PHARMACEUTICAL CHEMISTRY DEPARTMENT

Courses of Pharmaceutical Chemistry Department

No.	Course Title	Course Code
1	Pharmaceutical Analytical Chemistry I	PHC 111
2	Pharmaceutical Analytical Chemistry II	PHC 122
3	Instrumental Analysis	PHC 213
4	Pharmaceutical Organic Chemistry I	PHC 114
5	Pharmaceutical Organic Chemistry II	PHC 125
6	Structural Elucidation of Organic Compounds	PHC 216
7	Medicinal Chemistry I	PHC 317
8	Medicinal Chemistry II	PHC 328
9	Drug Design and Drug Development	PHC 429

Elective Courses:

No.	Course Title	Course Code
1	Analysis of Food and Cosmetics	PHC 601
2	Chemistry of Medicinal Heterocycles	PHC 602

Pharmaceutical Analytical Chemistry-I (PHC 111)

Program (s) on which the course is given: Bachelor of Pharmacy
Department offering the program: All Faculty Departments
Department offering the course: Department of Pharmaceutical Chemistry
Academic year: 2014/2015
Approval Date: September 2014

A. Basic Information

Course Title: Analytical Chemistry-I **Course Code:** PHC 111
Prerequisites: None
Students' Level/Semester: First Year /1st Semester
Credit hours: 3 (2+1)
Actual teaching hours per week:
Lectures: 2 hr/week **Practical:** 2 hr/week **Tutorial:** N/A **Total:** 4 hr/week

B. Professional Information

1. Overall Aim of Course

This course aims to provide the student with good knowledge to study qualitative inorganic analysis and quantitative analysis of chemical substances through gravimetric analysis that would enable the student to work upon graduation in the different related fields of analysis (forensic chemistry, water analysis, environmental analysis for detection of pollutants,…..etc).

2. Intended Learning Outcomes (ILOs)

By the end of this course student should be able to:

a- Knowledge and Understanding:

a1. Identify different types of chemical equations (molecular and ionic equations).

a2. Recognize different types of chemical reactions (acid-base, precipitation, complexation, displacement and redox reactions).

a3. Recognize suitable methods for gravimetric determination of inorganic compounds

b- Intellectual Skills:

b1. Predict either the reactions will give positive or negative results.

b2. Select the suitable scheme for the systematic examination of cations as well as anions either in simple mixtures or in special admixtures producing difficulties.

b3. Design certain schemes for the analysis of cations and anions.

c- Professional and Practical Skills:

c1. Apply the given schemes for identification of anions and cations.

c2. Apply gravimetric analysis through precipitation of cation or anion in pure form.
c3. Analyze qualitatively chemical substance through identification of its acid radical (anion) and its basic radical (cation).
c4. Identify anions and cations in their mixtures.
c5. Analyze quantitatively chemical substances through gravimetric analysis [through precipitation of either its cation or its anion, purification (washing), filtration, drying and/or ignition and finally weighing].

d- General and Transferable Skills:

d1. Argue about the choice of a certain scheme to analyze given mixtures concerning the topics of the course.
d2. Interact efficiently with others.
d3. Work effectively in a team.

3. Contents

Teaching Week	Topic	No. of hours	Lecture	Practical
One	- Introduction.	**4**	**2**	
	- Carbonate and Bicarbonate			**2**
Two	- Introduction.	**4**	**2**	
	- Sulphur group (Sulphide,Sulphite Thiosulphate and Sulphate)			**2**
Three	-Carbonate group. -Sulphur group	**4**	**2**	
	- Halides (Cl^-, Br^- and I-) Nitrate and Nitrite.			**2**
Four	-Halides group. -Cyanogen group	**4**	**2**	
	Cyanogen group (CNS-, Ferrocyanide and Ferricyanide) (PO_4^{3-}, AsO_4^{3-} and AsO_3^{3-}) + **First Midterm Exam.**			**1.5** **0.5**
Five	-Phosphate group. -Nitrogen containing anion group	**4**	**2**	
	- Revision			**2**

Six	-Group-I cations. -Group-II cations	**4**	**2**	
	-First practical exam + Quiz 1			**2**
Seven	-Group-III cations. -Group-IV cations.	**4**	**2**	
	- Cations : Group I			**2**
Eight	**Second Midterm Exam**			
Nine	- Group -V cations	**4**	**2**	
	-Group II			**2**
Ten	Group-VI cations.	**4**	**2**	
	-Group III and IV			**2**
Eleven	- Gravimetric analysis.	**4**	**2**	
	- Second Practical Exam + Quiz 2			**2**
Twelve	- Gravimetric analysis.	**2**	**2**	
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Thirteen	**Revision**	**2**	**2**	**------**
Total no. of hours		**44**	**24**	**20**
Fourteen	**University Elective Final Exams**			
Fifteen	**Final Exams of Faculty**			
Sixteen				

4. Teaching and Learning Methods

4.1. Data show and computer in lectures.
4.2. Practical work.
4.3. Group Discussion.
4.4. Data Analysis.
4.5. Problem solving.
4.6. Assignments.
4.7. Power point presentations.
4.8. Demonstration videos.
4.9. Self-learning by discussion of projects prepared by students.
4.10. Office hours.

5. Student Assessment Methods

5.1. Written Exams to assess knowledge and understanding as well as intellectual skills.
5.2. Practical Exam to assess professional and practical skills.
5.3. Practical Quizzes to assess knowledge and understanding of practical part.
5.4. Oral exam to assess all skills including general and transferable skills.
5.5. Class work to assess all types of skills.

Assessment Schedule

Assessment 1…… Practical exam 1 + Quiz 1 Week 6
Assessment 2…… Practical exam 2 + Quiz 2 Week 11
Assessment 3…… First Midterm exam. Week 4
Assessment 4 …….. Second midterm exam. Week 8
Assessment 5…….. Final Written exam. Week 15/16
Assessment 6 …….. Oral exam Week 15/16
Assessment 7 …….. Class work (Lab performance and participation in lectures) During the semester

Weighting of Assessments

1st Mid-Term Examination		5 %
2nd Mid-Term Examination		15 %
Final-Term Examination		30 %
Oral Examination		10 %
Class Work (Lab performance + Discussions)		10 %
Practical		30 %
Practical Examination	25 %	
Quiz	5 %	
Total		**100 %**

6. List of References

6.1. Course Notes

Staff lectures handouts are **uploaded to the Moodle**.
Lab manual is **given to each student**.

6.2. Essential Books (Text Books)

G. Svehla , Vogel's Qualitative Inorganic Analysis, Addison Wesley,Longman Ltd, 6th Edition, 2000

6.3. Recommended Books

Catherine Housecroft and Alan G. Sharpe, Inorganic Chemistry (4th Edition, 2012

6.4. Periodicals, Websites, ……etc

http://www.wikipedia.org/

7. Facilities Required for Teaching and Learning

- Lecture halls.
- Laboratories.
- Personal Computer (available for each staff member).
- Computer equipped with projector and internet connection available for the usual lectures and Labs.
- Meeting rooms for office hours.
- White board.
- Different laboratory equipment (glass ware, tubes, flasks and beakers, flames, balance …..etc).

Course Coordinator: Prof. Dr. Mohammad Abdelkawy

Head of Department: Prof. Dr. Ramzia Ismail El-Bagary

Department Approval Date: September 2014

FUTURE UNIVERSITY IN EGYPT
FACULTY OF PHARMACEUTICAL SCIENCES AND PHARMACEUTICAL INDUSTRIES

Course Specifications

Pharmaceutical Analytical Chemistry-II (PHC 122)

Program (s) on which the course is given:	Bachelor of Pharmacy
Department offering the program:	All departments
Department offering the course:	Department of Pharmaceutical Chemistry
Academic year:	2014/2015
Approval Date:	September 2014

A. Basic Information

Course Title: Analytical Chemistry-II **Course Code: PHC 122**

Prerequisites: -

Students' Level/Semester: **First Year/ Second Semester**

Credit hours: **4 (3+1)**

Actual teaching hours per week:

Lectures: 3 hr/week **Practical:** 2 hr/week **Tutorial:** N/A **Total:** 5 hr/week

B. Professional Information

1. Overall Aim of Course

The aim of this course is to provide the students with a quantitative sense in chemical analysis as well as a deep knowledge of acid –base (aqueous & non- aqueous) titrations, precipitemetry, complexometry and redox reactions.

2. Intended Learning Outcomes (ILOs)

By the end of the course, the student should be able to:

a- Knowledge and Understanding:

a1. State different quantitative methods of chemical analysis.

a2. Identify methods of analysis of various pharmaceutical organic and inorganic substances and drugs.

a3. Recognize theories of acid & base.

a4. Calculate pH of acids, bases, salts and buffers.

a5. State different types of titration (Direct, Indirect and Back titration).

a6. Identify biphasic titration and formal titration.

a7. Classify types of solvents in non-aqueous titration.

a8. Identify non-aqueous titration for analysis of weak acids & weak bases.

a9. Enumerate factors affecting stability of the complex.

a10. Identify complexing agents e.g:EDTA.

a11. Detect stability constant of complex as well as end points.

a12. State types of indicators that can be used in (acid-base titration, complexometry, Redox Reaction).

a13. Recognize types of titration (Complexometric titration, Direct titration, Back titration, Replacment titration, Cyanometry, Mercurimetry)

a14. Differentiate between different methods of preceptimetric reactions (Lebig's – Denig's – Mohr's – Volhared – Fajans).

a15. Calculate the equivalent weight in Redox by different methods.

a16. Mention Nernest's equation and factors affecting oxidation potential.

b- Intellectual Skills:

b1. Differentiate between accurate and rough measures correctly.

b2. Categorize compounds according to their acidic/basic nature in aqueous and non-aqueous medium.

b3. Detect the appropriate method used to determine quantitatively compounds forming precipitate(s).

b4. Select the appropriate method to determine quantitatively Metals forming Complex.

b5. Choose methods to determine oxidants and reductants compounds.

b6. Suggest the suitable analytical methods for different classes of pharmaceutical compounds.

b7. Create new methods for analysis of mixtures of different substance.

c- Professional and Practical Skills:

c1. Prepare different standard solutions**.**

c2. Standardize solutions by direct or indirect methods

c3. Use the suitable standard for determination of a particular chemical substance.

c4. Use Redox reaction for analysis of oxidizing and reducing substances.

c5. Apply methods of analysis for individual compounds or their mixtures.

c6. Determine quantitatively compounds forming precipitate(s).

c7. Determine quantitatively Metals forming Complex.

d- General and Transferable Skills:

d1. Collect the gained experiences in certain pharmaceutical activities**.**

d2. Use different resources to work with minimal guidance.

d3. Work effectively in group**s.**

d4. Communicate effectively with others.

3. Contents

Teaching Weeks	Topic	No. of hours	Lecture	Practical
One	Acid-base (aqueous titration)	5	3	
	Preparation and standardization of 0.1N HCl			2
Two	Acid-base (aqueous titration)	5	3	
	Acid base titration: Determination of mixture of Hydrochloric acid / Acetic acid			2
Three	Acid-base (aqueous titration)	5	3	
	Determination of mixture of Borax / Boric acid			2
Four	Acid-base (aqueous titration)	5	3	1.5
	Determination of mixture of Calcium / Magnesium and Determination of Nickel **First Midterm Exam**			0.5
Five	Acid –base (non aqueous titration)	5	3	
	Revision of acid-base and complexometry			2
Six	Redox Reactions	5	3	
	First Practical Exam.			2
Seven	Redox Reactions	5	3	
	Determination of Chloride concentration by Mohr's method and Determination of Chloride/Iodide mixture by Fajan's methods			2
Eight			-	-
	Second Midterm Exam	-		
Nine	Redox Reactions	5	3	
	Determination of the concentration of Sodium Oxalate and Ferrous Sulphate			2
Ten	Complexometery	5	3	
	Revision Redox titration and Acid base titration			2

Eleven	Complexometery	5	3	
	Second Practical Exam.			2
Twelve	Precipitimetry	3	3	
	……			-
Thirteen	Precipitimetry	3	3	
	……			-
Total No. of hours		56	36	20
Fourteen	**University Elective Final Exams**			
Fifteen	**Final Exams**			
Sixteen				

4. Teaching and Learning Methods

4.1. Data show and computer in lectures.
4.2. Practical work.
4.3. Group Discussion.
4.4. Data Analysis.
4.5. Problem solving.
4.6. Assignments.
4.7. Power point presentations.
4.8. Demonstration videos.
4.9. Self-learning by discussion of projects prepared by students.
4.10. Office hours

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5. Student Assessment Methods

5.1. Written Exams to assess knowledge and understanding as well as intellectual skills.
5.2. Practical Exam to assess professional and practical skills.
5.3. Assignments to assess general and transferable skills.
5.4. Oral exam to assess all skills including general and transferable skills.
5.5. Class work to assess all types of skills.

Assessment Schedule

Assessment 1……	Practical exam 1	Week 6
Assessment 2……	Practical exam 2	Week 11
Assessment 3……	First Midterm exam	Week 4
Assessment 4 ……..	Second midterm exam	Week 8
Assessment 5……..	Final Written exam	Week 15/16
Assessment 6 ……..	Oral exam	Week 15/16
Assessment 7 ……..	Class work (Lab performance and participation in lectures)	During the semester

Weighting of Assessments

1st Mid-Term Examination		5	%
2nd Mid-Term Examination		15	%
Final-Term Examination		30	%
Oral Examination		10	%
Practical Examination		30	%
-Practical	25 %		
-Activity (Assignment)	5 %		
Class Work		10	%
Total		**100**	**%**

6. List of References

6.1. Course Notes

Staff lectures handouts **uploaded to the Moodle.**

Lab manual **given to each student**

6.2. Essential Books (Text Books)

G. Svehla , Vogel's Qualitative Inorganic Analysis, Addison Wesley,Longman Ltd, 6th Edition, 2000

6.3. Recommended Books

Gary D. Christian, Purnendu K. Dasgupta, Kevin A. Schug , Analytical Chemistry, 7th Edition November 2013, ©2014.

6.4. Periodicals, Websites

Periodical Scientific Journals:

Analytical Chemistry Acta Pharm

Websites:
www.Sciencedirect.com
www.pubmed.com

7. Facilities Required for Teaching and Learning

- Lecture halls.
- Laboratories.
- Personal Computer (available for each staff member).
- Computer equipped with projector and internet connection available for the usual lectures and Labs.
- Meeting rooms for office hours.
- White board.
- Different laboratory equipment (glass ware, pipette and burette, flasks and beakers, flames, electric balance …..etc).

Course Coordinator: Amr Mohamed Badawey

Head of Department: Prof. Dr. Ramzya Elbagary

Department Approval Date: September 2014

FUTURE UNIVERSITY IN EGYPT
FACULTY OF PHARMACEUTICAL SCIENCES AND PHARMACEUTICAL INDUSTRIES

Course Specifications

Instrumental Analysis (PHC213)

Program (s) on which the course is given:	Bachelor of Pharmacy
Department offering the program:	All Faculty Departments
Department offering the course:	Pharmaceutical Chemistry
Academic year:	----------
Approval Date:	September 2014

A. Basic Information

Course Title: Instrumental Analysis **Course Code :** PHC213

Prerequisites: Pharmaceutical Analytical Chemistry II (PHC 122**)**

Students' Level/Semester: Second Level/ 3rd Semester

Credit hours: **4(3+1)**

Actual teaching hours per week:

Lectures: 3/week **Practical:** 2/week **Tutorial:** N/A **Total:** 5/week

B. Professional Information

1. Overall Aim of Course

The aim of this course is to provide the students with quantitative analysis of chemical substances through instrumental analysis education that would enable the student to work upon graduation in the different related fields of analysis and research (pharmaceutical compounds, water analysis, environmental analysis for detection of pollutants,…..etc) in a communicative team work.

2. Intended Learning Outcomes (ILOs)

By the end of the course, the student should be able to:

a- Knowledge and Understanding

a1 .Define the theories of instrumental methods of spectroscopic analysis (molecular absorption Spectrophotometry)

a2. Identify the theories of instrumental methods of spectroscopic analysis [molecular emission (Flourimetry)].

a3. Discuss the theories of instrumental methods of spectroscopic analysis [Flame spectroscopy (atomic absorption)].

a4. Recognize the theories of instrumental methods of spectroscopic analysis [Flame spectroscopy (atomic emission)]

a5. Illustrate the theories of Electrochemistry (Potentiometry).

a6. List the theories of Electrochemistry (Conductometry).

a7. Enumerate the theories of Electrochemistry (Polarograghy analysis).

a8. Recognize chromatomatography.

a9. Discuss the separation techniques [columnar method e.g.: HPLC, GC, Planar technique e.g.: TLC].

b- Intellectual Skills:

b1. Choose suitable instrumental methods of analysis of the substance to be analyzed (Spectrophotometry Electrochemical, Potentiometry, Conductometry, and Polarography).

b2. Detect certain classes of pharmaceutical compounds.

c- Professional and Practical Skills:

c1. Use instruments in analytical laboratories.

c2. Detect the quality of analyzed sample.

c3. Write full report justifying his judgment.

c4. Dispose hazardous materials according to safety measures.

c5. Apply safety measures in practice.

c6. Analyze different mixtures concerning the topics of the course in a systematic way

d- General and Transferable Skills:

d1. Interact efficiently with others.

d2. Work effectively in a team.

d3. Manage time effectively.

d4. Make appropriate decisions depending on studying situations.

d5. Collect the gained experiences in certain pharmaceutical activities.

d6. Work with minimal guidance using full range of resources.

d7. Communicate effectively with others.

3. Contents

Teaching Weeks	Topic	No. of hours	Lecture	Practical
One	Colorimetry	5	3	
	Determination of Lambda Max of $KMNO_4$			2
Two	Spectrophotometry	5	3	
	Determination of conc of Potassium Permenganate ($KMNO_4$) sample **.**			2
Three	Spectrophotometry	5	3	
	Effect of PH on the absorption Spectrum of Methyl Red (MR)			2

Four	Flame spectroscopy	5	3	
	Effect of PH on the absorption Spectrum of Methyl Red (MR) **+ First Midterm Exam**			1.5 + 0.5
Five	Fluorimetry	5	3	
	Spectrophotomery Revision**.**			2
Six	Fluorimetry	5	3	
	First Practical Exam.			2
Seven	Potentiometry	5	3	
	Potentiometry-Determination of Strength of HCL.			2
Eight	**Second Midterm exams**			
Nine	Potentiometry	5	3	
	Conductometry.			2
Ten	Conductometry+Polarography	5	3	
	Conductometry+Chromatography			2
Eleven	Chromatography	5	3	
	Chromatography			2
Twelve	Chromatography	5	3	
	Final Practical Exam			2
Thirteen	Revision	3	3	
Total No. of hours		58	36	22
Fourteen	**University Elective Final Exams**			
Fifteen	**Final Exams of Faculty**			
Sixteen				

4. Teaching and Learning Methods

4.1. Lectures.
4.2. Practical sessions.
4.3. Group discussions.
4.4. Data analysis.
4.5. Problem solving.
4.6. Office hours.

5. Student Assessment Methods

5.1. Practical exam to assess practical and professional skills..
5.2. Written exams to assess knowledge and understanding as well as intellectual skills.
5.3. Oral exam to assess all types of skills and mainly general and transferable skills.
5.4. Class work to assess all types of skills.

Assessment Schedule

Assessment 1	First Midterm Exam	Week 4
Assessment 2	Second midterm exam	Week 8
Assessment 3	Practical exam	Week 12
Assessment 4	Final written exam	Week 15/16
Assessment 5	Oral Exam	Week 15/16
Assessment 6	Class work	(During the semester)

Weighting of Assessments

Mid-Term Examination			20%
Final-Term Examination			30%
Oral Examination			10%
Practical Examination			30%
	Practical Examination	25%	
	Activities	5%	
Classr Work		10%	
Total			100%

6. List of References

6.1. Course Notes

Staff lectures handouts are uploaded to the Moodle.
Lab manual is given to each student.

6.2. Essential Books (Text Books)

- J.Mendham, R.C.Denney, J. D. Barnes & M.J.K. Thomas,Vogel's Quantitative Chemical Analysis (6th Edition), Prentice Hall, Upper Saddle River, NJ, (2000**).**

6.3. Recommended Books

- Frank A. Settle, Handbook of Instrumental Techniques for Analytical Chemistry , Prentice Hall, Upper Saddle River, NJ, (1997).
- Douglas A. Skoog, F. James Holler, Stanley R. Crouch, Principles of Instrumental Analysis, (6th Edition) ,Stanford University, University of Kentucky, Stanley R. Crouch, (2007).

6.3. Periodicals, Websites, ……etc

i. www.sfgate.com.

ii. Sciencedirect.com.

Analytical chemistry, Anal.chem.Acta, Pharm.biomed.anal., Analyst., Pharm.abstracts, Chem. Abstracts,…….etc.

4. Facilities Required for Teaching and Learning :

-Lecture halls

-Laboratories.

-Personal Computer

- Laboratory equipments (Centrifuges, balances, chemicals and ovens.

-Instruments: spectrophotometers, conductometers and pH meters water bathes & glass ware)

-Classroom clickers (student response systems).

-Computer equipped with projector

-White board.

Course Coordinator: ----------

Head of Department: Prof.Dr. Ramzia Ismaeel Elbagary

Date:

6.4.

Pharmaceutical Organic Chemistry-I (PHC 114)

Program (s) on which the course is given:	Bachelor of Pharmacy
Department offering the program:	All Faculty Departments
Department offering the course:	Department of Pharmaceutical Chemistry
Academic year:	2014/2015
Approval Date:	September 2014

A- Basic Information

Course Title: Pharmaceutical Organic Chemistry-I
Course Code: PHC 114
Prerequisites: ----------
Students' Level/Semester: First Level/ First Semester
Credit hours: **3 (2+1)**
Actual teaching hours per week: 4 hr
Lectures: 2 hr/week **Practical: 2 hr/week** **Tutorial: N/A**
Total: 4 hr/week

B- Professional Information

1 – Overall aims of course

By the end of this course the students will be able to demonstrate knowledge of the basic concepts of organic chemistry effectively, and to carry simple organic experiments safely and under the supervision of their instructors.

2 – Intended learning outcomes of course (ILOs)

By the end of this course the students will be able to:

a- Knowledge and understanding:

a1. State names of aliphatic compound.

a2. Identify the basics of aliphatic hydrocarbons.

a3. Recognize the basics of aliphatic alcohols, ethyl halides and ethers.

a4. Identify the basics of carbonyl compounds and derivatives.

a5. Recognize the basics of amines.

a6. Describe all reaction mechanisms of aliphatic Organic Compounds.

a7. Recall all chemical reactions of aliphatic hydrocarbons

a8. Recognize the commonly used organic terminology.

b- Intellectual skills

b1. Analyze problems regarding aliphatic Hydrocarbons.
b2. Assess problems regarding aliphatic alcohols, ethyl halides and ethers
b3. Solve problems regarding carbonyl compounds and derivatives.
b4. Analyze problems regarding amines.
b5. Illustrate how to convert one compound to the other.
b6. Predict different reaction mechanisms.
b7. Select the most appropriate method of synthesis of classes of aliphatic organic compounds.

c- Professional and practical skills

c1. Handle chemicals safely and efficiently.

c2. Conduct standard pharmaceutical laboratory procedures and instrumentation.

c3. Identify some organic compounds depending on their physical and chemical properties.

c4. Prepare some pharmaceutical organic compounds.

c5. Validate the mechanisms of aliphatic organic reactions.

d- General and transferable skills

d1. Work effectively in a team.
d2. Communicate effectively with others .
d3. Use different resources to enhance professional skills.

3- Contents

Week	Topic	No. of hours	Lecture / Week	Practical
One	**INTRODUCTION**			
	Chemical bonds and shapes of molecules Polar and non polar molecules. Orbital hybridization	2	2	-
Two	Types of reactions.	4	2	
	Classification of organic compounds.			
	Nucleophilicity and basicity.			
	Introduction			2
	CLASSES OF ALIPHATIC COMPOUNDS **The Study includes: Nomenclature, Synthesis, Physical Properties and Chemical Reactions of:**			
Three	Alkanes	4	2	

	Identification of Ethanol, Formaldehyde and Acetone			2
Four	Alkenes and Polyenes	4	2	
	Identification of Tartaric acid, Citric acid and Potassium Citrate **1st Midterm Exam**			1.5 practical 0.5 Exam
Five	Alkynes	4	2	
	Identification of Formic acid and Acetic acid			2
Six	Alkyl Halides, Alcohols	4	2	
	Identification of Urea and Ethyl acetate			2
Seven	Ethers, Carbonyl Compounds	4	2	
	Identification of Oxalic acid Preparation of 1,3,5-tripheyl-1,3,5-trazinane Preparation of Aurine			2
Eight	**2nd Midterm Exam**			
Nine	Carbonyl Compounds (1)	4	2	
	Preparation of Ethyl acetate Addition of Sodium Bisulfite			2
Ten	Carbonyl Compounds (2)	4	2	
	Revision (1)			2
Eleven	Amines	4	2	
	Revision (2)			2
Twelve	Carboxylic Acids and Derivatives (1)	4	2	
	Final practical exam + Quiz			2
Thirteen	Carboxylic Acids and Derivatives (2)	2	2	
Total No. of hours		44	24	20
Fourteen	**University Elective Final Exams**			
Fifteen	**Faculty Final Exams**			
Sixteen				

4– Teaching and learning methods

4.1. Data show and computer in lectures.
4.2. Practical work.
4.3. Group discussion.
4.4. Problem solving.
4.5. Power point presentations.
4.6. Office hours.

5- Student assessment methods

5.1. Written exams **to assess** knowledge and understanding and intellectual skills.
5.2. Practical exam and Quiz **to assess** professional and practical skills.
5.3. Class work and participation to **assess** knowledge and understanding as well as intellectual skills.
5.4. Oral exam **to assess** all types of skills and mainly general and transferrable skills.

Assessment Schedule

Assessment 1 … Written Exams Week: (4, 8, 15/16)
Assessment 2 … Practical Exam Week: (12)
Assessment 3 … Quiz Week: (12)
Assessment 4 … Oral Exam Week: (15/16)
Assessment 5 … Class work (Lab performance and participation in lectures) (During the semester)

Weighting of assessments

1st Mid-Term Examination		5%
2nd Mid-Term Examination		15%
Final-Term Examination		30%
Oral Examination		10%
Practical Examination		30%
Practical Examination	25%	
Quiz	5%	
Class Work		10%
Total		**100%**

6- List of references

6.1. Course notes

Staff lectures handouts are **uploaded to the Moodle**.
Lab manual **is given to each student**.

6.2. Essential books (text books)

- Carey, F. A.; Giuliano, R. M. " Organic Chemistry",8th edition, McGraw-Hill international Edition (2011).

6.3. Recommended books

- Solomons & Fryhle, "Organic Chemistry", Wiley International/ 8th edition (2011).

6.4. Periodicals, Websites, ……etc

Websites : www.Wikipedia.com

7.Facilities required for teaching and learning

- Lecture halls.
- Laboratories.
- Personal Computer (available for each staff member).
- Computer equipped with projector and internet connection available for the usual lectures and Labs.
- Meeting rooms for office hours.
- White board.
- Different laboratory equipment (condensers, conical flasks, filter papers, separating funnel, spatula, water bathes and glass ware).
- Books.
- Library furnished with textbooks.
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Course coordinator:

Prof. Dr. Hanan M. Refaat

Head of Department:

Prof. Dr. Ramzia El-Bagary

Department Approval Date: September 2014

Pharmaceutical Organic Chemistry-II (PHC 125)

Course Specifications

Program(s) on which the course is given: Bachelor of Pharmacy
Department offering the program: All Departments
Department offering the course: Department of Pharmaceutical Chemistry
Academic year: 2014/2015
Date of approval: September 2014

A- Basic Information

Title: Pharmaceutical Organic Chemistry-2
Code: PHC 125
Prerequisite: Pharmaceutical Organic Chemistry-1 PHC 114
Students' Level/ Semester: First Level/ Second Semester
Credit Hours: 4 (3+1)
Actual Teaching Hours per Week: 5
Lectures: 3/ week **Practical:** 2/week **Tutorial:** N/A **Total:** 5/week

B- Professional Information

1 – Overall Aims of Course

The course aims to cover the basic knowledge of aromatic organic chemistry and heteroaromatic organic chemistry. It ensures that the student has acquired and understood the skills to apply the basic chemistry of aromatic and heteroaromatic organic compounds. The course also aims at giving students detailed knowledge about the synthesis - in particularly – the green synthesis of aromatic and heteroaromatic compounds. It gives certain examples of aromatic and heteroaromatic compounds which are registered as drugs and methods of their synthesis.

2 – Intended Learning Outcomes of Course (ILOs)

By the end of this course the students will be able to:

a- Knowledge and Understanding:

a1. Define the concepts of aromaticity of benzenoid and non benzenoid aromatic compounds.

a2. Recognize the names of aromatic compounds.

a3. Outline the mechanism of the reactions of aromatic organic compounds.

a4. Describe synthesis and chemical reactions of aromatic and heteroaromatic organic compounds.

a5. Illustrate the chemistry of heterocyclic.

b- Intellectual Skills:

b1. Solve problems related to organic compounds.

b2. Identify aromatic compounds.

b3. Detect the mechanism of chemical reactions of aromatic and heteroaromatic organic compounds.

b4. Determine the functional groups of aromatic and heteroaromatic organic compounds and the chemical reactions of each.

b5. Suggest pathways of converting some compounds to the other.

c- Professional and Practical Skills:

c1. Handle organic compounds and chemicals properly.

c2. Identify aromatic organic compounds from their physical and chemical properties.

c3. Convert some aromatic organic compounds to another.

c4. Synthesize certain examples of aromatic and heteroaromatic compounds which are registered as drugs and methods of their synthesis.

d- General and Transferable Skills

d1. Communicate effectively with others.

d2. Collaborate actively in groups to solve organic problems.

3- Contents

Teaching Week	Topic	No. of hours	Lecture	Practical
One	-1-Aromaticity - non benzenoid compounds - benzenoid compounds	**5**	**3**	
	- melting point & crystalization			**2**
Two	-Reaction of Aromatic Compounds -Electrophilic substitution	**5**	**3**	
	- Identification of benzyl alc. & benzaldehyde -preparation of dibenzalacetone			**2**
Three	- Orientation	**5**	**3**	

	- Ortho- Para- Directing groups & Meta- Directing groups.			
	- Identification of bezoic acid & salicylic acid - preparation of aspirin			**2**
Four	- Alkylbenzenes - Aryl Halides	**5**	**3**	
	- Identification of benzene, toluene and naphthalene - preparation of naphthalene picrate **+ 1st Midterm Exam**			**1.5 + 0.5**
Five	Work Shop, Dr. JJ, UCC	**8**	**6**	
	- Identification of methyl salicylate & aspirin - hydrolysis of ester			**2**
Six		**2**	**-**	
	- Identification of aniline, aniline HCl and p-toludine			**2**
Seven	- Nomeclature of Heterocyclic Compounds , Chemistry of five-member heterocycles - Benzo derivatives of pyrrole, furan and thiophene	**5**	**3**	
	- Preparation of benylidene aniline - Revision 1			**2**
Eight	**2nd Midterm Exam**			
Nine	- Aryl amines	**5**	**3**	
	Revision 2			**2**
Ten	- Chemistry of six-member heterocyclic rings (pyridine) -Benzo-derivatives of pyridines (Quinoline & Isoquinoline & Acridine).	**5**	**3**	
	Revision 3			**2**
Eleven	-Phenols	**5**	**3**	

	Practical exam & Quiz			**2**
Twelve	. Aromatic Carbonyl Compounds (Aldehydes and Ketones)	**3**	**3**	
Thirteen	Aromatic Carboxylic Acids and Derivatives	**3**	**3**	
Total no. of hours		**56**	**36**	**20**
Fourteen	**University Elective Final Exams**			
Fifteen	**Final Exams of Faculty**			
Sixteen				

4– Teaching and Learning Methods

4.1. Modified Lecture (Students' Response System through Clickers).
4.2. Practical training/Laboratory
4.3. Seminar/Workshop
4.4. Class Activity
4.5. Group Discussion
4.6 Assignments

3. Student Assessment Methods

3.1. Written to assess knowledge and understanding as well as intellectual skills.
3.2. Practical and quiz to assess professional and practical skills.
3.3. Class work (Lab performance and participation) to assess all types of skills.
3.4. Oral exam to assess all skills including transferable skills.
3.5. Assignments to assess general and transferrable skills.

Assessment Schedule

Assessment 1	First Mid Term Exam	Week 4
Assessment 2	2nd Mid Term Exam	Week 8
Assessment 3	Practical Exam	Week 11
Assessment 4	Final Written Exam	Week 15/16
Assessment 5	Oral Exam	Week 15/16
Assessment 6	Classwork (Participation & lab performance)	(during the Semester)

Weighting of Assessments

1st Mid-Term Examination		5 %
2nd Mid-Term Examination		15 %
Final-Term Examination		30 %
Oral Examination		10 %
Practical		30 %
Practical Examination	25 %	
Activities (Assignments)	5 %	
Class Work (Participation & lab performance)		10%
Total		100 **%**

6. List of references

6.1. Course notes

-Staff Lectures Handouts are **uploaded to the Moodle.**
- Lab Manual is **given to each student.**

6.2. Essential books (text books)

- Organic Chemistry, Francis A. Carey, Robert M. Guiliano, 8th edition, MgGraw-Hill international Edition (2011). (**Given to each Student**).

6.3. Recommended books

- Morrison, R. T.; Boyde, R. N. " Organic Chemistry",6th edition, Prentice Hall of India (1996).(**Available at the Library**).

- Solomons & Fryhle Organic Chemistry, Wiley International/ 11th Edition (2014).

(**Available at the Library**).

6.4. Periodicals, Websites,…….etc

http://www.wikipedia.org/

7- Facilities required for teaching and learning

- Study halls
- Laboratories
- Equipment
- Chemicals
- Glassware (beakers, condensers, glass rods, conical flasks, …..)
- Books

- audio-visual tools
- computer lab
- Meeting room for Office Hours
- White Boards

Course coordinator:

Prof. Dr. Khairia M. Youssef

Head of Department:

Professor Dr. Ramzia El-Bagary

Department Approval Date: September 2014

FUTURE UNIVERSITY IN EGYPT
FACULTY OF PHARMACEUTICAL SCIENCES AND PHARMACEUTICAL INDUSTRIES

Course Specifications

Structural Elucidation of Organic Compounds (PHC 216)

Program (s) on which the course is given:	Bachelor of Pharmacy
Department offering the program:	All Faculty Departments
Department offering the course:	Department of Pharmaceutical Chemistry
Academic year:	--------
Approval Date:	September 2014

A. Basic Information

Course Title: Structural Elucidation of Organic Compounds

Course Code: PHC 216

Prerequisites: Pharmaceutical Organic Chemistry-II (PHC 125)

Students' Level/Semester: **Second level/ third semester**

Credit hours: **3 (2+1)**

Actual teaching hours per week:

Lectures: 2 hr/week **Practical:** 2 hr/week **Tutorial:** (Twice per semester)

Total: 4 hr/week

B. Professional Information

1. Overall Aim of Course

After attending the lectures and tutorials, the student will be capable of independently using the different spectroscopic methods to elucidate the structures of Pharmaceutical Organic compounds, so he would be able to solve the spectroscopic problems for Pharmaceutical Organic compounds.

Upon successful completion of this course the student will gain basic knowledge of Stereochemistry and know the spatial (three-dimensional) structure of organic compounds. The course gives detailed knowledge about the reactions of stereochemical compounds and those with biological receptors. Moreover, the student will have basic knowledge about the recent techniques used in drug design process.

2. Intended Learning Outcomes (ILOs)

By the end of the course the student will be able to:

a- Knowledge and Understanding:

a1. Identify the basics of Ultraviolet and Infrared spectroscopy.

a2. Recognize the basics of nuclear magnetic resonance spectroscopy and elucidation of structure of Pharmaceutical Organic compounds.

a3. Identify the basics of mass spectroscopy and elucidation of structure of Pharmaceutical Organic compounds.

a4. Define the commonly used spectroscopic terminology.

a5. Identify the basics of stereochemistry.

a6. Define the commonly used stereo chemical terminology.
a7. Identify the spatial 3 dimensional arrangement of organic compounds.
a8. Describe different types of isomerism and its types of reaction mechanisms.
a9. Enumerate the reactions of some selected classes of stereo chemical drugs.
a10. Illustrate the reaction mechanisms of stereo chemical compounds.
a11. Discuss theoretical concepts of spectroscopic tools.
a12. Define stereo selective and stereospecific reactions of organic compounds knowledge.
a13. Illustrate the principle of molecular modeling and different strategies of drug- receptor interactions through computer-aided drug design.

b- Intellectual Skills:

b1. Develop critical thinking and decision-making skills.
b2. Illustrate applied spectroscopic techniques to solve spectroscopic problems of Pharmaceutical Organic compounds.
b3. Analyze spectroscopic data to identify different Pharmaceutical Organic compounds.
b4. Convert one stereo chemical drug to another.
b5. Solve stereo chemical problems.
b6. Predict the spectroscopic tools to recognize different structures of Pharmaceutical Organic compounds.
b7. Assess problems relevant to structure elucidation of Pharmaceutical Organic compounds.
b8. Apply the principles of bioinformtics.

c- Professional and Practical Skills:

c1. Apply a variety of spectroscopic concepts.
c2. Analyze spectroscopic data of Pharmaceutical Organic compounds.
c3. Predict the structure of unknown Pharmaceutical Organic molecules.
c4. Build up stereo chemical compounds using stereo chemical models.
c5. Detect stereo chemical compounds from their physical and chemical properties.
c6. Use the tools for separation of stereo chemical isomers and racemic resolution.
c7. Apply stereo chemical concepts for certain compounds with their biological receptors.
c8. Synthesize some selected classes of stereo chemical drugs.
c9. Select the molecular modeling technique used in drug design.

d- General and Transferable Skills:

d1. Communicate effectively with others.

d2. Collaborate actively in groups to solve stereo chemical organic problems.

3. Contents

Teaching Weeks	Topic		No. of hours	Lecture	Practical
	Stereochemistry	**Spectroscopy**			
One	Constitutional Isomerism	Introduction	4	2	
	Introduction				2
Two	Constitutional Isomerism	Ultra Violet (UV)	4	2	
	Ultra Violet (UV)				2
Three	Stereoisomerism (Conformational Isomerism)	Ultra Violet (UV)	4	2	
	Conformational Isomerism				2
Four	Geometrical Isomerism	Infra Red (IR)	4	1.5 Lecture 0.5 Exam	
	First Midterm Exam				
	Infra Red (IR)				2
Five	Geometrical Isomerism	Infra Red (IR)	4	2	
	Infra Red (IR)				2
Six	Optical Isomerism	Infra Red (IR)	4	2	
	Geometrical Isomerism **First Practical Exam**				2
Seven	Optical Isomerism	1H NMR	4	2	
	Optical Isomerism 1H NMR				2

Eight	**Second Midterm exam**		-	-	-
Nine	Stereochemical Reactions	1H NMR	4	2	
	1H NMR				2
Ten	Stereochemical Reactions	1H NMR 13C NMR	4	2	
	Second Practical Exam 13C NMR tutorial				2
Eleven	Chiral Molecules that do not possess chiral carbon	13C NMR Mass spectroscopy	4	2	
	Computer lab for determination of the 3D of stereochemical compounds tutorial				2
Twelve	Chiral Molecules that do not possess chiral carbon	Mass spectroscopy	4	2	
	Mass spectroscopy tutorial				2
Thirteen	Molecular Modeling & bioinformatics		4	2	
	Tutorial				2
Total No. of hours			48	24	24
Fourteen	**University Elective Final Exams**		-	-	-
Fifteen	**Faculty Final Exams**		-	-	-
Sixteen			-	-	-

4. Teaching and Learning Methods

4.1. Data show and computer in lectures.
4.2. Group discussion.
4.3. Problem solving.
4.4. Assignments.
4.5. Power point presentations.
4.6. Self-learning by discussion of projects prepared by students.
4.7. Office hours.
4.8. Case study.
4.9. Tutorial, problem-based learning.

5. Student Assessment Methods

5.1. Class work (assignments, tutorial) to assess professional and intellectual skills.
5.2. Written exams to assess knowledge, understanding and intellectual skills.
5.3. Oral exam to assess all types of skills and mainly general and transferable skills.
5.4. Research to assess general and transferrable skills.
5.5. Practical Exams to assess professional and practical skills.

Assessment Schedule

Assessment 1 … Written Exams	Week: (4, 8, 15/16)
Assessment 2 … Practical Exams	Week: (6 and 10)
Assessment 3 … Oral Exam	Week: (15/16)
Assessment 4 … Research	(During the semester)
Assessment 5 … Class work (Lab performance and participation in lectures)	(During the semester)

Weighting of Assessments

First Mid-Term Examination		5%
Second Mid-Term Examination		15 %
Final-Term Examination		30%
Oral Examination		10%
Practical Examination		30%
First Practical Exam	10%	
Second Practical Exam	15%	
Research	5%	
Class Work		10%
Total		**100%**

6. List of References

6.1. Course Notes

Staff lectures handouts are **uploaded to the Moodle**.

Lab manual **is given to each student**.

6.2. Essential Books (Text Books)

Carey, F.A.; Giuliano, R. M. "Organic Chemistry", 8th edition, McGraw-Hill international Edition (2011).

6.3. Recommended Books

Solomons & Fryhle,"Organic Chemistry", Wiley International/ 8th Edition (2011).

6.4. Periodicals, Websites, ……etc

www.Wikipedia.com

7. Facilities Required for Teaching and Learning

- Lecture halls.
- Personal Computer (available for each staff member).
- Computer equipped with projector and internet connection available for the usual lectures and Labs.
- Meeting rooms for office hours.
- White board.
- Different laboratory equipment (stereo chemical models, computers, internet).
- Books.
- Library furnished with textbooks.

Course Coordinator:

Head of Department
Prof. Dr. Ramzia El-Bagary

Department Approval Date: September 2014

FUTURE UNIVERSITY IN EGYPT
FACULTY OF PHARMACEUTICAL SCIENCES AND PHARMACEUTICAL INDUSTRIES

Course Specifications

Medicinal Chemistry-I (PHC 317)

Program (s) on which the course is given:	Bachelor of Pharmacy
Department offering the program:	All Faculty Departments
Department offering the course:	Pharmaceutical Chemistry Department
Academic year:	----------
Approval Date:	September 2014

A. Basic Information

Course Title: Medicinal Chemistry-I **Course Code:** PHC 317
Prerequisites: Structural Elucidation of Organic Compounds (PHC 216)
Students' Level/Semester: **3rd year/5th semester**
Credit hours: **4 (3+1)**
Actual teaching hours per week:
Lectures: 3 hr/week **Practical:** 2 hr/week **Tutorial:** N/A **Total:** 5 hr/week

B. Professional Information

1- Overall Aim of Course

This course helps the student to:

a. Understand the biological response due to the chemical structure of some compounds as antibiotics, sulfonamides, anticancer, antifungal, antiprotozoal, antiviral, anti-infective, anti- mycobacterial and anti- thyroid drugs.
b. Understand the mode of action of the chemical structure of the above compounds on various receptors, enzymes and systems.
c. Understand the modification of a compound structure to alter its physicochemical properties, which may affect its biological response or influence its formulation or administration.
d. Study the side effects, if any-that arise from the chemical structure of the studied compounds.
e. Study methods for synthesis of some drugs.
f. Study methods for analysis of some drugs in pure and dosage forms.
g. Study structure activity relationships.
h .Study the nomenclature of some classes of drugs.

The practical course is designed to expose the student to various synthetic and purification techniques in medicinal chemistry and methods of determination in pure and dosage forms and purity tests.

2- Intended Learning Outcomes of Course (ILOs)

By the end of the course, the student should be able to:

a- Knowledge and Understanding:

a1. Memorize the relationship of chemical structures and pharmacodynamics &, pharmacokinetic of some classes of drugs e.g. antibiotics and sulphonamides.

a2. Correlate the relationship between chemical structures and biological actions of some classes of drugs e.g. anti-thyroid drugs.

a3. Memorize the methods of synthesis of some classes of drugs e.g. anticancer drugs

a4. Differentiate the analytical methods: principles, validation, application, and good laboratory practice.

a5. Recognize the pharmacopoeial standards of the different methods of analysis of chemically active compounds e.g. antifungal drugs.

a6. Memorize the nomenclature of some classes of drugs e.g. anti-infective drugs.

a7. Summarize the concepts of drug synthesis and drug actions, side effects, and toxicities of some classes of drugs as antiprotozoal drugs.

a8. Explain the structure, and function of drugs on treating diseases from structural/functional anomalies of some classes of drugs as antiviral drugs.

b- Intellectual Skills:

b1. Relate chemical structure of enzyme or receptor model to biological activity of some classes of drugs e.g. anti-mycobacterial drugs.

b2. Discover lead compounds.

b3. Develop different analytical procedures for the evaluation of different drugs and for quality control of pharmaceutical preparations.

b4. Differentiate between different groups of drugs.

b5. Predict the biological response of some groups of drugs and medical use by referring to their chemical structures.

b6. Suggest the suitable route of administration of - different drugs according to their chemical features.

b7. Solve problems related to qualitative and quantitative information, extending to situations where evaluations have to be made on the basis of limited information.

b8. Modify a compound structure to alter its physicochemical properties, which may affect its biological response and affect its formulation or administration

b9. Calculate the concentration of drugs in pure and dosage forms.

b10. Interpret the effect of various functional groups on drug action.

b11. Relate the concepts of drug receptor interactions

b12. Relate the concepts of Structure Activity Relationships and drug metabolic pathways.

C-Professional and Practical Skills:

c1. Use efficiently equipment for identification of different new compounds.

c2. Solve various analytical problems

c3. Suggest suitable analytical methodology for assay of an active ingredient in a bulk or a single component.

c4. Perform chemical reactions for identification of compounds.

c5. Apply various synthetic and purification techniques in medicinal chemistry

d- General and Transferable Skills:

d1. Use variety of sources to retrieve information.

d2. Develop presentation skills.

d3. Manage time efficiently.

d4. Work effectively in team.

d5. Present pharmaceutical science materials and arguments clearly and correctly in writing and orally to both specialist and lay audience.

d6. Prescribe OTC drugs suitable for the patient taking in consideration the medical history of the patient.

3- Contents

Week	Topic	No. of hours	Lecture	Practical
One	Antibiotics (β-lactam)	**5**	**3**	
	Introduction to Semi-Quantitative			**2**

	analysis			
Two	Antibiotics (β-lactam)	**5**	**3**	
	Limit test for Chloride			**2**
Three	Non β-lactam Antibiotic	**5**	**3**	
	Limit test for Sulphates			**2**
Four	Sulfonamides	**5**	**3**	
	Limit test for Iron **1st Midterm Exam**			**1.5** **0.5**
Five	Anticancer drugs	**5**	**3**	
	Limit test for Lead			**2**
Six	Anticancer drugs Antimalarial	**5**	**3**	
	Limit test for Heavy Metals			**2**
Seven	Antifungal drugs	**5**	**3**	
	Difficulties			**2**
Eight	**2nd** Mid-Term			
Nine	Antiprotozoal (antiamoebic, anti-trypanosoma, antileishmania)	**5**	**3**	
	Titration			**2**
Ten	Antiviral	**5**	**3**	
	Titration			**2**
Eleven	Anti-infective agents (alcohols, aldehydes, acids, halogen compounds, phenols, nitrofurans, quinolones).	**5**	**3**	
	Final Practical Exam			**2**
Twelve	Antimycobacterial drugs	**3**	**3**	
Thirteen	Hormones (steroid)Antithyroid drugs	**3**	**3**	
Total no. of hours		**56**	**36**	**20**
Fourteen	University Elective Final Exams			
Fifteen	**Final Exams**			
Sixteen				

4- Teaching and Learning Methods

4.1. Data show and computer in lectures.
4.2. Laboratory sessions
4.3. Group discussion.
4.4. Data analysis.
4.5. Problem solving.

4.6. Assignments.

4.7. Power point presentations.

4.8. Demonstration videos.

4.9. Self-learning by discussion of projects prepared by students.

4.10. Office hours.

5- Student Assessment Methods

5.1. Written Exams to assess knowledge and understanding as well as intellectual skills.

5.2. Practical Exam and Quiz to assess the professional and practical capabilities of student.

5.3. Oral exam to assess all types of skills and mainly general and transferrable skills.

5.4. Class work (Participation & Assignments to assess all types of skills.

Assessment Schedule

Assessment 1	First Midterm exam	Week 4
Assessment 2	Second midterm exam	Week 8
Assessment 3	Practical exam + Quiz	Week 11
Assessment 4	Final Written exam	Week 15/16
Assessment 5	Oral exam	Week 15/16
Assessment 6	Class Work (Participation & assignments) (During the semester)	

Weighting of Assessments

1st Mid-Term Examination		5 %
2nd Mid-Term Examination		15 %
Final-Term Examination		30 %
Oral Examination		10 %
Class Work (Participation & Assignment)		10 %
Practical		30 %
	Practical Examination 25 %	
	Quiz 5 %	
Total		**100 %**

6. List of References

6.1. Course Notes

Staff lectures handouts are **uploaded to the Moodle**.
lab manual **is given to each student**.

6.2. Essential Books (Text Books)

- Williams, A; Lemke, L, Foy's Principles of Medicinal Chemistry; 7th ed., by Lippincott Williams & Wilkins (2013).

6.3. Recommended Books

i. Block, J; Beale, J, Wilson and Griswold's "Textbook of Organic Medicinal and Pharmaceutical Chemistry", 12th ed., by Lippincott Williams & Wilkins (2011).
ii. Kathleen Parfitt, Martindale: The complete drug reference, 37th ed., by The Pharmaceutical Press, London (2012).
iii. Brunton, L; Lazo, S; Parker, L, Goodman and Gilman's "The Pharmacological Basis of Therapeutics", 12th ed., by McGraw-Hill (2011).
iv. Different pharmacopoeias (British, Egyptian, European, USP).
v. The Merck Index, Merck and Co., INC, White house Station, 14th ed., 2012.
vi. Williams, A; Lemke, L, Foy's Principles of Medicinal Chemistry; 7th ed., by Lippincott Williams & Wilkins (2011).
vii. Remington: The Science and Practice of Pharmacy.
viii. Other available medicinal chemistry books.
ix. Donald, A. (Ed.), Burger's Medicinal Chemistry and Drug Discovery, 7th edition., John Wiley& Sons, Inc., Hoboken, New Jersy, volume 5: Chemotherapeutic agents (2010).
- Other available medicinal chemistry books.

6.4. Periodicals, Websites, … etc

Periodical Scientific Journals: Journal of Medicinal Chemistry

Websites:

www.Sciencedirect.com

www.pubmed.com

7. Facilities Required for Teaching and Learning

- Lecture halls.
- Laboratories.
- Personal Computer (available for each staff member).

- Computer equipped with projector and internet connection available for the usual lectures and Labs.
- Meeting rooms for office hours.
- White board.
- Different laboratory equipment (beakers, conical flasks, burettes, bulb pipettes…)
- Books.
- Audio-lectures.
- Library furnished with textbooks.

Course Coordinator: ----------

Head of Department: Prof. Dr. Ramzia El-Bagary

Department Approval Date: September 2014

FUTURE UNIVERSITY IN EGYPT
FACULTY OF PHARMACEUTICAL SCIENCES AND PHARMACEUTICAL INDUSTRIES

Course Specifications

Medicinal Chemistry-II (PHC 328)

Program (s) on which the course is given:	Bachelor of Pharmacy
Department offering the program:	All Faculty Departments
Department offering the course:	Pharmaceutical Chemistry Department
Academic year:	----------
Approval Date:	September 2014

A. Basic Information

Course Title: Medicinal Chemistry-II **Course Code:** PHC 328

Prerequisites: Structural Elucidation of Organic Compounds (PHC 216)

Students' Level/Semester: **3rd year/6th semester**

Credit hours: **4 (3+1)**

Actual teaching hours per week:

Lectures: 3 hr/week **Practical:** 2 hr/week **Tutorial:** N/A **Total:** 5 hr/week

B. Professional Information

Overall Aim of Course

This course helps the student to:

a. Understand the biological response due to the chemical structure of compounds as oral hypoglycemic, cardiovascular drugs, diuretics, CNS depressants, stimulants and antidepressants, analgesics and antihistamines.

b. Understand the mode of action of the chemical structure of the above compounds affecting various receptors, enzymes and systems.

c. Understand the modification of a compound structure to alter its physicochemical properties, which may affect its biological response or influence its formulation or administration.

d. Study the side effects, if any-that arise from the chemical structure of the studied compounds.

e. Study methods for synthesis of some drugs.

f. Study methods for analysis of drugs in pure and dosage forms.

g. Study structure activity relationships.

h .Study the nomenclature of drugs.

The practical course is designed to expose the student to various synthetic and purification techniques in medicinal chemistry and methods of determination in pure and dosage forms and purity tests.

2-Intended Learning Outcomes of Course (ILOs)

By the end of the course, the student should be able to:

a- Knowledge and Understanding:

a1. Memorize the relationship of chemical structures and pharmacodynamics &, pharmacokinetic ofsome drugs e.g.: oral hypoglycaemic drugs.

a2. Correlate the relationship between chemical structures and biological actions of some classes of drugs as cardiovascular drugs.

a3. Memorize the methods of synthesis of some drugs

a4. Differentiate the analytical methods: principles, validation, application, and good laboratory practice.

a5. Recognize the pharmacopoeial standards of the different methods of analysis of chemically active compounds as diuretics.

a6. Memorize the nomenclature of some drugs as CNS depressants.

a7. Summarize the concepts of drug synthesis and drug actions, side effects, and toxicities of CNS stimulants and antidepressants.

a8. Explain the structure, and function of some drugs on treating diseases from structural/functional anomalies as analgesics and antihistamines.

b- Intellectual Skills:

b1. Relate chemical structure of enzyme or receptor model to biological activityof some classes of drugs.

b2. Discover lead compounds.

b3. Develop different analytical procedures for the evaluation of different drugs and for quality control of pharmaceutical preparations.

b4. Differentiate between different groups of drugs.

b5. Predict the biological response of some groups of drugs and medical use by referring to their chemical structures.

b6. Suggest the suitable route of administration of - different drugs according to their chemical features.

b7. Solve problems related to qualitative and quantitative information, extending to situations where evaluations have to be made on the basis of limited information.

b8. Modify a compound structure to alter its physicochemical properties, which may affect its biological response and affect its formulation or administration

b9. Calculate the concentration of some drugs in pure and dosage forms.

b10. Interpret the effect of various functional groups on drug action.

b11. Relate the concepts of drug receptor interactions

b12. Relate the concepts of Structure Activity Relationships and drug metabolic pathways.

C-Professional and Practical Skills:

c1. Use efficiently equipment for identification of different new compounds.

c2. Solve various analytical problems.

c3. Suggest suitable analytical methodology for assay of an active ingredient in a bulk or a single component.

c4. Perform chemical reactions for identification of compounds.

c5. Apply various synthetic and purification techniques in medicinal chemistry

d- General and Transferable Skills:

d1. Use variety of sources to retrieve information.

d2. Develop presentation skills.

d3. Manage time effeciently.

d4. Work effectively in team.

d5. Present pharmaceutical science materials and arguments clearly and correctly in writing and orally to both specialist and lay audience.

d6. Prescribe OTC drugs suitable for the patient taking in consideration the medical history of the patient.

3- Contents

Week	Topic	No. of hours	Lecture	Practical

One	Autonomic nervous system	**5**	**3**	
	Assay of Aspirin			**2**
Two	Autonomic nervous system and Oral Hypoglycemic	**5**	**3**	
	Assay of anti-inflammatory			**2**
Three	Oral Hypoglycemic	**5**	**3**	
	Assay of Oral Hypoglycemic			**2**
Four	Cardiovascular drugs	**5**	**3**	
	Assay of cardiovascular drugs **1st Mid-Term Examination**			**1.5** **0.5**
Five	Cardiovascular drugs	**5**	**3**	
	Assay of cardiovascular drugs			**2**
Six	Diuretics	**5**	**3**	
	Assay of Diuretics			**2**
Seven	CNS depressants	**5**	**3**	
	Chloral Hydrate assay			**2**
Eight	**2nd Midterm Exam**			
Nine	CNS depressants	**5**	**3**	
	Sedative mixture assay, Assay of Aminophylline			**2**
Ten	CNS stimulants and Antidepressants Local anesthetic	**5**	**3**	
	Assay of sedative mixture, Assay of Oral rehydran			**2**
Eleven	CNS stimulants and Antidepressants	**5**	**3**	
	Final Practical Exam + Quiz			**2**
Twelve	Analgesics (NSAIDs & Opioids)	**3**	**3**	
Thirteen	Analgesics (NSAIDs & Opioids) Antihistamines	**3**	**3**	
Total no. of hours		**56**	**36**	**20**
Fourteen	**University Elective Final Exams**			
Fifteen	**Final Exams of Faculty**			
Sixteen				

4- Teaching and Learning Methods

4.1. Data show and computer in lectures.

4.2. Laboratory sessions

4.3. Group discussion.

4.4. Data analysis.

4.5. Problem solving..

4.6. Power point presentations.

4.6. Demonstration videos.

4.7. Self-learning by discussion of projects prepared by students.

4.8. Office hours.

4.9. Assignments.

4.10. Demonstrations.

5- Student Assessment Methods

5.1. Written Exams to assess knowledge and understanding as well as intellectual skills.

5.2. Practical Exams to assess the professional and practical skills.

5.3. Class work (Participation & Assignments) to assess general and transferrable skills.

5.4. Oral exam to assess all types of skills and mainly general and transferrable skills.

Assessment Schedule

Assessment 1	First Midterm exam	Week 4
Assessment 2	Second midterm exam	Week 8
Assessment 3	Practical exam	Week 11
Assessment 4	Final Written exam	Week 15/16
Assessment 5	Oral exam	Week 15/16
Assessment 6	Class Work (Participation and assignments) (During the semester)	

Weighting of Assessments

1st Mid-Term Examination	5 %
2nd Mid-Term Examination	15 %
Final-Term Examination	30 %
Oral Examination	10 %
Class Work (Participation & Assignments)	10 %
Practical	30 %
Practical Examination	25 %

Quiz	5 %
Total	**100 %**

6. List of References

6.1 . Course Notes

- Staff lectures handouts are **uploaded to the Moodle**.
- lab manual **is given to each student**.

6.2. Essential Books:

Williams, A; Lemke, L, Foy's Principles of Medicinal Chemistry; 7th ed., by Lippincott Williams & Wilkins (2013).

6.3. Recommended Books

i. Block, J; Beale, J, Wilson and Griswold's "Textbook of Organic Medicinal and Pharmaceutical Chemistry", 12th ed., by Lippincott Williams & Wilkins (2011).
ii. Kathleen Parfitt, Martindale: The complete drug reference, 37th ed., by The Pharmaceutical Press, London (2012).
iii. Brunton, L; Lazo, S; Parker, L, Goodman and Gilman's "The Pharmacological Basis of Therapeutics", 12th ed., by McGraw-Hill (2011).
iv. Different pharmacopoeias (British, Egyptian, European, USP).
v. The Merck Index, Merck and Co., INC, White house Station, 14th ed., 2012.
vi. Williams, A; Lemke, L, Foy's Principles of Medicinal Chemistry; 7th ed., by Lippincott Williams & Wilkins (2011).
vii. Remington: The Science and Practice of Pharmacy.
viii. Other available medicinal chemistry books.
ix. Donald, A. (Ed.), Burger's Medicinal Chemistry and Drug Discovery, 7th edition., John Wiley& Sons, Inc., Hoboken, New Jersy, volume 5: Chemotherapeutic agents (2010).

- Other available medicinal chemistry books.

-Periodicals, Web Sites, … etc

-Periodical Scientific Journals:

Journal of Medicinal Chemistry

Websites:

- www.Sciencedirect.com
- www.pubmed.com

7. Facilities Required for Teaching and Learning

- Lecture halls.
- Laboratories.
- Personal Computer (available for each staff member).
- Computer equipped with projector and internet connection available for the usual lectures and Labs.
- Meeting rooms for office hours.
- White board.
- Different laboratory equipment and glassware (beakers, burettes, conical flasks, bulb pipettes, glass rod,……).
- Books.
- Audio-lectures.
- Library furnished with textbooks.

Course Coordinator: ----------

Head of Department: Prof. Dr. Ramzia El-Bagary

Department Approval Date: September 2014

FUTURE UNIVERSITY IN EGYPT
FACULTY OF PHARMACEUTICAL SCIENCES AND PHARMACEUTICAL INDUSTRIES

Course Specifications

Drug Design and Development (PHC 429)

Program (s) on which the course is given:	Bachelor of Pharmacy
Department offering the program:	All Faculty Departments
Department offering the course:	Pharmaceutical Chemistry Department
Academic year:	----------
Approval Date:	September 2014

A. Basic Information

Course Title: Drug Design and Development **Course Code: PHC 429**

Prerequisites: Medicinal Chemistry-I (PHC 317**)**

Students' Level/Semester: **Fourth year/8th semester**

Credit hours: **2 (1+1)**

Actual teaching hours per week: **Lectures:** 1 hr/week **Practical:** 2 hr/week **Tutorial:** N/A **Total:** 3 hr/week

B. Professional Information

1- Overall Aim of Course

The course comprises the physicochemical properties of drugs in relation to biological action. The student will be able to understand drug-receptor interactions, isosterism, drug metabolism, prodrug concept. He will also gain knowledge about the recent techniques used in drug design and drug development process. This will enable him to predict the pharmacological activity of the compounds from their chemical structure.

In the practical course, the student will be able to deal with some computer aided drug design software.

2- Intended Learning Outcomes of Course (ILOs)

By the end of this course, the student should be able to:

a- Knowledge and Understanding:

a1. Illustrate the chemical structure, pharmacophore moieties and consequently the structure activity relationships in each class of studied drugs.

a2. Memorize the relationship of chemical structures and pharmacodynamics &, pharmacokinetic of some classes of drugs.

a3. Enumerate the chemical basis for the mechanisms of drug actions.

a4. Demonstrate the process of drug design and synthesis.

a5. Explain the chemical and metabolic instabilities in each class of drugs.

a6. Recognize the metabolic changes of drugs

a7. Mention the side effects and uses of the titled drugs.

a8. Illustrate the principle of molecular modeling and different strategies of drug-receptor interactions through computer-aided drug design.

Intellectual Skills:

b1. Use enzyme or receptor model to relate chemical structure to biological activity.

b2. Differentiate between different groups of drugs.

b3. Predict the biological response of some drugs and medical use by referring to their chemical structures.

b4. Solve problems related to qualitative and quantitative information, extending to situations where evaluations have to be made on the basis of limited information.

b5. Interpret the effect of various functional groups on drug action.

b6. Relate the concepts of drug receptor interactions

b7. Relate the concepts of Structure Activity Relationships and drug metabolic pathways.

b8. Predict the activity of compounds according to the different techniques in molecular modeling.

b9. Apply the principles of bio-informatics and computer aided drug design.

b10. Modify a compound structure to alter its physicochemical properties, which may affect its biological response.

b11. Conclude the main concepts of Drug Design and Development and their application in understanding drug actions.

c- Professional and Practical Skills:

c1. Apply the given information to evaluate the activity of related compounds within a pharmacological class based on structural similarities and dissimilarities.

c2. Examine a drug structure to deduce relative receptor affinity, metabolic pathways, distribution potential, and potential side effects or toxicities based on functional group properties and structural similarity to other pharmacophores.

c3. Justify therapeutic recommendations based on an understanding of drug chemistry.

c4. Design new chemical entities based on computer-aided drug design.

c5. Predict the biological activity of drugs using computer aided drug design.

c6. Apply in practice setting the knowledge and understanding required to meet the needs of patients and other health care professional.

d- General and Transferable Skills:

d1. Use different resources retrieve information from a variety of sources.

d2. Use gained skills for continuing professional development.

d3. Develop presentation skills.

d4. Manage time efficiently.

d5. Work effectively in a team.

d6. Make appropriate decisions for arising problems.

d7. Present pharmaceutical science materials and arguments clearly and correctly in writing and orally to both specialist and lay audience.

3- **Contents**

Teaching Weeks	Topic	No. of hours	Lecture	Practical
One	Non-computational drug design Physicochemical properties of drugs	3	1	
	Introduction to Accelrys discovery studio®, drawing structures , conformational analysis and energy minimization			2
Two	Non-computational drug design Physicochemical properties of drugs	3	1	
	Introduction to Accelrys discovery studio®, drawing structures , conformational analysis and energy minimization			2

Three	Structure characteristics and biological activity	3	1	
	Introduction to Catalyst® modules, Pharmacophore hypothesis generation and data base screening			2
Four	Structure characteristics and biological activity	3	1	
	Introduction to Catalyst® modules, Pharmacophore hypothesis generation and data base screening **First Midterm Exam**			1.5 0.5
Five	- Stereo chemical aspects of drugs ▪ Optical isomerism. ▪ Geometrical isomerism.	3	1	
	Receptor visualization, binding site determination			2
Six	Conformational isomerism. Bioisosterism..	3	1	
	Introduction to docking using Ligand fit module			2
Seven	Hansh QSAR equation and its application.	3	1	
	Cdocker module and docking studies			2
Eight	**Second Midterm exam**			
Nine	Hansh QSAR equation and its application.	3	1	
	Cdocker module and docking studies			2
Ten	Computer aided drug design	3	1	
	Introduction to Qsar and denovo synthesis of Ligands using Ludi Module.			2
Eleven	Computer aided drug design and drug metabolism	3	1	
	Final Practical Exam			2
Twelve	Drug metabolism	1	1	

Thirteen	Drug metabolism	1	1	
Total No. of hours		32	12	20
Fourteen	**University Elective Final Exams**			
Fifteen	**Final Exams of Faculty**			
Sixteen				

4- **Teaching and Learning Methods**

4.1. Data show and computer in lectures.

4.2. Laboratory sessions

4.3. Group discussion.

4.4. Data analysis.

4.5. Problem solving.

4.6. Assignments.

4.7. Power point presentations.

4.8. Demonstration videos.

4.9. Self-learning by discussion of projects prepared by students.

4.10. Office hours.

4.11. Case study.

4.12. Demonstrations.

5- **Student Assessment Methods**

5.1. Written Exams to assess knowledge and understanding as well as intellectual skills.

5.2. Practical Exam (including quiz) to assess professional and practical skills.

5.3. Class Work (Participation and assignments) to assess all types of skills and mainly general and transferrable skills.

Assessment Schedule

Assessment 1 First Midterm exam Week 4

Assessment 2 Second midterm exam Week 8

Assessment 3 Practical exam Week 11

Assessment 4 Final Written exam Week 15/16

Assessment 5 Class Work (participation and assignments) (During the semester)

Weighting of Assessments

1st Mid-Term Examination		5 %
2nd Mid-Term Examination		15 %
Final-Term Examination		40 %
Class Work (Participation and assignments)		10 %
Practical		30 %
Practical Examination	25 %	
Quiz	5 %	
Total	**100 %**	

6- List of References

6.1. Course Notes

Staff lectures handouts are **uploaded to the Moodle**.

lab manual **is given to each student**.

6.2. Essential Books (Text Books)

- Williams, A; Lemke, L, Foy's Principles of Medicinal Chemistry; 7th ed., by Lippincott Williams & Wilkins (2013).
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6.3. Recommended Books

- Block, J; Beale, J, Wilson and Gisvold's "Textbook of Organic Medicinal and Pharmaceutical Chemistry", 12th ed., by Lippincott Williams & Wilkins (2011).
- Kathleen Parfitt, Martindale: The complete drug reference, 37th ed., by The Pharmaceutical Press, London (2012).
- Brunton, L; Lazo, S; Parker, L, Goodman and Gilman's "The Pharmacological Basis of Therapeutics", 11th ed., by McGraw-Hill (2006).
- Different pharmacopeias (British, Egyptian, European, USP).
- The Merck Index, Merck and Co., INC, White house Station, 14th ed., 2012.
- Remington: The Science and Practice of Pharmacy.
- Other available medicinal chemistry books.
- Donald, A. (Ed.), Burger's Medicinal Chemistry and Drug Discovery, 7th edn., John Wiley& Sons, Inc., Hoboken, New Jersy, (2010).
- Other available medicinal chemistry books.
- Kristian Stromgaard, Povl Krogsgaard-Larsen, Ulf Madsen , Textbook of drug design and discovery , 4th ed. 2009
- Izet M. Kapetanovic, Drug Discovery and Development - Present and Future ,2011

6.4. Periodicals, Web sites, … etc

Periodical Scientific journals:

Journal of Medicinal Chemistry

Websites:

-www.pubmed.com -----
www.orgsyn.syn

-www.drugdiscoverytoday.com

-www.cheminformatics.com

-www.merck.com

-www.Sciencedirect.com

7- Facilities Required for Teaching and Learning

- Discovery Studio 4.1 and Argus Lab. programs of molecular modeling, computer lab.

- Lecture halls
- Personal Computer (available for each staff member).
- Computer equipped with projector and internet connection available for the usual lectures and Labs.
- Meeting rooms for office hours.
- White board.
- Books.
- Audio-lectures.
- Library furnished with textbooks.
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Course Coordinator: ----------

Head of Department: Prof. Dr. Ramzia El-Bagary

Department Approval Date: September 2014

Course specifications

Analysis of Foods and Cosmetics (PHC 601)

Program(s) on which the course is given: Bachelor of Pharmacy

Department offering the course : All Faculty Departments

Department offering the course : Pharmaceutical Chemistry

Academic year : ----------

Approval Date : September 2014

A. Basic Information

Course Title: Analysis of food & Cosmetics **Course Code:** PHC 601

Prerequisite: Instrumental Analysis (PHC 213)

Student`s Level/semester: Elective

Credit hours: 2 (1 + 1)

Actual teaching hours per week:

Lectures: 1/week Practical: 2/week Tutorial: N/A Total : 3/week

B. Professional Information:

1. Overall Aim of the Course :

The course aim to provide the post graduate students with the basic knowledge about the concept of application of analytical chemistry in the fields of analysis of foods as lipids (fats & oils) and milk products as (condensed, dried milk, etc.) as well as cosmetics.

2. Intended Learning outcomes (ILOs)

By the end of the course, the student should be able to:

a. Knowledge and Understanding:

a1. Recognize the types of oils and fats analysis according to pharmacopeia monographs.
a2. Identify methods of analysis of condensed milk and dry milk.
a3. Discuss the types of Cosmetics analysis.

b. Intellectual Skills:

b1. Select appropriate methods for the qualitative analysis of food and cosmetics.
b2. Choose the suitable methods for quantitative analysis of food and cosmetics.
b3. Assess problems relevant to physical principles.

c. Professional and Practical Skills:

c1. Examine physical and chemical properties of oils, fats and milk.
c2. Analyze some of cosmetic preparations.
c3. Dispose hazardous materials according to safety measures.
c4. Apply safety measures in practice.

d. General and Transferable Skills:

d1. Interact efficiently with others.
d2. Work effectively in a team.
d3. Manage time effectively.
d4. Make appropriate decisions.
d5. Collect the gained experiences in certain pharmaceutical activities.
d6. Work with minimal guidance using full range of resources.
d7. Apply good oral and written communication skills.

3. Contents

Week	Topic	No. of hours	Lecture	Practical
One	Composition of lipids	3	1	
	Physical examination of lipid			2
Two	Physical & chemical examination of lipids	3	1	
	Identification tests			2
Three	Physical & chemical examination of lipids	3	1	
	Acid value			2

Four	Physical & chemical examination of lipids	3	1	
	Saponification value **+1st Mid term exam**			1.5 + 0.5
Five	Hydrogenation of lipids	3	1	
	Oil report 1			2
Six	Rancidity of lipids & oil report	3	1	
	Oil report 2			2
Seven	Rancidity of lipids & oil report	3	1	
	Unknown sample & calculation % of adulteration of oil sample (Revision			2
Eight	**Second midterm exam**			
Nine	Analysis of butter fats	3	1	
	Analysis of Ca^{+2} & Mg^{+2} in cosmetic			2
Ten	Analysis of milk	3	1	
	Analysis of Al^{+3}			2
Eleven	Analysis of milk	3	1	
	Revision			2

Twelve	Analysis of Cosmetics	3	1	
	Practical exam			2
Thirteen	Analysis of Cosmetics	1	1	
Total no. of hours		34	12	22
Fourteen	**University Elective Final Exams**			
Fifteen	**Final Exams**			
Sixteen				

4. 4. Teaching and Learning Methods

4.1. Lectures.
4.2. Practical training/laboratory.
4.3. Data analysis.
4.4. Problem solving.
4.5. Office hours.
4.6. Case study.
4.7. Demonstrations.

5. Student Assessment Methods

5.1.Practical exam to assess practical and professional skills.
5.2.Written exam to assess knowledge and understanding as well as intellectual skills.
5.3. Class work (Lab. Performance) to assess all types of skills including general and transferrable skills.

Assessment Schedule

Assessment 1...First Midterm Week 4
Assessment 2…Second Midterm Week 8
Assessment 3…Practical Exam Week 12
Assessment 4…Final Written Exam. Week 15/16
Assessment 5…Class Work (Lab performance) (During Semester)

Weighting of Assessments

1st Mid-Term Examination 5%
2nd Mid -Term Examination 15%
Final-Term Examination 40%
Class Work (Lab performance) 10%
Practical 30%

Practical Examination	25%	
Activities	5%	
Total		**100%**

6. List of References

6.1. Course Notes

Staff lectures handouts are **uploaded to the Moodle**

Lab manual is **given to each student**

6.2. Essential Books (Text Books)

-J.Mendham, R.C. Denney, J.D. Barnes & M.J.K. Thomas, Vogel's Quantitative Chemical Analysis (6th Edition),, Prentice Hall, Upper Saddle River, NJ, (2000).

6.3. Recommended Books

- W.W. Christie and X .Han. Lipid Analysis, 4th Edition, Elsevier, 2010.
- A.Salvador and A.Chisvert, Analysis of Cosmetic products, First Edition, 2007.
- Frank A. Settle, Handbook of Instrumental Techniques for Analytical Chemistry, Prentice Hall, Upper Saddle River, NJ, (1997).

6.4. Periodicals, Websites, ……etc

http://www.wikipedia.org/

7. Facilities Required for Teaching and Learning

- Lecture halls
- Computer equipped with projector.
- White board.
- Different laboratory equipment (Electric Balance, water bathes, glass ware).
-Books.
- Library furnished with Textbooks.

Course Coordinator:.

Head of Department: Prof. Dr. Ramzia El Bagary

Department Approval Date: September 2014

Chemistry of Medicinal Heterocycles (PHC 602)

Course specifications

Programme on which the course is given: Bachelor of Pharmacy
Department offering the programme: All departments
Department offering the course: Pharmaceutical Chemistry department
Academic year: ……
Date of specification approval: September 2014

A- Basic Information:

Course Title: **Chemistry of Medicinal Heterocycles**
Course Code: **PHC 602**
Prerequisite: **Structural Elucidation of Organic Compounds (PH 216)**
Students' Level/Semester: Elective
Credit Hours: **2(2+0)**
Lecture: **2 hr/week**
Tutorial: **Twice per semester**
Practical: **N/A**
Total: **2 hr/week**

B- Professional Information

1 – Overall aims of course

The lectures and practical labs of this course give the students information about how to identify the chemistry of medicinally important heterocycles drugs, how to correlate the physical and chemical properties of the pharmacophores with the drug activity and how to synthesize small drugs and organic compound with the help of his instructors**.**

2 – Intended learning outcomes of course (ILOs)

By the end of the course, the student should be able to:

a- Knowledge and understanding:

a1. Enumerate the basic chemistry of heterocyclic bases.
a2. Relate the chemistry of heterocyclic compounds and nucleosides with their functional group transformations.
a3. Recognize the synthesis and reactions of some heterocyclic drugs and nucleosides.

b- Intellectual skills

b1. Predict the mechanism of a given reaction.
b2. Solve problems related to organic compounds.
b3. Choose the appropriate method for synthesis of selected compounds.

c- Professional and practical skills

c1. Use studied data to handle pharmaceutical materials and chemicals safely afterwards.
c2. Apply standard pharmaceutical laboratory procedures and instrumentation.
c3. Identify the essential pharmacophore of the heterocyclic drugs.
c4. Apply studied data in future to synthesize some heterocyclic drugs of medicinal importance.

General and transferable skills

d1. Work effectively in team.
d2. Communicate effectively with others by oral and written means.

3- Contents

Week	Topic	Total No. of hours	Hrs. of Lecture
One	Nomenclature of different heterocyclic Scaffold	2	2
Two	Reactions of Heterocyclic Compounds	2	2
Three	Reactions of Heterocyclic Compounds (Cont.)	2	2
Four	Chemistry of Nucleosides + **First Midterm Exam**	2	1.5 + 0.5
Five	Chemistry of Nucleotides	2	2
Six	Chemistry Of RNA and DNA	2	2
Seven	Chemistry Of RNA and DNA (Cont.)	2	2
Eight	**Second Midterm Exam**		
Nine	Study of Drugs Containing Nucleosides	2	2
Ten	Study of Drugs Containing Nucleosides (Cont.)	2	2
Eleven	Pharmacodynamics and Pharmacokinetics of heterocyclic Drugs	2	2
Twelve	Pharmacodynamics and Pharmacokinetics of heterocyclic Drugs (Cont.)	2	2
Thirteen	**Revision**	2	2
Total no. of hours		**24**	**24**
Fourteen	**University Elective Final Exam**		
Fifteen	**Final Exam**		
Sixteen			

4– Teaching and learning methods

4.1. Modified Lecture (Students' Response System through Clickers).
4.2. Seminar/Workshop
4.3. Class Activity
4.4. Group Discussion
4.5. Tutorials

5- Student assessment methods

5.1. Written exam(s) **to assess** knowledge and understanding, intellectual skills as well as professional skills.
5.2. Class Work (Tutorials) to assess all types of skills and mainly general and transferrable skills.

Assessment schedule

Assessment 1	First Midterm exam	Week 4
Assessment 2	Second Midterm exam	Week 8
Assessment 3	Final Written exam	Week 15/16
Assessment 4	Class Work (Tutorials)	During the semester

Weighting of assessments

First Midterm exam	10%
Second Midterm exam	20%
Final-Term Written Examination	40%
Class Work (Tutorial)	30 %
Total	**100%**

6- List of references

6.1. Course notes

Staff lectures handouts are **uploaded to the Moodle**.

6.2. Essential books (textbooks):

- Francis A. Carey, Robert M. Giuliano " Organic Chemistry",8th edition, Mcgraw-Hill International Edition (2011).

6.3. Recommended books:

- Solomons & Fryhle Organic Chemistry, Wiley International/ 11th Edition (2014).

6.4. Periodicals, Web sites, … etc

http://www.chemweb.com
http://www.chemistry.com

http://www.orgsyn.org

Head of Department:

Prof. Dr. Ramzia Ismail

Department Approval Date: September 2014