FUTURE UNIVERSITY IN EGYPT
FACULTY OF PHARMACEUTICAL SCIENCES AND PHARMACEUTICAL INDUSTRIES

**Course Specifications**

# General and Physical Chemistry (PHC101)

| | |
|---|---|
| **Program (s) on which the course is given:** | Bachelor of Pharmaceutical Sciences and Pharmaceutical Industries |
| **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:** General and Physical Chemistry **Course Code:** PHC 101

**Prerequisites:** None

**Students' Level/Semester:** First Level/ First 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 course aims to cover the basic knowledge of general and physical chemistry.
It ensures that the student has and understands the skills to apply the basic chemistry in inorganic and physical chemistry in his study.

### 2. Intended Learning Outcomes (ILOs)

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

**a- Knowledge and Understanding:**

a1. Describe the electronic structure of atoms and types of bonds.
a2. Recognize gases, liquids and solid states.
a3. Identify the properties of solutions.
a4. Define thermochemistry.

**b- Intellectual Skills:**

b1. Suggest the hybridization in any organic compound.
b2. Illustrate the structure and the geometry of any organic or inorganic compounds.
b3. Interpret the obtained data.

**c- Professional and Practical Skills:**

c1. Measure the colligative properties of the solutions.
c2. Determine the heat contents and the rate of any reactions.
c3. Calculate some physical constants of solutions.

**d- General and Transferable Skills:**

d1. Demonstrate written communication skills.

d2. Discuss answers for asked questions.
d3. Explain any item of the course either in lectures or during the practical sessions.

## 3. Contents

| Teaching Weeks | Topic | No. of hours | Lecture | Practical |
|---|---|---|---|---|
| **One** | - The quantum theory and the electronic structure of atoms. | **5** | **3** | |
| | -Safety laboratory rules.<br>-SI units, significant figures, rules for rounding, mole concept. | | | **2** |
| **Two** | -Periodic relationships among the elements. | **5** | **3** | |
| | -Determination of empirical and molecular formula. | | | **2** |
| **Three** | -Bonding and structure. | **5** | **3** | |
| | -Determination of formula of hydrated salt. | | | **2** |
| **Four** | - The octet rule and Lewis structure.<br>**First Midterm Exam** | **5** | **3** | |
| | -Density of water. | | | **2** |
| **Five** | -Molecular Geometry & Hybridization. | **5** | **3** | |
| | -Determination of gas law constant. | | | **2** |
| **Six** | -Molecular orbital theory. | **5** | **3** | |
| | -Determination of heat of combustion of an alcohol. | | | **2** |
| **Seven** | -Gases. | **5** | **3** | |
| | -Determination of the effect of concentration on the rate of the reaction. | | | **2** |
| **Eight** | **Second Midterm exam** | | | |
| **Nine** | -Solutions. | **5** | **3** | |

| | | | | |
|---|---|---|---|---|
| | -Molecular weight determination by elevation of the boiling point. | | | **2** |
| **Ten** | -Colligative properties. | **5** | **3** | |
| | -The mutual solubility of phenol and water. | | | **2** |
| **Eleven** | -Thermochemistry. | **5** | **3** | |
| | -Revision | | | **2** |
| **Twelve** | -Chemical equilibrium**.** | **5** | **3** | |
| | **-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.** Class activity.
   - **4.4.** Group Discussion
5. **Student Assessment Methods**
   - **5.1.** Written exams should assess knowledge and understanding as well as intellectual skills in addition to professional skills.
   - **5.2.** Practical exam to assess professional and practical skills.
   - **5.3.** Activity to assess the general and transferrable skills.
   - **5.4.** Semester Work (Participation) to assess all types of skills.

**Assessment Schedule**

Assessment 1 4th Week……...1st Mid-Term Exam
Assessment 2 8th Week …..….2nd Mid-Term Exam
Assessment 3 12th Week……..Practical Exam
Assessment 4 15/16th Week….Final Written Exam
Assessment 5 During the semester……Activity given to students
Assessment 6 During the semester……Semester Work (Participation)

**Weighting of Assessments**

1st Mid-Term Examination 5%

| | | |
|---|---|---|
| 2nd Mid-Term Examination | | 15% |
| Final-Term Examination | | 40% |
| Semester Work | | 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 (7th Edition), Prentice Hall, Upper Saddle River, NJ. (1996).

G. Svehla , Vogel's Qualitative Inorganic Analysis, Addison Wesley,Longman Ltd, 7th Edition, 1996

### 6.3. Recommended Books

Frank A. Settle, Handbook of Instrumental Techniques for Analytical Chemistry , Prentice Hall, Upper Saddle River, NJ. (1997).

Block, J.H. and Beale, J.M. Anti-infective agents in 'Wilson and Gisvold's: Textbook of organic medicinal and pharmaceutical chemistry". 11th ed. Lippincott Williams and Wilkins.(2002).

### 6.4. Periodicals, Websites, ……etc

http://www.wikipedia.org/

## 7. Facilities Required for Teaching and Learning

Classroom clickers (student response systems).

Computer equipped with projector

White board.

Different laboratory equipment (Electronic Balances, Water baths, Ovens…..etc).

**Course Coordinator** Prof. Dr.Mohammad Abdelkawy

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

**Department Approval Date: September 2014**

# Pharmaceutical Organic Chemistry 1 (PHC 111)

## A- Course Specifications

| | |
|---|---|
| **Program(s) on which the course is given:** | Bachelor of Pharmaceutical Sciences and Pharmaceutical Industries |
| **Department offering the program:** | All Departments |
| **Department offering the course:** | Department of Pharmaceutical |
| **Academic year:** | 2014-2015 |
| **Date of approval:** | September 2014 |

## B- Basic Information

**Title:** Pharmaceutical Organic Chemistry-1
**Code:** PHC111
**Prerequisite**: ----------

**Students' Level/ Semester:** First year/First semester

**Credit Hours:** 4 (3+1)
**Actual Teaching Hours per Week:**

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

## C- 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. Recall the basics of Aliphatic Organic Chemistry.

a2. Nominate the organic compounds using IUPAC.

**b- Intellectual skills**

b1. Solve simple organic problems.

b2. Convert one compound to the other.

b3. Predict the mechanism of certain organic reactions.

**c- Professional and practical skills**

c1. Handle chemicals safely and efficiently..

c2. Conduct standard pharmaceutical laboratory procedures and instrumentation.

c3. Identify some organic compounds from their physical and chemical properties.

c4. Validate the mechanisms of aliphatic organic reactions.

**d- General and transferable skills**

d1 . Work effectively in team.

d2. Assess problems relevant to aliphatic organic principles

d3. Communicate effectively with others.

d4. Assess critical thinking.

**3- Contents**

| Week | Topic | No. of hours | Lecture / Week | Practical |
|---|---|---|---|---|
| | INTRODUCTION (6 Hours) | | | |
| One | Chemical bonds and shapes of molecules<br>Polar and non polar molecules.<br>Types of reactions. | 3 | 3 | --- |
| | CLASSES OF ALIPHATIC COMPOUNDS (20 Hours)<br>The Study includes: Nomenclature, Synthesis, Physical Properties and Chemical Reactions of: | | | |
| Two | Alkanes | 5 | 3 | 2 |
| Three<br>Four | Alkenes and Polyenes<br>Alkynes + **Fifth week exam** | 5 | 3 | 2 |

| | | | | |
|---|---|---|---|---|
| Five | Alkyl Halides, Alcohols | 5 | 3 | 2 |
| Six | Ethers, Carbonyl Compounds | 5 | 3 | 2 |
| Seven | **Second Midterm exam** | 5 | 3 | 2 |
| Eight | Mid Term Exam | | | |
| Nine<br>Ten | Carbonyl Compounds | 5<br>5 | 3<br>3 | 2<br>2 |
| Eleven | Amines | 5 | 3 | 2 |
| Twelve<br>Thirteen | Carboxylic Acids and Dervatives<br>**Final Practical Exam** | 5<br>5 | 3<br>3 | 2<br>2 |
| Total no of hours | | 58 | 36 | 22 |
| Fourteen | Final Exams of Faculty | | | |
| Fifteen | | | | |
| Sixteen | | | | |

## 4– Teaching and learning methods

4.1- Lectures.

4.2- Practical Session.

## *5*- Student assessment methods

5.1- Written exam(s) to assess knowledge and understanding and intellectual skills.

5.2- Practical exam(s) to assess professional and practical skills.

5.3- Attendance and participation to assess al types of skills.

5.4- Oral exam to assess knowledge, understanding, intellectual and transferable skills.

***Assessment schedule***

| | | |
|---|---|---|
| Assessment 1 | First Midterm exam | Week 4 |
| Assessment 2 | Second Mid Term Exam | Week 8 |
| Assessment 3 | Practical exam | Week 13 |
| Assessment 4 | Final Written exam | Week 16 |
| Assessment 5 | Oral exam | Week 16 |
| Assessment 6 | Attendance & Participation | During the semester |

**Weighting of assessments**

| | |
|---|---|
| First Midterm Examination | 5% |
| Second Mid-Term Examination | 15 % |
| Final-term Examination | 30 % |
| Oral Examination. | 10 % |
| Practical Examination | 30 % |
| Attendance & Communication | 10 % |
| Total | 100% |

## 6- List of references

### 6.1- **Course notes**

Lecture and practical notes prepared by instructors

### 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).

### *7*- Facilities required for teaching and learning

Study halls, Laboratories, equipments, chemicals, glasswares, books, audio-visual tools.

**Course coordinator:**

Prof Dr. Mona Mounir

**Head of Department:** Prof. Dr. Ramzia el-Bagary

**Department Approval Date: September 2014**

# Pharmaceutical Organic Chemistry-2 (PHC 112)

## Course Specifications

| | |
|---|---|
| **Program(s) on which the course is given:** | Bachelor of Pharmaceutical Sciences and Pharmaceutical Industries |
| **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 112**
**Prerequisite: Pharmaceutical Organic Chemistry-1 PHC 111**
**Students' Level/Semester:** First Year – second Semester
**Credit Hours: 4 (3+1)** **Lecture: 3hrs/week**
**Tutorial: N/A** **Practical: 2hrs/week** **Total: 5hrs**

## B- Professional Information

### 1 – Overall Aims of Course

The course aims to cover the basic knowledge of aromatic organic chemistry.

It ensures that the students has and understand the skills to apply the basic chemistry of aromatic organic compounds.

The course also aims at giving students detailed knowledge about the synthesis - in particularly – the green synthesis of aromatic compounds and heterocycles.

### 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. Mention the names of different aromatic compounds.

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

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

a5. Illustrate the physical properties of certain aromatic compounds.

a6. Mention the chemical properties of studied classes of compounds.

**b- Intellectual Skills:**

b1. Solve organic problems.

b2. Identify aromatic compounds.

b3. Identify the mechanism of chemical reactions of aromatic and Hetero aromatic organic compounds.

b4. Predict the functional groups of different aromatic classes and determine the chemical reactions of each.

b5. Suggest the synthetic pathways to convert some compounds to the other.

**c- Professional and Practical Skills: The course enables the student to:**

c1. Handle properly organic compounds and chemicals.

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

c3. Convert some aromatic organic compounds to another.

C4. Synthesize aromatic organic compounds.

**d- General and Transferable Skills**

d1. Demonstrate written communication skills.

d2 . Demonstrate oral communication skills.

d3. Collaborate in groups to solve organic problems.

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**3. Contents**

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

| | | | | |
|---|---|---|---|---|
| **Three** | - **Orientation**<br>-Ortho- Para- Directing groups & Meta- Directing groups. | **5** | **3** | |
| | - Identification of bezoic acid & salicylic acid<br>-preparation of aspirin | | | **2** |
| **Four** | **- Alkylbenzenes** | **5** | **3** | |
| | - Identification of benzene, toluene and naphthalene<br>- preparation of naphthalene picrate<br>**1st Midterm Exam** | | | **2** |
| **Five** | **-Aryl and aralkyl Halides** | **5** | **3** | |
| | - Identification of methyl salicylate & aspirin<br>- hydrolysis of ester | | | **2** |
| **Six** | **-Aromatic nitro compounds**<br>**- aryl amines (basicity & preparation)** | **5** | **3** | |
| | - Identification of aniline, aniline HCl and p-toludine | | | **2** |
| **Seven** | **-Aryl amines (reactions)**<br>**-Aryl Diazonium salts** | **5** | **3** | |
| | - Preparation of benylidene aniline<br>- Revision 1 | | | **2** |
| **Eight** | **2nd Midterm Exam** | | | |
| | | | | |
| **Nine** | **- Phenols** | **5** | **3** | |
| | Revision 2 | | | **2** |
| **Ten** | **-Aromatic Carbonyl Compounds (Aldehydes and Ketones)**. Nomenclature, preparation | **5** | **3** | |
| | **Practical exam & Quiz.** | | | **2** |
| **Eleven** | **-Aromatic Carbonyl Compounds (Aldehydes and Ketones)**. Reactions | **5** | **3** | |
| | **Practical exam & Quiz** | | | **2** |

| | | | | |
|---|---|---|---|---|
| **Twelve** | **-Aromatic Carboxylic Acids and Derivatives** | **3** | **3** | |
| **Thirteen** | **Revision** | **3** | **3** | |
| **Total no. of hours** | | **56** | **36** | **20** |
| **Fourteen** | **-University Elective Final Exams** | | | |
| **Fifteen** | **Final Exams of Faculty** | **2** | | |
| **Sixteen** | | | | |

## 4. Teaching and Learning Methods

- **4.1.** Lectures.
- **4.2.** Practical.
- **4.3.** Group Discussion
- **4.4.** Modified Lecture (Students' Response System through Clickers).
- **4.5.** Data Analysis.

## 5. Student Assessment Methods

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- **5.1.** Written to assess knowledge and understanding as well as intellectual skills.
- **5.2.** Practical to assess professional and practical skills.
- **5.3.** Quiz to assess knowledge and understanding of the practical part, intellectual skills as well as professional and practical skills
- **5.4.** Oral exam to assess all skills including transferable skills.
- **5.5.** Semester work (Lab performance) to assess all types of skills.

**Assessment Schedule**

Assessment 1… Written Exam Week: (4, 8, 15/16)
Assessment 2 … Practical Exam Week: (10-11)
Assessment 3… Quiz Week: (10-11)
Assessment 4….Semester Work (Lab performance) Each lab
Assessment 5….Oral exam Week (15/16)

**Weighting of Assessments**

| | |
|---|---|
| 1st Mid-Term Examination | 5 % |
| 2nd Mid-Term Examination | 15 % |
| Final-Term Examination | 30 % |
| Oral Examination | 10 % |
| Semester Work (lab performance) | 10 % |
| Practical | 30 % |

| | |
|---|---|
| Practical Examination | 25 % |
| Quiz | 5 % |
| **Total** | 100 **%** |

## 6- List of references

6.1- **Course notes**
Lecture and practical notes prepared by instructors

6.2- **Essential books** (text books)
- Organic Chemistry, Francis A. Carey, Robert M. Guiliano, 8th edition, MgGraw-Hill (2011).

6.3- **Recommended books**

- Morrison, R. T.; Boyde, R. N. " Organic Chemistry",6th edition, Prentice Hall of India (1996).
- Solomons & Fryhle Organic Chemistry, Wiley International/ 11th Edition (2014).

## 7- Facilities required for teaching and learning

Study halls, Laboratories, equipments, chemicals, glasswares, books, audio-visual tools, computer lab.

**Course coordinator:**

**Prof. Dr. Khairia M. Youssef**

**Head of Department:**

**Professor Dr. Ramzia El-Bagry**

**Department Approval Date: September 2014**

# Analytical Chemistry-I (PHC 121)

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|---|---|
| **Program (s) on which the course is given:** | Bachelor of Pharmaceutical Sciences and Pharmaceutical Industries |
| **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 121

**Prerequisites:** None

**Students' Level/Semester:** First Year – second 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

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. Illustrate how to analyze qualitatively chemical substance through identification of its acid radical (anion) and its basic radical (cation).

a4. Identify anions and cations in their mixtures.

a5. Describe how to analyze quantitatively chemical substances through gravimetric analysis.

**b- Intellectual Skills:**

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

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

b3. Recognize suitable methods for gravimetric determination of inorganic compounds

**c- Professional and Practical Skills:**

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

c2. Design certain schemes for the analysis of cations and anions.

c3. Applying gravimetric analysis through precipitation of cation or anion in pure form.

**d- General and Transferable Skills:**

d1. Suggest methods of analysis of different mixtures concerning the topics of the course in a systematic way.

d2. Interact efficiently with others.

d3. Work effectively in a team.

**3. Contents**

| Teaching Week | Topic | No. of hours | Lecture | Practical |
|---|---|---|---|---|
| **One** | - Introduction. | **5** | **3** | |
| | - Carbonate and Bicarbonate | | | **2** |
| **Two** | - Introduction. | **5** | **3** | |
| | - Sulphur group (Sulphide,Sulphite Thiosulphate and Sulphate) | | | **2** |
| **Three** | -Carbonate group.<br>-Sulphur group | **5** | **3** | |
| | - Halides (Cl-, Br- and I-) Nitrate and Nitrite. | | | **2** |
| **Four** | -Halides group.<br>-Cyanogen group | **5** | **3** | |
| | Cyanogen group (CNS-, Ferrocyanide and Ferricyanide) ($PO_4^{3-}$, $AsO_4^{3-}$ and $AsO_3^{3-}$) + **First** | | | **2** |

| | | | | |
|---|---|---|---|---|
| | **Midterm Exam.** | | | |
| **Five** | -Phosphate group.<br>-Nitrogen containing anion group | **5** | **3** | |
| | - Revision | | | **2** |
| **Six** | -Group-I cations.<br>-Group-II cations | **5** | **3** | |
| | -First practical exam. | | | **2** |
| **Seven** | -Group-III cations.<br>-Group-IV cations. | **5** | **3** | |
| | - Cations : Group I | | | **2** |
| **Eight** | **Second Midterm Exam** | | | |
| | | | | |
| **Nine** | - Group -V cations | **5** | **3** | |
| | -Group II | | | **2** |
| **Ten** | Group-VI cations. | **5** | **3** | |
| | -Group III and IV | | | **2** |
| **Eleven** | - Gravimetric analysis. | **5** | **3** | |
| | -Revision | | | **2** |
| **Twelve** | - Gravimetric analysis. | **5** | **3** | |
| | **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.
**4.3.** Group Discussion
**4.4.** Data Analysis.

## 5. Student Assessment Methods

**5.1.** Discussions to assess knowledge and understanding.

**5.2.** Written Exam to assess knowledge and understanding as well as intellectual skills.

**5.3.** Practical Exam to assess professional and practical skills.

**5.4.** Quiz to assess knowledge and understanding of the practical part, intellectual skills as well as professional and practical skills

**5.5.** Oral exam to assess all skills including transferable skills.

**5.6.** Semester work (Lab performance) to assess all types of 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…Semester Work (Lab performance) Each lab

Assessment 5…Oral Exam Week (15/16)

### Weighting of Assessments

| | | |
|---|---|---|
| 1st Mid-Term Examination | | 5 % |
| 2nd Mid-Term Examination | | 15 % |
| Final-Term Examination | | 30 % |
| Oral Examination | | 10 % |
| Semester Work(lab performance) | | 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, 7th Edition, 1996

### 6.3. Recommended Books


- Frank A.settle, Handbook of instrumental techniques for Analytical Chemistry, Prentice hall, Upper Saddle River, NJ. (1997).

- Block, J.H. and Beale, J.M. Anti-infective agents in 'Wilson and Gisvold's: Textbook of organic medicinal and pharmaceutical chemistry". 11th ed. Lippincott Williams and Wilkins. (2002).


### 6.4. Periodicals, Websites, ……etc

http://www.wikipedia.org/

## 7. Facilities Required for Teaching and Learning

- Computer equipped with projector
- White board.
- Different laboratory equipment (viscometer, stalagmometer, pycnometer, water bathes and glass ware …..etc).

**Course Coordinator:** Prof. Dr.Mohammad Abdelkawy

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

**Department Approval Date: September 2014**

# Pharmaceutical Organic Chemistry-III (PHC213)

## Course Specifications

**Program(s) on which the course is given:** Bachelor of Pharmaceutical sciences and Pharmaceutical Industries

**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-III **Code: PHC 213**

**Prerequisites:** Pharmaceutical Organic Chemistry-2 PHC 112
**Students' Level/ Semester:** Second Level/ Third 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

Upon successful completion of this course the students can differentiate most of the heterocyclic organic compounds and acquire basic knowledge of Stereochemistry.

The course ensures that the student has and understand the skills to identify the spatial (three-dimensional) structure of organic compounds.

The course also aims at giving students detailed knowledge about the reactions of Heterocyclic and Stereochemical compounds.

The course also aims at giving students detailed knowledge about the reactions of stereochemical compounds with biological receptors.

The course also aims to allow students to build up stereochemical compounds using stereochemical models.

### 2 – Intended Learning Outcomes of Course (ILOs)

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

**a- Knowledge and Understanding:**

a1. Outline the mechanism of some heteroaromatic organic reactions.

a2. Define the way of writing the nomenclature of heteroaromatic compounds.

a3. Mention the spatial 3 dimensional arrangement of organic compounds.

a4. Describe different types of isomerism.

a5. Describe different types of isomerism interconversion mechanisms.

a6. Describe different types of isomerism reaction mechanisms.

a7. Outline the chemistry of heterocyclic compounds.

a8. Enumerate the reactions of some selected classes of heterocycle drugs.

a9. Define the concepts of isomerism and stereochemical compounds.

a10. Illustrate the mechanism of reactions of stereochemical compounds.

a11. Outline the chemical reactions of stereochemical compounds.

**b-Intellectual Skills:**

b1. Solve organic chemistry problems of heterocyclic chemistry .
b2. Convert one compound to the other.
B3.Apply the basics of stereochemistry.
b4. Solve stereochemical problems.
b5. Predict stereochemistry of compounds.
b6. Suggest synthesis and mechanism of stereochemical reactions of organic compounds.
b7. Select the suitable method for synthesis of certain heterocyclic drugs.

**c-Professional and Practical Skills: The course enables the student to:**

c1. Handle safely pharmaceutical materials and chemicals.
c2. Conduct standard pharmaceutical laboratory procedures and instrumentation.
c3. Identify organic compounds from the physical and chemical properties.
c4. Draw chemical structures using chemsketch software.
c5. Build up stereochemical compounds using stereochemical models.
c6. Prepare heteroaromatic compounds.
c7**.** Use the tools for separation of stereochemical isomers and racemic resolution.
c8.Synthesize some selected classes of heterocycle drugs.
c9. Synthesize stereochemical compounds.

**d- General and Transferable Skills**

d1- Practice written communication skills.
d2- Practice oral communication skills.
d3- Collaborate actively in groups to solve problems related to Organic Chemistry.

## 3. Contents

| Teaching Week | Topic | No. of hours | Lecture | Practical |
|---|---|---|---|---|
| **One** | **-1- Constitutional Isomerim** | **5** | **3** | |
| | Preparation of benzylidene Aniline | | | **2** |
| **Two** | **2- Stereoisomerism**<br>**a. Conformational Isomerism** | **5** | **3** | |
| | Preparation of Acetanilide | | | **2** |
| **Three** | **b-Geometrical Isomerism**<br>. | **5** | **3** | |
| | - Preparation of dibenzalacetone | | | **2** |
| **Four** | **c- Optical Isomerism** | **5** | **3** | |
| | Preparation of Benzanilide<br><br>**1st Midterm Exam** | | | **2** |
| **Five** | **3- Stereochemical Reactions** | **5** | **3** | |
| | - Preparation of Naphthalene Picrate | | | **2** |
| **Six** | **4- Chiral Molecules that not possess chiral carbon**<br>**Drug-Receptor Interaction** | **5** | **3** | |
| | Preparation of Aspirin | | | **2** |
| **Seven** | **5-Heterocyclic Compounds**<br>**1. Nomenclature** | **5** | **3** | |
| | - Preparation of EthylAcetate | | | **2** |
| **Eight** | **2nd Midterm Exam** | | | |
| | | | | |
| **Nine** | **6-Chemistry of five-member heterocycles** | **5** | **3** | |
| | Hydrolysis of Methylsalicylate | | | **2** |
| **Ten** | **7-Benzo derivatives of pyrrole, furan and thiophene** | **5** | **3** | |

| | | | | |
|---|---|---|---|---|
| | | | | |
| | **Practical exam & Quiz.** | | | **2** |
| **Eleven** | **8- Chemistry of six-member heterocyclic rings (pyridine)** | **5** | **3** | |
| | **Practical exam & Quiz** | | | **2** |
| **Twelve** | **9-Benzo-derivatives of pyridines (Quinoline & Isoquinoline & Acridine** | **3** | **3** | |
| | | | | |
| **Thirteen** | **Revision** | **3** | **3** | |
| **Total no. of hours** | | **56** | **36** | **20** |
| **Fourteen** | **University Elective Final Exams** | | | |
| | | | | |
| **Fifteen** | **Final Exams of Faculty** | **2** | | |
| **Sixteen** | | | | |

## 4. Teaching and Learning Methods

- **4.1.** Lectures.
- **4.2.** Practical.
- **4.3.** Group Discussion
- **4.4.** Modified Lecture (Students' Response System through Clickers).
- **4.5.** Data Analysis.

## 5. Student Assessment Methods

- **5.1.** Discussions to assess knowledge and understanding.
- **5.2.** Written to assess knowledge and understanding as well as intellectual skills.
- **5.3.** Practical to assess professional and practical skills.
- **5.4.** Quiz to assess knowledge and understanding of the practical part, intellectual skills as well as professional and practical skills
- **5.5.** Oral exam to assess all skills including transferable skills
- **5.6.** Semester Work (Lab performance) to assess all types of skills..

**Assessment Schedule**

Assessment 1… Written Exam Week: (4, 8, 15/16)
Assessment 2 … Practical Exam Week: (10-11)
Assessment 3… Quiz Week: (10-11)
Assessment 4….Semester Work (Lab performance) Each lab
Assessment 5…Oral Exam Week (15/16)

**Weighting of Assessments**

| | |
|---|---|
| 1st Mid-Term Examination | 5 % |
| 2nd Mid-Term Examination | 15 % |
| Final-Term Examination | 30 % |
| Oral Examination | 10 % |
| Semester Work (lab performance) | 10 % |
| Practical | 30 % |
| -Practical Examination | 25 % |
| -Quiz | 5 % |
| **Total** | 100 **%** |

## 6- List of references

### 6.1- Course notes

Lecture and practical notes prepared by instructors

### 6.2- Essential books (text books)

- 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).

## 7- Facilities required for teaching and learning

Study halls, Laboratories, equipments, chemicals, glasswares, books, audio-visual tools, computer lab.

**Course Coordinator:**

Professor Dr. Khairia M. Youssef

**Head of Department:**

Professor Dr. Ramzia El-Bagry

**Department Approval Date: September 2014**

FUTURE UNIVERSITY IN EGYPT
FACULTY OF PHARMACEUTICAL SCIENCES AND PHARMACEUTICAL INDUSTRIES

**Course Specifications**

# Pharmaceutical Analytical Chemistry II (PHC 222)

| | |
|---|---|
| **Program (s) on which the course is given:** | Bachelor of Pharmaceutical Sciences and Pharmaceutical Industries |
| **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 II** **Course Code: PHC 222**

**Prerequisites:** Analytical Chemistry 1 (PHC 121)

**Students' Level/Semester:** **Second Level/ Third 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 a quantitative sense in chemical analysis as well as a deep knowledge of acid –base (aqueous & non- aqueous) titrations, precipitemetry and redox titration.

### 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**. Recongize theories of Acid & Base.

**a4.** Calculate PH of acids , bases , salts and buffer.

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

**a6**. Identify biphasic titration and formal titration.

**a7**. Classify types of solvent in non-aqueous titration.

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

**a9.** State types of indicators that can be used in (acid-base titration, , Redox Reaction).

**a10**.Illustrate types of titration ( Direct titration,Back titration,Replacment titration)

**a11**. Differentiate between different methods of preceptimetric reactions ( Lebig's – Denig's – Mohr's – Volhared – Fajans).

**a15.** Illustrate how to use Redox reaction for analysis of oxidizing and reducing substance.

**a16.** Calculate the equivalent weight in Redox by different methods.

**a17.** State Nernest equation and factors affecting oxidation potential.

**b- Intellectual Skills:**

**b1**.Differantiate between accurate and rough measures correctly.

**b2.** Categorize compounds according to their acidic/basic nature in aqueous and nonaqueous medium.

**b3.** Select methods to determine quantatively compounds forming precipitate(s).

**b4**. Choose methods to determine oxidants and reductants compounds.

**b5**. Suggest the suitable analytical methods for different classes of pharmaceutical compounds.

**b6**. Apply methods of analysis for individual compounds or their mixtures create new methods for analysis of mixtures of different substance.

**c- Professional and Practical Skills:**

**c1**. Prepare different standard solutions**.**

**c2**. Standardize standard solution by direct or indirect methods

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

**c4.** Apply the suitable analytical method based on the knowledge and skills acquired.

**d- General and Transferable Skills:**

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

**d2.** Work with minimal guidance using full range of resources.

**d3.** Work in group**.**

**d4.** Demonstrate oral and written communication skills.

## 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 | First Midterm Exam | 2 | - | |
| | determination of mixture of $Na_2CO_3$ / $NaHCO_3$ | | | 2 |
| Five | Acid –base (non aqueous titration) | 5 | 3 | |
| | Revision Acid base titration | | | 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 | REDOX titration and Acid base titration | 5 | 3 | |
| | Revision | | | 2 |

| | | | | |
|---|---|---|---|---|
| **Eleven** | **Redox Titration** | **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 of Faculty** | | | |
| **Sixteen** | | | | |

## 4. Teaching and Learning Methods

**4.1.** Lectures.
**4.2.** Library search on certain points related to the course topics.
**4.3**. Discussions on lecture subjects.
**4.4.** Academic office hour(s) for possible misunderstanding and further questions.
**4.5.** Activities.

## 5. Student Assessment Methods

**5.1**. Practical exam to assess practical skills.
**5.2**. Written exam to assess the overall learning outcome.
**5.3.** Oral exam to assess all types of skills and mainly general and transferrable skills
5.4. Activity to assess general and transferrable skills.
5.5. Semester work (Participation) to assess all types of skills.

**Assessment Schedule**

Assessment 1 practical exam 1 Week 6
Assessment 2 practical exam 2 Week 11
Assessment 3 Written exams Weeks (4, 8, 15/16)
Assessment 4 Oral exam Week (15/16).

**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 **5** % | | |
| Semester Work | **10** | % |
| **Total** | **100** | **%** |

## 6. List of References

### 6.1. Course Notes

Notes on analytical chemistry for 1st – year pharmacy student (by staff of Anal. Chem., Faculty of Pharmacy- Future University

### 6.2. Essential Books (Text Books)

J. Mendham, R.C. Denney, J. D. Barnes & M.J.K. Thomas, Vogel's Quantitative Chemical Analysis (7th Edition), Prentice Hall, Upper Saddle River, NJ. (1996).

### 6.3. Recommended Books

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

### 6.4. Periodicals, Websites

analytical chemistry, anal. Chem.Acta, pharm.biomed.anal.,analyst., off. anal.chem., pharm.abstracts, chem. abstracts, sciencedirect.com,pubmed.com……etc.

## 7. Facilities Required for Teaching and Learning

**7.1.** Projectors.
**7.2.** Computer aided with data show**.**
**7.3.** Smart Boards**.**
**7.4.** Laboratory equipment's (electronic balances, chemicals and glass wares).

**Course Coordinator: Prof. Dr. Amr Badawey**

**Head of Department**
**Prof. Dr. Ramzia Elbagary**

**Department Approval Date: September 2014**

FUTURE UNIVERSITY IN EGYPT
FACULTY OF PHARMACEUTICAL SCIENCES AND PHARMACEUTICAL INDUSTRIES

**Course Specifications**

# Spectrometric Identification of Pharmaceutical Compounds (PHC 214)

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

## A. Basic Information

**Course Title: Spectrometric Identification of Pharmaceutical Compounds**
**Course Code: PHC 214**
**Prerequisites: PHC 213**
**Students' Level/Semester:** Level Two/ Fourth Semester
**Credit hours:** **2**
**Actual teaching hours per week:**
**Lectures:** 2/week **Practical:** N/A
**Tutorial:** Twice/semester **(within lectures)** **Total:** 2/week

## B. Professional Information

1. **Overall Aim of Course**

   By the end of the course, the student will be capable of independently using the different spectroscopic methods to elucidate the structures of Pharmaceutical Organic compounds and solve the spectroscopic problems related to them.

2. **Intended Learning Outcomes (ILOs)**

   **By the end of the course, the student should 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. Recognize the spectroscopic tools used to identify different structures of Pharmaceutical Organic Compounds.

   **b- Intellectual Skills:**

   b1. Apply critical thinking to make proper decisions.

b2. Apply theoretical concepts of spectroscopic tools on different Pharmaceutical Compounds.
b3. Solve spectroscopic problems of Pharmaceutical Organic Compounds using spectroscopic techniques.
b4. Analyze spectroscopic data to identify different Pharmaceutical Organic Compounds.

**c- Professional and Practical Skills:**

c1. Use variety of spectroscopic concepts.
c2. Interpret spectroscopic data of Pharmaceutical Organic Compounds.
c3. Predict the structure of unknown Pharmaceutical Organic molecules.

**d- General and Transferable Skills:**

d1. Argue about problems relevant to structure elucidation of Pharmaceutical Organic Compounds.
d2. Communicate effectively with others.

## 3. Contents

| Teaching Weeks | Topic | No. of hours | Hrs. of Lecture / Week |
|---|---|---|---|
| One | Introduction | 2 | 2 |
| Two | Ultra Violet (UV) | 2 | 2 |
| Three | Ultra Violet (UV) (Cont.) | 2 | 2 |
| Four | Infra Red (IR) + **First Midterm Exam** | 2 | 2 |
| Five | Infra Red (IR) (Cont.) | 2 | 2 |
| Six | Infra Red (IR) (Cont.) + Tutorial | 2 | 2 |
| Seven | 1H NMR<br>Mass | 2 | 2 |
| Eight | **Second Midterm Exam** | -- | -- |
| Nine | 1H NMR | 2 | 2 |
| Ten | 1H NMR (Cont.)+ 13C NMR | 2 | 2 |

| | | | |
|---|---|---|---|
| Eleven | 13C NMR + Mass Spectroscopy | 2 | 2 |
| Twelve | Mass Spectroscopy (Cont.) | 2 | 2 |
| Thirteen | Tutorial | 2 | 2 |
| Total No. of hours | | 24 | 24 |
| Fourteen | Final Written Exams | | |
| Fifteen | | | |
| Sixteen | | | |

## 4. Teaching and Learning Methods

**4.1.** Interactive Lectures

**4.2.** Exercises and Assignment.

**4.3.** Tutorials and Interactive discussions.

## 5. Student Assessment Methods

**5.1.** Semester Work (assignments and tutorials) to assess professional and intellectual skills.

**5.2.** Written exams to assess understanding and knowledge as well as intellectual skills.

**5.3.** 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 Semester Work (Assignments + Tutorials) During the semester

Assessment 4 Final Written Exam Week 15/16

Assessment 5 Oral Written Exam Week 15/16

**Weighting of Assessments**

| | |
|---|---|
| First Midterm Exam | 10% |
| Second Mid-Term Examination | 30% |
| Final-Term Examination | 40% |
| Oral Examination | 10% |
| Semester Work (Assig. + Tutorial) | 10% |
| **Total** | **100%** |

## 6. List of References

### 6.1. Course Notes

Lecture notes prepared by instructors.

### 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).

### 6.3. Periodicals, Websites, ……etc

www.Wikipedia.com

## 7. Facilities Required for Teaching and Learning

- Study halls.
- Audio-visual tools (Data show, electronic board).
- Books

**Course Coordinator**

**Prof. Dr. Manal Kandeel**

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

**Department Approval Date: September 2014**

# Applied Analytical Chemistry (PHC 223)

**Program (s) on which the course is given:** Bachelor of Pharmaceutical Sciences and Pharmaceutical Industries
**Department offering the program:** All Faculty Departments
**Department offering the course:** Pharmaceutical Chemistry Department

**Academic year:** 2014/2015
**Approval Date:** September 2014

## A. Basic Information

**Course Title:** Applied Analytical Chemistry **Course Code:** PHC 223
**Prerequisites:** Pharmaceutical Analytical Chemistry (1) PHC 121
**Students' Level/Semester:** Second Level / Fourth Semester
**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 Course

This course aims to provide the student with good knowledge to professionally and independently analyze water by different methods of qualitative and quantitative analysis .

### 2. Intended Learning Outcomes (ILOs)

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

**a- Knowledge and Understanding:**

a1. Define the basics of complexometric titration.
a2. Outline the physical examination of water
a3. Identify the different resources of water.
a4. Illustrate the different analytical procedures.
a5. Recognize the qualitative and quantitative analysis for chemical examination of water

**b- Intellectual Skills:**

b1. Analyze different metals in water.
b2. Predict the results.
b3. Apply the obtained data for determination of concentration of different substances in water

**c- Professional and Practical Skills:**

c1. Handle chemicals safely and efficiently.
c2. Dispose hazardous materials according to safety measures.
c3. Collect water samples.
c4. Analyze various water samples.
c5. Write a report for water analysis.
c6. Interpret the results of the water report.
c7. Implement different methods of analysis of water.
c8. Analyze different mixtures concerning the topics of the course in a systematic way.

**d- General and Transferable Skills:**

d1. Assess problems relate to presence of metals in water.
d2. Interact efficiently with others.
d3. Work effectively in a team.
d4. Apply safety measures in practice
d5. Manage time effectively.
d6. Improve decision making capabilities.

**3. Contents**

| Teaching Week | Topic | No. of hours | Lecture | Practical |
|---|---|---|---|---|
| **One** | **1-*Complexometry*** <br>• Theories of Acid –Base Titrations <br>• Type of Ligand | **3** | **1** | |
| | - Compexometric determination of copper. | | | **2** |
| **Two** | • Factors Affecting Stability of the Complex <br>• EDTA as titrant in complexometric titration <br>• Stability and stability constant of complex. | **3** | **2** | |
| | - Compexometric determination of Zinc. | | | **2** |
| **Three** | • Factors Affecting Stability | **3** | **1** | |

| | | | | |
|---|---|---|---|---|
| | of the Complex<br>• EDTA as titrant in complexometric titration<br>• Stability and stability constant of complex | | | |
| | -Complexometric determination of calcium | | | **2** |
| **Four** | **Applicaions**<br>• Direct Titration.<br>• Back titration 1. | **3** | **1** | |
| | - Complexometric determination of Aluminium.<br>**1st Midterm Exam** | | | **2** |
| **Five** | • Back titration 2.<br>• Replacement titration. | **3** | **1** | |
| | - Compleometric determination of Calcium and Magnesium mixtures. | | | **2** |
| **Six** | **-Cyanometry**<br>**-Mercurimetry** | **3** | **1** | |
| | -Determination of alkalinity in water. | | | **2** |
| **Seven** | 2-***Water Analysis***<br>**-Chemical Examination**<br>• Acidity<br>• Alkalinity<br>• $CL^-$<br>• Hardness | **3** | **1** | |
| | - Determination of acidity in water. | | | **2** |
| **Eight** | **Second Midterm Exam** | | | |
| **Nine** | **Pollution**<br>• Oxygen Absorbed<br>• Nitrite<br>• Nitrate<br>• Ammonia | **3** | **1** | |

| | | | | |
|---|---|---|---|---|
| | | | | |
| | -Determination of Iron in water | | | **2** |
| **Ten** | **Gases in Water**<br>• $H_2S$<br>• $Cl_2$<br>• $O_2$ dissolved | **3** | **1** | |
| | -Determination of Zinc in water | | | **2** |
| **Eleven** | **Metals in Water**<br>• Iron<br>• $Pb^{2+}$<br>• $Mn^{2+}$<br>• $Zn^{2+}$<br>• $Cu^{2+}$ | **3** | **1** | |
| | -Determination of copper and lead in water<br>-Practical Revision | | | **2** |
| **Twelve** | - Water treatment | **3** | **1** | |
| | **Practical Exam** | | | **2** |
| **Thirteen** | **Revision** | **1** | **1** | |
| **Total no. of hours** | | **34** | **12** | **22** |
| **Fourteen** | **University Elective Final Exams** | | | |
| | | | | |
| **Fifteen** | **Final Exams of Faculty** | | | |
| **Sixteen** | | | | |

## 4. Teaching and Learning Methods

**4.1.** Lectures.
**4.2.** Practical.
**4.3.** Group Discussion
**4.4.** Modified Lecture (Students' Response System through Clickers).
**4.5.** Data Analysis.

## 5. Student Assessment Methods

**5.1.** Discussions to assess knowledge and understanding.
**5.2.** Written to assess knowledge and understanding as well as intellectual skills.
**5.3.** Practical to assess professional and practical skills.

**5.4.** Quiz to assess knowledge and understanding of the practical part, intellectual skills as well as professional and practical skills
**5.5.** Oral exam to assess all skills including transferable skills.
**5.6.** Semester work (Lab performance) to assess all types of skills.

**Assessment Schedule**

| | |
|---|---|
| Assessment 1… Written Exam | Week: (4, 8, 15/16) |
| Assessment 2 … Practical Exam | Week: (12) |
| Assessment 3… Quiz | Week: (12) |
| Assessment 4…Semester Work (Lab performance) | Each lab |
| Assessment 5 Oral exam | Week (15/16) |

**Weighting of Assessments**

| | | |
|---|---|---|
| 1st Mid-Term Examination | | 5 % |
| 2nd Mid-Term Examination | | 15 % |
| Final-Term Examination | | 30 % |
| Oral Examination | | 10 % |
| Semester Work | | 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)

-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.

### 6.3. Recommended Books

-Frank A. Settle, Handbook of Instrumental Techniques for Analytical Chemistry, Prentice Hall, Upper Saddle River, NJ

### 6.4. Periodicals, Websites, ……etc

http://www.wikipedia.org/

## 7. Facilities Required for Teaching and Learning

- Classroom clickers (student response systems).
- Computer equipped with projector.
- White board.
- Different laboratory equipment.

**Course Coordinator:** Prof. Dr. Hayam Lotfy

**Head of Department:** Prof. Dr. Ramzeya El Bagary

**Department Approval Date: September 2014**

FUTURE UNIVERSITY IN EGYPT
FACULTY OF PHARMACEUTICAL SCIENCES AND PHARMACEUTICAL INDUSTRIES

**Course Specifications**

# Instrumental Analysis (PHC224)

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

## A. Basic Information

**Course Title:** Instrumental Analysis **Course Code:** PHC224

**Prerequisites:** ------

**Students' Level/Semester:** Second Level/ Fourth 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 the knowledge and skills needed to perform quantitative analysis of chemical substances through instrumental analysis. This would enable the student to work upon graduation in the different related fields of analysis and research (e.g.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, student should be able to:**

**a-Knowledge and Understanding**

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

a2. State the theories of instrumental methods of spectroscopic analysis (molecular emission (Flourimetry).

a3. Mention the theories of instrumental methods of spectroscopic analysis (Flame spectroscopy (atomic absorption)).

a4. Define the theories of instrumental methods of spectroscopic analysis (Flame spectroscopy(atomic emission)).

a5. Describe the theories of Electrochemistry (Potentiometry).

a6. Outline the theories of Electrochemistry(Conductometry).

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

**b- Intellectual Skills:**

b1. Select the suitable instrumental methods of analysis of the substance. to be

analysed ( Spectrophotometry Electrochemical, Potentiometry, Conductometry, and Polarography).

b2. Detect classes of pharmaceutical compounds.

**c-Professional and Practical Skills:**

c1. Use instruments in analytical laboratories.
c2. Judge the quality of analyzed sample.
c3. Write full report justifying his judgment.
c4. Dispose hazardous materials according to safety measures.

**d-General and Transferable Skills:**

d1.Apply safety measures in practice .
d2.Interpret different mixtures concerning the topics of the course in a systematic way.
d3.Interact efficiently with others.
d4.Work effectively in a team.
d5.Manage time effectively.
d6. Make appropriate decisions.
d7.Collect the gained experiences in certain pharmaceutical activities.
d8.Work with minimal guidance using full range of resources.
d9.Apply good oral and written communication skills.

## 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 + **First Midterm Exam** | 5 | 3 | |
| | Effect of PH on the absorption Spectrum of Methyl Red (MR). | | | 2 |
| **Five** | Fluorimetry | | 3 | |
| | Spectrophotomery Revision**.** | 5 | | 2 |
| **Six** | Fluorimetry | | 3 | |
| | First Practical Exam. | 5 | | 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 | | 3 | |
| | Chromatography | 5 | | 2 |
| **Twelve** | Chromatography | | 3 | |
| | **Final Practical Exam** | 5 | | 2 |
| **Thirteen** | Revision | | 3 | |
| | | 3 | | |
| **Total No. of hours** | | 58 | 36 | 22 |
| **Fourteen** | **Final Exams of Faculty** | | | |
| | | | | |
| **Fifteen** | | | | |
| **Sixteen** | | | | |

## 4-Teaching and Learning Methods

4.1. Lectures.
4.2.Practical sessions.
4.3.Group discussions

## 5-Student Assessment Methods

**5.1.** Practical exam to assess practical and professional skills.
**5.2.** Written exam to assess knowledge, comprehension and other intellectual skills.
**5.3.** Oral exam to assess all types of skills and mainly general and transferable skills.
**5.4.** Activities (Oral presentation & problem solving) to assess intellectual skills as well as general and transferrable skills.
**5.5.** Semester work (Participation) to assess all types of skills.

**Assessment Schedule**

| | | |
|---|---|---|
| Assessment 1 | Week 4 | first midterm exam. |
| Assessment 2 | Week 8 | Second midterm exam. |
| Assessment 3 | Week 12 | practical exam. |
| Assessment 4 | Week 15/16 | final written exam |
| Assessment 5 | Week 15/16 | Oral exam |
| Assessment 6 | During the semester | Activities (Oral presentation & problem solving) |
| Assessment 7 | During the semester | Semester work |

**Weighting of Assessments**

| | | |
|---|---|---|
| Mid-Term Examination | | 20% |
| Final-Term Examination | | 30% |
| Oral Examination | | 10% |
| Practical Examination | | 30% |
| - Practical Examination | 25% | |
| Activities (Oral presentation & problem solving) | 5% | |
| Semester 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 (7th Edition), Prentice Hall, Upper Saddle River, NJ, (1996**).**

**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).

**6.4.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

- Laboratory equipments (Centrifuges, balances, chemicals and ovens.
- Instruments: spectrophotometers, conductometers and pH meters.
- Classroom clickers (student response systems).
- Computer equipped with projector
- White board.

**Course Coordinator:** Prof.Dr.Mohammad Abdelkawy Mohammad.

**Head of Department:** Prof.Dr. Ramzia Ismaeel Elbagary

**Department Approval Date: September 2014**

FUTURE UNIVERSITY IN EGYPT
FACULTY OF PHARMACEUTICAL SCIENCES AND PHARMACEUTICAL INDUSTRIES

**Course Specifications**

# Pharmaceutical Chemistry I (PHC 331)

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

## A. Basic Information

**Course Title:** Pharmaceutical Chemistry I **Course Code: PHC 331**

**Prerequisites:** PHC 213: Pharmaceutical Organic Chem. 3

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

The course aim and intended learning outcomes is based on that mentioned in the programmed specifications, with more course-related specific details. By the end of the course, the student will:

### 1- Overall Aim of Course

a- Understand the biological response from the chemical structure of compounds.

b-Understand the mode of action in relation to the chemical structure of compounds affecting various receptors, enzymes and systems.

c- Understand the effect of modification of a compound structure on its physicochemical properties, biological response and formulation or administration.

d- Study the side effects , if any, from the chemical structure of compounds

e- Study methods for synthesis of drugs.

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

g- Study structure activity relationships.

h- Study the nomenclature of drugs.

i- Understand 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 this course, the student should be able to:**

**a- Knowledge and Understanding:**

a1. Identify the relationship of chemical structures and pharmacodynamics &, pharmacokinetic.

a2. Recognize the relationship of chemical structures and biological actions for antibiotics, sulfonamides, antifungal, antiviral…..etc.

a3. Recognize the methods of synthesis of drugs

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

a5. Identify the pharmacopoeial standards of the different methods of analysis of chemically active compounds.

a6. Recognize the nomenclature of antibiotics, sulfonamides, antifungal, antiviral…..etc.

a7. Define the modification of a compound structure to alter its physicochemical properties, which may affect its biological response and its formulation or administration.

a8. Recognize the main concepts of Medicinal Chemistry and their application in understanding diseases and drug actions.

**b- Intellectual Skills:**

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

b2. Discover lead compounds.

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

b4. Demonstrate knowledge and critical understanding of essential facts, concepts, principles and theories related to the subject areas identified under knowledge and understanding.

b5. Apply in practice setting the knowledge and understanding required to meet the needs of patients and other health care professional.

b6. Differentiate between different groups of drugs.

b7. Predict their biological response and medical use by referring to their chemical structures.

b8. Suggest the suitable route of administration of - different drugs according to their chemical features.

b9- Solve problems related to qualitative and quantitative information, extending to situations where evaluations have to be made on the basis of limited information.

b10. Calculate of concentration of drugs in pure and dosage forms.
b11. Interpret the effect of various functional groups on drug action.

b12. Relate the concepts of drug receptor interactions

b13. 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 . Apply the suitable analytical methodology for assay of an active ingredient in a bulk or a single component.

c4. Perform properly chemical reactions for identification of compounds.

c5. Prescribe OTC drugs suitable for the patient taking in consideration the medical history of the patient.

c6. Apply various synthetic and purification techniques in medicinal chemistry

**d-General and Transferable Skills**:

d1.Use variety of sources to obtain information.

d2. Apply his / her independent study skills needed for continuing professional development.

d3. Develop presentation skills.

d4. Apply an ethical attitude and approach.

d5. Manage time effectively.

d6. Solve problems in a systematic way and acquire group working behavior.

d7. Demonstrate critical thinking and decision making abilities

d8. Summarize the concepts of drug synthesis and drug actions, side effects, and toxicities.

d9. Explain the structure, and function of drugs on treating diseases from structural/functional anomalies.

d10. Value the metabolic pathways of drugs and its role in drug discovery

d11. Present pharmaceutical science materials and arguments clearly and correctly in writing and orally to both specialist and lay audience

## 3- Contents

| Week | Topic | No. of hours | Lecture | Practical |
|---|---|---|---|---|
| **One** | introduction for drug metabolism | **5** | **3** | |
| | Limit test for Chloride | | | **2** |
| **Two** | β-Lactam antibiotics | **5** | **3** | |
| | Limit test for Sulfate | | | **2** |
| **Three** | β-Lactam antibiotics<br>Non β-Lactam antibiotics. | **5** | **3** | |
| | Limit test for Iron | | | **2** |
| **Four** | Non β-Lactam antibiotics+ **First Midterm Exam** | **5** | **3** | |
| | Limit test for Lead<br>1st Mid-Term Examination | | | **2** |
| **Five** | Antiseptic and disinfectant agents. | **5** | **3** | |
| | Limit test for Heavy metals | | | **2** |
| **Six** | Sulphonamides. | **5** | **3** | |
| | Purity tests for pharmaceutical compounds | | | **2** |
| **Seven** | Antimalarial agents, Hormones. | **5** | **3** | |
| | Purity tests for pharmaceutical compounds | | | **2** |
| **Eight** | **2nd Midterm Exam** | | | |
| | | | | |
| **Nine** | Hormones, Antiprotozoal agents. Anthelmintic and antibilharzial agents | **5** | **3** | |
| | Assay of Hydrogen peroxide | | | **2** |
| **Ten** | Antifungal agents | **5** | **3** | |
| | Assay of tincture Iodi. | | | **2** |
| **Eleven** | Anti T.B and antileprotic agents. | **5** | **3** | |
| | Assay of Ampicillin | | | **2** |
| **Twelve** | Antiviral agents.. | **5** | **3** | |
| | Assay of Sutrim tablets | | | **2** |
| **Thirteen** | Antineoplastic drugs. | **5** | **3** | |
| | **Practical exam** | | | **2** |
| **Total no. of hours** | | **60** | **36** | **24** |
| **Fourteen** | **Final Exams of Faculty** | | | |
| **Fifteen** | | | | |
| **Sixteen** | | | | |

## 4- Teaching and Learning Methods

3.1. Lectures
3.2. Assignments
3.3. Practical Sessions
3.4. Demonstrations

## 5- Student Assessment Methods

5.1. Written Exams to assess Knowledge and understanding, intellectual and professional skills of student.

5.2. Practical Exams & Quiz to assess professional and practical skills,
5.3. Assignments to assess general and transferrable skills of student.
5.4. Oral exam assess Knowledge and understanding, intellectual and professional and general and transferrable skills of student
5.5. Semester 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 +Quiz | Week 13 |
| Assessment 4 | Final Written Exam | Week 15/16 |
| Assessment 5 | Oral Exam | Week 15/16 |
| Assessment 6 | Semester Work | During the semester |
| Assessment 7 | Assignments | During the semester |

**Weighting of Assessments**

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

## 6- List of References

### 6.1. Course Notes

Notes on pharmaceutical chemistry for 3rd pharmacy students, available in selling quarters.

**6.2. Essential Books (Text 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, 34th ed., by The Pharmaceutical Press, London (2005).
- 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., 2006.
- Williams, A; Lemke, L, Foy's Principles of Medicinal Chemistry; 6th ed., by Lippincott Williams & Wilkins (2008).
- Remington: The Science and Practice of Pharmacy.
- Other available medicinal chemistry books.

**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).
- - Donald, A. (Ed.), Burger's Medicinal Chemistry and Drug Discovery, 6th edn., John Wiley& Sons, Inc., Hoboken, New Jersy, volume 5: Chemotherpeutic agents (2003).
- - Kathleen Parfitt, Martindale: The complete drug reference, 34th ed., by The Pharmaceutical Press, London (2005).
- Williams, A; Lemke, L, Foy's Principles of Medicinal Chemistry; 6th ed., by Lippincott Williams & Wilkins (2008).
- Other available medicinal chemistry books.

6.4**. Periodicals, Web Sites, … etc**

www.Sciencedirect.com and www.pubmed.com , Journal of Medicinal Chemistry --- etc

**7. Facilities Required for Teaching and Learning**

Projectors, Data shows, Boards, Laboratories equipped by centrifuges, balances, pH meters, magnetic stirrer, hotplates, chemicals and glass ware.

**Course Coordinator: Prof. Dr. Ramzia El-Bagary**

**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**

# Pharmaceutical Chemistry-2 (PHC 432)

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

## A. Basic Information

**Course Title:** Pharmaceutical Chemistry-2 **Course Code: PHC 432**

**Prerequisites:** PHC 213 (Pharmaceutical Organic Chemistry 3)

**Students' Level/Semester:** **Fourth year/ 7th 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

The course aim and intended learning outcomes is based on that mentioned in the programmed specifications, with more course-related specific details

### 1. Overall Aim of Course

**By the end of the course, the student will:**

a- Understand the biological response from the chemical structure of compounds.
b-Understand the mode of action in relation to the chemical structure of compounds affecting various receptors, enzymes and systems.
c- Understand the effect of modification of a compound structure on its physicochemical properties, biological response and formulation or administration.
d- Study the side effects , if any, from the chemical structure of compounds
e- Study methods for synthesis of drugs.
f- Understand methods for analysis of drugs in pure and dosage forms.
g- Study structure activity relationships.
h- Study the nomenclature of drugs.
i- Understand 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 this course, the student should be able to:**

**a- Knowledge and Understanding:**

a1. Identify the relationship of chemical structures and pharmacodynamics &, pharmacokinetic.

a2. Recognize the relationship of chemical structures and biological actions for oral hypoglycemic, cardiovascular drugs, diuretics, anti-inflammatory, CNS acting drugs…..etc.

a3. Discuss the method of drugs synthesis

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

a5. Identify the pharmacopoeial standards of the different methods of analysis of chemically active compounds.

a6. Recognize the nomenclature of oral hypoglycemic, cardiovascular drugs, diuretics, anti-inflammatory, CNS acting drugs…..etc.

a7. Define the modification of a compound structure to alter its physicochemical properties, which may affect its biological response and its formulation or administration.

a8. Recognize the main concepts of Medicinal Chemistry and their application in understanding diseases and drug actions.

**b- Intellectual Skills:**

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

b2. Discover lead compounds.

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

b4. Demonstrate knowledge and critical understanding of essential facts, concepts, principles and theories related to the subject areas identified under knowledge and understanding.

b5. Apply in practice setting the knowledge and understanding required to meet the needs of patients and other health care professional.

b6. Differentiate between different groups of drugs.

b7. Predict their biological response and medical use by referring to their chemical structures.

b8. Suggest the suitable route of administration of - different drugs according to their chemical features.

b9. Solve problems related to qualitative and quantitative information, extending to situations where evaluations have to be made on the basis of limited information.

b10. Calculate of concentration of drugs in pure and dosage forms.

b11. Interpret the effect of various functional groups on drug action.

b12. Relate the concepts of drug receptor interactions

b13. 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 properly chemical reactions for identification of compounds.

c5. Prescribe OTC drugs suitable for the patient taking in consideration the medical history of the patient.

c6. Apply various synthetic and purification techniques in medicinal chemistry.

**d- General and Transferable Skills**:

d1.Use variety of sources to obtain information.

d2. Apply his / her independent study skills needed for continuing professional development.

d3. Develop presentation skills.

d4. Apply an ethical attitude and approach.

d5. Manage time effectively.

d6. Solve problems in a systematic way showing group working behavior.

d7. Demonstrate critical thinking and decision making abilities.

d8. Summarize the concepts of drug synthesis and drug actions, side effects, and toxicities.

d9. Explain the structure, and function of drugs on treating diseases from structural/functional anomalies.

d10. Value the metabolic pathways of drugs and its role in drug discovery

d11. Present pharmaceutical science materials and arguments clearly and correctly in writing and orally to both specialist and lay audience

### 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<br>**1st Mid-Term Examination** | | | **2** |
| **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 | | | **2** |
| **Ten** | CNS stimulants and Antidepressants Local anesthetic | **5** | **3** | |
| | Assay of sedative mixture | | | **2** |
| **Eleven** | CNS stimulants and Antidepressants | **5** | **3** | |
| | Assay of Oral rehydran | | | **2** |
| **Twelve** | Analgesics (NSAIDs & Opioids) | **5** | **3** | |
| | Assay of Aminophylline | | | **2** |
| **Thirteen** | Analgesics (NSAIDs & Opioids) Antihistamines | **5** | **3** | |
| | Final Practical Exam | | | **2** |
| **Total no. of hours** | | **60** | **36** | **24** |
| **Fourteen** | | | | |
| **Fifteen** | Final Exams of Faculty | | | |

| | |
|---|---|
| **Sixteen** | |

**4- Teaching and Learning Methods**

3.1. Lectures
3.2. Assignments
3.3. Practical Sessions
3.4. Demonstrations

**1- Student Assessment Methods**

5.1. Written Exams to assess Knowledge and understanding, intellectual and professional skills of student.

5.2. Practical Exams & Quiz to assess professional and practical skills,
5.3. Assignments to assess general and transferrable skills of student.
5.4. Oral exam assess Knowledge and understanding, intellectual and professional and general and transferrable skills of student
5.5. Semester 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 +Quiz | Week 13 |
| Assessment 4 | Final Written Exam | Week 15/16 |
| Assessment 5 | Oral Exam | Week 15/16 |
| Assessment 6 | Semester Work | During the semester |
| Assessment 7 | Assignments | During the semester |

**Weighting of Assessments**

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

## 6. List of References

### 6.1. Course Notes

i. Notes on pharmaceutical chemistry for 4th pharmacy students, available in selling quarters.

### 6.2.Essential Books (Text Books)

i. Williams, A; Lemke, L, Foy's Principles of Medicinal Chemistry; 6th ed., by Lippincott Williams & Wilkins (2008).

### 6.3. Recommended Books

i-Block, J; Beale, J, Wilson and Gisvold's "Textbook of Organic Medicinal and Pharmaceutical Chemistry", 12th ed., by Lippincott Williams & Wilkins (2011).

ii. Kathleen Parfitt, Martindale: The complete drug reference, 34th ed., by The Pharmaceutical Press, London (2005).

iii. Brunton, L; Lazo, S; Parker, L, Goodman and Gilman's "The Pharmacological Basis of Therapeutics", 11th ed., by McGraw-Hill (2006).

iv. Different pharmacopeias (British, Egyptian, European, USP).

v. The Merck Index, Merck and Co., INC, White house Station, 14th ed., 2006.

vi. Williams, A; Lemke, L, Foy's Principles of Medicinal Chemistry; 6th ed., by Lippincott Williams & Wilkins (2008).

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, 6th edn., John Wiley& Sons, Inc., Hoboken, New Jersy, volume 5: Chemotherpeutic agents (2003).

x. - Kathleen Parfitt, Martindale: The complete drug reference, 34th ed., by The Pharmaceutical Press, London (2005).

xi. Other available medicinal chemistry books.

### 6.4.Periodicals, Web Sites, … etc

www.Sciencedirect.com and www.pubmed.com , Journal of Medicinal Chemistry --- etc

## 7. Facilities Required for Teaching and Learning

Projectors, Data shows, Boards, Laboratories equipped by centrifuges, balances, pH meters, magnetic stirrer, hotplates, chemicals and glass ware.

**Course Coordinator: Prof. Dr. Ramzia El-Bagary**

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

**Department Approval Date: September 2014**

# Drug Design (PHC433)

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

## A. Basic Information

**Course Title: Drug Design** **Course Code: PHC 433**

**Prerequisites:** Pharmaceutical Chemistry (1) PHC 331

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

**Credit hours:** **2**

**Actual teaching hours per week:**

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

## A. Professional Information

### 1. Overall Aim of Course

The course comprises the physicochemical properties of drugs in relation to biological action, drug-receptor interactions, isosterism, drug metabolism, prodrug concept, and principles of drug design and drug development through Molecular Modeling aspects.

### 2. Intended Learning Outcomes (ILOs)

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

**a- Knowledge and Understanding:**

a1. Demonstrate the physicochemical properties of drugs

a2. Identify the structure characteristics and biological activity

a3. Define the metabolic changes of drugs

a4. Explain the concept of Drug Design and Drug Development

a5. Summarize the concepts of pharmacological activity, side effects, and toxicities.

**b- Intellectual Skills:**

b1. Conclude the main concepts of Medicinal Chemistry and their application in understanding drug actions and drug metabolism.

b2. Interpret the effect of various functional groups on drug action.

b3. Relate the concepts of drug receptor interactions

b4. Relate the concepts of Structure Activity Relationships and drug metabolic pathways.

**c- Professional and Practical Skills:**

c1. Use effectively the Docking techniques.

c2. Apply in practice gained knowledge about drug use and drug-drug interactions.

c3. Experiment molecular modeling programs.

**d- General and Transferable Skills:**

d1. Value the principles of Drug Design and Drug Development.

d2. Work effectively in team.

d3. Use variety of sources to retrieve information.

d4. Use properly and safety new tools and programs.

d5. Solve problems in a systemic way.

## 3. Contents

| Week | Topic | No. of hours | Lecture |
|---|---|---|---|
| **One** | **Physicochemical properties of drugs**<br>- Mechanism of drug absorption<br>- Physicochemical factors affecting drug absorption | 2 | 2 |
| **Two** | - Physicochemical factors affecting drug absorption<br>Effect of ionization and pH at absorption site. | 2 | 2 |
| **Three** | - Effect of drug lipid solubility at absorption site.<br>- Effect of substituent on dissociation constants and lipid solubility. | 2 | 2 |
| **Four** | - Effect of substituent on dissociation | 2 | 2 |

| | | | |
|---|---|---|---|
| | constants and lipid solubility. Hansh QSAR equation and its application + **First Midterm Exam** | | |
| **Five** | **Structure characteristics and biological activity**<br>- Drug-receptor interaction<br>▪ Receptors<br>Forces involved in the drug-receptor interaction | 2 | 2 |
| **Six** | - Stereochemical aspects of drugs<br>▪ Optical isomerism.<br>▪ Geometrical isomerism.<br>▪ Conformational isomerism.<br>Bioisosterism. | 2 | 2 |
| **Seven** | **Metabolic changes of drugs**<br>- Functionalization "Phase I"<br>▪ Oxidative reactions<br>- Reductive reactions Functionalization "Phase I"<br>▪ Reductive reactions<br>Hydrolytic reactions<br>▪ | 2 | 2 |
| **Eight** | **Second Midterm Exam** | | |
| **Nine** | - Conjugation "Phase II"<br>▪ Glucuronic acid conjugation.<br>▪ Sulfate conjugation. | 2 | 2 |
| **Ten** | Mid-Term Exam | | |
| **Eleven** | - Conjugation "Phase II"<br>▪ Sulfate conjugation.<br>▪ Glycine and glutamine conjugation.<br>. | 2 | 2 |
| **Twelve** | - Conjugation "Phase II"<br>.<br>▪ Glycine and glutamine conjugation.<br>▪ Glutathione or mercaptouric acid conjugation. | 2 | 2 |

| | | | |
|---|---|---|---|
| | | | |
| **Thirteen** | - Conjugation "Phase II"<br>▪ Glutathione or mercaptouric acid conjugation.<br>▪ Conjugation "Phase II" Acetylation and methylation | 2 | 2 |
| **Total no. of hours** | . | 24 | 24 |
| **Fourteen** | **Final Examination of Faculty** | | `` |
| **Fifteen** | | | ` |
| **Sixteen** | | | |

## 4. Teaching and Learning Methods

**4.1.** Lectures
**4.2.** Assignments
**4.3.** Demonstrations

## 5. Student Assessment Methods

**5.1.** Written Exams to assess knowledge and understanding, intellectual and professional skills of student.
**5.2.** Assignments to assess the general and transferable skills of student.
**5.3.** Oral exam to assess all types of skills and mainly general and transferrable skills.
**5.4.** Semester work (Participation) to assess all types of skills.

**Assessment Schedule**

| | | |
|---|---|---|
| Assessment 1 | First Mid-term Examination | Week four |
| Assessment 2 | Second Mid-term Examination | Week Eight |
| Assessment 3 | Final Examination | Week fifteen |
| Assessment 4 | Oral Examination | Week fifteen |
| Assessment 5 | Assignments | During the semester |
| Assessment 6 | Semester work (Participation) | During the semester |

**Weighting of Assessments**

| | |
|---|---|
| Mid-Term Examination | 30% |
| Final-Term Examination | 40% |
| Oral Examination | 10% |
| Semester Work (participation) | 10% |

| | |
|---|---|
| Assignments | 10% |
| **Total** | 100**%** |

## 6. List of References

### 6.1. Course Notes

Hand outs

### 6.2. Essential Books (Text Books)

R.B. Silvermann, The organic chemistry of drug design and drug action. Academic Press, London, 2014

### 6.3. Recommended Books

W.O. Foy, Williams, D.A. and Lemeke, T.L., Foye's Principle of Medicinal Chemistry, 7th Edition, Lippincott Williams & Wilkins, Media PA, USA, 2013.

### 6.1. Periodicals, Websites, ……etc

Available electronic web references

## 7. Facilities Required for Teaching and Learning

Computer
Smart Board
Data Show

**Course Coordinator: Prof. Dr. Ramzia Ismail Ibrahim El Bagary**
**Head of Department: Prof. Dr. Ramzia Ismail Ibrahim El Bagary**

**Department Approval Date: September 2014**

# Analysis of Foods and Cosmetics (PHC 626)

## Course Specifications

| | |
|---|---|
| **Program (s) on which the course is given:** | Bachelor of Pharmaceutical Sciences and Pharmaceutical Industries |
| **Department offering the program:** | All Faculty Departments |
| **Department offering the course:** | Pharmaceutical Chemistry department |
| **Academic year:** | 2014/2015 |
| **Approval Date:** | September 2014 |

## A.Basic Information

**Course Title:** Analysis of food & Cosmetics **Course Code:** PHC 626
**Prerequisites:** Instrumental Analysis PHC 224
**Students' Level/Semester:** Elective Course
**Credit Hours:** 2 hr.(1+1)
**Actual teaching hours per week:**
**Lecture**: 1 hr./week **Practical** 2 hrs/week **Total:** 3 hr./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 this course students should be able to:**

#### a- Knowledge and Understand:

a1.Recognise 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. Apply the basic knowledge gained in qualitative analysis.

b2. Apply the basic knowledge gained in quantitative analysis.

b3. Assess problems relevant to physical principles.

b4. Apply critical thinking in solving problems.

**c-Professional and Practical Skills:**

c1. Examine physical and chemical properties of oils, fats and milk.

c2. Analyze some cosmetic preparations.

c3. Dispose hazardous materials according to safety measures.

**d- General and Transferable Skills:**.

d1. Interact efficiently with others.

d2. Work effectively in a team.

d3. Apply safety measures in practice.

d4. Manage time effectively.

d5. Make appropriate decisions.

d6. Collect the gained experiences in certain pharmaceutical activities.

d7. Work with minimal guidance using full range of resources.

d8. 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<br>**+1st Mid term exam** | **3** | **1** | |
| | Saponification value | | | **2** |
| **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 of Faculty** | | | |
| **Sixteen** | | | | |

## 4. Teaching and Learning Methods

4.1. Lectures.
4.2. Practical training/laboratory.
4.3. Seminar/workshop.
4.4. Class activity

## 5. Student Assessment Methods

5.1. Practical exam to assess practical and professional skills.
5.2. Written exam to assess knowledge, comprehension and other intellectual skills.
5.3. Activities to assess general and transferrable skills.
5.4. Semester Work (Lab performance) to assess all types of skills.

**Assessment Schedule**

Assessment 1...Written Exam Week: (4, 8,15/16)
Assessment 2…Practical Exam Week: (12)
Assessment 3…Quiz Week: (12)
Assessment 4.. Semester work (Lab performance) Each lab
Assessment 5…Activities During the semester

**Weighting of Assessments**

| | | |
|---|---|---|
| 1st Mid-Term Examination | | 5% |
| 2nd Mid -Term Examination | | 15% |
| Final-Term Examination | | 40% |
| Semester Work | | 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 (7th Edition),, Prentice Hall, Upper Saddle River, NJ, (1996)

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**

- Classroom clickers (student response systems).
- Computer equipped with projector.
- White board.
- Different laboratory equipment.

**Course Coordinator: Prof. Dr. M.Abdelkawy Mohammed**

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

**Department Approval Date: September 2014**