Course Syllabus typical Format (CSTF)

First: Course Information

1	College: **Pharmacy**	2	Department: **Pharmaceutics**
3	Academic Semester: **First Semester**	4	Academic year: **1443 H**
5	Course Name: **Pharmaceutical Technology**	6	Course code and number: **PDPH 0451**
7	Number of credit hours: **3 Units** (2 theoretical/lecture, 1 lab)		
8	Course requirement in program: [√] Required (obligatory) [ ] Optional (Elective)		
9	Course type: [ ] University Requirement [√] College Requirement [ ] Departmental Requirement		
10	Pre-requisite (code and number) (if applicable): Not applicable		

Second: Instructor Information

1	Instructor's name: **Dr. Ayman Grawan**		
2	Sections of the course that we teach all the course		
3	Office phone number: **0144273022-3928**	4	Mobile number (optional): **0581036622**
5	Office location and number: **First Floor (01-03-1-06)**		
6	Office hours: Wednesday **(9:00-11:00 am)**		
7	Website: www.ut.edu.sa/web/u58062		
8	E-mail: agrawan@ut.eud.sa		

Third: Lecture and lab timetables:

Section	Days	Time	Place (Building/Room)
Division 1 (295, 296)	Tuesday	8:00-1:00 Am	Faculty of Medicine/ 1st floor/ Lecture room 001-03-0-06
	Thursday	8:00-1:00 Am	Faculty of Medicine/ 1st floor/ Lecture room 001-03-0-06

Fourth: Course description

Course description as found in the University Catalogue in both Arabic and English
This course aims to provide the students with the necessary knowledge in the area of pharmaceutical technology, the pharmaceutical plant construction and the considerations layout of industrial firms. After completing this course the students will have learned adequate knowledge in the area of industrial unit operations (Particle size reduction, mixing, heat transfer, evaporation, granulation, drying, etc. ….) and the specific factors associated with the preparation and evaluation of different dosage forms
تم تصميم هذا المقرر لتزويد الطلاب بالمعلومات الأساسية في مجال التصنيع الدوائي ومساعدتهم في معرفة الاقسام المختلفة بمصانع الأدوية. في نهاية المقرر سيكون الطلاب علي دراية كاملة بمراحل التصنيع الدوائي مثل (تقليل حجم الجسيمات ، الخلط ، نقل الحرارة ، التبخر ، التجبيب ، التجفيف ، إلخ ...) والعوامل المرتبطة بتحضير وتقييم جودة الأشكال الصيدلية المختلفة.

Fifth: General Objectives and Teaching Strategies

1: Knowledge and Understanding: • Demonstrate different types of design, manufacture, evaluation, quality assurance, of different drug dosage forms.	Teaching strategies ▪ Lectures
2. Skills: ▪ Apply basic drug formulations and development skills. ▪ Interpret information obtained from different resources to provide creative solutions for complex problems.	▪ Tutorial hours.
3. Values: ▪ Demonstrate leadership skills, accountability and acceptance of responsibility within a team in various professional settings.	▪ Research and small group activity. ▪ Assignments.

Sixth: Course or Curriculum units, subjects, specific objectives, and time schedule in the academic semester (first semester)

Week number	Unit Number	Instructional Objectives (Unit/Chapter/Subject title)	Readings	Reference Number	Pages	
First	1	Pharmaceutical plants	1. Presenting an overview of the curriculum's content and extent. 2. Clarifying curriculum requirements, the general objective of the course and its content. 3. Specifying methods of communication between students and their instructors. 4. Clarifying the assessment techniques/methods of the learning objectives. 5. Clarifying policies concerning instruction, classroom participation and assessment. 6. Define Pharmaceutical Technology. 7. Explain the difference between pharmaceutics and Pharmaceutical Technology. 8. Explain the General Requirements for pharmaceutical plants.	1.3	10-100	Pharmaceutical Technology & Pharmaceutical plants & Unit operations.
Second	2	Heat transfer	1. Define the process of Heat transfer. 2. Study different types of Heat exchanger equipment. 3. Define the steam. 4. Explain the reasons for the widespread use of steam as a source of heat.	1.3	100-111	Double pipe heat exchanger and tubular heater, The rate of heat transfer
Third	3	Mixing	1) Differentiate between the terms: MIXING and SEGREGATION. 2) Understand the objective of mixing process and	1.3	760-773	mixing and segregation, Ordered

			when we use it. 3) Identify and differentiate between types of mixing processes and mixtures. 4) Describe the type: ORDERED MIXING. 5) Enumerate factors affecting ORDERED MIXING. 6) Study different types of mixers and when can be used. 7) Define the VORTEX and study how to reduce it. 8) Describe and understand the uses of different types of impellers. 9) Describe different mixers used for pharmaceutical preparations according to the physical form of the substance to be mixed. 10) Understand different mechanisms used for mixing in each equipment.			mixing
Fourth	4	Granulation	1) Define Granulation. 2) Understand the objective of granulation process. 3) Identify and differentiate between types of Granulators. 4) Describe the principle of granulation in each Granulator and its application.	1.3	720-733	, Chilsonator
Fifth	5	Drying	1) Define the process of DRYING. 2) Understand the mechanism of drying process and classify equipment according to the mechanism of drying process. 3) Differentiate between continuous drying process and patch type.	3	730-744	Freeze drying

			4) Study different types of dryers and when can be used. 5) Understand the disadvantages of each type of dryer. 6) Study the principle of drying process using FREEZE DRYER. 7) Describe different stages of freeze drying process.			
Sixth	6	Evaporation	1) Differentiate between the terms: EVAPORATION and DRYING. 2) Identify and differentiate between SCALING, SALTING and FOULING. 3) Describe the FLASH EVAPORATION. 4) Enumerate factors affecting EVAPORATION. 5) Study different types of EVAPORATORS. 6) Understand the mechanism of film formation in film evaporators.	3	790-799	Salting, Fouling
Tenth	7	Particle size reduction	1) Define particle size reduction for both solid and liquid materials. 2) Differentiate between the terms: MECHANICAL COMMINUTION and CHEMICAL COMMINUTION. 3) Know different mechanisms of particle size reduction. 4) Understand the objective of particle size reduction process. 5) Understand the disadvantages of particle size reduction process. 6) Identify different factors affecting PARTICLE SIZE REDUCTION.	1.3	10-90	Comminution

			7) Classify different equipment used in particle size reduction process.			
Eleventh	8	Good manufacturing Practice	1) Define and understand this terms: a. Active therapeutic ingredients. b. Dosage form. c. Drug Product. d. Manufacture process. e. Raw materials. f. Processing. g. Packaging. h. Starting Material. 2) Study the principles of Quality Assurance. 3) Differentiate between Quality Assurance (QA) and Quality Control (QC). 4) Describe and understand Validation and Sanitation processes. 5) Differentiate between Good laboratory practice (GLP) and Good clinical practice (GCP).	1.6	1002 – 1009	Quality Control And Quality Assurance
Twelves	9	Refrigeration	1) Define the process of Refrigeration. 2) Define the terms of: Glandular product, Sera, vaccines and latent heat of vaporization. 3) Describe and understand the Refrigerating plant. 4) Define and Understand the Freeze-drying process. 5) Enumerate the advantages and disadvantages of freeze drying. 6) Describe equipment used in freeze drying.	1.6	102-122	Refrigerating plant, Freeze dryer

Thirteenth	10	Sedimentation	1) Define the process of Sedimentation (Gravity separation). 2) Understand the objective of Sedimentation process and when it used. 3) Describe and understand the erythrocyte sedimentation rate (ESR). 4) Identify different factors affecting Sedimentation. 5) Define and Understand the Sedimentation Basin Zones equipment. 6) Describe and know Stoke's Law. 7) Understand the Floating drug delivery systems.	1.6	300-310	Sedimentation basin zones, Stoke's law
fourteenth	11	Crystallization	1) Define the process of Crystallization. 2) Differentiate between the terms: Crystalline form and Amorphous form. 3) Understand the effect of Crystallization on the rate of the drug absorption. 4) Identify and differentiate between Unsaturated solution, Saturated solution and Supersaturated solution. 5) Explain Mier's theory. 6) Enumerate steps of crystallization. 7) Identify different factors affecting Crystallization rate. 8) Describe and understand the Adiabatic evaporation (cooling and evaporation). 9) Classify different equipment used in Crystallization according to the mechanism of the process.	1.6	200-210	Crystalline, Amorphous, Mier's theory

Fifteenth	12	Centrifugation	1) Define the process of Centrifugation. 2) Differentiate between perforated (filter type) and non perforated (decanter type) centrifuge. 3) Identify and differentiate between the terms, vertical axes horizontal axes. 4) Define and Understand the Relative Centrifugal force (RCF). 5) Describe and understand different Centrifuge.	1.6	399-402	Relative Centrifugal Force

Seventh: Assessment and evaluation plan:

Assessment tools	Date and duration (day/date/ time)	Subject matter covered in the exam	Type of questions	Grades out of 100	Guidelines and instructions
Mid-term exam	19/10/2021 (10:00-11:30)	Lectures 1-6	MCQ, Short essays and complete	30 marks	Multitask exam measuring all kinds of the students talents with model answer from the lecture notes
Final exam	26/12/2021 (10:30-12:30)	Lectures 1-12	MCQ, Short essays and complete	40 marks	Multitask exam measuring all kinds of the students talents with model answer from the lecture notes
Practical Exam	19/12/2021	Practical experiments and theoretical parts	Practical	20 marks	Theoretical concepts and practical experiments.
Activities	14/11/2021			10 marks	

Eighth: Readings and further References

1	Main Reference (Textbook): ▪ Leon Lachman, Herbert A. Lieberman, Joseph L. Kaning "The Theory and Practice of Industrial Pharmacy". ▪ Fasttrack, "Pharmaceutical Dosage Form and Design", David Jones, Pharmaceutical Press, London, Chicago. ▪ M.E. Aulton, "Pharmaceutics, The Design and Manufacture of Medicines", Churchill Livingstone, Philadelphia, USA.
Extra reading references and citations (books, internet sites, research papers)	
2	▪ International Journal of Pharmaceutics..
3	List Electronic Materials, Web Site, etc. ▪ **www.pubmed.com** ▪ **www.Sciencedirect.com**

Ninth: The instructor's policy of dealing with students within the framework of the university laws, regulations, and guidelines (examples and prototypes).

1	Late attendance: Over 10 min delays will be considered absent.
2	Cheating and plagiarism: University rules will be applied.
3	Absences: University rules will be applied.
4	Late work policy: 5% of the activity mark will be reduced for each day delay.
5	Exiting during the lecture period: Allowed after permission.
6	Seating and student placement in the classrooms: Allowed any place in the lecture room.
7	Absence from an exam: University rules will be applied.
8	Mobile phone use in the classroom: The student will be considered absent.
9	Eating and drinking: Prohibited