The Hashemite University

الجامعـــــــــة الهاشميـــــــــة

Faculty of Pharmaceutical Sciences

Syllabus: Physical Pharmacy 2 (131701333)
Second Semester 20.. /20..

COURSE INFORMATION	
Course Name: Physical Pharmacy 2 (face-to-face education) **Semester:**Second **Department:**Department of Department of Pharmaceutics and Pharmaceutical Technology **Faculty:** Pharmaceutical Sciences	**Course Code:** 131701333 **Section:** **Core Curriculum**: Compulsory
Day(s) and Time(s): : According to HU courses timetable/semester **Classroom:** According to HU courses timetable/semester	**Credit Hours:** 2 **Prerequisites**: Physical Pharmacy 1 (131701317)

COURSE DESCRIPTION

This course addresses the basic physicochemical principles that determine the behavior of pharmaceutical materials in different physical and biological systems related to drug formulation and delivery. Diffusion, drug release and dissolution, chemical kinetics and stability, colloidal and coarse dispersions, interfacial phenomena, rheology, and complexation are thoroughly discussed.

DELIVERY METHODS

The course will be delivered through a combination of 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	**Dr.Areen Sulaiman Alshweiat**
Academic Title:	**Assistant Professor**
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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

COURSE OBJECTIVES

After successful completion of this course student is expected to:

1. Understand and explain the physicochemical principles related to pharmaceutical systems
2. Understand the effects of the physicochemical principles on the properties of systems
3. Integrate and apply knowledge of the physicochemical principles in the development of pharmaceutical dosage forms
4. Identify, analyze, interpret, integrate and evaluate formulation and manufacturing problems related problems.
5. Determine the best storage conditions for the different dosage forms
6. Calculate the shelf life of different dosage forms
7. Develop an appropriate plan to manage and overcome inconveniences of pharmaceutical formulations and dosage forms

INTENDED LEARNING OUTCOMES

A. Knowledge and understanding

To understand the interfacial phenomena and rheological behavior of pharmaceutical systems.

A2: To understand the rationale and theory related to discussed topics and recognize their pharmaceutical application

A3: To understand the properties of pharmaceutical systems such as dispersed systems

A4: To develop knowledge about diffusion and drug release from different pharmaceutical systems

A5: To understand and explain the different mechanisms of drug breakdown and kinetics of degradation

A6: To understand and explain the different properties of pharmaceutical polymers

A7: To develop knowledge about complexations and protein binding

B. Intellectual skills

B1: To Apply information regarding discussed physical principles in designing dosage forms

B2: To develop the ability to employ the principles in solving related formulation and manufacturing problems.

B2: To Solve problems related to diffusion, drug release, dissolution, chemical kinetics, and HLB

C. Approach to practice pharmacy

C1: To implement the concepts in formulation, package, and storage of different dosage forms

C2: To deliver the patient with the best storage conditions for different dosage forms

C2: To calculate the shelf life **of** different dosage forms

D. Personal and professional development

D1: To develop critical thinking, problem solving and decision making abilities

D2: To develop the ability to utilize IT skills in gaining and presenting information

D3: To develop skills of team work and time management

STUDENT LEARNING OUTCOMES MATRIX*

Alignment matrix between the course objectives and the **course** learning outcomes (CLOs) with the **program** learning outcomes (PLOs).

Core curriculum learning outcomes	B.Sc. Pharmacy Program ILOs	Course Objectives	Course Student ILOs				Assessment Method
			A	B	C	D	
Foundational Knowledge	Learner	1-5	A.1 A.2 A.3 A.4 A.5 A.6 A.7				• Exams • Quizzes • Homework • Discussion
Essentials for Practice and Care	Caregiver Manager Provider	4-7		B.1 B.2 B.3	C.1 C.2 C.3		• Exams • Quizzes • Homework • Discussion

Approach to Practice and Care	Creative Thinker & Problem-Solver Educator	4-7		B.1 B.2 B3	C.1 C.2 C.3		• Exams • Quizzes • Homework • Discussion
Personal & Professional Development	Self-aware Leader Professional	4-7		B.1 B.2 B3	C.1 C.2 C.3	D.1 D.2 D.3	• Exams • Quizzes • Homework • Discussion

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: 00962-5-3903333 Extension: 4209

Location: Students Affairs Deanship/ Department of Student Welfare Services

Email: **amalomoush@hu.edu.jo**

amalomoush@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 should not miss more than 15% 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.**

The instructor has the right to fail the coursework or deduct marks where plagiarism is detected

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 Weighting	Deadline 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.

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

Letter Grade	Description	Grade Points
A+	Excellent	4.00
A		3.75
A-		3.50
B+	Very Good	3.25
B		3.00
B-		2.75
C+	Good	2.50

C		2.25
C-		2.00
D+	Pass	1.75
D	Pass	1.50
F	Fail	0.00
I	Incomplete	-

WEEKLY LECTURE SCHEDULE AND CONTENT DISTRIBUTION

Note: For Physical Pharmacy 2 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.

Chapter 15	**Interfacial phenomena**	**Week 1-2**	**4 lecture hours**
Surface and Interfacial Tensions			
Surface free energy			
Surface Active Agents			
Micellization			
HLB system			
Applications of surface active agents			
Measurement of Tensions			
Chapter 19	**Rheology**	**Week 3-4**	**4 lecture hours**
Pharmaceutical importance			
Types of flow			
Newtonian Systems			
Newton's Law of Flow			
Non-Newtonian Systems			
Thixotropy			
Anti-thixotropy			
Determination of Rheological Properties			
Chapter 11	**Diffusion**	**Week 5-6**	**3 lecture hours**
Pharmaceutical importance			
Fick's First Law of Diffusion			
Fick's Second Law of Diffusion			
Steady-state Diffusion			
Procedures and Apparatus For Assessing Drug Diffusion			
Diffusion driving forces			
Pharmaceutical importance			
Chapter 13	**Drug release and dissolution**	**Week 6-8**	**5 lecture hours**
Introduction			
Noyes and Whitney equation			
Hixson-Crowell Cube-Root Law			
Factors affecting dissolution			
Intrinsic dissolution rate			
Drug release from matrix			
The Higuchi model			
Biopharmaceutical classification system (BCS)			
Dissolution methods and Apparatus			

Biorelevant media				
Chapter 17+19	**Dispersed system**		**Week 9-11**	**6 lecture hours**
Classification				
Colloidal dispersions				
Properties of colloids				
Colloid stability				
Coarse dispersions				
Emulsions				
Suspensions				
Chapter 7	**Pharmaceutical polymers**		**Week 12**	**2 lecture hours**
Definitions				
Polymer properties				
General properties of polymer solution				
Interaction of polymers with solvents				
Water-soluble polymers				
Water-insoluble polymers				
Pharmaceutical applications of polymers				
Chapter 14	**Chemical kinetics and stability**	**Week 13-15**		**4 lecture hours**
Introduction				
Chemical decomposition of drugs				
Rates and orders of reactions				
Half-life and shelf life				
Determination of reaction order				
Complex reactions				
Factors influencing drug stability				
Stability testing				
Chapter 10	**Complexation and protein binding**		**Week 16**	**3 lecture hours**
Metal ion complexes				
Inclusion complexes				
Methods of analysis of complexes				
Protein binding				
University Exams			***Week 16***	