The University of Jordan
Accreditation & Quality Assurance Centre

Course Syllabus

Practical Pharmaceutical Technology I

1	Course title	*Practical Pharmaceutical Technology I*
2	Couse 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	*NA*
7	Awarding institution	*The University of Jordan*
8	Faculty	*School of 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 of the course	*NA*
14	Language of Instruction	*English*
15	Date of Production / revision	*October 2020*
16.	***Teaching Methodology***	***Blended Learning (BL)***
17	***Platform***	***E-learning (Moodle) [for material & activities]*** ***Microsoft Teams (for synchronous meeting)***

NB:

Course Coordinator and the other instructor/s information will be added at the beginning of each semester

18. Course Description:

Description

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 excipients on granules flow properties, quality control tests, tableting technology, and dissolution of dosage forms.

Methodology

This Course is offered as a blended learning (BL) course, were Face-to-Face and Rotation models are being utilized. Here the students are directed by their instructor, and asked to study and read, online content (videos, pre session educational material, and sometimes websites) outside the class room, then assessed via online quizzes using the Moodle (e-learning). These activities are done prior to the weekly practical session, and during the 3-hour weekly meeting

(practical session) each student is asked to apply/perform the experiment, then discus outcomes/results with instructor and colleagues in the same group and other groups. Students are evaluated by their instructor during the practical session on applying what they had watched prior to session.

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 of 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:

- Develop, integrate, and apply knowledge from the foundational sciences (Biomedical sciences, Pharmaceutical sciences, Clinical sciences, Social/behavioral/administrative); *Learner*.
  1. Recognize various manufacturing processes for solid dosage forms with their advantages, utilities, and limitations: wet granulation, double compression or slugging, and direct compression.
  2. Name the categories of inactive ingredients used in the manufacturing of solid dosage forms, the function of each category and examples of each category.
  3. Explain the commonly used equipment in the operation unit: particle size analysis, size reduction, mixing, and drying.
  4. Explain consolidation process of powders and the operation of equipment used for solid powder consolidation.
  5. Classify various problems encountered during the manufacturing of solid dosage forms, such as capping, weight variation, and sticking.
  6. Suggest the possible remedies for each tableting problems.
- Dispense, compound, distribute, and manage so as to operate a successful pharmacy outlet/store; *Pharmacy System Manager*.
  7. Develop and provide accurate and usable dosage forms information regarding dosing and use instructions.
  8. Utilize proper documentation in management.
- Carry out compounding procedures to produce an effective and safe medicine (Compounder), and implement quality control measures and tests (Quality Manager); *Pharmaceutical Product Expert Manufacturer*.
  9. Utilize some equipment used in size reduction.
  10. Identify and assess physical and release properties of solid dosage forms.
  11. Perform quality control tests for intermediate and final dosage forms, including compressibility, flow rate, weight variation, friability, hardness, disintegration, and dissolution.

12. Propose remedies for the problems encountered during the manufacturing of solid dosage forms.
13. Develop formulations and manufacturing procedure for solid dosage forms.

- Interpret results derived experimentally or by simulation, summarize and present experimentally or simulated derived data, write a scientifically sound report of an experiment, and utilize IT in data management and presentation; *Simulated/Experimental Data Manager*.
  14. Summarize and present the data obtained from the unit operation unit, such as particle size analysis after size reduction.
  15. Interpret and analyze experimentally derived data.
  16. Build and compile scientific reports for experiments.
  17. Utilize *Microsoft Excel®* for experimental data management and presentation.
- Identify problems; explore and prioritize potential strategies; and design, implement, and evaluate a viable solution; *Problem Solving and critical thinking (Problem Solver)*.
  18. Identify key elements of problems and choose appropriate methods for their resolution in a considered manner.
  19. Outline and solve the problems encountered manufacturing process of pharmaceutical dosage forms in pharmaceutical firms.
- Demonstrate self-directed learning through ongoing reflection and analysis to identify areas and methods necessary to expand professional knowledge and competence in a changing practice environment; *Self-learner*.
  20. Seek proactively new knowledge related to particles and dosage forms testing and their management using official Pharmacopeia and through browsing the internet based professional website.
- Communicate effectively with patients, caregivers, pharmacy personnel, other health care professionals, community members, policy makers and administrators; *communicator*.
  21. Adapt to work independently and interact effectively within a team/learning group, giving and receiving information and ideas, and modifying responses where appropriate.
  22. Communicate effectively in a manner appropriate to the discipline(s) and report practical procedures in a clear and concise manner in a variety of formats.
  23. Develop skills and confidence required for assertive, persuasive, and clear communications.
- Exhibit behaviors and values that are consistent with the trust given to the profession by patients, other healthcare providers, and society; *Professional*.
  24. Demonstrate integrity by not cheating and not committing plagiarism.
  25. Demonstrate respect to professors and classmates by observing active listening inside the classroom
  26. Evaluate own strengths and weaknesses, challenge received, and develop own criteria and judgment.
  27. Acquire analytical skills to work with people and adapt quickly to working environment in pharmaceutical firms.
- *Team Working and Leadership*
  28. *Develop and show qualities and skills to integrate, work, and coordinate with people in a team.*

C. Program Competencies Achieved:

1. ***Learner***: Develop, integrate, and apply knowledge from the foundational sciences (Biomedical sciences, Pharmaceutical sciences, Clinical sciences, Social/behavioral/administrative).

2. ***Pharmacy System Manager***: Dispense, compound, distribute, and manage so as to operate a successful pharmacy outlet/store.
3. ***Pharmaceutical Product Expert (Manufacturer)***: Carry out compounding procedures to produce an effective and safe medicine (Compounder), and implement quality control measures and tests (Quality Manager).
4. ***Simulated/Experimental Data Manager***: Interpret results derived experimentally or by simulation, summarize and present experimentally or simulated derived data, write a scientifically sound report of an experiment, and utilize IT in data management and presentation.
5. ***Problem Solving and critical thinking (Problem Solver)***: Identify problems; explore and prioritize potential strategies; and design, implement, and evaluate a viable solution.
6. ***Self-learner***: Demonstrate self-directed learning through ongoing reflection and analysis to identify areas and methods necessary to expand professional knowledge and competence in a changing practice environment.
7. ***Communicator***: Communicate effectively with patients, caregivers, pharmacy personnel, other health care professionals, community members, policy makers and administrators.
8. ***Professional***: Exhibit behaviors and values that are consistent with the trust given to the profession by patients, other healthcare providers, and society.
9. ***Team Working***
10. ***Leadership***

20. Topic Outline and Schedule*:

Topic	*Week*	*Teaching Methodology*		*Achieved ILO/ILOs*	*Evaluation Method/s*	*Reference*
		Online Part	*Face-to-Face Part*			
Orientation & Introduction to general Laboratory Instructions.	1	*Synchronous (Microsoft TEAMS) & Video** about the topic*		20-23	Oral Discussion, Practical Session Weekly Evaluation	Laboratory Manual
• How to report data (Reports components and writing). • How to prepare Laboratory Log-books. • How to construct "Student Portfolio". • Introduction to unit Processes (Concept & Equipment)	2	*Synchronous (Microsoft TEAMS) & Two Videos** One includes power points slide show and word documents about Portfolio preparation and a video includes pre lab material and required information prior to the 4-week cycle*		7, 8, 15, 16, 21-23, 27	Portfolio (Reports, Log-book), Pre-lab Assessment (Moodle-based quizzes)	Videos Instructor, & Reports, Log-book, & Portfolio templates & models
Powder Mixing	3	*Video**of the experiment*	Application of the experiment	3, 4, 7, 8, 9, 14, 15, 16, 17, 23, 27	Oral Discussion, Practical Session Weekly Evaluation, Portfolio construction (Reports & Data Analysis, Log-book), Pre-lab Assessment (Moodle-based quizzes), & Examinations	Videos Laboratory Manual, General References provided below
Size reduction of Powders	4	*Video**of the experiment*	Application of the experiment	3, 4, 7-9, 14-17, 21-23, 27		
Granulation of Powders	5	*Video**of the experiment*	Application of the experiment	1, 3, 4, 7, 8, 9, 14, 15, 16, 17, 21-23		
USP Dissolution Method of Paracetamol/Acetaminophen Tablets	6	*Video**of the experiment*	Application of the experiment	3, 10, 11, 14, 15, 16, 17, 21-23		

Midterm Examination	7					
Characterization of Granules Flow Properties	8 & 9	*Video**of the experiment*	Application of the experiment	4, 7, 8, 11, 14, 15, 16, 17, 20, 21-23	Oral Discussion, Practical Session Weekly Evaluation, Portfolio construction (Reports & Data Analysis, Log-book), Pre-lab Assessment (Moodle-based quizzes), & Examinations	Videos Laboratory Manual, General References provided below
Effect of Additives on Flow Properties	10	*Video**of the experiment*	Application of the experiment	2, 12, 13, 7, 8, 14-19,20, 21-23		
Quality Control Tests	11	*Video**of the experiment*	Application of the experiment	5, 6, 7, 8, 10, 11, 14-17, 21-27		
Tablets Preparation and Testing	12&13	*Two Videos** *The first one about required reads and information and the second one about the experiment of the experiment*	Application of the experiment and Preparation of the final part of the portfolio	1, 2, 5, 6, 7, 8, 10-13, 14-20, 21-27		
Final Examinations	14					

*Each section instructor will be added at the beginning of each semester

**All videos were pictured and prepared; in the same practical session hall, using the same equipment, tools, and materials, by Suha Al Muhaissen, MSc. Each experiment video contains the practical part pictured inside the laboratory under the same settings that will be used by students, also, part of the video is about data analysis using Microsoft Excel tutorial. Moreover, the video may include

* Teaching methods include: Synchronous lecturing/meeting; Asynchronous lecturing/meeting

* Evaluation methods include: Homework, Quiz, Exam, pre-lab quiz…etc

21. Teaching/Learning 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*	*Assessment Method/s*
1, 2, 3, 4, 5, 6, 9, 10, 11	Practical Sessions (Experiments), Lecturing, Oral Discussion	Student Weekly Evaluation*, Reports**, Portfolio**, Pre-lab quizzes, Examination	Rubrics* Rubric & Key**
12, 13, 14, 20	Practical Sessions (Experiments), Lecturing, Reflections, Team working*	Student Weekly Evaluation*, Reports**, Log-book**, Portfolio**, Pre-lab quizzes, Examination	Rubrics* Rubric & Key**
7, 8, 15, 16, 17, 21, 22, 23	Practical Sessions (Experiments), Oral Discussion, Reflections, Team working*	Homework & Assignment**, Reports**, Log-book**, Portfolio**, Pre-lab quizzes, Examination	Rubrics* Rubric & Key**
18, 19, 24, 25, 26, 27	Practical Sessions (Experiments), Oral Discussion, Reflections, Team working*	Reports**, Log-book**, Portfolio**, Pre-lab quizzes	Rubrics* Rubric & Key**

** a special rubric is available to assess each of labelled/mentioned evaluation method.*
*** a key with a rubric is available to assess*

Teaching methods

- ✓ Blended Learning (part of the course is online material which is videos of the experiments)
- ✓ Practical Sessions (Experiments)
- ✓ Team-work Learning
- ✓ Lecturing
- ✓ Oral Discussions and brainstorming.
- ✓ Reflections.

Course Material and Announcements

Course related announcements and examinations results will be posted on the ***personal website of the instructor*** and also ***instructor E-learning website*** and is responsibility of each student to check the site regularly.

Learning Skills:

1. Critical thinking
2. Digital literacy
3. Problem-solving skills
4. Self-directed learning
5. Scientific reasoning
6. Communication skills
7. Scientific writing
8. Team and group working
9. Leadership and team/group coordination

22. Evaluation Methods and Course Requirements:

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

Evaluation Activity	*Mark*	*Topic (s)*	*Period (Week)$*	*Platform*
Prelab Quizzes	15	Week Topic*	Every week (from week 2 till week 11)	Moodle (E-learning)
Portfolio	25	Week Topic*	Weeks 3, 4, 5, 6, 7, 8, 9 & 11	Moodle (E-learning) and Paper-based
Weekly Evaluation	10	Week Topic*	Every week (from week 2 till week 11)	Practical sessions
Midterm Examination	20	Cycle 1	Week 8	In-School
Final Examination	30	Course material	Week 13	In-School

$16-week semester

* As listed above

1. Pre-lab evaluation (online quizzes)
2. Presentation
3. Portfolio construction
4. Reports writing
5. Log-book preparation
6. Evaluation of skills during Practical sessions
7. Home works & Assignments
8. Discussion
9. Examinations

23. Course Policies:

A. *Attendance Policies*:

Attendance: Mandatory.

First Warning: after/*with 1 absence*

Second Warning: after/*with 2 absence*

Falling in the Subject/Course: after/*with 3 absence*

NB. University regulations 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 Instructions are maintained

D. *Honesty Policy regarding cheating, plagiarism, misbehavior*:

The participation, and/or the commitment of cheating will lead to applying all following penalties together:

1) Failing the subject, he/she cheated at

2) Failing the other subject taken in the same course

3) Not allowed to register for the next semester (summer semester is not considered as a semester).

NB. University regulations applied.

E. *Grading Policy*:

Portfolio ***25 points***

Reports

Log-Book	
Pre-Lab Assessment (BL related activities)	***15 points***
Evaluation	***10 points***
Midterm Examination	***20 points***
Final Examination	***30 points***
Total	***100 points***

F. *Available university services that support achievement in the course*:

- ***a. Laboratory Room.***
- ***b. Computers in Laboratory Rooms to enable data processing using Microsoft Excel®.***
- ***c. Internet access at different Computers Rooms.***
- ***d. Computers to prepare materials and printouts at different Computer Rooms.***
- ***e. Classrooms, internet, library (books, and electronics journals and books).***

24. Required Equipment:

- ***a. All equipment; devices. Tools, instruments, and glass-wares required to perform assigned experiments.***
- ***b. Data show/Screen and internet connection.***

25. References:

A. Required book(s), assigned readings, and audio-visuals.

1. ***Laboratory Manual*** *(Practical Pharmaceutical Technology I Manual).*
2. ***USP Pharmacopeia*** *(Monograph for Acetaminophen, and Solid Dosage Forms Official Testing).*
3. ***British Pharmacopeia*** *(Solid Dosage Forms Official Testing).*
4. ***Videos for the used equipment and processes.***

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, latest edition)***
- ✓ ***United States Pharmacopeia***
- ✓ ***British Pharmacopeia***
- ✓ ***Additional:***

Any suitable reference book is accepted.
Research and review articles are also used.

26. Additional information:

NA

Name of Course Coordinator: **Suha Al Muhaissen** Signature: Date: **Oct 8th, 2020**

Head of Curriculum Committee/Department: Signature:

Head of Department: Signature:

Head of Curriculum Committee/Faculty: Signature:

Dean: Signature:

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