The University of Jordan

Accreditation & Quality Assurance Center

COURSE Syllabus

1	Course title	Pharmaceutical Technology I
2	Course number	1212331
3	**Credit hours (theory, practical)**	2 (theory)
	Contact hours (theory, practical)	2 (theory)
4	Prerequisites/corequisites	Prerequisite: 1202230 (Pharmaceutical Calculations and Compounding of Dosage Forms)
5	Program title	BSc in Pharmacy and PharmD
6	Program code	
7	Awarding institution	The University of Jordan
8	Faculty	Pharmacy
9	Department	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	BSc in Pharmacy or PharmD
13	Other department (s) involved in teaching the course	N/A
14	Language of Instruction	English
15	Date of production/revision	31 January 2016

16. Course Coordinator:

To be determined for each semester

17. Course instructors:

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18. Course Description:

Comprehensive survey of industrial processes used in the production of pharmaceuticals. Transfer process and unit operation with emphasis on subjects of pharmaceutical interests especially tableting.

19. Course aims and outcomes:

A- Aims:

1. To recognize the responsibilities and duties of the departments of a pharmaceutical firm.
2. To be able to conduct preformulation studies
3. To recognize various processes and equipment used in the unit operation: particle size analysis, size reduction, mixing and drying.
4. To understand the consolidation process of solid dosage forms, and the operation of tablet presses.
5. To recognize various manufacturing methods for solid dosage forms
6. To recognize the ingredients used in the formulation of solid dosage forms
7. To recognize the problems encountered during the manufacturing of solid dosage forms.

B- Intended Learning Outcomes (ILOs): Upon successful completion of this course students will be able to …

A. Knowledge and Understanding: Student is expected to

A1- Be able to describe the duties of the department of a pharmaceutical firm: Research and development department, quality control department, quality assurance department and quality control department.

A2- Have the ability to conduct preformulation studies, such as accelerated stability studies and compatibility studies.

A3- Be able to describe the commonly used equipment used in the operation unit: particle size analysis, size reduction, mixing and drying.

A4- Be able to operate some equipment used in size reduction, mixing and drying.

A5- Be able to describe the consolidation process of powders and the operation of equipment used for solid powder consolidation.

A6- Recognize various manufacturing process for solid dosage forms with their advantages, utility, and limitations: wet granulation, double compression or slugging and direct compression.

A7- Know the categories of inactive ingredient used in the manufacturing of solid dosage forms, the function of each category and examples of each category.

A8- 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.

A9- 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.

B. Intellectual, Analytical and Cognitive Skills: Student is expected to

B1- Be able to analyze and present the data obtained from the unit operation unit, such as particle size analysis after size reduction.

B2- Be able to suggest formulations and manufacturing procedure for solid dosage forms.

B3- Be able to suggest remedies for the problems encountered during the manufacturing of solid dosage forms.

C. Subject-Specific Skills: Student is expected to

D. Transferable Key Skills: Students is expected to

D1- Gain knowledge and analytical skills to work with people in pharmaceutical firms.

D2- Have the ability for quick adaptation to the working environment in pharmaceutical firms

D3- 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 in This Course:

1. Identify physiochemical properties of drug substances
2. Recognize the role of pharmaceutical excipients and their uses in drug formulations
3. Characterize various pharmaceutical dosage forms
4. Identify formulation principles and product development stages
5. Recognize various pharmaceutical manufacturing processes
6. Demonstrate the ability to perform pharmaceutical calculations
7. Comply with principles of good manufacturing practice (GMP) and good laboratory practice (GLP)
8. Recognize quality assurance principles
9. Recognize quality control principles
10. Identify the principles of stability testing and shelf-life determination
11. Identify analytical method development and validation used in pharmaceutical analysis
12. Demonstrate the ability to perform proper documentation
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
Performulation	1-2		A1,A2, B1, D1, D2	Exams	Aulton's Pharmaceutics: The Design and Manufacture of Medicines
Particle Size analysis	3-4		A3, A4, B1, D1	Exams	Same as above
Size Reduction	4-5		A3, A4, B1, D1	Exams	Same as above
Mixing	6-7		A3, A4, B1, D1	Exams	Same as above
Drying	8-9		A3, A4, B1, D1	Quiz; Exams	Same as above
Size Enlargement (Granulation)	10-11		A4, A5, B1, D1, D2	Quiz; Exams	Same as above
Compaction and Compression Of Powdered Solids, Oral Solid Dosage Forms	12-15		A5-A9, B2, B3, D1-D3	Exams	Same as above

21. Teaching Methods and Assignments:

Development of ILOs is promoted through the following <u>teaching and learning methods</u>:

A. Teaching Methods:
- Lectures
- Self-Reading
- Multimedia demonstrations

B. Learning Skills:
- Critical thinking
- Scientific reasoning
- Digital literacy
- Communication skills
- Problem-solving skills
- Self-directed learning

22. Evaluation Methods and Course Requirements:

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

- Exams
- Quizzes

23. Course Policies:

A- Attendance policies:

- As per the applicable university regulations

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

- As per the applicable university regulations

C- Health and safety procedures:

- N/A

D- Honesty policy regarding cheating, plagiarism, misbehavior:

- As per the applicable university regulations

E- Grading policy:

- Midterm exam (40%)
- Quiz (10%)
- Final (50%)

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

- University libraries
- Student computer labs
- University website (including E-Learning and faculty member websites)

24. Required equipment:

- Computer connected to the internet and data show projector
- Whiteboard and associated equipment

25. References:

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

- Aulton's Pharmaceutics: The Design and Manufacture of Medicines, by M.E. Aulton and K.M.G. Taylor. 4th Ed., 2013. Published by Churchill Livingstone.

B- Recommended books, materials, and media:

- Ansel's Pharmaceutical Dosage Forms and Drug Delivery Systems, by L.V. Allen, N.G. Popovich and H.C. Ansel. 9th Ed., 2011. Published by Lippincott Williams & Wilkins.
- Pharmaceutical dosage forms (Tablet V1, V2 and V3), by H.A. libberman and L. Lechman. 1990. Published by Marcel Dekker. Inc., N.Y., USA.
- The theory and practice of Industrial Pharmacy, by L. Lechman, H.A. Libberman and J.L. Kanig. 3rd Ed., 1986. Published by Lea and Febiger, Philadelphia, USA.
- Martin's Physical Pharmacy and Pharmaceutical Sciences. 6th Ed., 2011. Published by Lippincott Williams & Wilkins, USA.

26. Additional information:

Name of Course Coordinator: ----------Signature: ---------- Date: ----------

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