



Course Specification

(Bachelor)

Course Title: : Medicinal Chemistry - 1

Course Code: PHCH 416

Program: Pharmaceutical Sciences

Department: Pharmaceutical Chemistry

College: Pharmacy

Institution: Najran University

Version: 3

Last Revision Date: 18/11/2024

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A. General information about the course:

1. Course Identification

1. Credit hours: 3 (2+1)

2. Course type

A. ☐ University ☐ College ☐ Department ☐ Track ☒ Program
B. ☒ Required ☐ Elective

3. Level/year at which this course is offered: (7th Level / 4th year)

4. Course general Description:

The course describes the medicinal chemistry of an important class of drugs that act on the Autonomic Nervous System. The therapeutic agents that are used to treat many of the CNS-based disorders are studied such those disorders results from insufficiency of the neurotransmitters or their excesses and how to correct them by means of drugs. Also the course teaches the drugs acting on cardiovascular system, drugs acting on urinary system and their applications. The course exposes the students to the study of SAR, mechanism of action and the pharmacokinetics of these drugs i.e., absorption, distribution, metabolism and excretion of these agents and the factors that may affect them. The practical part deals with demonstrating and training student for synthesis of some selected drugs.

5. Pre-requirements for this course (if any):

PHCH 212

6. Co-requisites for this course (if any):

None

7. Course Main Objective(s):

- A) Identify functional groups and ring systems that characterize each of the drug classes.
- B) Identify the structural features and functional groups important for the pharmacological actions of each drug class.
- C) Recognize how tiny changes in structural features and functional groups may affect potency and activity of each drug class.
- D) Understand the mechanism of action (where known) of the active drugs.
- E) Make intelligent hypotheses about the biological activity, mechanism, and/or metabolism of an unknown compound based on the structural features found in the molecule.
- F) Describe the cross-reactivity between drug classes based on structure-activity relationships.

2. Teaching mode (mark all that apply)





No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100
2	E-learning		
3	Hybrid <ul style="list-style-type: none"> Traditional classroom E-learning 		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	30
2.	Laboratory/Studio	30
3.	Field	0
4.	Tutorial	0
5.	Others (specify)	0
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	Describe basic medicinal chemistry concepts, principles and theories and interpret the chemical information and data concerning structure activity relationship about ANS Drugs, cardiovascular and the diuretic drugs	K3	Lectures	Written exam Assignments
2.0	Skills			





Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
2.1	Predict metabolism pathways and suitable synthetic pathways of known related drug.	S1	Lectures Laboratory work	Written exam Practical exam Reports
2.2	Conclude the major activity and pharmacokinetic properties of a given drug based on the chemical structure	S1	Lectures Laboratory work	Written exam Practical exam Reports
2.3	Communicate clearly and effectively in a collaborative manner with the others	S5	Lectures Laboratory work	Assignment Reports
3.0	Values, autonomy, and responsibility			
3.1	Show time and self-management in class or labs as an individual and as a part of team	V4	Lectures Practice sessions	Observation cards Reports

C. Course Content (Theoretical)

No	List of Topics	Contact Hours
1.	Introduction to Medicinal Chemistry. - Definition of medicinal chemistry - Drug nomenclature - Chemical bases for drug action - Biological structures that interact with drugs (receptors, nucleic acids, lipids, and ion channel) Drug specificity, selectivity, and binding forces to its site of action - Structure activity relationship SAR - Principals of drug actions (functional groups, acid base chemistry, physicochemical properties)	6
2.	Classification of Drugs - Reversible enzyme inhibitors - Irreversible enzyme inhibitors - Transition state analogues - Natural substrate agonists and antagonists (Substrate mimic and competitive inhibitors)	2
3.	Prodrugs - Carrier linked prodrug. - Bio precursors	2
4.	Drug Metabolism - First phase metabolism - Second phase metabolism	4
5.	Autonomic Nervous System Drugs: - Adrenergic drugs - Antiadrenergic drugs - Cholinergic drugs - Anticholinergic drugs	6
6.	Cardiovascular System - Antihypertensive Drugs - Treatment of Angina Pectoris - Treatment of Heart Failure - Agents used in hyperlipidemia	6
7.	Drugs used in disorders of coagulation	2
8.	Drugs acting on urinary system	2
Total		30



Course Content (Practical)

No	List of Topics	Contact Hours
1	1- General Information & Lab safety	30
2	2- Basic Instructions in Conducting Organic Synthesis	
3	3- Synthesis of Dihydropyrimidines (Ca-Channel γ Blockers) (Part I)	
4	4- Synthesis of Dihydropyrimidines (Ca-Channel γ Blockers) (Part II)	
5	5- The Fischer indole synthesis	
6	6- Synthesis of 3-methyl-1H-pyrazol-(4H)-5-one	
7	7- Synthesis of 3,4-dihydro-1-hydroxy-4-oxophthalazine	
8	8- Synthesis of a Coumarin anticoagulant	
Total		30

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quiz-1	4-5	5
2.	Midterm	7-9	20
3.	Quiz-2	10-11	5
4.	Assignment	15	5
5.	Observation card	2-16	5
6.	Practical report or Practical quiz	15	10
7.	Final practical exam	16	10
8.	Final theoretical exam	17-19	40
9.	Total		100

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Wilson and Gisvolds Textbook of Organic Medicinal and Pharm. Chemistry, 12th edition
Supportive References	1. An Introduction to Medicinal Chemistry (6th edition) by Graham L. Patrick 2. PowerPoints slides
Electronic Materials	http://www.dlaf.nu.edu.sa/ http://www.drugdesign.com/web/





Other Learning Materials

Microsoft word software.
Microsoft PowerPoint software

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Suitable lecture room equipped with data show and internet and sufficient number of seats. Suitable laboratories equipped with health and safety tools, internet, and enough seats.
Technology equipment (projector, smart board, software)	Computers, data show, sound systems and internet
Other equipment (depending on the nature of the specialty)	<ul style="list-style-type: none"> • Melting point apparatus • Oven • Condenser • Magnetic Hot Plate Stirrer • Water bath

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Head of departments and students	Indirect Questionnaires (indirect)
Effectiveness of Students assessment	Faculty and students members	Indirect Questionnaires (indirect)
Quality of learning resources	Students	Questionnaires (Indirect)
The extent to which CLOs have been achieved	Student peer reviewer	Direct Indirect
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Pharmaceutical Chemistry Department Council
REFERENCE NO.	4-2024
DATE	18/11/2024

