Philadelphia University
Faculty of Pharmacy
Department of Pharmaceutical Sciences
Second Semester, 2017/2018

Course Syllabus

Course Title: Industrial Pharmacy	**Course code:** 0510426
Course Level: 4th Year	**Course prerequisite (s) and/or corequisite (s):** Pharmaceutics (II) 0510323
Lecture Time: Sun,Tue,Thur: 10:10-11 12:10-1 Mon,Wed 8:15-9:45 11:15-12:45	**Credit hours:** 3 hours

Academic Staff Specifics

Name	**Rank**	**Office Number and Location**	**Office Hours**	**E-mail Address**
Dr. Meriem Rezigue	Assistant professor	517 Faculty of pharmacy	To be announced	To be announced

Course description:
This course will introduce the student to the basic concepts of particle sizing, its importance in pharmaceutical technology and methods used to either achieve that or measure it. Pharmaceutical industrial process will be discussed in some details like drying, mixing, filtration and powder fluidity. The student will apply the knowledge to the pharmaceutical technology methods used in formulating and pre-formulating of several dosage forms.

Course objectives:
Pharmaceutical Technology module is a three hours course which aims at providing the student with a broad understanding of industrial pharmacy principles that govern the production of drugs dosage forms. The course will provide the student with basic knowledge and understanding of the different machines and techniques used for the formulation of dosage forms. It relates the basic scientific background to pharmaceutical industry.

Teaching methods:
Lectures, discussion groups, tutorials, problem solving, debates, etc.

Learning outcomes:

- **Knowledge and understanding**

The student by the end of this module should be able to:

1. Understand pharmaceutical operations in industrial pharmacy regarding unit operations including particle size reduction, mixing, drying and filtration/centrifugation.
2. Learn scientific terms related to the processes of drug manufacturing.
3. Understand the behavior of pharmaceutical powders in static and dynamic conditions.
4. Understand the basis of powder flow, its characterization and relation to the manufacture of solid dosage forms.
5. Gain knowledge related to the concept of particle size, particle size measurement and its relevance to the drug manufacture and performance.
6. Describe pharmaceutical equipment and apparatus used in the pharmaceutical production and problems rising with their use.

- **Cognitive skills (thinking and analysis).**

The student should be able by the end of this semester to

1. Differentiate between, and accordingly choose, techniques and machines used to formulate a certain dosage forms and drug delivery system.
2. Be able to describe the mechanism of actions in which the machines operate. Identify and solve problems arising from performing certain unit operations which affects subsequent one(s).
3. Compare between different methods used to evaluate powder flowability in order to select suitable methods for specific situations.
4. Perform calculation and data analysis related to particle size analysis and powder flow assessment.

- **Communication skills (personal and academic).**

1. Be able to represent and explain various issues related to the pharmaceutical operations in industrial manufacture of drug products.
2. Demonstrate ability to prepare relevant reports in a clear systematic way.
3. Be able to Adapt and accommodate team working.
4. Access resources related to the description and application of the methods used for various unit operations.

- **Practical and subject specific skills (Transferable Skills).**

1. Represent data in tabular and graphical manners .
2. Perform good analysis for the represented data, and calculate related statistical values .

3. Come out with the best interpretation and understanding of machinery-produced data and graph sheets.
4. Be able to search and extract relevant information from literature.

Course components

- **Books (title, author (s), publisher, year of publication)**

Aulton's Pharmaceutics: The Design and Manufacture of Medicines, Edit.: Michael E. Aulton and Kevin M. G. Taylor. Pub.: Churchill Livingstone, 4nd edition, 2013. ISBN: 978-0-7020-4290-4

Allocation of Marks	
Assessment Instruments	**Mark**
First examination	**20**
Second examination	**20**
Final examination:	**40**
Reports, research projects, Quizzes, Home works, Projects	**20**
Total	**100**

Documentation and academic honesty

- Documentation style (with illustrative examples)

  Documentation will be done on every experiment the student does.

- Protection by copyright.
  This will be taught to students during the course.

- Avoiding plagiarism.

Course academic calendar

week	Basic and support material to be covered	Homework / reports and their due dates
(1)	**Particle size analysis:** Importance. Equivalent diameters. Particle size distribution.	
(2)	Statistics related to particle size. Methods of particle size analysis.	
(3)	**Size reduction**: Objectives. Influence of material properties. Energy requirements. Effect of size reduction on size distribution. Methods of size reduction.	
(4)	Methods of size reduction.	
(5)	**Mixing:** Importance. Definition and objectives. Types of mixtures. Mixing process and its mathematical treatment. Evaluation of degree of mixing.	
(6) **First examination**	Mechanisms of mixing. Powder segregation Ordered mixing.	
(7)	Equipments of powder mixing. Equipments of liquids mixing Equipments of semisolids mixing.	
(8)	**Powder flow:** Measurement of adhesion and cohesion. Particle properties and bulk flow.	
(9)	Packing geometry. Flow through an orifice. Mass and funnel flow.	
(10)	Characterization of Powder Flow. Improvement of Powder Flow.	
(11) **Second examination**	**Drying:** Moisture content of wet solids. Loss of water from wet solids.	
(12)	Types of drying methods Rate of drying in fixed beds.	
(13)	Convective drying. Conductive drying. Radiation drying.	

(14)	Dryers for dilute solutions and suspensions. Freeze drying. Solute migration during drying.	
(15)	**Clarification:** Filtration. Centrifugation	
(16) **Final Examination**	Final Exam Week	

Expected workload:
On average students need to spend 2 hours of study and preparation for each 50-minute lecture/tutorial.

Attendance policy:
Absence from lectures and/or tutorials shall not exceed 15%. Students who exceed the 15% limit without a medical or emergency excuse acceptable to and approved by the Dean of the relevant college/faculty shall not be allowed to take the final examination and shall receive a mark of zero for the course. If the excuse is approved by the Dean, the student shall be considered to have withdrawn from the course.

Module references
1. Ansels Pharmaceutical Dosage Forms and Drug Delivery Systems (Paperback) by Loyd V., Jr. Allen, Nicholas G. Popovich, Howard C. Ansel, Loyd V. Allen, Publisher: Lippincott Williams & Wilkins; 8th edition (August 3, 2004) ISBN: 0781746124

2. Modern Pharmaceutics
by Gilbert S. Banker (Editor), Christopher T. Rhodes (Editor) 4th edition (June 15, 2002), Marcel Dekker; ISBN: 0824706749

3. Merck Index: An Encyclopedia of Chemicals, Drugs, & Biologicals
by Merck, Co, Maryadele J. Oneil (Editor), Ann Smith (Editor) 13th edition (October 2001), Merck & Co; ISBN: 0911910131

4. The Theory and Practice of Industrial Pharmacy
by Leon Lachman, Herbert A. Lieberman, Joseph L. Kanig. 3rd edition (August 1986), Lea & Febiger; ISBN: 0812109775

5. Physical Pharmacy: Physical Chemical Principles in the Pharmaceutical Sciences
by Alfred Martin, Pilar Bustamante, A.H.C. Chun (Illustrator)
622 pages 4th edition (January 15, 1993), Lea & Febiger; ISBN: 0812114388

6. Handbook of Pharmaceutical Excipients
by Arthur H. Kibbe (Editor), Ainley Wade, Paul J. Weller
665 pages 3rd edition Vol 3 (January 15, 2000), Amer. Pharmaceutical Assoc.; ISBN: 091733096X

7. Remington: The Science and Practice of Pharmacy by David B. Troy (Editor), Publisher: Lippincott Williams & Wilkins; 21st edition (May 28, 2005) ISBN: 0781746736

Websites
http:// www.Philadelphia.edu.jo/pharmacy/resources.html