

Philadelphia University	 PHILADELPHIA UNIVERSITY <small>THE WAY TO THE FUTURE</small>	Approved Date:
Faculty: Pharmacy		Issue: 1
Department: -	Course Syllabus	Credit Hours: 3
Academic Year: 2022/2023		Bachelor:

Course Information

Course No.	Course Title	Prerequisite	
0510518	Drug Design	0510411	
Course Type		Class Time	Room No.
<input type="checkbox"/> University Requirement <input type="checkbox"/> Faculty Requirement <input type="checkbox"/> Major Requirement <input checked="" type="checkbox"/> Elective Compulsory			

Course Delivery Method

<input type="checkbox"/> Blended	<input type="checkbox"/> Online	<input checked="" type="checkbox"/> Physical	
Learning Model			
Percentage	Synchronous	Asynchronous	Physical
	0	0	100%

Course Description

The subject deals with the most commonly used approaches in the design and development of new pharmaceutical agents based on the available information related to the structure activity relationships, the physicochemical characteristics, pharmacokinetic, Pharmacodynamic properties of drugs. Also describes the importance of studying the receptor and enzyme structure in the design of suitable chemical scaffolds for agonist and antagonist activity. The rest of the course will focus on the use of different modeling software and chemical drawing to study the drug-target interaction. Part of the class will focus on drug metabolism and its role in drug design, as well as the prodrug concept.

Course Learning Outcomes

Number	Outcome	Corresponding Program Outcomes	Corresponding Competencies
Knowledge			
K1	Understanding the common concepts of drug discovery and computer aided drug design techniques.	Kp1	C1
K2	Demonstrate knowledge about drug chemical structure, lead optimization, and prodrug approaches to improve activity, and to lower toxicity.	Kp1	C1
K3	Get familiarize with different modeling softwares for drawing chemical compounds as well as drug binding simulation to recognize structural moieties essential for drug target interactions and predict possible structural changes to improve binding.	Kp1	C1
Skills			
S1	Highlights the importance of simulation softwares in predicting drug target interactions to improve activity	Sp2, Sp3, Sp6	C8, C9, C12
S2	Use information obtained from virtual screening of targets to design and optimize different drug molecules and solve problems.	Sp2, Sp9	C8, C15

Learning Resources

Course Textbook	<ol style="list-style-type: none"> 1. The organic chemistry of drug design by Richard B. Silverman. Third edition, Elsevier, 2014. ISBN: 978-0-12-382030-3. 2. An introduction to Medicinal Chemistry by Graham L. Patrick. Fifth edition, Oxford, 2013. ISBN: 978-0-19-969739-7
Supporting References	<ol style="list-style-type: none"> 1. Drug design: structure - and ligand-based approaches by Kenneth M. Merz, Dagmar Ringe and Charles H. Reynolds. Cambridge University Press, 2010. ISBN: 978-0-521-88723-6
Supporting Websites	<ol style="list-style-type: none"> 1. https://pubchem.ncbi.nlm.nih.gov/ 2. https://www.rcsb.org/ 3. https://www.schrodinger.com/products/maestro 4. https://ftmap.bu.edu/login.php 5. http://pockdrug.rpbs.univ-paris-diderot.fr/cgi-bin/index.py?page=home 6. https://www.sib.swiss/
Teaching Environment	<input checked="" type="checkbox"/> Classroom <input type="checkbox"/> laboratory <input type="checkbox"/> Learning Platform <input type="checkbox"/> Other

Meetings and Subjects Time Table

Week	Topic	Learning Method*	Task	Learning Material
1	Vision and Mission of Faculty of Pharmacy Course Syllabus	Lecture		Vision and Mission of Faculty of Pharmacy Course Syllabus
2	Introduction to drug design and discovery	Lecture		Txt. B.1, Chapter 1
3	Study of the lead compound	Lecture		Txt. B.1, Chapter 2 Txt B.2, Chapter 12
4	Lead modification and lead optimization	Lecture		Txt. B.1, Chapter 2
5	Lead modification and lead optimization	Lecture		Txt. B.1, Chapter 2
6	Drawing chemical compounds using computer software	Lecture project based learning	Report Part 1	ChemDraw manual, video tutorials
7	Study of Drug-receptor interactions	Lecture		Txt. B.1, Chapter 3 Txt B.2, Chapter 2, 8
8	Study of Drug-enzyme interactions	Lecture		Txt. B.1, Chapter 4, 5 Txt B.2, Chapter 2, 7
9	DNA-interactive agents	Lecture		Txt. B.1, Chapter 6 Txt B.2, Chapter 3
10	3D visualizer softwares	Lecture project based learning	Report Part 2	Software manual, web-based instruction and video tutorials
11	Concept of computer aided drug design, Structure-based drug design	Lecture		Txt. B.2, Chapter 17
12	Ligand-based drug design Drug Design tutorial	Lecture project based learning	Report Part 3	Txt. B.2, Chapter 17 web-based instruction and video tutorials
13	Prodrug approach Carrier-linked prodrugs	Lecture		Txt. B.1, Chapter 9
14	Prodrug approach Bioprecursors	Lecture		Txt. B.1, Chapter 9
15	Project presentations	project based learning	Short presentation	Project reports
16	Final Exam			

*Includes: lecture, flipped Class, project based learning, problem solving based learning, collaboration learning.

Course Contributing to Learner Skill Development

Using Technology
<ol style="list-style-type: none"> 1. Utilize computer software such as ChemDraw and Biological receptors visualizer to draw drug structures in 3D view 2. Utilize variable software related to the learning process such as scientific search engines, data bases, and presentation views.
Communication Skills
<ol style="list-style-type: none"> 1. Communicate with colleges for studying biological targets using special softwares 2. Gain the spirit of working in groups and two-way discussion in presentation
Application of Concept Learnt
<ol style="list-style-type: none"> 1. Applying compiled knowledge into drug discovery, design and optimization in assigned projects.

Assessment Methods and Grade Distribution

Assessment Methods	Grade	Assessment Time (Week No.)	Course Outcomes to be Assessed
Mid Term Exam	% 30	11th week	K1, K2
Term Works*	% 30	W6, 10, 12, 15	K3, S1, S2
Final Exam	% 40	16th week	K1, K2, K3
Total	%100		

* Include: quizzes, in-class and out of class assignment, presentations, reports, videotaped assignment, group or individual project.

Alignment of Course Outcomes with Learning and Assessment Methods

Number	Learning Outcomes	Corresponding Competencies	Learning Method*	Assessment Method**
Knowledge				
K1	Understanding the common concepts of drug discovery and computer aided drug design techniques.	C1	Lecture	Exam, Quiz
K2	Demonstrate knowledge about drug chemical structure, lead optimization, and prodrug approaches to improve activity, and to lower toxicity.	C1, C6	Lecture project based learning	Exam, Quiz, report
K3	Get familiarize with different modeling softwares for drawing chemical compounds as well as drug binding simulation to recognize structural moieties essential for drug target interactions and predict possible structural changes to improve binding.	C1, C6	Lecture project based learning	Report, short presentation evaluation
Skills				
S1	Highlights the importance of simulation softwares in predicting drug target interactions to improve activity	C8, C9, C12	project based learning	Report, short presentation evaluation
S2		C8, C15	project	Report, short

	Use information obtained from virtual screening of targets to design and optimize different drug molecules and solve problems.		based learning	presentation evaluation
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*Include: lecture, flipped class, project based learning, problem solving based learning, collaboration learning.

** Include: quizzes, in-class and out of class assignments, presentations, reports, videotaped assignments, group or individual projects.

Course Polices

Policy	Policy Requirements
Passing Grade	The minimum pass for the course is (50%) and the minimum final mark is (35%).
Missing Exams	<ul style="list-style-type: none"> • Anyone absent from a declared semester exam without a sick or compulsive excuse accepted by the dean of the college that proposes the course, a zero mark shall be placed on that exam and calculated in his final mark. • Anyone absent from a declared semester exam with a sick or compulsive excuse accepted by the dean of the college that proposes the course must submit proof of his excuse within a week from the date of the excuse's disappearance, and in this case, the subject teacher must hold a compensation exam for the student. • Anyone absent from a final exam with a sick excuse or a compulsive excuse accepted by the dean of the college that proposes the material must submit proof of his excuse within three days from the date of holding that exam.
Attendance	The student is not allowed to be absent more than (15%) of the total hours prescribed for the course, which equates to six lecture days (n t) and seven lectures (days). If the student misses more than (15%) of the total hours prescribed for the course without a satisfactory or compulsive excuse accepted by the dean of the faculty, he is prohibited from taking the final exam and his result in that subject is considered (zero), but if the absence is due to illness or a compulsive excuse accepted by the dean of the college that The article is introduced, it is considered withdrawn from that article, and the provisions of withdrawal shall apply to it.
Academic Integrity	Philadelphia University pays special attention to the issue of academic integrity, and the penalties stipulated in the university's instructions are applied to those who are proven to have committed an act that violates academic integrity, such as cheating, plagiarism (academic theft), collusion, intellectual property rights.