1	Course title	**Practical Pharmaceutical Technology I**
2	Course number	**1212332**
3	Credit hours (theory, practical)	**1 (Practical)**
	Contact hours (theory, practical)	**3 (practical)**
4	Prerequisites/co-requisites	**Pharmaceutical Technology I (*1212331)***
5	Program title	**BSc Pharmacy & PharmD**
6	Program code	**1212332**
7	Awarding institution	**The University of Jordan**
8	Faculty	**Pharmacy**
9	Department	**Department of Pharmaceutics and Pharmaceutical Technology**
10	Level of course	**Undergraduate**
11	Year of study and semester (s)	**First Semester of the 3rd year**
12	Final Qualification	**Pharmacist & PharmD**
13	Other department (s) involved in teaching the course	**NA**
14	Language of Instruction	**English**
15	Date of production/revision	**31 January 2016**

16. Course Coordinator:

Office numbers, office hours, phone numbers, and email addresses should be listed.

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Monday:	***1pm - 3pm***
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Wednesday:	***1pm - 3pm***

17. Other instructors:

Office numbers, office hours, phone numbers, and email addresses should be listed.

Dr. Sammer Abu Lateefeh, PhD.
Office:
Phone:
E-mail:
Office hours:

Pharmacist Ammer Albdlhafez, BSc
Office:
Phone:
E-mail:
Office hours:

18. Course Description:

As stated in the approved study plan.

The series of practical classes provides advanced skills in the area of pharmaceutical technology and has particular emphasis on the methods, materials and testing procedures associated with the manufacture of pharmaceutical grade tablets. Experiments illustrate the flow properties of powders, mixing and milling of powders, wet and dry granulation methods, powder particle size analysis, evaluation of granules flow properties, studying the effect of excepients on granules flow properties, quality control tests, tableting technology, and dissolution of dosage forms.

19. Course aims and outcomes:

A- Aims:

1. ***To be able to conduct pre-formulation studies***
2. ***To recognize various processes and equipment used in the unit operation: particle size analysis, size reduction, mixing and drying.***
3. ***To understand the consolidation process of solid dosage forms and the operation of tablet presses.***
4. ***To recognize various manufacturing methods for solid dosage forms***
5. ***To recognize the ingredients used in the formulation of solid dosage forms***
6. ***To evaluate physical and release properties of solid dosage forms***
7. ***To recognize the problems encountered during the manufacturing of solid dosage forms.***

B- Course Intended Learning Outcomes (ILOs):

Upon successful completion of this course students will be able to …

a. Knowledge and understanding:

1. To be able to describe the commonly used equipment used in the operation unit: particle size analysis, size reduction, mixing and drying.
2. To be able to operate some equipment used in size reduction, mixing and drying.
3. To be able to describe the consolidation process of powders and the operation of equipment used for solid powder consolidation.
4. To recognize various manufacturing process for solid dosage forms with their advantages, utility, and limitations: wet granulation, double compression or slugging and direct compression.
5. To know the categories of inactive ingredient used in the manufacturing of solid dosage forms, the function of each category and examples of each category.
6. To know various problems encountered during the manufacturing of solid dosage forms, such as capping, weight variation, and sticking, and the possible remedies for each problem.
7. To be able to perform quality control tests for the intermediate and final solid dosage forms. These tests include compressibility, flow rate, weight variation, friability, hardness, disintegration and dissolution.
8. To be able study and evaluate physical and release properties of solid dosage forms.

b. Intellectual skills:

1. To be able to analyze and present the data obtained from the unit operation unit, such as particle size analysis after size reduction.
2. To be able to suggest formulations and manufacturing procedure for solid dosage forms.
3. To be able to suggest remedies for the problems encountered during the manufacturing of solid dosage forms.

c. Subject-specific skills:

1. Deductive reasoning
2. Numerical Analysis
3. Written/oral communication
4. Information retrieval and analysis
5. Practical application of theory
6. Report writing

d. Transferable skills

1. To gains knowledge and analytical skills to work with people in pharmaceutical firms.
2. To have the ability for quick adaptation to the working environment in pharmaceutical firms
3. To have the ability to deal with and suggest solutions to the problems encountered during the manufacturing process of pharmaceutical dosage forms in pharmaceutical firms.

C. Program Competencies Achieved:

3.2 Recognize the role of pharmaceutical excipients and their uses in drug formulations
3.3 Characterize various pharmaceutical dosage forms
3.4 Identify formulation principles and product development stages
3.5 Recognize various pharmaceutical manufacturing processes
3.6 Demonstrate the ability to perform pharmaceutical calculations
3.7 Comply with principles of good manufacturing practice (GMP) and good laboratory practice (GLP)
3.8 Recognize quality assurance principles
3.9 Recognize quality control principles
3.11 Identify analytical method development and validation used in pharmaceutical analysis
3.12 Demonstrate the ability to perform proper documentation
3.13 Identify the general principles of environmental control within pharmaceutical manufacturing sites

20. Topic Outline and Schedule:

Topic	*Week*	*Instructor*	*Achieved ILOs*	*Evaluation Methods*	*Reference*
Orientation (Introduction to General Laboratory Instructions)	1	Section Instructor*	C3-6	Oral Discussion, Practical Sessions Evaluation	Laboratory Manual
How to Prepare Laboratory Log-Book?	2	Section Instructor*	d1 & 2, c3	Log-Book	Instructor
Powder Mixing	3	Section Instructor*	a1-3, b1, c1-6,d1	Oral Discussion, Reports, Exams	Laboratory Manual, General References provided below
Size Reduction of Powder	4	Section Instructor*	a1-3,b1, c1-6, d1	Oral Discussion, Reports, Exams	Laboratory Manual, General References provided below
Granulation of Powder	5	Section Instructor*	a1-4, c1-6	Oral Discussion, Reports, Exams	Laboratory Manual, General References provided below
USP Dissolution Methods of Paracetamol Tablets	6	Section Instructor*	a1, 7, & 8	Oral Discussion, Reports, Exams	Laboratory Manual, General References provided below
Midterm exam	7				
Characterization of Granules Flow Properties	8 & 9	Section Instructor*	a3 & 7, c1-6	Oral Discussion, Reports, Exams	Laboratory Manual, General References provided below
Effect of Additives on Flow Properties	10	Section Instructor*	a5, b2&3, c1-6	Oral Discussion, Reports, Exams	Laboratory Manual, General References provided below
Quality Control Tests	11	Section Instructor*	a6-8, c1-6	Oral Discussion, Reports, Exams	aLaboratory Manual, General References provided below
Tablets Preparation and Testing	12 & 13	Section Instructor*	a5-8, b2 & 3, c1-6, d1-3	Oral Discussion, Reports, Exams	Laboratory Manual, General References provided below
Final exam	14				

* Sections (1 & 2) instructor: Suha Al Muhaissen, Section (3) instructor: Dr. Samer & Ph. Amer

21. Teaching Methods and Assignments:

Development of ILOs is promoted through the following teaching and learning methods:

ILO/s	Teaching and Learning Method/s	Evaluation Method/s
a1-8	Practical Sessions (Experiments), Lecturing, Oral Discussion	Student Evaluation, Reports, Exams
b1-3	Practical Sessions (Experiments), Lecturing	Log-Book, Reports, Exams
c1-6	Practical Sessions (Experiments), Oral Discussion	Reports, Home Work, Exams
d1-3	Practical Sessions (Experiments), Oral Discussion	Reports, Log-Book

Learning Skills:

1. *Critical thinking*
2. *Digital literacy*
3. *Problem-solving skills*
4. *Self-directed learning*
5. *Scientific reasoning*
6. *Communication skills*
7. *Team and group working*

22. Evaluation Methods and Course Requirements:

Opportunities to demonstrate achievement of the ILOs are provided through the following assessment methods and requirements:

1. ***Reports and HomeWorks***
2. ***Evaluation on Practical Sessions***
3. ***Log-Book Preparations***
4. ***Exams***

23. Course Policies:

A- Attendance policies:

Attendance: Mandatory.

First Warning: *with 1 absence*

Last Warning: *with 2 absences*

Failing in the Subject: *with 3 absences*

NB: University Regulation Applied

B- Absences from exams and handing in assignments on time:

Will result in zero achievement unless health report or other significant excuse is documented.

C- Health and safety procedures:

General Laboratory Safety Instruction are maintained

D- Honesty policy regarding cheating, plagiarism, misbehavior:

The participation, the commitment of cheating will lead to applying all following penalties together

1. ***Failing the subject he/she cheated at***

2. ***Failing the other subjects taken in the same course***
3. ***Not allowed to register for the next semester. The summer semester is not considered as a semester***

NB: University Regulation Applied

E- Grading policy:

Reports	***10 points***
Log-Book	***10 points***
Evaluation	***10 points***
Midterm Exam	***30 points***
Final Exam	***40 points***
Total	***100 points***

F- Available university services that support achievement in the course:

a. ***Laboratory Room***
b. ***Internet access at different Computer Rooms***
c. ***Computers to prepare materials and print outs at different Computer Rooms***

24. Required equipment:

All Equipment; devices, tools, instruments, and glassware required to perform assigned experiments

25. References:

A- Required book (s), assigned reading and audio-visuals:

1. ***Laboratory Manual (****Practical Pharmaceutical Technology I Manual****)***
2. ***USP Monograph for Acetaminophen***

B- Recommended books, materials, and media:

- ***Pharmaceutics: The Science of Dosage Form design (M.E.Aulton, latest edition)***
- ***Pharmaceutical Dosage Forms: Tablets (1:3) (Leiberman and Lachman eds)***
- ***British Pharmacopeia***
- ***United States Pharmacopeia***

26. Additional information:

NA

Name of Course Coordinator: ***Suha Al Muhaissen***	Signature:	Date: Jan. 31, 2016
Head of curriculum committee/Department:	Signature:	
Head of Department:	Signature:	
Head of curriculum committee/Faculty:	Signature:	
Dean:	Signature:	

Copy to:
Head of Department
Assistant Dean for Quality Assurance
Course File