



<b>Faculty: Pharmacy</b>	
<b>Department: Pharmaceutical Sciences</b>	<b>Program: Master</b>
<b>Semester: 1<sup>st</sup></b>	<b>Academic year: 2021/2022</b>

## Course Plan

### First: Course Information

<i>Course Number: 1101702</i>	<i>Course Name: Pharmaceutical technology</i>	<i>Credit Hours: 3</i>
<i>Prerequisite: -</i>	<i>Section Number: Pharmaceutical sciences</i>	<i>Lecture Time: 4:30-7:30 pm</i>
<b>Course Nature:</b>	<input type="checkbox"/> <i>University Obligatory Requirements</i> <input type="checkbox"/> <i>Department Obligatory Requirements</i> <input type="checkbox"/> <i>Academy Obligatory Requirements</i> <input type="checkbox"/> <i>Supporting Specialization Requirements</i> <input type="checkbox"/> <i>Department Elective Requirements</i>	
<b>Type of Education:</b>	<input type="checkbox"/> <i>Fully Direct (Fully Face-to-Face Education)</i> <input type="checkbox"/> <i>Blended Learning (2 Face-to-Face + 1 Asynchronous)</i> <input type="checkbox"/> <i>Fully Electronic Education (2 Synchronous + 1 Asynchronous)</i>	

### Second: lecturer's Information

<i>Name: Samer Adwan</i>	<i>Academic Rank: Assistant Professor</i>	
<i>Office Number: 210D</i>	<i>Telephone Ext: 1585</i>	<i>Email: sadwan@zu.edu.jo</i>
<b>Office Hours:</b>	<i>Sunday Monday Tuesday Wednesday Thursday</i> <i>To be announced</i>	

### Third: Brief Description of the Course

This course covers the fundamentals of drug delivery systems and novel dosage form design. It starts by providing the students with the basic knowledge of drug delivery in addition to technologies, different approaches and factors affecting the design of novel delivery systems. The course also emphasizes the diverse dosage form designs intended for different routes of administration as oral, transdermal, ophthalmic, and nasal routes. The use of different drug carriers (as liposomes, and micro- & nano- carriers) for drug targeting will be illustrated.

#### Fourth: Learning Sources

<b>1. Textbook:</b>	Pharmaceutics, the Science of dosage form design		
<b>Author:</b> Michael E. Aulton	<b>Edition:</b> 5 <sup>th</sup>	<b>Year:</b> 2018	
<b>References</b>	2. Martin's Physical Pharmacy and Pharmaceutical Sciences; 7 <sup>th</sup> edition 2017, Patrick J. Sinko, Lippincott Williams & Wilkins 3. Hillery, A.M., Lloyd, A.W., & Swarbrick, J. (Eds.). (2001). Drug Delivery and Targeting: For Pharmacists and Pharmaceutical Scientists (1st ed.). CRC Press. <a href="https://doi.org/10.1201/b12801">https://doi.org/10.1201/b12801</a>		
<b>Teaching Type:</b>	<input type="checkbox"/> Classroom	<input type="checkbox"/> Laboratory	<input type="checkbox"/> Workshop
	<input type="checkbox"/> MS Team	<input type="checkbox"/> Moodle	<input type="checkbox"/>

#### Fifth: Learning Outcomes

<i>Course Learning Outcomes</i>		<i>Program Learning Outcome Code</i>
<i>Code</i>	Knowledge	
K1	Learning the most updated research methods to find research articles	P.K1
K2	Posses knowledge and understanding of scientific subjects and challenges	P.K2
C1	Read, write, understand, interpret and criticize research article	P.C1
C2	Suggest ideas and write research proposals in the assigned area of pharmaceutical sciences	P.C2
C3	Engage in innovative activities by using creative thinking to envision better ways of accomplishing professional goals.	P.C3
S1	The student should be able to Play his/ her role efficiently either as an independent researcher or part of a research team	P.S1
S2	Actively participate and engage as a member of pharmaceutical community by demonstrating mutual respect, understanding.	P.S2
S3	Effectively communicate verbally and nonverbally when interacting with an individual, group, or organization.	P.S3

#### Six: Course Calendar

Lecture Date	Learning Outcome	Topics	Learning Procedure *s	Teaching *Methods
18/10/2021	K1, K2, C1, C2, C3	<b>Introduction</b> <ul style="list-style-type: none"> <li>- Preformulation and product development</li> <li>- Pharmaceutical polymers</li> <li>- Polymer properties and classification</li> </ul>	Direct	Lecture
25/10/2021	K1, K2, C1, C2, C3	<b>Implantable devices</b> <ul style="list-style-type: none"> <li>- Introduction</li> <li>- Modified drug release</li> <li>- Non-degradable polymeric implants</li> <li>- Biodegradable polymeric implants</li> <li>- Implantable pumps</li> </ul>	Direct	Lecture
1/11/2021	K1, K2, C1, C2, C3	<b>In situ forming implants</b> <ul style="list-style-type: none"> <li>- Solvent induced phase inversion implants</li> <li>- Thermoresponsive systems</li> <li>- pH responsive systems</li> </ul>	Direct	Lecture
8/11/2021	K1, K2, C1, C2, C3	<b>Particulate systems and nanotechnology</b> <ul style="list-style-type: none"> <li>- Introduction</li> <li>- Physical properties and characterization</li> </ul>	Direct	Lecture
15/11/2021	K1, K2, C1, C2, C3	<ul style="list-style-type: none"> <li>- Polymer-based particulate systems</li> <li>- Polymeric nanoparticles</li> </ul>	Direct	Lecture

		<ul style="list-style-type: none"> <li>- Micelles</li> </ul>		
22/11/2021	K1, K2, C1, C2, C3	<ul style="list-style-type: none"> <li>- Lipid-based particulate systems</li> <li>- Solid lipid nanoparticles</li> <li>- Liposomes</li> <li>- Nanoemulsions</li> </ul>	Direct	Lecture
29/11/2021	K1, K2, C1, C2, C3	<p><b>Topically applied systems and technologies</b></p> <ul style="list-style-type: none"> <li>- Introduction</li> <li>- Transdermal patches</li> <li>- Microneedles</li> </ul>	Direct	Lecture
6/12/2021	K1, K2, C1, C2, C3	<ul style="list-style-type: none"> <li>- Physical technologies</li> <li>- Laser</li> <li>- Sonophoresis</li> <li>- Iontophoresis</li> </ul>	Direct	Lecture
13/12/2021	K1, K2, C1, C2, C3	<p><b>Orally controlled systems</b></p> <ul style="list-style-type: none"> <li>- Introduction</li> <li>- Classification</li> <li>- Dissolution controlled systems</li> <li>- Diffusion controlled systems</li> <li>- Osmotically controlled systems</li> <li>- Miscellaneous forms</li> </ul>	Direct	Lecture
20/12/2021		<p><b>Seminars</b></p> <ul style="list-style-type: none"> <li>- Student presentations and discussion</li> </ul>	Direct	Class room discussion, group discussion

27/12/2021	C1, C2, C3, S2, S3	<b>Seminars</b> - Student presentations and discussion		
3/1/2022		<b>Seminars</b> - Student presentations and discussion		
10/1/2022		<b>Seminars</b> - Student presentations and discussion		
17/1/2022		<b>Seminars</b> - Student presentations and discussion		

## Seventh: Assessment methods

Methods	Fully Electronic Education	Blended Learning	Direct Teaching	The course outcomes that are measured
First Exam	0	0	20	measured
Second Exam	0	0	20	measured
Mid-term Exam	30	30	30	√

Participation	0	10	30	√
Asynchronous Meetings	30	20	0	
Final Exam	40	40	40	√

## Eighth: Course Polices

Course policies are applied in all types of education (electronic learning, blended learning, & face-to-face learning) as follows:

- 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: Fraud or moral impersonation are unacceptable and are punishable according to university regulations and instructions.
- Interactive lectures will be given through a platform (MS Teams).
- Assignments and Quizzes will be given through a platform (Moodle).
- Commitment to the right appearance in front of the camera with the proper background.
- Exams will be given face to face on campus.

Approval	Name	Date	Signature
Head of Department			
Faculty Dean			