Course Plan for Bachelor Program - Study Plan Development and Updating Procedures/ Pharmacy Department	QF02/0408-4.0E

Study Plan No.	**2021/2022**		**University Specialization**		**Bachelor of Pharmacy**	
Course No.	**0201111**		**Course Name**		**Physical Pharmacy**	
Credit Hours	**2**		**Prerequisite *Co-requisite**		**General Chemistry**	
Course Type	☐ Mandatory University Requirement	☐ University Elective Requirement	☐ Faculty Mandatory Requirement	☐ Support course family requirements	☐ **Mandatory Requirement**	☐ Elective Requirement
Teaching Style	☐ Full Online Learning		☐ Blended Learning		☑ **Traditional Learning**	
Teaching Model	☐ 1 Synchronous: 1 Asynchronous		☐ 1 Face to Face: 1 Asynchronous		☑ **2 Traditional**	

Faculty Member and Study Divisions Information *(to be filled in each semester by the subject instructor)*

Name	Academic rank	Office No.	Phone No.	E-mail	
Office Hours (Days/Time)	**Sunday, Tuesday, Thursday ()**		**Monday, Wednesday ()**		
Division number	**Time**	**Place**	**Number of Students**	**Teaching Style**	**Approved Model**
				Traditional Learning	**2 Traditional**

Brief Description

This course focuses on different concepts in physical chemistry that lay the foundation for pharmaceutical sciences and dosage form design. These concepts include intermolecular forces, liquids and solids, properties of solutions, chemical kinetics, chemical equilibria and chemical thermodynamics.

Learning Resources

Course Book Information (Title, author, date of issue, publisher ... etc)	Chemistry, The Central Science, Brown, Lemay, Bursten and Murphy, Prentice Hall, 14th edition (2017).			
Supportive Learning Resources (Books, databases, periodicals, software, applications, others)	1. Chemistry: The Molecular Nature of Matter, James E. Brady, Neil D. Jespersen, Alison Hyslop, 7th Edition International Student Version, 2015. 2. Chemical Principles, The Quest for Insight, Peter Atkins (Oxford University), Loretta Jones (University of Northern Colorado), Leroy Laverman (University of California, Santa Barbara), 7th Edition, 2016. 3. Chemistry, by Raymond Chang Kenneth Goldsby, 12th edition, AP student edition, 2016.			
Supporting Websites	-			
The Physical Environment for Teaching	☑ **Classroom**	☐ Labs	☑ **Virtual Educational**	☐ Others

			Platform	
Necessary Equipment and Software	Moodle			
Supporting People with Special Needs	-			
For Technical Support	E-Learning & Open Educational Resources Center. Email: elearning@zuj.edu.jo; Phone: +962 6 429 1511 ext. 425/362.			

Course learning outcomes *(K= Knowledge, S= Skills, C= Competencies)*

No.	Course Learning Outcomes	The Associated Program Learning Output Code
Knowledge **The student should be able to:**		
K1	Recognize the fundamental physical properties of solids, liquids, and gases.	**MK1**
K2	Classify the main types of intermolecular forces and relate them to the properties of liquids.	**MK1**
K3	Describe the solution process and solution properties, including colligative properties.	**MK1**
K4	Identify reaction orders and reaction rates and the factors affecting them.	**MK1**
K5	Define the concept of equilibrium and the equilibrium constant and its applications.	**MK1**
K6	Outline the fundamentals of chemical thermodynamics.	**MK1**
Skills **The student should be able to:**		
S1	Perform the calculations involving gas reactions, solution concentrations, colligative properties, reaction rates, and equilibrium constants.	**MS4**
Competencies **The student should be able to:**		
C1	Assume responsibility for his/her own learning by following up with the course material and submitting assignments on time.	**MC3**

Mechanisms for Direct Evaluation of Learning Outcomes

Type of Assessment / Learning Style	Fully Electronic Learning	Blended Learning	Traditional Learning (Theory Learning)	Traditional Learning (Practical Learning)
Midterm Exam	30%	30%	**30%**	0%
Participation / Practical Applications	0%	0%	**20%**	50%
Asynchronous Interactive Activities	20%	20%	**0%**	0%

Final Exam	50%	50%	**50%**	50%

Note 1: *Asynchronous interactive activities are activities, tasks, projects, assignments, research, studies, projects, and work within student groups ... etc, which the student carries out on his own, through the virtual platform without a direct encounter with the subject teacher.*

Note 2: *According to the Regulations of granting Master's degree at Al-Zaytoonah University of Jordan, 40% of final evaluation goes for the final exam, and 60% for the semester work (examinations, reports, research or any scientific activity assigned to the student).*

Schedule of Simultaneous / Face-to-Face Encounters and their Topics

Week	Subject	Learning Style*	Reference **
1	Characteristics of gases The gas law The ideal gas law Gas mixtures and partial pressure	Lecture, participatory learning	pp. 394 - 413
2	The kinetic molecular theory of gases Molecular effusion and diffusion Real gases	Lecture, participatory learning	pp. 414 - 437
3	A molecular comparison of gases, liquids and solids, Intermolecular forces Some properties of liquids and vapor pressure Phase diagrams	Lecture, participatory learning	pp. 438 - 455
5	Structures of solids Bonding in solids	Lecture, participatory learning	pp. 456 - 458
6	Properties of solutions: The solution process Saturated solutions and solubility	Lecture, participatory learning	pp. 528 - 534
7	Factors affecting solubility Ways of expressing concentration.	Lecture, participatory learning	pp. 535 - 245
8	Colligative properties Nonelectrolytes Colloids	Lecture, participatory learning	pp. 546 - 574
9	Chemical Kinetics: Factors that affect reaction rates Reaction rates The rate law **Midterm Exam**	Lecture, participatory learning	pp. 574 - 584
10	Concentration and rate The change of concentration with time	Lecture, participatory learning	pp. 585 - 591
11	Temperature and rate Reaction mechanisms Catalysis	Lecture, participatory learning	pp. 591 - 597
12	Chemical equilibrium: The Concept of equilibrium The equilibrium constant	Lecture, participatory learning	pp. 628 - 640

	Heterogeneous equilibrium		
13	Calculating equilibrium constant Applications of equilibrium constant Le Châtelier's Principle	Lecture, participatory learning	pp. 641 - 648
14	Chemical thermodynamics: Spontaneous processes Entropy and the Second Law of Thermodynamics.	Lecture, participatory learning	pp. 802 - 809
15	The molecular interpretation of entropy Entropy changes in chemical reactions Gibb's free energy Free energy and temperature Free energy and the equilibrium constant.	Lecture, participatory learning	pp. 809 - 824
16	**Final Exam**		

** Learning styles: Lecture, flipped learning, learning through projects, learning through problem solving, participatory learning ... etc.*
*** Reference: Pages in a book, database, recorded lecture, content on the e-learning platform, video, website ... etc.*

Schedule of Asynchronous Interactive Activities *(in the case of e-learning and blended learning)*

Week	Task / Activity	Reference	Expected Results
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