacy Students and Pharmaceutical Chemists for David Watson.
- 2- Undergraduate instrumental analysis for James W. Robinson

Optional Course Texts and Materials

- 3- Principles of instrumental analysis for D.A. Skoog, F.J. Holler and T.A. Nieman.
- 4- Introduction to spectroscopy: A guide for students of organic chemistry for Donald L. P., Gary M. L. and George S. K.
- 5- Analytical Chemistry: An introduction for D.A. Skoog, D.M. West and F.J. Holler.
- 6- A textbook of pharmaceutical analysis for Connors, Kenneth Antonio.
- 7- BP, USP, EP
- 8- ICH Guidelines (Validation of Analytical Procedures), Q2(R1). ICH: 2005. URL: (<http://www.ich.org/products/guidelines/quality/quality-single/article/validation-of-analytical-procedures-text-and-methodology.html>)

