Course Specification of: Chromatography and separation techniques

---

University: **Zagazig** Faculty: **Pharmacy**

A- Course specifications:

Program(s) on which the course is given: **Bachelor of Pharmacy, (clinical pharmacy)**

Major or Minor element of programs: Major

Department offering the program:

Department offering the course: **Pharmacognosy Department.**

Academic year/Level: **Fourth level /eighth term**

Date of specification approval: **30/9/2019**

B- Basic information:

Title: **Chromatography and separation techniques**

Code: **PG E10**

Credit Hours: ---

Lectures : **2 hrs/week**

Practical: **1 hr/week**

Tutorials: ---

Total: **3 hrs/week**

C- Professional information:

1-Overall Aims of the Course:

On completion of the course, the student will be able to:

Illustrate different modes of separation, gel filtration and permeation, ion exchange and non-ion exchange manifestation and applications. High pressure liquid chromatography, gas liquid chromatography and their applications

2-Intended Learning Outcomes (ILOs):

A- Knowledge and Understanding	
a1	Outline the principles of different chromatographic separation techniques.
a2	Illustrate the applications of different chromatographic techniques.
a3	Identify suitable chromatographic techniques for qualitative and quantitative determination of drugs in body fluids
B- Professional and Practical skills	
b1	Handel basic laboratory equipments effectively and safely.
b2	Perform laboratory techniques for extraction, isolation and identification of different classes of drugs from natural origin, dosage forms and body fluids.
b3	Construct a research study about different chromatographic techniques.
C- Intellectual skills	
c1	Predict different analytical tools used for determination of chemicals qualitatively and quantitatively.
c2	Select appropriate chromatographic methods for isolation and identification of different classes of compounds in the body and in different dosage forms
D- General and Transferable skills	
d1	Work effectively as a member of a team.
d2	Write reports and present it.
d3	Develop communications skills with systematic and creative thinking individually or among a team

D- Contents:

week No.	Lecture contents (2 hrs/lec.)	Practical session (2hrs/lab)
1	-Introduction, classification, and terminology and mode of chromatographic separation.	Laboratory safety measures Extraction of herbal drugs. Demonstration on soxhlet apparatus
2	- Classical chromatographic techniques (Column chromatography)	Extraction and detection of caffeine in tea powder, tablets and power drinks by TLC.
3	- Con. classical chromatographic techniques (TLC and paper)	Extraction and detection of atropine in hyoscyamus powder, atropine ampoules using standard by TLC
4	Non classical chromatographic techniques (HPLC chromatography)	**Activity (1)**: **Write a report on:** Using any chromatographic

		techniques, how can you perform qualitative and quantitative analysis of a medicinal plant metabolites or a toxic plant metabolite in body fluid (group discussion, 3 weeks for preparation)
5	- Applications of HPLC chromatography	Demonstration of HPLC in the faculty analytical central lab
6	-Gas chromatography, principle, mobile phase, stationary phase.	Demonstration of GC in the faculty analytical central lab
7	Midterm exam	
8	Gas chromatography, detectors, quantification and application.	Report presentation and group discussion on **activity (1).**
9	- Retention parameters in GC - Hyphenated techniques	Trouble shooting in GC and HPLC
10	-Ion exchange chromatography	Videos on the operation of gel and ion exchange chromatography
11	- Gel chromatography	Extraction and analysis of a drug in urine samples
12	- Analysis of drugs in body fluids (Sample preparation and extraction)	Practical exam
13	- Analysis of drugs in body fluids (Applications)	
14	- Revision	
15	Written exam	

E- Teaching and Learning Methods:

- Lectures
- Practical sessions
- Videos for machines not available for actual demonstration (Gel chromatography and ion exchange .....)
- Self learning (group discussion, research activity)

F- Student Assessment Methods:

1- Written exam (periodic, final) **to assess** (a1, a2, a3, c1, c2)

2- Activity (1): a research about a specific chromatographic technique

and its application in the field of natural products **to assess** (b3, d1, d2, d3)

3- Practical exam **to assess** (b1, b2)

Assessment schedule:

Assessment (1): Periodic exam	Week 7
Assessment (2): Activity	Week 4, 8
Assessment (3): Practical exam	Week 12
Assessment (4): Final written exam	Week 15

Weighting of Assessment:

Assessment method	Marks	Percentage
Periodic exam	10	10%
Practical exam	25	25 %
Final written exam	50	50 %
Oral exam	15	15%
TOTAL	100	100%

G- Facilities Required for Teaching and Learning:

- Black (white) board, Data show.
- Laboratory equipment (soxhlet apparatus, Clevenger, TLC plates, glass columns, sprayers, capillaries, jars, separating funnels)
- HPLC and GC machines in the faculty central lab.
- Chemicals (organic solvents, silica for column and TLC, spraying reagents, Plant powders, alkaloids, and flavonoids).

H- List of References:

1- Course Notes: Student book for chromatography and separation techniques, approved by Pharmacognosy Department 2019

2- Essential Books:

- Preparative Chromatography Techniques, Kurt Hostettmann, Maryse Hostettmann, Andrew Marston; Springer Science & Business Media (2013).
- Sample Preparation of Pharmaceutical Dosage Forms (Challenges and Strategies for Sample Preparation and Extraction), Beverly Nickerson, Springer Science & Business Media (2011).
- Basics of gas chromatography, Harold M. Mcnair and James M. Miller, Second edition, John Wiley and sons, INC publication (2009).
- Chromatography: Fundamentals and Applications by E. Heftmann (2004) 6th ed, ELSEIVIER Inc., San Diego, CA 92101-4495, USA.
- Application of High Performance Liquid Chromatography. A. Pryde and M. T. Gilbert (1980) Chapman and Hall. London, New York.

3- **Recommended Books**

- Drogenanalyse II: "Inhaltsstoffe und Isolierungen" E. Stahl and W. Schild (1981) Gustav Fischer Verlag. Stuttgart, New York.
- Advances in Chromatography. Edited by J. C. Giddings, E. Grushka, J. Cazes and P. R. Brown (1983) Volume 22. Marcel Dekker Inc., New York and Basel.
- The Essence of Chromatography by C. F. Poole (2003) 1st, ELSEIVIER Inc., San Diego, CA 92101-4495, USA.

- Chromatographic Analysis of Pharmaceuticals. Edited by J. A. Adamovics (1997) 2nd ed.,. Marcel Dekker Inc., New York, Basel, Hong Kong.
- GLC and HPLC Determination of Therapeutic Agents. Part 1, edited by K. Tsuji and W. Morazowich (1978). Marcel Dekker Inc., New York and Basel.

4- Periodicals and websites:

Phytochemistry, J. of Natural Products, Die Pharmazie and journal of chromatography.

http:// www.elsevier.com/phytochem

http:// www.elsevier.com/phytomed

http:// www.wiley.co.uk.

http:// bioweb@cellbiol.com

Course Coordinator: Prof. Dr. Assem El-Shazly

Head of Department: Prof. Dr. Amal Al-Gendy

Date: 30/ 9/ 2019 تم مناقشة و اعتماد توصيف المقرر من مجلس القسم بتاريخ م

Matrix I of Chromatography and separation techniques Course

Course Contents		ILOs of Chromatography and separation techniques Course										
		Knowledge and understanding			Professional and practical skills			Intellectual skills		Transferable and general skills		
		a1	a2	a3	b1	b2	b3	c1	c2	d1	d2	d3
Lectures												
1	- Introduction, classification, and terminology and mode of chromatographic separation	×										
2	- Classical chromatographic techniques (Column chromatography)	×										
3	- Con. classical chromatographic techniques (TLC and paper)	×										
4	Non classical chromatographic techniques (HPLC chromatography)	×										
5	- Applications of HPLC chromatography		×					×				
6	-Gas chromatography, principle, mobile phase, stationary phase.	×										

7	Gas chromatography, detectors, quantification and application.		×					×				
8	- Retention parameters in GC - Hyphenated techniques	×	×						×			
9	-Ion exchange chromatography	×	×									
10	- Gel chromatography	×	×									
11	- Analysis of drugs in body fluids (Sample preparation and extraction)			×				×	×			
12	- Analysis of drugs in body fluids (Applications)			×				×	×			
Practical sessions												
13	- Laboratory safety measures				×							
14	- Extraction of herbal drugs.					×						
15	Demonstration on soxhlet apparatus				×	×						
16	Extraction and detection of caffeine in tea powder, tablets and power drinks by TLC.				×	×				×		×

17	Extraction and detection of atropine in hyoscyamus powder, atropine ampoules using standard by TLC				×	×				×		×
18	**Activity (1)**: **Write a report on:** Using any chromatographic techniques, how can you perform qualitative and quantitative analysis of a medicinal plant metabolites or a toxic plant metabolite in body fluid (group discussion, 3 weeks for preparation)						×			×	×	×
19	Demonstration of HPLC in the faculty analytical central lab					×	×		×			
20	Demonstration of GC in the faculty analytical central lab					×	×					
21	Report presentation and group discussion on **activity (1).**				×	×	×			×	×	×
22	Trouble shooting in GC and HPLC				×	×						
23	Videos on the operation of gel and ion exchange chromatography				×	×						
24	Extraction and analysis of a drug in urine samples				×	×				×		

Course Coordinator: Prof. Dr. Assem Al-Shazly

Head of Department: Prof. Dr. Amal Al-Gendy

Date: تم مناقشة و اعتماد توصيف المقرر من مجلس القسم بتاريخ 30/ 9 /2019 م