Hashemite University
Faculty of Pharmaceutical Sciences
Department of Pharmaceutics and Pharmaceutical Technology

Semester: First **Year: 2021/2022**

Course Information	
Course Title	Industrial Pharmacy 1
Course Number	131701436
Credit Hours	2
Prerequisites	131701333

Instructor	
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Course Description

This course discusses the necessary technological concepts for processing of pharmaceutical powders (size analysis, reduction and separation as well as mixing, powder flow, granulation and drying). The course also covers the manufacturing, formulation, and quality requirements for tablets.

Course Objectives

This course tends to give student theoretical knowledge (including processes, machinery, materials, formulation, standards and quality requirements) about the covered topics, which are related to manufacturing of different pharmaceutical dosage forms.

Intended Learning Outcomes

After successful completion of this course student is expected to :

A- Knowledge and understanding

A1: To be able to describe and distinguish the commonly used equipment for different discussed processes: particle size analysis, size reduction, size separation, mixing, powder flow, granulation, drying and tableting.

A2: To understand the mechanisms related to different processes such as milling, mixing, intra-granular bonding.

A3: To know the categories of additives used in the manufacturing of tablets, the function of each category and examples of each category.

A4: To know various problems encountered during the manufacturing of solid dosage forms, such as capping, weight variation, and sticking, and the possible solution for each

problem.

A5: To know the different types of tablets (e.g. disintegrating, chewable, lozenges, etc.) and the principle of their formulation.

A6: To know the quality control tests for the intermediate (powder mixes and granules) and final solid dosage forms (tablets). These include tests to assess mixture uniformity, flowability, weight variation, friability, hardness, disintegration and dissolution.

B- Intellectual skills

B1: To be able to analyze, present and compare the data obtained from some tests, such as particle size analysis , flowability and dissolutions tests.

B2: become able to suggest and discuss a manufacturing procedure for tablet dosage forms

B3: become able to analyze the effect of each manufacturing step on the final result

B4: become able to analyze and compare different solutions for a manufacturing problem.

C- Approach to practice pharmacy

D- Personal and professional development

D1: To understand the general duties of pharmacist in different department of a pharmaceutical manufacturing company: research and development department, quality control department, quality assurance department and quality control department.

D2: To develop of problem solving and critical thinking skills

D3: To develop the ability to utilize IT skills in gaining and presenting information

D4: To develop skills of team work and time management

Reading List	
1 (textbook)	Aulton M., Taylor Kevin (ed.), Aulton's Pharmaceutics The design and Manufacture of Medicine, Elsevier, 5th edition, 2018.
2	Khar RK, Vyas SP, Ahmad FJ, Jain GK (2013). Lachman/liebermans: The Theory and Practice of Industrial Pharmacy. 4th editionCbs Publishers & Distributors.
3	Remington: The Science and Practice of Pharmacy, Elsevier, 23rd ed, 2020.
4	Augsburger, L., Hoag, S., (eds), *Pharmaceutical dosage forms: Tablets,* Informa healthcare, New York, 3rd edition, 2008.

Course Contents

Topics	Topic Details	Reference No.	Chapter	Estimated no. of hours	Assessment
Particle size analysis	Particle size (*Dimensions, Equivalent diameters, Particle size distribution , Statistics to summerize data , Influence of particle shape)* Particle size analysis Methods Selection of suitable method	1	9	5	

Particle size reduction and separation	Objectives of particle size reduction Influence of material properties on size reduction Influence of size reduction on size distribution Size reduction methods Selection of particle size reduction method Objectives of size separation Size separation methods Size separation by sieving methods Size separation by fluid classification Sedimentation methods Elutriation methods	1	10	4	
					1st exam
Mixing	Mixing principles Mechanisms of mixing and demixing Mixing of powders Mixing of miscible liquids and suspensions Mixing of semisolids	1	11	5	
Powder flow	Particle properties Process conditions: hopper design Characterization of powder flow Improvement of powder flowability	1	12	3	
Powders, granules and granulation	Introduction to powders and granules Powdered and granulated products as dosage forms Granules used as an intermediate in tablet manufacture Granulation mechanisms Mechanisms of granule formation Pharmaceutical granulation equipment	1	28	4	
					2nd exam
Drying	Drying of wet solids Types of drying methods for wet solids Dryers for solution and dilute suspensions Freeze drying Solute migration during drying	1	29	3	
Tablets and compaction	Quality attributes of tablets Tablet manufacturing Tablet excipients Tablet types Tablet testing Fundamental aspects of the compression of powders Fundamental aspects of the compaction of powders Relationships between material properties and tablet strength	1	30	6	
					Final exam

Grade Distribution		
Assessment	**Grade**	**Date**
- First Exam	30	
- Second Exam	30	
- Final Exam	40	

Important regulations

- On average, students need to spend 4 hrs of study and preparation weekly.
- Excellent attendence is expected. According to the university policy, students who miss more than 15% of the lecture hours with or without excuse will be dismissed from the course
- At the beginning of the lectures, be on time and don't leave before the end of the lecture without an accepted excuse
- If you missed a class, it is your responsibility to find out about any announcements or assignments you have missed
- For any clarification, please communicate your instructor at his posted office hours or by appointment
- Switch off your mobile or keep it silent throughout the lecture
- Listen well to the lecture and avoid side discussions, if you have a question, ask your instructor and not your collegue
- If you have any information, document your reference, if you didn't, then you broke the intellectual property rights law and the law will be applied
    - For more informations, visit the website:
        - http://www.plagiarism.org/
- Exams are scheduled to be given three times throughout the semester, your are expected to attend all. If not, make-up exams will be offered for valid reasons. It may be different from regular exams in content and format.
- Cheating, academic diconduct, fabrication and plagiarism will not be tolerated, and the university policy will be applied

Last updated on 1 / 10 / 2021 by : Dr. Nizar Al-Zoubi