Faculty: Pharmacy	
Department: Pharmaceutics and Pharmaceutical Technology	**Program: Pharmacy**
Academic year: 2024/2025	**Semester: First**

Course Plan

First: Course Information

Course Title:	***Pharmaceutical Product Development and Manufacturing (1)***			***Course No. 1102702***	
Credit Hours:	***3***	***Theoretical:***	***2***	***Practical:***	***1***
Prerequisite:		***Section No.: 1***		***Lecture Time: Sat. 12:00 – 3:00 PM***	
Level in JNQF	***9***		***Virtual hours in the JNQF***	***150 hrs***	
Type Of Course:	☐ ***Obligatory University Requirement*** ☐ ***Elective University Requirement*** ☐ ***Obligatory Faculty Requirement*** ☐***Elective Faculty Requirement*** ■ ***Obligatory Specialization Requirement*** ☐ ***Elective Specialization requirement*** ☐***Ancillary course***				
Type of Learning:	☐ ***Face-to-Face Learning*** ■ ***Blended Learning (2 Face-to-Face + 1 Asynchronous)*** ☐ ***Online Learning (2 Synchronous + 1 Asynchronous)***				

Second: Instructor's Information

Course Coordinator:		
Name: Prof Bashar Altaani	***Academic Rank: Assistant Professor***	
Office Number: 214	***Ext. Number:***	***E-mail: baltaani@zu.edu.jo***
Course Instructor:		
Name: Prof Bashar Altaani	***Academic Rank: Professor***	
Office Number: 214	***Ext. Number:***	***E-mail: baltaani@zu.edu.jo***
Office Hours:	***To be announced***	

Third: Course Description

Pharmaceutical Development courses series is designed to enable the students to develop quality pharmaceutical dosage forms that meet international and regulators requirements. In this course, the students will learn how to develop the drug substance into the following dosage forms: Solution dosage forms such as syrup, elixir, otic, nasal ophthalmic and others preparation, Semisolid dosage forms such as ointments, pasts, cream, gel etc., aerosol dosage forms such as sprays, foam, MDI and others, modified release dosage forms, For each dosage form the student will learn its ideal properties, the used of suitable additives, method of preparation and quality control.

Fourth: Course objectives

The objectives for this course are:

1) Identify potential barriers to drug development into liquid, semisolid, or aerosol dosage forms
2) Solve the problems that may face drug development into liquid, semisolid, or aerosol dosage forms
3) Conduct drug development of drug into liquid, semisolid, or aerosol dosage forms
4) Manufacturing of the drug into liquid, semisolid, or aerosol dosage forms

Fifth: Learning Outcomes

Level descriptor according to (JNQF)	*CILOs Code*	*CILOs* If any CLO will not be assessed in the course, mark NA.	*Associated PILOs Code* *Choose one PILO for each CILO**	*Assessment method* *Choose at least two methods*	*Scores out of 100* State the total score identified for each CILO	*Minimum acceptable Score/percentage (%)* *The percentage should not be less than 50% **
Knowledge	**K1**	**Identify** the different physicochemical properties that may affect the development of a drug into liquid, semisolid, or aerosol dosage forms.	**P.K1: knowledge**	Midterm exam Final exam Assignments	20	70% (14)
	K2	**Recognize** the main stages of the drug development process into liquid, semisolid, or aerosol dosage forms.	**P. K1: knowledge**	Midterm exam Final exam Assignments	20	70% (14)
Skills	**S1**	**Solve** problems related to the design of various relevant liquid, semisolid, or aerosol dosage forms pharmaceutical dosage forms	**P. S1: Skills**	Midterm exam Final exam	15	70% (10.5)
	S2	**Distinguish** the ingredients and techniques needed in designing a quality pharmaceutical solid dosage form for a drug into liquid, semisolid, or aerosol dosage forms	**P. S2: skills**	Midterm exam Final Assignments	15	70% (10.5)
Competencies	**C1**	**Conduct** formulation development for a drug into liquid, semisolid, or aerosol dosage forms	**P.C1 competencies**	Midterm exam Final Assignments	15	70% (10.5)
Competencies	**C2**	**Solve** processing issues during manufacturing of the developed pharmaceutical product	**P. C1: competencies**	Final Assignments	15	70% (10.5)

*For each CILO, the PILO could be the same or different.

Sixth: Learning Source

Main Reference:	The Theory and Practice of Industrial Pharmacy		
Editor: Roop Khar et al	***Issue No.:***	***4th***	***Publication Year: 2017***
Additional Sources &Websites:	- **Handbook of Pharmaceutical Manufacturing Formulations** - **Pharmaceutical Dosage Forms and Drug Delivery** - **Assigned literature** - **ICH guidelines** - ***Others***		
Teaching Type:	■ ***Classroom*** ■ ***Laboratory*** □ ***Workshop*** □ ***MS Teams*** ■ ***Moodle***		

Seventh: Course Structure

Lecture Date	Intended Teaching Outcomes (CILOs)	Topics	Teaching Procedures*	Teaching Methods**	References***
Sat 19/10/2024	K2	- Course outline - Introduction to pharmaceutical liquid dosage form	Face to Face	Lecture videos	Reference 1 Reference 2 Reference 3 Assigned literature
Sat 26/10/2024	K1	Literature review of the drug physicochemical properties and formulation development	Face to Face (Practical)	• Direct teaching • Teaching through discussion • Problem solving based teaching	Assigned material
Sat 2/11/2024	K1 K2 S1 C2	Solutions dosage form development, manufacturing, and quality control (oral preparations)	asynchronous	Lecture videos	Reference 1 Reference 2 Reference 3 Assigned literature
Sat 9/11/2024	C1 C2	Pharmaceutical analysis development	Face to Face (Practical)	• Direct teaching • Teaching through discussion • Problem solving based teaching	Assigned material

Sat 16/11/2024	K1 K2 S1 S2 C2	Solutions dosage form development, manufacturing, and quality control (non-oral preparations)	asynchronous	Lecture videos	Reference 1 Reference 2 Reference 3 Assigned literature
Sat 23/11/2024	K1 C1	Physicochemical characterization of the active ingredient	Face to Face (Practical)	• Direct teaching • Teaching through discussion • Problem solving based teaching	Assigned material
Sat 30/11/2024	K1 K2 S1 S2 C2	Suspension and emulsion dosage forms development, manufacturing, and quality control	asynchronous	Lecture video	Reference 1 Reference 2 Reference 3 Assigned literature
Sat 7/12/2024	K1 S1 C1	Improvement of the properties of the active ingredient	Face to Face (Practical)	• Direct teaching • Teaching through discussion • Problem solving based teaching	Assigned material
Sat 14/12/2024	K1 K2 S1 S2 C2	Semisolid dosage form development, manufacturing, and quality control	asynchronous	Lecture video	Reference 1 Reference 2 Reference 3 Assigned literature
Sat 21/12/2024	S1 S2 C1 C2	Formulation of the drug into a pharmaceutical dosage form	Face to Face (Practical)	• Direct teaching • Teaching through discussion • Problem solving based teaching	Assigned material
Sat 4/1/2025	K1 K2 S2	Aerosol dosage form development, manufacturing, and quality control	asynchronous	Lecture videos	Reference 1 Reference 2 Reference 3 Assigned literature
Sat 11/1/2025	S1 S2 C1 C2	Packaging selection and specification development of the pharmaceutical product	Asynchronous (Practical)	Problem-solving based teaching	Assigned material
Sat 18/1/2025	C1 C2	Quality control testing of the pharmaceutical product	Face to Face (Practical)	Lecture videos	Reference 1 Reference 2 Reference 3 Assigned literature

Teaching procedures: (Face-to-face, synchronous, asynchronous). * * Teaching methods: Lecture, video…..). ***
Reference: Pages of the book, recorded lecture, video….)

Eighth: Assessment methods

Methods	Online Learning	Blended Learning	Face-To-Face Learning	Specific Course Output to be Assessed *State the score identified for each CILO for each method of assessment out of 100 **If any CILO will not be assessed in the course, mark NA.											
				K1	K2	S1	S2	S3	S4	S5	C1	C2	C3	C4	C5
Mid-term Exam			30	**6**	**8**	**2**	**4**				**5**	**5**			
Final Exam			40	**8**	**8**	**5**	**6**				**6**	**7**			
Assignment 1			5	**2**		**1**	**2**								
Assignment 2			5	**1**	**1**	**2**									
Assignment 3			5		**1**	**2**					**1**	**1**			
Lab reports			15	**3**	**2**	**3**	**3**				**3**	**2**			
Total out of 100			100	**20**	**20**	**15**	**15**				**15**	**15**			

***Refer to document (CC-2023-03)**

Ninth: Course Policies

- All course policies are applied on all teaching patterns (online, blended, and face-to-face Learning) as follows:
  a. Punctuality.
  b. Participation and interaction.
  c. Attendance and exams.
- Academic integrity: (cheating and plagiarism are prohibited).
- Meeting the deadline for the lecture.
- Commitment to interaction and participation.
- University regulations for attendance and absence from lectures and examinations are in force.
- Academic Integrity: According to university regulations and instructions, fraud or moral impersonation is unacceptable and punishable.

Approval	Name	Date	Signature
Head of Department	Dr. Randa Mansour	2024/10/07	
Faculty Dean	Dr. Ahlam Alkilani	2024/10/07