

## Course Syllabus typical Format (CSTF)

### First: Course Information

1	College: Pharmacy	2	Department: Pharmaceutical Chemistry
3	Academic Semester: First Semester	4	Academic year: 1443 H
5	Course Name: Introductory Medicinal Chemistry	6	Course code and number: PDPC0341
7	Number of credit hours: .3 Units (3 theoretical/lecture )		
8	Course requirement in program: [ <input checked="" type="checkbox"/> ] Required (obligatory) [ <input type="checkbox"/> ] Optional (Elective)		
9	Course type: [ <input type="checkbox"/> ] University Requirement [ <input checked="" type="checkbox"/> ] College Requirement [ <input type="checkbox"/> ] Departmental Requirement		
10	Pre-requisite (code and number) (if applicable): PDPC212		

### Second: Instructor Information

1	Instructor's name: Prof. Dr. Kamel Metwally- Dr. Hebatallah Atteia- Dr. Nehal Elsherbiny		
2	Sections of the course that I teach ( All )		
3	Office phone number: 3912- 3917-3924		Mobile number (optional):
5	Office location and number: First Floor (01-03-1-06A)- Second floor (01-25-2-050)-Second floor (01-25-2-051)		
6	Office hours: Sunday (12:00-2:00 pm)		
7	Website: <a href="https://www.ut.edu.sa/ar/web/u58364">https://www.ut.edu.sa/ar/web/u58364</a> ; <a href="https://www.ut.edu.sa/ar/web/u58397">https://www.ut.edu.sa/ar/web/u58397</a> <a href="https://www.ut.edu.sa/ar/Staff/Pages/default.aspx?EmpNum=S0Aqcoxtq5mjV5egp5Jw2g%3d%3d">https://www.ut.edu.sa/ar/Staff/Pages/default.aspx?EmpNum=S0Aqcoxtq5mjV5egp5Jw2g%3d%3d</a> ; <a href="https://www.ut.edu.sa/ar/Staff/Pages/default.aspx?EmpNum=drZOyn2tAXnD5fTnbesNrA%3d%3d">https://www.ut.edu.sa/ar/Staff/Pages/default.aspx?EmpNum=drZOyn2tAXnD5fTnbesNrA%3d%3d</a> ; <a href="https://www.ut.edu.sa/ar/Staff/Pages/default.aspx?EmpNum=a%2bygem5hlWrHk%2fnjboq6cQ%3d%3d">https://www.ut.edu.sa/ar/Staff/Pages/default.aspx?EmpNum=a%2bygem5hlWrHk%2fnjboq6cQ%3d%3d</a>		
8	E-mail: <a href="mailto:kametwally@ut.edu.sa">kametwally@ut.edu.sa</a> , <a href="mailto:hatteia@ut.edu.sa">hatteia@ut.edu.sa</a> , <a href="mailto:nelsherbiny@ut.edu.sa">nelsherbiny@ut.edu.sa</a>		

### Third: Lecture and lab timetables

Section	Days	Time	Place (Building/Room)
Male	Sunday	9:00-12:00 am	Faculty of Pharmacy/ 1st floor/ Lecture room 001-03-0-06
Female	Tuesday	9:00 -12:00 am	Faculty of Pharmacy/ 1 <sup>st</sup> floor/ Lecture room 01-25-2-076

#### Fourth: Course description

Course description as found in the University Catalogue in both Arabic and English

The course covers the physical and chemical properties of drugs in relation to biological activity, drug targets and drug-target interactions, Hansch QSAR equation, isosteres and bioisosteres. The course also covers the chemical structures, biological activity and molecular mode of action of chemotherapeutic agents including: antibiotics (semisynthetic and synthetic) and antimicrobial agents, antiparasitic agents, antimycobacterial agents, antifungal agents, antiviral agents and antineoplastic agents.

يتناول المقرر الخواص الفيزيائية والكيميائية للأدوية وعلاقتها بالنشاط الحيوي ومستقبلات الدواء والتفاعلات مع المستقبلات و معادلة هانش للعلاقة الحيوية-الكيميائية الكمية Hansch QSAR، والايروستيرز والبيو أيزوستيرز وكذلك النشاط البيولوجي الجزيئي لأدوية العلاج الكيميائي بما في ذلك؛ المضادات الحيوية (شبه صناعية والاصطناعية) والعوامل المضادة للجراثيم، ومضادات الطفيليات والفطريات ومضادات الفيروسات ومضادات الأورام.

#### Fifth: General Objectives and Teaching Strategies

	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
<b>1.0</b>	<b>Knowledge:</b> By the end of this course, the student should be able to:		
1.1	Describe the effect of the physical and chemical properties of drugs on their biological activity, absorption, distribution, metabolism, excretion as well as the drug-receptor interaction.	<ul style="list-style-type: none"> <li>- Interactive lectures.</li> <li>- Self-directed learning (SDL)</li> </ul>	<ul style="list-style-type: none"> <li>- Written Exam (Quiz, Midterm, and Final).</li> <li>- Multiple-Choice Questions (MCQ) paper-and-pencil tests.</li> <li>- Modified Essay Questions (MEQ) paper-and-pencil tests.</li> </ul>
1.2	Define the terms and acronyms that are used in medicinal chemistry, e.g. SAR, MOA, Log P agonist, antagonist, classical and non-classical isosteres, therapeutic index, organic and inorganic drug salts of drugs...etc.		
1.3	Outline the prototype, molecular modifications and molecular mechanism of actions of the listed classes.		
<b>2.0</b>	<b>Skills:</b> By the end of this course, the student should be able to:-		

2.1	Recognize the effect of structural modifications on pharmacodynamics and pharmacokinetics of drugs.		- Written Exam (Quiz, Midterm, and Final).
2.2	Analyze structure activity relationship and possible problems related to the chemical incompatibilities leading to drug-drug interactions or drug-food interactions as well as drug adverse effects and toxicity.	- Interactive lectures - SDL	- Multiple-Choice Questions (MCQ) paper-and-pencil tests. - Modified Essay Questions (MEQ) paper-and-pencil tests.
2.3	Demonstrate ability to search and navigate the internet.	- Interactive lectures - SDL	- Classroom discussion
2.4	Use computer and communication technology to prepare oral presentations.	- Assignments - Small group activity (presentation) and discussion	- Use writing, speaking, data and media creatively for assignment and presentations.
<b>3.0</b>	<b>Values:</b> By the end of this course, the student should be able to:		
3.1	Plan effective time management schedules for delivering of duties and activities.	- Assignments - Small group activity (presentation) and discussion	- Evaluation of the role of each student in assignment and activity.

Sixth: Course or Curriculum units, subjects, specific objectives, and time schedule in the academic semester (first, second, or third semester (summer))

Week number	Units		Instructional Objectives (Actions that prove the students adoption of specified behavior and achievement, learning outcomes, content)	Readings		Keywords
	Unit Number	Unit/Chapter/Subject title		Reference Number	Pages	
First	<b>Introduction to Medicinal Chemistry (1)</b>	<ul style="list-style-type: none"> <li>- Introduction to Medicinal Chemistry</li> <li>- Introducing the course content</li> <li>- Review of the previous prerequisite.</li> <li>- Highlighting the knowledge and skills the curriculum is based on.</li> </ul>	<ul style="list-style-type: none"> <li>- Presenting the introduction to Medicinal Chemistry.</li> <li>- Presenting an overview of the course content and extent</li> <li>- Clarifying curriculum requirements</li> <li>- Specifying methods of communication between students and their instructors</li> </ul>	2 1	17-28 180-185	<ul style="list-style-type: none"> <li>- Introduction, general policies and exam purpose.</li> <li>- Acid/base strength of drugs.</li> <li>- Solubility of drugs and biological activity.</li> </ul>

		<ul style="list-style-type: none"> <li>- Effect of acid/base strength of drugs on drug absorption.</li> <li>- Effect of solubility on drug absorption.</li> </ul>	<ul style="list-style-type: none"> <li>- Clarifying the assessment methods</li> <li>- Clarifying policies concerning instruction, classroom participation and assessment.</li> </ul>			
Second	<b>Introduction to Medicinal Chemistry (2)</b>	<ul style="list-style-type: none"> <li>- Stereochemical aspects of drug action.</li> <li>- Isosterism and bioisosterism.</li> <li>- Drugs and drug targets.</li> <li>- Receptor site theory.</li> <li>- Binding and drug- receptor interactions</li> <li>- Design of agonists.</li> <li>- Design of antagonists.</li> </ul>	<ul style="list-style-type: none"> <li>- Describe the effect of the physical and chemical properties of drugs on their biological activity, absorption, distribution, metabolism, excretion as well as the drug-receptor interaction</li> <li>- Analyze structure activity relationship and predict possible problems related to the chemical structures of drugs.</li> <li>- Define the structure activity relationships (SAR), isosterism and bioisosterism.</li> <li>- Outline drug-target interactions.</li> <li>- Define agonists and antagonists on the molecular level.</li> </ul>	2 1	17-28 180-185	<ul style="list-style-type: none"> <li>- Physicochemical properties of drugs.</li> <li>- Structure activity relationships (SAR).</li> <li>- Isosterism and bioisosterism.</li> <li>- Stereochemistry and biological activity.</li> <li>- Drug-targetb interactions.</li> <li>- Agonists and antagonists.</li> </ul>
Third	<b>Synthetic antimicrobial agents (part 1)</b>	<ul style="list-style-type: none"> <li>- Alcohols and phenols and related compounds</li> <li>- Cationic surfactants.</li> <li>- Urinary antiseptics.</li> <li>- Synthetic antibacterial agents (quinolones)</li> </ul>	<ul style="list-style-type: none"> <li>- Label and outline the origin, molecular modifications and molecular mechanism of actions of these classes of anti-infective agents</li> <li>- Analyze structure activity relationship and predict possible problems related to the chemical structures of these classes of anti-infective agents</li> <li>- Explain the mechanism of action and medicinal application of these classes of anti-infective agents</li> <li>- In class activity (interactive learning).</li> </ul>	2 1 2 2 1 1 1	30-71 185-186 87-92 383-406 186-188 190 258-260	<ul style="list-style-type: none"> <li>- Alcohols and phenols.</li> <li>- Cationic surfactants.</li> <li>- Hexamine.</li> <li>- Nitrofurans.</li> <li>- Quinolone antibacterial agents.</li> </ul>
Fourth	<b>Synthetic antimicrobial agents (part</b>	<ul style="list-style-type: none"> <li>- Sulfonamides.</li> <li>- Antimycobacterial agents.</li> </ul>	<ul style="list-style-type: none"> <li>- Analyze structure activity relationship and predict possible problems related to the chemical structures of the</li> </ul>	1	260-293 206-219	<ul style="list-style-type: none"> <li>- Sulfonamide antibacterial drugs.</li> </ul>

	2)		<p>mentioned classes of synthetic antimicrobial agents.</p> <ul style="list-style-type: none"> <li>- Explain the mechanism of action and medicinal application of the mentioned classes of synthetic antimicrobial agents.</li> <li>- In class activity (interactive learning).</li> </ul>		220-224	<ul style="list-style-type: none"> <li>- Antitubercular agents.</li> <li>- Antileprotic agents.</li> </ul>
Fifth	<b>Antiparasitic drugs</b>	<ul style="list-style-type: none"> <li>- Anti-amoebic drugs.</li> <li>- Anti-leishmanial drugs.</li> <li>- Anti-trypanosomal drugs.</li> <li>- Anti-malarial drugs.</li> <li>- Anthelmintic drugs.</li> </ul>	<ul style="list-style-type: none"> <li>- Analyze structure activity relationship and predict possible problems related to the chemical structures of the mentioned classes of anti-parasitic agents.</li> <li>- Explain the mechanism of action and medicinal application of the mentioned classes of anti-parasitic agents.</li> <li>- In class activity (interactive learning).</li> </ul>	1	227-228 228-241 206-219 242-256	<ul style="list-style-type: none"> <li>- Anti-amoebic drugs.</li> <li>- Anti-leishmanial drugs.</li> <li>- Anti-trypanosomal drugs.</li> <li>- Anti-malarial drugs.</li> <li>- Anthelmintic drugs.</li> </ul>
Sixth	<b>Antifungal drugs</b>	<ul style="list-style-type: none"> <li>- Types of mycoses.</li> <li>- Obstacles to antifungal therapy.</li> <li>- Drugs targeting fungal cell wall.</li> <li>- Drugs targeting fungal cell membrane.</li> <li>- Drugs altering cell membrane permeability.</li> </ul>	<ul style="list-style-type: none"> <li>- Label and outline the origin, molecular modifications and molecular mechanism of actions of different classes of antifungal agents.</li> <li>- Analyze structure activity relationship and predict possible problems related to the chemical structures of antifungal agents.</li> <li>- Explain the mechanism of action and medicinal application of antifungal agents.</li> <li>- In class activity (interactive learning).</li> </ul>	1		<ul style="list-style-type: none"> <li>- Mycosis.</li> <li>- Caspofungin.</li> <li>- Tolnaftate.</li> <li>- Allylamine antifungal agents.</li> <li>- Azole antifungal agents.</li> <li>- Polyene antifungal agents.</li> <li>- Flucytosine.</li> <li>- Griseofulvin.</li> </ul>
Seventh	<b>Antibiotics (part 1)</b>	<ul style="list-style-type: none"> <li>- Introduction to antibiotics.</li> <li>- <math>\beta</math>-lactam antibiotics.</li> </ul>	<ul style="list-style-type: none"> <li>- Label and outline the origin, molecular modifications and molecular mechanism of actions of the mentioned classes of antibiotics.</li> <li>- Analyze structure activity relationship and predict possible problems related to the chemical structures of the mentioned classes of antibiotics.</li> </ul>	1	294-308	<ul style="list-style-type: none"> <li>- <math>\beta</math>-lactam antibiotics.</li> </ul>

			<ul style="list-style-type: none"> <li>- Explain the mechanism of action and medicinal application of the mentioned classes of antibiotics.</li> <li>- In class activity (interactive learning).</li> </ul>			
Eighth	<b>Mid-Term Exam</b>		-			
Ninth	<b>Mid-Term Exam</b>		-			
Tenth	<b>Antibiotics (part 2)</b>	<ul style="list-style-type: none"> <li>- <math>\beta</math>-lactam antibiotics.</li> <li>- Vancomycin.</li> <li>- Cycloserine.</li> <li>- Polymyxins.</li> </ul>	<ul style="list-style-type: none"> <li>- Label and outline the origin, molecular modifications and molecular mechanism of actions of the mentioned classes of antibiotics.</li> <li>- Analyze structure activity relationship and predict possible problems related to the chemical structures of the mentioned classes of antibiotics.</li> <li>- Explain the mechanism of action and medicinal application of the mentioned classes of antibiotics.</li> <li>- In class activity (interactive learning).</li> </ul>	1	294-308	<ul style="list-style-type: none"> <li>- <math>\beta</math>-lactam antibiotics.</li> <li>- Vancomycin.</li> <li>- Cycloserine.</li> <li>- Polymyxins.</li> </ul>
Eleventh	<b>Antibiotics (part 3)</b>	<ul style="list-style-type: none"> <li>- Protein synthesis inhibitors.</li> <li>- Nucleic acid synthesis inhibitors.</li> </ul>	<ul style="list-style-type: none"> <li>- Label and outline the origin, molecular modifications and molecular mechanism of actions of the mentioned classes of antibiotics.</li> <li>- Analyze structure activity relationship and predict possible problems related to the chemical structures of the mentioned classes of antibiotics.</li> <li>- Explain the mechanism of action and medicinal application of the mentioned classes of antibiotics.</li> </ul>	1	308-324	<ul style="list-style-type: none"> <li>- Protein synthesis inhibitors.</li> <li>- Nucleic acid synthesis inhibitors.</li> </ul>
Twelfth	<b>Antiviral Agents</b>	<ul style="list-style-type: none"> <li>- Classification and Biochemistry of viruses.</li> <li>- Drugs active against DNA-viruses.</li> <li>- Drugs acting against RNA viruses.</li> </ul>	<ul style="list-style-type: none"> <li>- Outline virus biochemistry and mechanism of infection, and numerate the different targets of antiviral agents.</li> <li>- Label and outline the origin, molecular modifications and molecular mechanism of actions of different classes of antiviral agents.</li> </ul>	1	330-354	<ul style="list-style-type: none"> <li>- Anti-herpetic drugs.</li> <li>- Anti-flu drugs.</li> <li>- Anti-HIV drugs.</li> <li>- Anti-hepatitis C drugs.</li> </ul>

			<ul style="list-style-type: none"> <li>- Analyze structure activity relationship and predict possible problems related to the chemical structures of antiviral agents.</li> <li>- Explain the mechanism of action and medicinal application of different classes of antiviral agents.</li> <li>- In class activity (interactive learning).</li> </ul>			
13 <sup>th</sup>	<b>Antineoplastic Agents (part 1)</b>	<ul style="list-style-type: none"> <li>- Pathophysiology of cancer.</li> <li>- Cancer therapeutic modalities.</li> <li>- Drugs directly interacting with nucleic acids.</li> </ul>	<ul style="list-style-type: none"> <li>- Label and outline the origin, molecular modifications and molecular mechanism of actions of the mentioned classes.</li> <li>- Analyze structure activity relationship and predict possible problems related to the chemical structures of of the mentioned classes.</li> <li>- Explain the mechanism of action and medicinal application of different classes of of the mentioned classes.</li> <li>- In class activity (interactive learning)</li> </ul>	1	330-354 355-383 383-412	<ul style="list-style-type: none"> <li>- Intercalating agents.</li> <li>- Topoisomerase inhibitors.</li> <li>- Alkylating agents.</li> </ul>
14 <sup>th</sup>	Vacation					
15 <sup>th</sup>	<b>Antineoplastic Agents (part 2)</b>	<ul style="list-style-type: none"> <li>- Antimetabolites.</li> <li>- Drugs acting on structural proteins.</li> <li>- Protein kinase inhibitors.</li> </ul>	<ul style="list-style-type: none"> <li>- Label and outline the origin, molecular modifications and molecular mechanism of actions of the mentioned classes.</li> <li>- Analyze structure activity relationship and predict possible problems related to the chemical structures of the mentioned classes.</li> <li>- Explain the mechanism of action and medicinal application of different classes of the mentioned classes.</li> <li>- In class activity (interactive learning).</li> </ul>	1	330-354 355-383 383-412	<ul style="list-style-type: none"> <li>- Antimetabolites.</li> <li>- Anti-tubulin agents.</li> <li>- Protein kinase inhibitors.</li> </ul>
16 <sup>th</sup>			Revision	-	-	-
17 <sup>h</sup>	Vacation					
18 <sup>th</sup> & 19 <sup>th</sup>	الاختبارات النهائية					

## Seventh: Assessment and evaluation plan

Assessment tools	Date and duration (day/date/ time)	Subject matter covered in the exam	Type of questions	Grades out of 100	Guidelines and instructions
Assignments & activity	Weeks 2-13		Written reports Oral presentations	20 marks	- Marking of reports. - Evaluation of presentations.
Mid-term exam	8,9 <sup>th</sup> week		MCQ Short essay	30 marks	- Choose the most appropriate answer from multiple choice. - Writing short essays to SAR of drugs.
Final exam	18 <sup>th</sup> & 19 <sup>th</sup> week		MCQ Short essay	50 marks	- Multitask exam measuring all kinds of the students' talents. - Choose the most appropriate answer from multiple choice. - Writing short essays to SAR of drugs.

## Eighth: Readings and further References

1	Main Reference (Textbook) (correct citation in accordance to APA or other citation standards specific to discipline) From where student can get the textbook? 1- Wilson and Gisvold's Textbook of Organic Medicinal and Pharmaceutical Chemistry. 2- An Introduction to Medicinal Chemistry, Graham L. Patrick.
Extra reading references and citations (books, internet cities, research papers)	
2	Foye's Principles of Medicinal Chemistry.
3	
4	



Ninth: The instructor's policy of dealing with students within the framework of the university laws, regulations, and guidelines (examples and prototypes).

1	Late attendance: Over 10 min delays will be considered absent.
2	Cheating and plagiarism: University rules will be applied.
3	Absences: University rules will be applied.
4	Late work policy: 5% of the activity mark will be reduced for each day delay.
5	Exiting during the lecture period: Allowed after permission.
6	Seating and student placement in the classrooms: Allowed any place in the lecture room.
7	Absence from an exam: University rules will be applied.
8	Mobile phone use in the classroom: Prohibited.
9	Eating and drinking: Prohibited

Tenth: (for the instructor) Final and formative evaluation for the course instruction

- 1) Comments and reflections on students' answers of open ended question in the Course Evaluation Form.
- 2) Comments and reflections on students' statistical or numerical ratings of the items in the Course Evaluation Form(s).
- 3) Instructor's reflections and comments on students' performance and marks/grades statistical distribution in the course
- 4) Obstacles faced by the instructor in implementing the course plan
- 5) Points of strength found in the implementation of the course plan
- 6) Expected changes that need to be adopted into the course plan
- 7) Adopted assumptions by the instructor proven to be false

8) Mark/grade optimization in light of possible measurement or assessment (by tests or rubrics) sources of errors