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

Course syllabus

Course Title: Advanced Pharmaceutical Technology	**Course code: 0510543**
Course Level: 5 th year	**Course prerequisite : Industrial Pharmacy (0511426)**
Lecture Time: **Sunday / Tuesday / Thursday Class 1 10.10-11:00** **Monday / Wednesday Class 2 12.10-13:00** **Class 3 09:45-11:15**	**Credit hours: 3 hours**

Instructor

Name	Rank	Office Number and Location	Office Hours	E-mail Address
Dr. Randa Mansour	Assistant professor	531	11-12 Every day	r.mansour@philadelphia.edu.jo

Course description :

After completion of Industrial pharmacy and its fundamentals, Pharmaceutical Technology is a major requirement module which has a reflective, interactive and analytical contextual focus, will provide a comprehensive and sound understanding of the theory and practice of pharmaceutical technology and to appreciate the various processes; batch or continuous, that are available. The importance of the technology process in producing good quality products will be emphasized. The modern techniques of production of tablets and capsules will be covered. A pragmatic approach will be adopted throughout. The Course will examine current compression theory and practice in details. The course will discuss the basic concepts of pharmaceutical preformulation.

Course objectives:

This course aims to provide students with fundamental understanding of principles of Pharmaceutical powder compaction and industrial pharmacy principles that govern the production of drug dosage forms for both tablets and capsules. The course will provide students with basic knowledge and understanding of the different machines and techniques used for the formulation of these dosage forms. It enriches students with the scientific knowledge of pharmaceutical industry.

This course will carry on teaching the students more concepts in industrial pharmacy like granulation, tablet manufacturing, tablet Excipient, tablet testing and coating, hard and soft capsules production, sustained release dosage forms along with the basic concepts of pharmaceutical preformulation .

Course/ module components

- **Books**

  1. Aulton's Pharmaceutics: The Design and Manufacture of Medicines, Edit.: Michael E. Aulton and Kevin M. G. Taylor. Pub.: Churchill Livingstone, 4nd edition, 20013. ISBN: 978-0-7020-4290-4

Teaching methods:

Lectures (interactive; group discussion), Numerical problems and identification of some pharmaceutical compounds related to some topics will be discussed in the class.

Learning outcomes:

Knowledge and understanding

Upon completion of this course students will be able to:

a. Learn scientific terms related to the processes of drug manufacturing and drug release.
b. Gain knowledge related to basis of the production of solid dosage forms, tablets and capsules.
c. Describe pharmaceutical equipment and apparatus used in the pharmaceutical production of tablets, hard gelatin capsules and softgels.
d. Get detailed knowledge on compression machinery and some of the compression problems that can arise and how they can be overcome.
e. Understands the basis, techniques and interpretation of the quality control of the solid pharmaceutical preparations.
f. Understand the fundamental principles of granulation and the advantages, disadvantages and potential of the various granulations, layering, spray drying, extrusion and spheronisation methods.
g. Understand the techniques and processes available for granulation in relation to controlled release products.
h. Get a good knowledge on the mechanisms of drug release from

Cognitive skills (thinking and analysis)

a. Differentiate between, and accordingly choose, techniques and machines used to prepare solid dosage forms.
b. Be able to select suitable production techniques for specific situations.
c. Be able to describe the mechanism of actions in which the machines operate.
d. Identify and solve problems arising in the pharmaceutical preparation of solid dosage forms.
e. Perform calculation, data analysis an interpretation related to quality control testing of solid dosage forms.

Communication skills (personal and academic).

a. Be able to represent and explain various issues related to the pharmaceutical preparation of solid dosage forms.
b. Demonstrate ability to prepare relevant reports in a clear systematic way.
c. Be able to Adapt and accommodate team working.
d. Access resources related to the description and application of the methods used for various unit operations.

Transferable Skills

a. Represent data in tabular and graphical manners.
b. Perform good analysis for the represented data, and calculate related statistical values.
c. Come out with the best interpretation and understanding of machinery-produced data and graph sheets.
d. Be able to search and extract relevant information from literature.

Assessment instruments

- In-class quizzes
- Homework assignments
- Short reports and/ or presentations, and/ or Short research projects

- Examination: marks

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)***

Whenever applicable, students should conduct their assignments themselves whether individually or in a group work referencing all information, data, figures and diagrams taken from literature. The references should be given according to the acceptable format.

- ***Protection by copyright***

Students should realize that some published information or data are the property of their authors and they are not allowed to use it without asking permission from the originators.

- ***Avoiding plagiarism.***

Plagiarism is the unauthorized use or close imitation of the language and thoughts of another author and the representation of them as one's own original work, without proper acknowledgment of the author or the source. Students must pursue their studies honestly and ethically in accordance with the academic regulations. Cheating in exams and plagiarism are totally unacceptable and those who, intentionally, commit such acts would be subjected for penalties according to the University regulations.

Course academic calendar

week	Basic and support material to be covered
(1)	**Introduction** **Granulation:** Powders and granules Reasons for granulation
(2 &3)	Methods of granulation: Dry granulation and Wet granulation Effect of granulation method on granule Structure Granulation mechanisms Mechanisms of granule formation Pharmaceutical granulation equipments
(4 & 5)	**Pharmaceutical powder compaction technology:** Quality attributes of tablets Tablet manufacturing Stages in tablet formation Tablet presses and Instrumentation of tablet presses
(6)	Technical problems during tabletting Tablet production via granulation Tablet production by direct compaction Tablet Excipient
(7) **First examination**	Tablet types Tablet testing
(8)	**Sustained release dosage forms**
(9)	**Coating of tablets and multiparticulates:** Definition and Types of tablet coating Reasons for coating tablets **Film coating:** Process description ,Coating suspension formulation Ideal characteristics of a film coating , Types of polymer available , Plasticizers ,Colorants ,Solvents , Process details and Basic requirements ,Ideal characteristics of film-coated tablets , coating faults **Sugar coating:** Stages , Process details ,Ideal characteristics of sugar-coated tablets , Coating faults , Press coating
(10)	Functional coatings: Controlled-release coatings Types of multiparticulate Extruded/spheronized granulates Mechanisms of drug release from multiparticulates Enteric coating Standards for coated tablets
(11 , 12 & 13) **Second examination**	**Hard gelatin capsules:** Introduction Raw materials , Manufacture and Formulation **Soft gelatin capsules:** Description Rationale for the selection of gelatin capsules as a dosage form Manufacture and formulation of gelatin capsules and quality considerations
(14 & 15)	**Pharmaceutical Preformulation:** The physicochemical properties of drug substances Spectroscopy , Solubility ,Melting point , Assay development Drug and product stability , Stability assessment ,Powder flow properties , Compression properties and Excipient compatibility **In Vitro- In Vivo Correlation : Importance of Dissolution in IVIVC**
(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.

Other References

- **Books**

  Students will be expected to give the same attention to these references as given to the course textbook(s)

  1. Martin's Physical Pharmacy and Pharmaceutical Sciences By : Patrick J. Sinko**,** Lippincott Williams & Wilkins , 2006, 5th Edition

  2. Modern Pharmaceutics
  by Gilbert S. Banker (Editor), Christopher T. Rhodes (Editor) 4th edition (June 15, 2002), Marcel Dekker; ISBN: 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 Alfonso R. Gennaro (Editor) 20th edition (December 15, 2000), Lippincott, Williams & Wilkins; ISBN: 0683306472

  Website(s):

  http://www.philadelphia.edu.jo/pharmacy/resources.html