**Model (No 12)**

**Course Specification : Medicinal Chemistry (3)**

**University :**Mansoura University

**Faculty :**Faculty of Pharmacy

**Department :**

## 1- Course data :-

| | | | | | | |
|---|---|---|---|---|---|---|
| **Code:** | PD513 | | | | | |
| **Course title:** | Medicinal Chemistry (3) | | | | | |
| **Level:** | Five | | | | | |
| **Program Title:** | • pharmaceutical sciences | | | | | |
| **Specialization:** | Major | | | | | |
| **Teaching Hours:** | **Theoretical:** | 2 | **Tutorial:** | | **Practical:** | 1 |

## 2- Course aims :-

1. Recognizing the relationships between the chemical structures of different chemotherapeutic drugs and biological activities.
2. Understand the different mode of action of different classes of chemotherapeutic agents.

## 3- Intended learning outcomes of course (ILO'S) :-

### a- Knowledge and understanding

1. [a4] Enumerate the theories of isolation, synthesis, purification, identification and standardization methods of chemicals, natural and pharmaceutical compounds; as well as the fundamentals of drug design and development.
    - a4.1-Outline the general synthetic pathways of different drug classes.
2. [a5] Identify the structure-activity relationship of group of pharmaceutical compounds.
    - a5.1-Realize how drug-receptor interactions occur based on the pharmacophoric group in each pharmacological class
3. [a14] Classify the pharmacological properties of drugs including mechanism of action, therapeutic uses, dosage, contraindications, adverse drug reactions and drug interactions.

- a14.1-List the various structural subclasses of chemotherapeutic drugs and identify the representative pharmacophore in each pharmacological class
- a14.2-Explain the molecular mechanisms of drug action.

**b- Intellectual skills**

1. [b5] Design appropriate methods for isolation, synthesis, purification, identification and standardization of various chemicals and pharmaceutical compounds.
   - b5.1-Predict pathways of metabolic degradation based on vulnerability of drug functional groups to metabolizing enzymes.
2. [b6] Apply the principles of bioinformatics and computer-aided tools and molecular modeling programs in the design of new molecular entities.
   - b6.1-Interpret the structural feature of a given drug in relation to affinity to a specific receptor.
3. [b16] Predict the physical and chemical properties and biological activity of natural and synthetic compounds based on molecular structure.
   - b16.1-Predict the major pharmacological action and therapeutic activity of a given drug based on the molecular structure.

**c- Professional and practical skills**

1. [c4] Apply appropriate methods for extraction, isolation, synthesis, purification, identification and standardization of active substances from different origins.
   - c4.1-Apply the given information to evaluate the activity of related compounds within a pharmaceutical class based on structural similarities and dissimilarities.
   - c4.2-Detect the possible side effects and toxicity to a given drug molecule based on its structural features.
   - c4.3-Analyze quantitatively drug concentration in pharmaceutical preparations.
2. [c17] Apply the concepts of pharmaceutical care in different pharmacy practice settings.
   - c17.1-Counsel the patients about proper use of antibiotics and prescribe therapeutic recommendations based on an understanding of drug chemistry'

**d- General and transferable skills**

1. [d3] Interact effectively in team working.
    - d3.1-Work effectively in a team.
2. [d4] Exploit calculations and statistical methods as well as information technology (IT) tools.
    - d4.1-Practice independent learning needed for continuous professional development.
3. [d8] Present information clearly in written, electronic and oral forms.
    - d8.1-Implement writing and presentation skills.
4. [d9] Promote critical thinking, problem-solving, decision-making, and time managing capabilities.
    - d9.1-Demonstrate creativity and time management abilities.

**4- Course contents :-**

| No | Topics | Week |
|---|---|---|
| 1 | Introduction to chemotherapy | 1 |
| 2 | Penicillins and Cephalosporins | 2-3 |
| 3 | Non-classical antibiotics | 4 |
| 4 | antineoplastic agents | 5 |
| 5 | Quinolones, , chloramphenicol, UTIs | 6 |
| 6 | Mid-term exam | 7 |
| 7 | Sulfonamides, antiprotozoal drugs, anthelmintics | 8-9 |
| 8 | Macrolides, aminoglycosides, lincomycins, tetracyclins | 10-13 |
| 9 | Practical course and case study | 1-12 |

**5- Teaching and learning methods :-**

| S | Method | Knowledge and understanding | Intellectual skills | Professional skills | General skills |
|---|---|---|---|---|---|
| 1 | Lectures using Data show, PowerPoint presentations | a4.1,a5.1,a14.1,a14.2 | b5.1,b6.1,b16.1 | c4.1,c4.2,c4.3 | d3.1 |
| 2 | Research assignments | a4.1,a5.1,a14.1,a14.2 | b5.1,b6.1,b16.1 | c4.1,c4.2,c4.3 | d4.1 |
| 3 | Use of computer software for drawing of chemical structures | a4.1,a5.1,a14.1,a14.2 | b5.1,b6.1,b16.1 | c17.1 | |
| 4 | Case study | a4.1,a5.1,a14.1,a14.2 | b5.1,b6.1,b16.1 | c4.1,c4.2,c4.3 | d3.1 |

**6- Teaching and learning methods of disables :-**

1. -

## 7- Student assessment :-

### a- Student assessment methods

| No | Assessment Method | Knowledge and understanding | Intellectual skills | Professional skills | General skills |
|---|---|---|---|---|---|
| 1 | Written exam | a4.1,a5.1,a14.1,a14.2 | b5.1,b6.1,b16.1 | | |
| 2 | Practical exam | | | c4.1,c4.2,c4.3,c17.1 | |
| 3 | Oral exam | | | | d8.1,d9.1 |
| 4 | Case study | a4.1,a5.1,a14.1,a14.2 | b5.1,b6.1,b16.1 | | |

### b- Assessment schedule

| No | Method | Week |
|---|---|---|
| 1 | Mid-term exam | 7 |
| 2 | Final written exam | 7 |
| 3 | Oral exam | 15 |
| 4 | Practical exam | 13 |

### c- Weighting of assessments

| No | Method | Weight |
|---|---|---|
| 1 | Mid_term examination | 10 |
| 2 | Final_term examination | 50 |
| 3 | Oral examination | 15 |
| 4 | Practical examination | 20 |
| 5 | Semester work | 5 |
| Total | | 100% |

## 8- List of references

| S | Item | Type |
|---|---|---|
| 1 | Practical course notes prepared by the department staff members | Course notes |
| 2 | "Foye's Principles of Medicinal Chemistry", 7th edition, (David A. Williams, Thomas L. Lemke & William O. Foye, Editors), Lippincott Williams & Wilkins, 2012 | Books |
| 3 | "Wilson and Gisvold's Textbook of Organic Medicinal and Pharmaceutical Chemistry" 12th Edition, (J. H. Block and J. M. Beale Jr, Editors), Lippincott Williams & Wilkins, Philadelphia, PA, 2011 | Books |
| 4 | Graham L. Patrick; "An Introduction to Medicinal Chemistry" Oxford University Press, USA; 6th edition, 2017 | Books |

| | | |
|---|---|---|
| 5 | Thomas, Gareth, "Fundamentals of Medicinal Chemistry" Wiley-Blackwell; Kindle Edition (2013). | Books |

**9- Matrix of knowledge and skills of the course**

| S | Course contents | Knowledge and understanding | Intellectual skills | Professional skills | General skills |
|---|---|---|---|---|---|
| 1 | Introduction to chemotherapy | a5.1,a14.1 | b6.1 | c4.2 | d4.1,d8.1,d9.1 |
| 2 | Penicillins and Cephalosporins | a4.1,a5.1,a14.1,a14.2 | b5.1,b6.1,b16.1 | c4.1,c4.2 | d4.1,d8.1 |
| 3 | Non-classical antibiotics | a4.1,a5.1,a14.1,a14.2 | b5.1,b6.1,b16.1 | c4.1,c4.2,c17.1 | d4.1,d9.1 |
| 4 | antineoplastic agents | a4.1,a5.1,a14.1,a14.2 | b5.1,b6.1,b16.1 | c4.1,c4.2 | d4.1 |
| 5 | Quinolones, , chloramphenicol, UTIs | a4.1,a5.1,a14.1,a14.2 | b5.1,b6.1,b16.1 | c4.1,c4.2,c17.1 | d4.1 |
| 6 | Mid-term exam | a4.1,a5.1,a14.1,a14.2 | b5.1,b6.1,b16.1 | c4.1,c4.2,c17.1 | d4.1 |
| 7 | Sulfonamides, antiprotozoal drugs, anthelmintics | a4.1,a5.1,a14.1,a14.2 | b5.1,b6.1,b16.1 | c4.1,c4.2 | d4.1 |
| 8 | Macrolides, aminoglycosides, lincomycins, tetracyclins | a4.1,a5.1,a14.1,a14.2 | b5.1,b6.1,b16.1 | c4.1,c4.2 | d4.1 |
| 9 | Practical course and case study | a4.1,a5.1,a14.1,a14.2 | b5.1,b6.1,b16.1 | c4.1,c4.2,c4.3 | d3.1,d4.1,d8.1,d9.1 |

**Course Coordinator(s): -**

Hussein Ibrahim Ismail El-Subbagh

**Head of department: -**

Mohamed Ahmed Ahmed Mostafa