

Syllabus: Physical Pharmacy 1 (131701317) First Semester 20., /20.,

	COURSE INF	ORMATION			
Course Name:	Physical Pharmacy 1 (face-to-	Course Code: 131701317			
face education)		Section:			
Semester:First		Core Curriculum: Compulsory			
Department:Depa	artment of Department of				
Pharmaceutics and	Pharmaceutical Technology				
Faculty: Pharmac	eutical Sciences				
Day(s) and Time(s): :	Credit Hours: 2			
According to HU	courses timetable/semester	Prerequisites: Pharmaceutical			
Classroom: According to HU courses		Calculations and Compounding (131701231)			
timetable/semester	•				
	COUDSE DE	COIDTION			

.OUKSE DESCRIPTION

This course investigates the application of physicochemical principles on problems in the pharmaceutical sciences. The impacts of physicochemical and biopharmaceutical properties of drugs on the safety, effectiveness, stability, and formulation of various pharmaceutical dosage forms are discussed thoroughly during the course. Topics of states of matter, phase equilibria, thermodynamics, solutions, ionic equilibria and buffering, solubility, and partitioning are investigated.

DELIVERY METHODS

The course will be delivered through a combination active learning strategies. These will include:

- PowerPoint lectures and active classroom based discussion •
- Collaborative learning through small groups acting in an interdisciplinary context. •
- E-learning resources: e-reading assignments and practice quizzes through Model and Microsoft Team •

FACULTY INFORMATION

Name

Areen Sulaiman Alshweiat

Academic Title:	Assistant Professor	
Office Location:	A429	
Telephone Number:	3429	
Email Address:	Areen.alshweiat@hu.edu.jo	
Office Hours:	As announced per semester	
	Please send an e-mail (Areen.alshweiat@hu.edu.jo) to	
	meet at any other time.	

REFERENCES AND LEARNING RESOURCES

Required Textbook

1. Sinko, P.J. Martin's Physical Pharmacy, 6 th edition, Lippincott Williams & Wilkins, 2011

Suggested Additional Resources:

- **1.** Florence A.T. and Attwood. D. Physicochemical Principles of Pharmacy, 5th Edition. 2011. Published by Pharmaceutical Press, UK
- 2. Ma, J. K., & Hadzija, B. (2013). Basic physical pharmacy. Jones & Bartlett Publishers.
- **3.** Amiji, M.M., Cook, TJ., and Mobley, W.C. Applied Physical Pharmacy, 2nd edition, McGraw Hill Education, 2014
- **4.** Dash, A.K., Singh, S. and Tolman, J. Pharmaceutics: Basic Principles and Application to Pharmacy Practice. Elsevier Academic Press, 2014

STUDENT LEARNING OUTCOMES MATRIX*

Core Curriculum Learning Outcomes	Program Learning Outcomes	Course Objectives	Course Student Learning Outcomes	Assessment Method
CLO-1 Think critically and creatively in a variety of methods in order to make decisions and solve problems.	1: Apply critical thinking and demonstrate problem-solving skills in two or more of the major fields of physical pharmacy.	1. Develop an understanding of the principles of physical pharmacy.	 1.1. Understand the basics of the physicochemical properties of drugs such as: Intermolecular forces, States of matter (gas, liquid and solid) and phase equilibria and phase rule. 1.2. Understand the rationale and theory related to discussed topics and recognize their pharmaceutical application. 	 Exams Quizzes Homework assignments
		2. Provide the theoretical knowledge and understanding of the physicochemical principles related to pharmaceutical systems	2.1. Understand basic rules, laws and equations regarding the discussed topic such as equations of thermodynamics, phase rule, ideal gas equation, Clausius –Clapyron equation equations describing colligative properties (Raoult's law, Vant Hoff equation), Buffer equation.	ExamsQuizzes
		3. Learn to solve problems.	3.1. Solve problems related to states of matter, concentration expression, buffers and isotonic solutions.	 Exams Quizzes Homework assignments
		4. Develop the ability to employ the principles in the development of pharmaceutical dosage forms and solving related formulation and manufacturing problems.	 4.1. Analyze, present and compare the data obtained from some preformulation tests, such as x-ray powder diffraction, differential scanning calorimetry, thermogravimetry. 4.2. Recognize the application of concepts in formulation, package and storage of different dosage forms. 	 Exams Quizzes Homework assignments
CLO-2 Demonstrate competency in the use of research skills and various information sources.	1: Use modern literature search methods to obtain information about physical pharmacy topics and write reports.	1.Obtain an understanding of the role of physical pharmacy in pharmaceutical application.	1.1. Acquire the ability to learn independently; articulate the importance of independent learning for future professional development	 "On-line" reading assignments Term project
CLO-3 Communicate competently with others using oral and	1: To develop critical thinking, problem solving and decision making abilities	1. Acquire positive attitudes towards further studies in the topics of physical pharmacy1.	1.1. Develop a positive attitude towards the topics of physical pharmacy1.	Term project

written English		
skills.		

ACADEMIC SUPPORT

It is The Hashemite University policy to provide educational opportunities that ensure fair, appropriate and reasonable accommodation to students who have disabilities that may affect their ability to participate in course activities or meet course requirements. Students with disabilities are encouraged to contact their Instructor to ensure that their individual needs are met.

Special Needs Section:

Tel:00962-5-3903333Extension:4209Location:StudentsAffairsDepartmentofStudentWelfareServicesEmail:amalomoush@hu.edu.jo
amalomoush@staff.hu.edu.joamalomoush@staff.hu.edu.joamalomoush@staff.hu.edu.joamalomoush@staff.hu.edu.jo

COURSE REGULATIONS

Participation

Class participation and attendance are important elements of every student's learning experience at The Hashemite University, and the student is expected to attend all classes. A student <u>should</u> <u>not miss more than 15%</u> of the classes during a semester. *Those exceeding this limit of 15% will receive a failing grade regardless of their performance*. It is a student's responsibility to monitor the frequency of their own absences. **Attendance record begins on the first day of class irrespective of the period allotted to drop/add and late registration. It is a student's responsibility to sign-in; failure to do so will result in a non-attendance being recorded.**

In exceptional cases, the student, with the instructor's prior permission, could be exempted from attending a class provided that the number of such occasions does not exceed the limit allowed by the University. The instructor will determine the acceptability of an absence for being absent. A student who misses more than 25% of classes and has a valid excuse for being absent will be allowed to withdraw from the course.

On average, students need to spend 15 hrs of study and preparation weekly. At the beginning of the lectures, be on time and don't leave before the end of the lecture without an accepted excuse. If you missed a class, it is your responsibility to find out about any announcements or assignments you have missed. For any clarification, please communicate your instructor at her posted office hours or by appointment. Listen well to the lecture, if you have a question, ask your instructor. You will find the course material at the course team after the lecture.

Plagiarism

Plagiarism is considered a serious academic offence and can result in your work losing marks or being failed. HU expects its students to adopt and abide by the highest standards of conduct in their interaction with their professors, peers, and the wider University community. As such, a student is expected not to engage in behaviours that compromise his/her own integrity as well as that of the Hashemite University.

Plagiarism includes the following examples and it applies to all student assignments or submitted work:

- Use of the work, ideas, images or words of someone else without his/her permission or reference to them.
- Use of someone else's wording, name, phrase, sentence, paragraph or essay without using quotation marks.
- Misrepresentation of the sources that were used.

<u>The instructor has the right to fail the coursework or deduct marks where plagiarism is</u> <u>detected</u>

Late or Missed Assignments

In all cases of assessment, students who fail to attend an exam, class project or deliver a presentation on the scheduled date without prior permission, and/or are unable to provide a medical note, will automatically receive a fail grade for this part of the assessment.

- Submitting a term paper on time is a key part of the assessment process. Students who fail to submit their work by the deadline specified will automatically receive a 10% penalty. Assignments handed in more than 24 hours late will receive a further 10% penalty. Each subsequent 24 hours will result in a further 10% penalty.
- In cases where a student misses an assessment on account of a medical reason or with prior permission; in line with University regulations an incomplete grade for the specific assessment will be awarded and an alternative assessment or extension can be arranged.

Student Complaints Policy

Students at The Hashemite University have the right to pursue complaints related to faculty, staff, and other students. The nature of the complaints may be either academic or non-academic. For more information about the policy and processes related to this policy, you may refer to the students' handbook.

COURSE ASSESSMENT

Course Calendar and Assessment

Students will be graded through the following means of assessment and their final grade will be calculated from the forms of assessment as listed below with their grade weighting taken into account. The criteria for grading are listed at the end of the syllabus

Assessment	Grade	Deadline
	Weighting	Assessment

First exam	25%	TBA
Second exam	25%	TBA
Quizzes- Homework	10%	TBA
Final exam	40%	TBA

Description of Exams

Test questions will predominately come from the material presented in the lectures. Semester exams will be conducted during the regularly scheduled lecture period. The exam will consist of a combination multiple-choice, short answer, match, true and false, calculation problems, and/or descriptive questions.

Homework: Will be given for the selected chapters, while the chapter in progress you are supposed to work on them continuously and submit in the announced date.

You are also expected to work on in-chapter examples, self-tests and representative number of end of chapter problems. The answers of self-tests and end of chapter exercises are given at the end of the book.

Quizzes: Announced quizzes will be given during or/and at the end of each chapter based upon the previous lectures.

No make-up exams, homework or quizzes will be given. Only documented absences will be considered as per HU guidelines.

Letter Grade	Description	Grade Points
A+	Excellent	4.00
А		3.75
A-		3.50
B+	Very Good	3.25
В		3.00
В-		2.75
C+	Good	2.50
С		2.25
C-		2.00
D+	Pass	1.75
D	Pass	1.50
F	Fail	0.00
Ι	Incomplete	-
D+ D F I	Pass Pass Fail Incomplete	1.75 1.50 0.00

Grades are not negotiable and are awarded according to the following criteria*:

WEEKLY LECTURE SCHEDULE AND CONTENT DISTRIBUTION

Note: For Physical Pharmacy 1 sections with 2 lecture periods per week (S/T or M/W), one lecture period covers 1.5 lecture hours (80 minutes). The course content specifies the sections in chapters of the reference textbooks will be included in quizzes, homework and exams.

Chanter 2	State of Matter	Week 1-3	6 lecture hours
Binding forces l	Detween molecules	<u>Week I b</u>	<u>o lecture nours</u>
The gaseous sta	te		
The liquid state			
Chapter 2	Phase equilibria and phase rule	Week 4	2 lecture hours
Systems contain	ing one component		
Two-componen	t systems containing liquid phases		
Two-componen	t systems containing solid and liquid phases: Eutectic mixtu	ires	
Three-compone	nt systems		
<u>Chapter 3</u>	Thermodynamics	<u>Week 5-6</u>	<u>3 lecture hours</u>
Thermodynan	nic system Energy		
Thermodynami	c processes		
Thermodynami	c states		
The first law of	thermodynamics		
The second law	of thermodynamics		
The third law o	f thermodynamics		
Free energy			
Chapter 4	Determination of the physical properties of molecules	Week 6-7	3 lecture hours
Additive and co	nstitutive properties		
Dielectric const	ant and induced polarization		
Permanent dipo	le moment of polar molecules		
Electromagnetic	c radiation		
Atomic and mo	lecular spectra		
Ultraviolet and	visible spectrphotometry		
Floresence and	phosphoresence		
Infrared spectro	oscopy		
Near infrared s	pectroscopy		
Electron param	agnetic and nuclear magnetic resonance spectroscopy		
Refractive index	x and molar refraction		
Optical rotation	l		
Chapter 5	Solutions	Week 8-9	4 lecture hours
Types of solutio	ns		
Concentration e	expressions		
Ideal and real s	olutions		
Raoult's Law			
Colligative prop	perties of solutions Electrolyte dissociation		
Chapter 7	Acid-base equilibria	Week 10-11	4 lecture hours
Arrhenius Theo	ry, Brönsted–Lowry Theory, Lewis Electronic Theory		
Ionization of W	eak Electrolytes		
Ionization of sa	lts		
Ionization of Po	lyprotic Electrolytes		
Ionization of W	ater		
pН			

Calculation of p	Calculation of pH								
<u>Chapter 8</u>	Buffered and isotonic solutions	Week 12-13		3 lecture hours					
Buffer Equation	n								
Buffer Capacity	ý l								
Pharmaceutical	Buffers								
Isotonic Solutions									
Measurement o	f Tonicity								
Methods of Adjusting Tonicity									
<u>Chapter 9</u>	Solubility and distribution phenomena		Week 13-14	<u>3 lecture hours</u>					
Expressions of solubility									
Solute-Solvent i	interactions								
Factors influen	cing solubility								
Solubility of gas	ses in liquids								
Solubility of liq	uids in liquids								
Solubility of sol	ids in liquids								
Partition coeffic	cient								
Apparent parti	tion coefficient								
<u>Review</u>			<u>Week 1</u>	<u>15</u>					
University Example	ms		Week 1	<u>6</u>					

ASSESSMENT RUBRICS

	Classroom Pa	articipation: Assessm	ent Criteria		
	Quality				S
Criteria	Excellent (4 points)	Good (3 points)	Satisfacto ry (2 points)	Needs Improveme nt (1 points)	C O T e
Degree to which student integrates course readings into classroom participati on	 often cites from readings; uses readings to support points; often articulates "fit" of readings with topic at hand. 	 -occasionally cites from readings; - sometimes uses readings to support points; -occasionally articulates "fit" of readings with topic at hand . 	 -rarely able to cite from readings; - rarely uses readings to support points; - rarely articulates "fit" of readings with topic at hand 	 -unable to cite from readings; -cannot use readings to support points; cannot articulates "fit" of readings with topic at hand . 	
Interaction / participati on in classroom discussions	 -always a willing participant, responds frequently to questions; - routinely volunteers point of view . 	 often a willing participant, responds occasionally to questions; occasionally volunteers point of view . 	 -rarely a willing participant, - rarely able to respond to questions; - rarely volunteers point of view . 	 -never a willing participant., - never able to respond to questions; - never volunteers point of view . 	
Interaction /participati on in classroom learning activities	 -always a willing participant; -acts appropriately during all role plays; - responds frequently to questions; - routinely volunteers point of view. 	 often a willing participant; acts appropriately during role plays; responds occasionally to questions; occasionally volunteers point of view. 	 rarely a willing participant. occasionally acts inappropriately during role plays; rarely able to respond to direct questions; rarely volunteers point of view . 	 never a willing participant often acts inappropriately during role plays. never able to respond to direct questions; never volunteers point of view. 	
Demonstra tion of professiona l attitude and demeanor	 - always demonstrates commitment through thorough preparation; - always arrives on time; - often solicits instructors' perspective outside class. 	 rarely unprepared; rarely arrives late; occasionally solicits instructors' perspective outside class. 	 often unprepared; occasionally arrives late; rarely solicits instructors' perspective outside class . 	 -rarely prepared; often arrives late; -never solicits instructors' perspective outside class 	

Classroom Participation: Oral Presentation										
Element	Excellent		Sat	Satisfactory			leeds nprovement		P o i n t s	
	8	7	6	5	4	3	2	1	0	
Organization	There of infoTitle s are in	is a logical s ormation. lide and clos cluded appro	equence ing slide opriately.	 There seque Title are in 	e is some log ence of infor slide and clos ncluded.	ical mation. sing slides	 The log inf Tite slide 	ere is little or r ical sequence ormation. le slide and/ or les are not inc	of r closing	
Slide Design (text, colors, background, illustrations, size, titles, subtitles)	 Preset and a 	ntation is att ppealing to v	ractive viewers.	 Prese appe 	entation is so aling to view	mewhat ers.	 Lit be pre- to 	le to no attem en made to ma sentation app viewers.	pt has ike ealing	
Content	 Presentation covers topic completely and in depth. Information is clear, appropriate, and accurate. 		 Prese esser Som some incor 	entation inclu ntial information e information what confus rect, or flawe	ides some tion. n is ing, ed.	 Prelitt Inf Inf 	esentation incluses le essential ormation. ormation is con ccurate, or fla	udes nfusing, wed.		
Language	 Spelling, grammar, usage, and punctuation are accurate Eluent and effective 		 There spelli and/ 	e are minor p ng, grammar or punctuatio	roblems in 7, usage, on.	 Th err gra pu Les 	ere are persist ors in spelling, immar, usage, nctuation.	ent and/or : and		
Delivery	 Fluent and effective Ideas were communicated with enthusiasm, proper voice projection and clear delivery. There was sufficient eye contact with audience. There was sufficient use of other non-verbal communication skills. 		 There was some difficulty communicating ideas due to voice projection, lack of preparation, incomplete work, and/or insufficient eye contact. Insufficient use of non-verbal communication skills. Delivery pace is somewhat appropriate 		eff Th dif ide pro wc eyr No col	ective. ere was great ficulty commu- as due to poor ojection, lack o eparation, inco rk, and/or littl e contact. use of non-ve mmunication s	nicating r voice f mplete e or no rbal kills.			

	 Appropriate delivery pace was used. 		 Inappropriate delivery pace was used. 	
Interaction with Audience	 Answers to questions are coherent and complete. 	 Most answers to questions are coherent and complete. 	 Answers to questions are neither coherent nor complete. 	
	 Answers demonstrate confidence and extensive knowledge. 	 Answers somehow demonstrate confidence and extensive knowledge. 	 Is tentative or unclear in responses. 	
	Total Score (Y x 5/16) =			