



**Hawler Medical University**  
**College of Pharmacy**  
**Department of Pharmaceutics**  
**Course Book**

**Industrial Pharmacy**

**5<sup>th</sup> Stage**

Course Coordinator:

**Heba Antwan Fatohy**

Lecturer

**Course Name: Industrial pharmacy**

**Course Level Year: 5<sup>th</sup> Stage**

**Credit Hour(s): 3 hours**

**Course Coordinator: Dr. Heba A. Fatohy**

**Lecturer (theory):**

**Dr. Heba A. Fatohy , Dr. Adnan B. Qader, Dr. Sabah Souliman**

**Topics:**

<b>First Semester</b>		
<b>Subject</b>	<b>Lecturer</b>	<b>Hours</b>
Mixing	<b>Dr. Heba</b>	6
Milling	<b>Dr. Heba</b>	6
Drying	<b>Dr. Adnan</b>	6
Clarification & Filtration	<b>Dr. Sabah</b>	6
Preformulation	<b>Dr. Heba</b>	5
Sterilization & Sterile products	<b>Dr. Adnan</b>	5
Semisolid dosage forms Ointments, creams, pastes, emulsions and jellies	<b>Dr. Sabah</b>	6
Suppositories dosage form	<b>Dr. Heba</b>	5
Second semester		
<b>Subject</b>	<b>Lecturer</b>	<b>Hours</b>
Tablet dosage form	<b>Dr. Heba</b>	10
Tablet coating	<b>Dr. Adnan</b>	3
Capsule dosage form Hard gelatin capsule Soft gelatin capsule	<b>Dr. Heba</b>	6
Pharmaceutical aerosols	<b>Dr. Sabah</b>	3
Ophthalmic preparations Drops Ointments Lenses Jellies	<b>Dr. Heba</b>	6
Drug delivery system ◆ Microencapsulation ◆ Modified release (sustained release) ◆ Transdermal	<b>Dr. Adnan &amp; Dr.Sabah</b>	10
Biotechnology	<b>Dr. Sabah</b>	5
cGMP	<b>Dr. Adnan</b>	2

**Textbook(s):**

1. Theory and practical of industrial pharmacy (Leon Lachman)
2. Pharmaceutics. The science of dosage form design, 2<sup>nd</sup> edition by M. E. Aulton, Churchill livingstone UK 2004.
3. Pharmaceutical Dosage Form :- Tablets, vol. 1 2<sup>nd</sup> edition by Herbert A. Lieberman, Leon Lachman and Joseph B. Schwartz. Marcel Dekker. 2002.
4. Ansel's, Pharmaceutical Dosage Forms and Drug Delivery Systems, 8<sup>th</sup> edition, Lippincott Williams and Wilkins. 2004.

**Lecturer (practical): Dr. Anoosh Bashir**

<b>First Semester</b>	
<b>Subject</b>	<b>Hours</b>
Introduction to industrial pharmacy & pharmaceutical plant & equipment	<b>3</b>
gnixiM	<b>6</b>
scitiremorciM	<b>6</b>
Rheology	<b>6</b>
Drying, loss on drying & moisture content, fluidized bed drying	<b>6</b>
Sterilization	<b>6</b>
Effervescent granule formulation	<b>6</b>
Preparation and evaluation of semisolid dosage form and suppositories	<b>6</b>
<b>Second Semester</b>	
<b>Subject</b>	<b>Hours</b>
Direct compression method for preparation of tablet	<b>6</b>
Dry granulation method for preparation of tablet	<b>6</b>
Wet granulation method for preparation of tablet	<b>6</b>
Evaluation of tablet dosage form: 1. Hardness, thickness & diameter 2. Friability & weight variation 3. Tablet disintegration 4. Dissolution rate	<b>9</b>

5- Tablet coating	<b>6</b>
6- Capsule formulation	<b>6</b>
7- Evaluation of capsule dosage form	<b>6</b>
8- Microencapsulation	

**Textbook(s):**

1. Theory and practical of industrial pharmacy (Leon Lachman)
2. Pharmaceutics. The science of dosage form design, 2<sup>nd</sup> edition by M. E. Aulton, Churchill livingstone UK 2004.
3. Pharmaceutical Dosage Form :- Tablets, vol. 1 2<sup>nd</sup> edition by Herbert A. Lieberman, Leon Lachman and Joseph B. Schwartz. Marcel Dekker. 2002.
4. Ansel's, Pharmaceutical Dosage Forms and Drug Delivery Systems, 8<sup>th</sup> edition, Lippincott Williams and Wilkins. 2004.

**Hawler Medical University**  
**College of Pharmacy**  
**Department of Pharmacology and Toxicology**  
**Course Book**  
**Clinical Toxicology**  
**5<sup>th</sup> Year**

**Course Coordinator and list of Teachers**

1. Name of the course: **Clinical Toxicology** 5<sup>th</sup> year
2. Lecture in charge: Dr. Ansam N. Al-Hassani
3. Department: Pharmacology and Toxicology
4. Contact: Hawler Medical University

Collage of Pharmacy - Department of Pharmacology and Toxicology

Email: ansamalhasni@yahoo.com

Website link: [www.hawlermu.org](http://www.hawlermu.org)

5. Participant lecturers:  
Dr. Ansam N. Al-Hassani

**Course Overview**

To develop an understanding about the mechanism of toxicity of many drugs and compounds on human body and produce their toxic or cell health.

**Course Objective**

The students will have basic understanding of the toxic and side effect due to misuse of drugs and chemicals in which we are contact with. Also understanding the environmental toxicity (car, water, and soil), industrial toxicity (metals, alkali and acids), and the major sign and symptoms of toxicity and how we can protect or treat them.

**Course Reading List**

Gossel and Bricker, Principles of clinical toxicology.

## Syllabus

1. Course title: Clinical Toxicology 5<sup>th</sup> year.

2. 2hr. theory and 3hr. practice.

Course Participants: 5<sup>th</sup> year pharmacy students.

Instructors:

Dr. Ansan N. Al-Hassani

Course length 15 weeks (semester program)

Teaching methods- Theory (power point presentation) / practical (experiments)

Assessment (grading): summative assessment.

1<sup>st</sup> semester 40%

Final exam: 60%

## Outline of Course

Subject	Lecturer	No. of hrs.
Introduction, initial Management and Treatments	Dr. Ansam	1
Cardiovascular Drugs Toxicity A. digitalis      B. B-blockers		1 2
Analgesic, Antipyretic and and Anti-inflammatory drugs Toxicity A. salicylates      B. paracetamol		1 2
CNS Depressants Toxicity		2
CNS Stimulants		1
Tricyclic Antidepressants Toxicity		2
Acute Metallic Poisoning		1
Cyanide Poisoning		1
Antihistamines Toxicity		1
Alcohol (methanol and propylenglycol)		2
Drug Abuse		2
Miscellaneous Agents		4
Poisoning with Toxic Inhalants		2
Hydrocarbons Toxicity		1
Antidiabetic Drugs		2
Antibiotics		1
Vitamins		1
Warfare		1
Reference Books: Gossel and Bricker, Principles of Clinical Toxicology.		

# Clinical Biochemistry

## Fifth Stage

### Course Coordinator and list of teachers

1. name of the course : Clinical Biochemistry 5<sup>th</sup> year

2. Lecturer. in charge : Dr. Showan D. Husain

3. Dept. : Clinical Analysis

4. Contact :

Address: Hawler Medical University

College of Pharmacy / Dept. Clinical Analysis

Email : [showand\\_2000@yahoo.com](mailto:showand_2000@yahoo.com)

Website link: [www.hawlermu.org](http://www.hawlermu.org)

5. Participant lecturers :

a –Dr. Abdulkadr Aziz

b- Dr.Sanna Ghadhban

c- Dr.Shatha Rouf

d- Dr.Basima Sadiq

### Course Overview:

The emphasis will be on the application of biochemical Knowledge to the diagnosis and treatment of disease .

The correlation used for qualitative and quantitative analysis of solutes present in body tissues and fluids are described. Techniques used to identify disease of liver, Kidney , heart and their associated diseases are explained with emphasis on enzyme activity .

**Course Objectives:** At the end of this course the student will be introduced to:

- 
- The effect of the different diseases on liver function, renal function, lipid metabolism
  - The principle of laboratory tests and their uses in diagnosis.
-

## **Syllabus:**

1. Course title: Clinical Biochemistry 5th year
2. Theoretical Clinical Biochemistry ,Credit hours = 3 hours
3. Practical Clinical Biochemistry ,Credit hour = 1 hour

- **Water and electrolytes**
    - Hyponatremia and hypernatremia.
    - Hypokalemia and hyperkalemia.
  - **Acid- base balance**
    - Metabolic acidosis and alkalosis.
    - Respiratory acidosis and alkalosis.
  - **Plasma lipids and lipoproteins.**
    - Classification
    - Metabolism of plasma lipoproteins.
    - Hypercholesterolemia and atherosclerosis.
  - **Blood glucose regulation.**
    - Hyperglycemia.
    - Types of diabetes.
  - **Liver function**
    - Synthetic, metabolic, excretory, detoxification and conjugation function
    - Bilirubin metabolism
    - jaundice.
  - **Renal function.**
    - Renal physiology.
    - Renal function tests.
    - Clinical utility of urea, creatinine and uric acid.
    - Hyperuricemia and gout.
  - **Enzymes**
    - Creatine kinase - Aldolase - Lactate dehydrogenase .
    - Aminotransferase – Glutamate dehydrogenase – Alkaline phosphatase.
    - 5-nucleotidase – Gamma glutamyl transferase.
    - Amylase – Lipase – chymotrypsin –
    - Acid phosphatase.
  - **Endocrinology**
    - Prolactin – Growth hormone – FSH - LH – TSH – ACTH
    - TSH - T3 – T4 – Sex hormone
  - **Cardiac diseases**
    - Hypertension
    - Arrhythmia
  - **Quality control in clinical biochemistry**
    - Goals for quality control program.
    - Control of quality ( process control )and error detection.
    - Detection and resolution of quality problems.
    - External quality control programs and other tools for accuracy control.
    - Automated quality control initiatives
  - **Tumor markers**
    - Classification and uses.
    - Specific tumor markers
    - Oncofetal and blood group antigens.
- Receptors and other markers**



- **Text book and references :**

- Tietz text book of clinical chemistry . second Edition carl A.Burtis Edward R.Ashwood.
- Clinical chemistry Theory analysis and correlation second Edition
  - Lawrence A.Kaplan. ◦Amada J.Persce.
- Clinical chemistry and metabolic medicine- seventh edition by Crook

Assessment (grading): summative assessment:

1<sup>st</sup> semester 40%:

Final exam: 60%

Text book and references:

- Lippincotts Illustrated Reviews : Biochemistry by Richard A. Harvey, Pamela C. and Denise R. Ferrier .4<sup>th</sup> edition .2008
- Chemistry for the health Sciences by George I sackheim and Dennis D. Lehman 8<sup>th</sup> edition
- Harper Biochemistry by D.W. Martin ,P.A. Mayes V.W. Rodwell

**Practical Syllabus**

**Course contents / outline distributed per week**

<b>Week</b>	<b>Subject</b>
1 <sup>st</sup>	Introduction to instrumentation and techniques used in analyzing biological samples : Spectrophotometer , Electrophoresis , Flame Photometer . - General techniques for the collection and preservation of specimens for analysis .
2 <sup>nd</sup>	Blood analysis : Determination of blood glucose and glucose tolerance test.
3 <sup>rd</sup>	Determination of albumin and total proteins in the plasma and its significance in liver function analysis .
4 <sup>th</sup>	Lipid determination in the serum : Determination of triglyceride. Determination of total serum cholesterol.
5 <sup>th</sup>	Determination of : - HDL cholesterol - LDL cholesterol - Using results to assess atherosclerosis.
6 <sup>th</sup>	Determination of serum bilirubin. Diagnosis of types of jaundice ( Pre-hepatic , Hepatic and Post-hepatic ) .
7 <sup>th</sup>	Determination of serum uric acid. Diagnosis of Gout .
8 <sup>th</sup>	Determination of serum creatinine and urea.

	Diagnosis of kidney diseases.
9 <sup>th</sup>	Determination of Alkaline phosphatase and acid phosphatase
10 <sup>th</sup>	Determination of serum aminotransferase activity , SGPT , SGOT for liver disease and myocardial infarction.
11 <sup>th</sup>	General urine analysis
12 <sup>th</sup>	Detection of HbA1C
13 <sup>th</sup>	-Hormone analysis using ELISA
14 <sup>th</sup>	-Determination of alpha amylase in blood
15 <sup>th</sup>	Determination of calcium and phosphate.

### Student's Feedback on the Subject

Date:            Course:            Year:            Lecturer/tutor

No.	Evaluation Question	Subject's Level 1-5	Subjective Remarks
1	The objectives and key messages of the subject were clear		
2	The contents of the subject of the were useful and related to the main objects of the course		
3	The material were prepared carefully as needed		
4	The lecturer/tutor while lecturing tried to analyze the principles, contents and the important points of the subject simply and properly.		
5	The lecturer/tutor while lecturing kept my attention.		
6	The lecturer/tutor came into the classroom on time and was committed to the duration of the lecture.		
7	The lecturer's behavior in the classroom was clam and respectful		
8	The slides used in the lecturer were clear and attractive		
9	At the end of the lecture, the lecturer gave the students a chance for question and comments. His/her answers were complete		
10	The reading sources are new and compliable with the subject.		
	Total of the level		

Students to evaluate the level of the contents				
1	2	3	4	5
Poor	Accept	Medium	Good	Very good

### Student's Feedback on the Subject

Date:          Course:          Year:          Lecturer/tutor

No.	Evaluation Question	Subject's Level 1-5	Subjective Remarks
1	The objectives and key messages of the subject were clear		
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10	The reading sources are new and compliable with the subject.		
	Total of the level		

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Poor	Accept	Medium	Good	Very good

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10	The reading sources are new and compliable with the subject.		
	Total of the level		

Students to evaluate the level of the contents				
1	2	3	4	5
Poor	Accept	Medium	Good	Very good

**Examinations:**

- The exams will be held during the course.
- Quizzes – during the practical hours.
- Theoretical exams: one per semester.
- Practical exams: one or two per semester.
- Final exam – Theoretical, Practical and Oral.

**Theoretical:** exams will be mixed

- MCQ. (Multiple choices questions)
- SCQ. (Single choices Questions)
- Short Essays



**Hawler Medical University**  
**College of Pharmacy**  
**Dept. of Pharmaceutical Chemistry**  
**Course Book**

**Pharmaceutical Instrumental Analysis**

**Course Coordinator:**  
**Lecturer Aras N. Hamad**

**Pharmaceutical Instrumental**  
**Analysis**

**Course Coordinator and list of teachers**

5. Name of the course : Pharmaceutical Instrumental Analysis 5<sup>th</sup> year

6. Lecturer in charge: Dr. Aras N. Hamad

7. Department: Pharmaceutical Chemistry

8. Contact :

Address: Hawler Medical University

College of Pharmacy / Dept. of Pharmaceutical Chemistry

Email: [dr.aras\\_najmaddin@yahoo.com](mailto:dr.aras_najmaddin@yahoo.com)

Website link: [www.hawlermu.org](http://www.hawlermu.org)

6. Participant lecturers :

1. Dr. Lazeeza S. Omar

## Course Overview

We concentrated upon the most commonly used techniques in drug structure determination: nuclear magnetic resonance (NMR), infrared (**IR**) and ultraviolet-visible (UV-Vis) spectroscopy, and mass spectrometry (MS).

The amount of space devoted to each technique in this course is meant to be representative of their current usage for structure determination.

Finally, we will try to bring all of these techniques together in an attempt to show student how to go about the structure determination of an unknown compound in a (reasonably) logical manner. Our aim has been to provide spectra to illustrate every point made, but do analyze fully each of the spectra in order to obtain the maximum information available.

## Course Objectives

The objective of this course is to develop a working knowledge of spectroscopy and spectrometry as applied to the structural elucidation of drugs. We will cover  $^1\text{H}$  and  $^{13}\text{C}$  NMR spectroscopy, infrared spectroscopy, UV-visible spectroscopy and mass spectrometry.

We might not get too heavy on theory but we will cover many practice problems.

## Course Reading List:

1. Text Book – Spectroscopic Identification of organic compounds by Sliverstein , Bassler and Morril, 4<sup>th</sup> edition
2. Spectroscopic Methods in Organic Chemistry by William and Fleming 2<sup>nd</sup> edition 1971
3. Gilbert, J.C., Martin, S.F. Experimental Organic Chemistry: A Miniscale and Macroscale Approach, 4th ed.; Brook/Cole: Pacific Grove, CA, 2006.
4. Landrie, C. Organic Chemistry Laboratory I: Lab Manual & Course Materials, Kendall-Hunt: 2009.

## Syllabus:

1. Course title: Pharmaceutical Instrumental Analysis 5th year
2. Number of credits 4: 3hr theory 3hr practice (1 semester = 15 weeks)

The course complies the following:

### Ultraviolet spectroscopy:

- General remarks concerning spectroscopy
- Region of electromagnetic spectrum, electronic transition
- Influence of solvent polarity on various electronic transitions
- Spectra in the identification of organic compounds
- Chromophores groups , auxochrome , bathochromic shift, hypsochromic shift, and hyperchromic effect.
- Woodward's rules

### IR Spectroscopy:

- Physical principle
- Some background
- Theory of IR Absorption Spectroscopy
- Vibrational Spectroscopy
- Fundamental and non fundamental absorption frequency
- Instrumentation of IR and FTIR
- Characteristic Group vibrations
- Factor determining the position and intensity of absorption bands
- Quantitative Analysis by FTIR
- Problems

### NMR (Nuclear Magnetic Resonance) :

- Introduction
- NMR phenomena
- Nuclear spin and the Spectrometer
- Instrumentation (old machine and Plus NMR)
- Origin of the NMR Effect
- What Does an NMR Spectrum Tell You?
- Chemical shift and **the  $\delta$  Scale**
- Spin-Spin coupling
- Integration
- Examples
- Diamagnetic Anisotropy and Shielding and Deshielding
- Examples
- Why go to higher field strength
- Quantitative Analysis by H-NMR
- Problems from Morrison and Boyd
- C13 NMR
- C13 Chemical shift
- Coupling and Decoupling in C13 NMR
- Examples

- N15 – NMR
- Phosphorous -31NMR
- Fluorine -19 NMR
- Problems
- Two-dimensional (2D) spectroscopy
- COSY spectrum
- Examples
- C13 Assignment Techniques
- Distortionless Enhancement polarization transfer DEPT 135, DEPT 90, DEPT 45
- ATP
- Heteronuclear Multiple Correlation Spectroscopy HMQC
- Heteronuclear Multiple Bond Correlation Spectroscopy HMBC
- Heteronuclear Single Quantum Correlation (HSQC)
- Examples

### **Mass Spectroscopy:**

- Application of Molecular Mass spectrometry
- Instrumentation
- Principle of measurement
- Vaporization and Ionization Processes
- Ionization to Radical Cation Molecular Ion (m+)
- Glossary
- The Mass Spectrum
- Examples
- Fragmentation processes
- Isotopes
- Examples
- Rearrangement
- McLafferty Rearrangements
- The retro-Diels-Alder
- Mass analysis
- Mass Spectral Data
- Quantitative application of Mass spectrometry
- GC/MS process
- Examples

### **Structural Elucidation Using IR, H- NMR, MS, C-NMR:**

### **Structural Elucidation Using IR, H- NMR, MS, C-NMR, COSY, DEPT 135, HMQC, HMBC:**

### **Spectroscopy Exercise:**

This will be a take-home exercise and are encouraged to work together. Questions will be posted on the course website and answers will be submitted via Blackboard. Further instructions will be provided in class and on the website. The Spectroscopy Exercise will provide practice in the use of IR and NMR spectra in determining the structures of organic molecules.

Assessment (grading): summative assessment:

Mid exam: 40%

Final exam: 60%



**Outline of course:**

Subject	Lecturer	No. of hrs
<b>1- Ultraviolet spectroscopy:</b>	<b>Dr. Lazeeza S Omar</b>	<b>9</b>
General remarks concerning spectroscopy, Region of electromagnetic spectrum, electronic transition, Influence of solvent polarity on various electronic transitions		3
Spectra in the identification of organic compounds Chromophoric groups , auxochrom , bathochromic shift, hypsochromic shift, and hyperchromic effect.		3
Wood wards rules		3

Subject	Lecturer	No. of hrs
<b>2- IR:</b>	<b>Dr. Aras N. Hamad</b>	<b>6</b>
Physical principle Some background	<b>Dr. Aras N. Hamad</b>	1
Theory of IR Vibrational Spectroscopy	<b>Dr. Aras N. Hamad</b>	1
Fundamental and non fundamental absorption frequency	<b>Dr. Aras N. Hamad</b>	1
Characteristic Group vibrations	<b>Dr. Aras N. Hamad</b>	1
Factor determining the position and intensity of absorption bands	<b>Dr. Aras N. Hamad</b>	1
Quantitative Analysis by FTIR Examples	<b>Dr. Aras N. Hamad</b>	1

Subject	Lecturer	No. of hrs
<b>3- NMR:</b>	<b>Dr. Aras N. Hamad</b>	<b>10</b>
Introduction, NMR phenomena	<b>Dr. Aras N. Hamad</b>	2
Instrumentation, what does an NMR Spectrum tell you	<b>Dr. Aras N. Hamad</b>	2
Chemical shift and the $\delta$ Scale ,spin -spin coupling , integration	<b>Dr. Aras N. Hamad</b>	1
Diamagnetic Anisotropy and Shielding and Deshielding	<b>Dr. Aras N. Hamad</b>	2
Quantitative Analysis by H-NMR	<b>Dr. Aras N. Hamad</b>	1
Examples	<b>Dr. Aras N. Hamad</b>	2

Subject	Lecturer	No. of hrs
<b>4- C-13 NMR:</b>	<b>Dr. Aras N. Hamad</b>	<b>6</b>
C13 Chemical shift	<b>Dr. Aras N. Hamad</b>	1
Coupling and Decoupling in C13 NMR	<b>Dr. Aras N. Hamad</b>	1
C13 Chemical shift	<b>Dr. Aras N. Hamad</b>	1
Examples	<b>Dr. Aras N. Hamad</b>	2
N15 – NMR, 31-P-NMR,F-NMR	<b>Dr. Aras N. Hamad</b>	1

Subject	Lecturer	No. of hrs
<b>5- 2D- NMR:</b>	<b>Dr. Aras N. Hamad</b>	<b>5</b>
Two-dimensional 2D. COSY spectrum,DEPT135,90,45, ATP	<b>Dr. Aras N. Hamad</b>	1
C13 Assignment Techniques	<b>Dr. Aras N. Hamad</b>	1
DEPT 135, DEPT 90, DEPT 45,ATP	<b>Dr. Aras N. Hamad</b>	1
HMQC, HMBC , HSQC	<b>Dr. Aras N. Hamad</b>	1
Examples	<b>Dr. Aras N. Hamad</b>	1

Subject	Lecturer	No. of hrs
<b>5- MS</b>	<b>Dr. Aras N. Hamad</b>	<b>6</b>
Application, Instrumentation,	<b>Dr. Aras N. Hamad</b>	1
Principle of measurement, Glossary ,Mass Spectrum	<b>Dr. Aras N. Hamad</b>	1
Fragmentation processes Isotopes, Fragmentation	<b>Dr. Aras N. Hamad</b>	1
Rearrangement	<b>Dr. Aras N. Hamad</b>	1
Quantitative application	<b>Dr. Aras N. Hamad</b>	1
Examples		1

Subject	Lecturer	No. of hrs
<b>6- Structural Elucidation</b>	<b>Dr. Aras N. Hamad</b>	<b>3</b>
Structural Elucidation Using IR, H- NMR, MS, C-NMR	<b>Dr. Aras N. Hamad</b>	2
Structural Elucidation Using IR, 1D&2D NMR, MS,	<b>Dr. Aras N. Hamad</b>	1

## Practical Syllabus

45 hr.

3 hr / week

1- Introduction – Quality Control	3
2- Importance and measurement of pH of solutions	3
3- Qualitative determination of aspirin using UV spectrophotometric technique	3
4- Spectrophotometric determination of Iron in vitamin tablets	3
5- Spectrophotometric determination of acetyl salicylic acid in aspirin tablets	3
6- Determination of L-ascorbic acid in pharmaceutical preparation using UV spectrophotometry	3
7- Two-component analysis "Vierordt's method-simultaneous equation method" for a mixture of $\text{KMnO}_4$ and $\text{K}_2\text{Cr}_2\text{O}_7$	3
8- High performance liquid chromatography- Principle	3
9- Qualitative estimation of amlodipine by HPLC	3
10- Quantitative estimation of dapsone by HPLC	3
11- Quantitative estimation of amlodipine by HPLC	3
12- Quantitative estimation of amlodipine by HPLC	3
13- Quantitative estimation of sulfamethoxazole by HPLC	3
14- FT-IR –principle	3
15- FT-IR sample preparation	3

## Student's Feedback on the Subject

Date:            Course:            Year:            Lecturer/tutor

No.	Evaluation Question	Subject's Level 1-5	Subjective Remarks
1	The objectives and key messages of the subject were clear		
2	The contents of the subject were useful and related to the main objects of the course		
3	The material was prepared carefully as needed		
4	The lecturer/tutor while lecturing tried to analyze the principles, contents and the important points of the subject simply and properly.		
5	The lecturer/tutor while lecturing kept my attention.		
6	The lecturer/tutor came into the classroom on time and was committed to the duration of the lecture.		
7	The lecturer's behavior in the classroom was calm and respectful		
8	The slides used in the lecture were clear and attractive		
9	At the end of the lecture, the lecturer gave the students a chance for question and comments. His/her answers were complete		
10	The reading sources are new and compliant with the subject.		
	Total of the level		

Students to evaluate the level of the contents				
1	2	3	4	5
Poor	Accept	Medium	Good	Very good

### Student's Feedback on the Subject

Date:            Course:            Year:            Lecturer/tutor

No.	Evaluation Question	Subject's Level 1-5	Subjective Remarks
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10	The reading sources are new and compliable with the subject.		
	Total of the level		

Students to evaluate the level of the contents				
1	2	3	4	5
Poor	Accept	Medium	Good	Very good

### Student's Feedback on the Subject

Date:            Course:            Year:            Lecturer/tutor

No.	Evaluation Question	Subject's Level 1-5	Subjective Remarks
1	The objectives and key messages of the subject were clear		
2	The contents of the subject of the were useful and related to the main objects of the course		
3	The material were prepared carefully as needed		
4	The lecturer/tutor while lecturing tried to analyze the principles, contents and the important points of the subject simply and properly.		
5	The lecturer/tutor while lecturing kept my attention.		
6	The lecturer/tutor came into the classroom on time and was committed to the duration of the lecture.		
7	The lecturer's behavior in the classroom was clam and respectful		
8	The slides used in the lecturer were clear and attractive		
9	At the end of the lecture, the lecturer gave the students a chance for question and comments. His/her answers were complete		
10	The reading sources are new and compliable with the subject.		
	Total of the level		

Students to evaluate the level of the contents				
1	2	3	4	5
Poor	Accept	Medium	Good	Very good

### Examinations:

- The exams will be held during the course.
- Quizzes – during the practical hours.
- Theoretical exams: one per semester.
- Practical exams: one or two per semester.
- Final exam – Theoretical, Practical and Oral.

### Theoretical: exams will be mixed

- MCQ. (Multiple choices questions)
- SCQ. (Single choices Questions)
- Short Essays

### Practical exam:

- Practical related Questions
- Theoretical related Questions
- Assay of unknown drug
- Identification of unknown drug

### On Answering: the student should

- Read the question carefully
- Think carefully before answering
- Plan your answering
- Answer should contain preface , content and conclusion
- Answer should be precise and to the point

Samples of the expected questions and their answers:

A.

0.570 g of a steel sample is dissolved in acid. The manganese is oxidized to permanganate,  $\text{MnO}_4^-$  (FW 118.936), using potassium persulfate and is diluted to 100 mL. A few mL of solution is placed in a 1 cm pathlength cell and the transmission is found to be 30% at 525 nm. The molar absorptivity of permanganate is  $2.24 \times 10^3$  at 525 nm. Calculate weight percent manganese (Mn, AW 54.938) in the steel.

$$A = 2 - \log \%T = 0.523$$

$$A = \epsilon c \quad 0.523 = (2.24 \times 10^3) (1 \text{ cm}) c$$

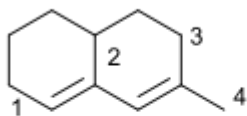
$$c = 2.33 \times 10^{-4} \text{ mole / L}$$

$$0.1 \text{ L} \times 2.33 \times 10^{-4} \text{ mole / L} \times 54.938 \text{ g / mole} = 1.282 \times 10^{-3} \text{ g}$$

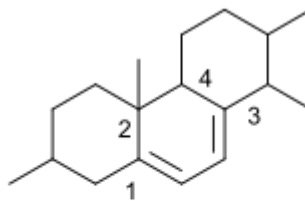
$$\frac{1.282 \times 10^{-3} \text{ g Mn}}{0.570 \text{ g sample}} \times 100\% = 0.225\% (w / w)$$

B-predict UV absorption maximum, for these two

Absorption maximum :  $214 + 20 + 5 = 239$  nm



heteroannular diene : 214  
alkyl substituents  $4 \times 5 = 20$   
exocyclic double bond : 5



homoannular diene : 253  
alkyl substituents :  $4 \times 5$   
exocyclic double bond :  $2 \times 5$

Absorption maximum :  $253 + 20 + 10 = 283$  nm

compounds:

### Student's Feedback on the Course

Date:            Course:            Year:            Lecturer/tutor

No.	Evaluation Question	Subject's Level 1-5	Subjective Remarks
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2	The contents of the subject of the were useful and related to the main objects of the course		
3	The coordinator teacher had worked hard to cooperate and prepare the material		
4	The coordinator teacher had worked hard to cooperate and prepare the course		
5	The lecturer were carefully selected and were expert in their field		
6	The coordinator teacher gave a good attention to the student's criticism and claim		
7	Information on the Examination process was well provided		
8	The questions of the exam were related to the content of the course		
9	Total of the level		
10	There is a potential to promote and develop the course in the following areas:		

Students to evaluate the level of the contents				
1	2	3	4	5
Poor	Accept	Medium	Good	Very good

# Cosmetics

**Course Name: Cosmetics**

**Course Level Year: 5<sup>th</sup> Class**

**Credit Hour(s): 2 hours**

**Course Coordinator: Dr. Muath Sh. M.AMIN**

**Lecturer: Dr. Huner K. Omer & Dr. Muath Sh. M. AMIN& Dr. Raad**

## **Topics:**

<b>Second Semester</b>	
<b>Subject</b>	<b>Hours</b>
Introduction to cosmetics, skin structure and function	4
Chemical peels	2
Sun protection and sun screen	2
Dry skin, causes of dry skin, care for dry skin and treatment of dry skin	4
Aging skin and dermal fillers	4
Skin whitening	2
Hair structure, function, hair loss, oily hair and dry hair	6
Shampoo formulation, types of shampoo, hair gels, hair mousses and hair sprays	6

## **Textbook(s):**

**Cosmetics formulation, manufacturing and quality control (Ed. PP Sharma)**

## **References:**

# Pro-drugs

## Course Coordinator and list of teachers

9. Name of the course : Pro-drugs 5<sup>th</sup> year
10. Lecturer in charge: Muhammad Hassan Muhammad
11. Department: Pharmaceutical Chemistry

12. Contact :

Address: Hawler Medical University

College of Pharmacy / Dept. of Pharmaceutical Chemistry

Email: [dr.mhassanm666666@yahoo.com](mailto:dr.mhassanm666666@yahoo.com)

Website link: [www.pha.hmu.edu.iq](http://www.pha.hmu.edu.iq)

7. Participant lecturers :
2. Assist. Lecturer Hayman Sardar Abdulrahman

## Course Overview

Prodrug will deal with topics important for understanding and appreciating the chemistry and properties of inactive medical substances that converted after metabolism into the active one.

The course covers material related to properties, and pharmaceutical importance the principle and theory of drug latention are also covered.

In addition this course is designed to incorporate a number of steroidal and polypeptide hormones, with their biosynthesis, actions, relation, and commercial products of them.



## **Course Objectives**

In respect to the four classes of prodrugs include classification of; synthesis, biotransformation, or formulation of certain drugs to improve their action as well as to avoid some side effects.

In case of hormones (steroidal and polypeptides) including their; synthesis, biosynthesis, actions, disturbance syndrome, as well as their relations.

## **Course Reading List:**

1. Text Book – Wilson and Gisvold's Organic Medicinal and Pharmaceutical Chemistry, edited by Delgado and W. A. Remer's, 11<sup>th</sup> edition (2004)
2. Reference – Medicinal Chemistry by Ashutosh Kar
3. Introduction to medicinal chemistry by Alex Gringauz

## Syllabus:

3. Course title: Pro-drugs 5<sup>th</sup> year

4. Number of credits 2: 2 hr theory (15 weeks)

The course complies the following:

Prodrugs:

- Drug Latentiation
- Classification of prodrugs
- Mutual prodrugs
- Carrier-linked prodrugs
- Bioprecursors
- Site specific drug delivery

Hormones

- Hypothalamic hormones
- Pituitary hormones
- Pancreatic hormones
- Placental hormones
- Gastrointestinal hormones
- Steroidal hormones

Assessment (grading): summative assessment:

Midterm: 40%

Final exam: 60%

## Outline of course:

Subject	Lecturer	No. of hrs
<b>1- Prodrugs:</b>	<b>Muhammad Hassan</b> Assist. Lecturer Hayman Sardar	<b>15</b>
Introduction to drug latentiation		2
Classification of prodrugs		2
Carrier-linked prodrugs		4
Mutual prodrug		2
Bioprecursors		3
Site specific drug delivery		2

Subject	Lecturer	No. of hrs
<b>2- Hormones:</b>	<b>Muhammad Hassan</b> Assist. Lecturer Hayman Sardar	<b>15</b>
Hypothalamic Hormones		2
Pituitary Hormones		2
Pancreatic Hormones		3
Placental Hormones		1
Gastrointestinal hormones		2
Steroidal hormones		5

### Student's Feedback on the Subject

Date:            Course:            Year:            Lecturer/tutor

No	Evaluation Question	Subject's Level 1-5	Subjective Remarks
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8	The slides used in the lecturer were clear and attractive		
9	At the end of the lecture, the lecturer gave the students a chance for question and comments. His/her answers were complete		
10	The reading sources are new and compliable with the subject.		
	Total of the level		

Students to evaluate the level of the contents				
1	2	3	4	5
Poor	Accept	Medium	Good	Very good

### Student's Feedback on the Lecturer

Date: \_\_\_\_\_ Course: \_\_\_\_\_ Year: \_\_\_\_\_ Lecturer/tutor \_\_\_\_\_

No	Evaluation Question	Subject's Level 1-5	Subjective Remarks
1	The objectives and key messages of the subject were clear		
2	The contents of the subject of the were useful and related to the main objects of the course		
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10	The reading sources are new and compliable with the subject.		
	Total of the level		

Students to evaluate the level of the contents				
1	2	3	4	5
Poor	Accept	Medium	Good	Very good

#### Examinations:

- The exams will be held during the course.
- Quizzes – during the theoretical hours.
- Theoretical exams: one per semester.
- Final exam – Theoretical and Oral.

**Theoretical:** exams will be mixed

- MCQ. (Multiple choices questions)
- SCQ. (Single choices Questions)
- Short Essays
- Diagrams

**On Answering:** the student should

- Read the question carefully
- Think carefully before answering
- Plan your answering
- Answer should contain preface , content and conclusion
- Answer should be precise and to the point

Samples of the expected questions and their answers:

\*MCQ – sample:

Prodrugs:

- (T) a – are activated within the body.
- (F) b –are more potent than their parent.
- (T) c –are divided to mutual, bioprecursor and carrier linked prodrug.
- (F) d – are usually used to increase bioavailability.

\*SCQ – sample

- All of the following are prodrugs except:

A – Methenamine

B – Diphenoxylate

C – Clofibrate

D – Amitriptyline

- Short essays

Give a short account on SAR of insulin

### Student's Feedback on the Course

Date:            Course:            Year:            Lecturer/tutor

No.	Evaluation Question	Subject's Level 1-5	Subjective Remarks
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Students to evaluate the level of the contents				
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