Pharmaceutics I

1	**Course name**	**Pharmaceutics I**
2	**Course Code**	**BH 103**
3	**Course type: /general/specialty/optional**	**Specialty**
4	**Accredited units**	**4 units (3 hours theory+2 hours practical)**
5	**Educational hours**	**5 hours/week**
6	**Pre-requisite requirements**	**Non**
7	**Program offered the course**	**Department of pharmaceutical and industrial pharmacy**
8	**Instruction Language**	**English**
9	**Date of course approval**	**12/2021**

Brief Description:	This course is designed to impart fundamental knowledge on the preparatory pharmacy with the arts and science of preparing the different conventional dosage forms. The students will study in this subjects the history of pharmacy and Orientation to Pharmacy, technique of weighing, concept of pre-formulations, and formulation, pharmaceutical systems, and techniques of measurements. Also the course covers other topics as pharmaceutical calculations, introduction to dosage forms, pharmaceutical solutions and suspension, and Clinical preparations
Textbooks required for this Course:	1. H.C. Ansel et al., Pharmaceutical Dosage Form and Drug Delivery System, LippincottWilliams andWalkins, New Delhi. 2. Carter S.J., Cooper and Gunn's-Dispensing for Pharmaceutical Students, CBS publishers, New Delhi. 3. M.E. Aulton, Pharmaceutics, The Science& Dosage Form Design, Churchill Livingstone, Edinburgh. 4. British pharmacopoeia.
Course Duration	28 weeks
Delivery	• Lecture-based, Group interaction and discussion, Use of video technique, practical classes.
Course Objectives:	Upon completion of this course the student should be able to: • Know the history of profession of pharmacy • Understand the basics of different dosage forms, pharmaceutical calculations and technique of weighing. • To understanding the concept of pre-formulations and formulation • Understand the pharmaceutical solutions and suspensions. • Preparation of various conventional dosage forms
Course Assessments	Midyear exam: 20% Quizzes, reports, presentation: 10% Practical continuous assessment, exam: 10% Final Practical exam: 20% Final theoretical exam: 40% Total: 100%
Content Breakdown Topical Coverage	**Content Breakdown Topical Coverage**
Session 1 (Week 1)	**Unit I: History of pharmacy: 3 hr.** • Introduction to drug and pharmacy • The influence of Arabic civilization in the development of Pharmacy • The role of Arabic scientists in the development of pharmacy
Session 2 (Week 2)	**Unit II: Orientation to Pharmacy (3 hrs)** • Introduction to the subject of pharmaceutics • Pharmacy as profession (Hospital, Retail, Industry) • The role of the pharmacist in the health care system • The relationship between pharmacist and other health care professionals • Reviewing and dispensing prescriptions and medication order • Labeling of dispensed medications • Computer labeling • Scope of pharmaceutics
Session 3 (Week 3)	**Unit III: Technique of weighing (2 hrs)** • Description of prescription balance

	• Care and use of prescription balance • Weighing of small doses (Aliquot method of weighing)
Session 4 (Week 4)	**Unit IV: Concept of pre-formulations and formulation (6 hr)** • Biopharmaceutical and therapeutic considerations in dosage form design. • Drug incompatibility: (Physical, Chemical, Pharmacokinetics, and Pharmacodynamic).
Session 5 (Week 5)	• Introductory aspects of physicochemical properties with their application.
Session 6 (Week 6)	• Pharmaceutical recipients: solvents, colorants, flavors, diluents, binders, disintegrants, lubricants, thickening agents, emulsifying agents, etc.
Session 7 (Week 7)	**Unit V: Pharmaceutical systems and techniques of measurements (2 hrs)** • Common systems, Weights and measures – Imperial & Metric system, (S.I. units and terminology, CGS, FFs, units of mass, units of amount of substance, units of length, units of radiation, dose equivalent) The relationship and unit conversions of systems
Session 8 (Week 8)	**Unit VI: Pharmaceutical calculations (10hrs)** • General dilutions: using stock solutions, allegation method, least weighable amounts/percentage error
Session 9 (Week 9)	• The calculation of dose: Miscellaneous dosage problem, calculation of doses of children. • Calculation of body surface area.
Session 10 (Week 10)	• Reducing and enlarging formulas
Session 11 (Week 11)	Midyear Exam
Session 12 (Week 12)	
Session 13 (Week 13)	
Session 14 (Week 14)	
Session 15 (Week 15)	• Density and specific gravity: sp. Gravity of liquids and solids, calculation of volume andweight from sp. Gravity
Session 16 (Week 16)	• Ratio strength and stock solutions
Session 17 (Week 17)	**(6hrs) Unit VII: Introduction to dosage forms** • Short description and properties of different dosage forms
Session 18 (Week 18)	• The need for dosage forms • Therapeutic consideration in dosage form design
Session 19 (Week 19)	• Routes of drug administration: Oral, parentral, rectal, nasal, etc.
Session 20 (Week 20)	**Unit VIII: Pharmaceutical solutions (7 hrs)** • Introduction • Advantages and disadvantages
Session 21 (Week 21)	• Aqueous solutions: Standards for water, aromatic waters, aqueous acids, solutions douches, enemas, gargles, mouth washes, juices, sprays, syrups, honey, otic solutions, irrigations, toothache drops
Session 22 (Week 22)	• Aromatic waters: Types and method of preparation • Non-aqueuse solutions : Elixirs, spirits, collodious, liniments,

	tinctures, mucilages • proof spirit and isotonic solutions • Pharmaceutical solvents: glycol, alcohol, etc.
Session 23 (Week 23)	**Unit IX: Pharmaceutical Suspension (6 hr)** • -Definition. • -Advantages of oral suspensions. • Classification based on type of preparation and route of administration
Session 24 (Week 24)	• Types of suspensions. • Manufacturing
Session 25 (Week 25)	• Sedimentation rate and factors affecting it. • Evaluation of stability of suspension
Session 26 (Week 26)	**Unit X: Clinical preparations (6 hr)** • Principle and methods of preparation: infusion, decoction, maceration, percolation.
Session 27 (Week 27)	• Principle and methods of preparation: infusion, decoction, maceration, percolation.
Session 28 (Week 28)	• Principle and methods of preparation: infusion, decoction, maceration, percolation.
	Final theoretical Exam.
Practical work (one/week)	**Practical Part:** 1. identification of laboratory apparatus 2. pharmaceutical calculations 3. chloroform water 4. peppermint water 5. aqueous iodine solution 6. weak iodine solution 7. orange tincture 8. simple syrup 9. orange syrup 10. camphor liniment 11. Ferrous sulphate mixture
	12.Final Practical Eaxm
Attendance Expectations	Students are expected to attend every session of class, arriving on time, returning from breaks promptly and remaining until class is dismissed. Absences are permitted only for medical reasons and must be supported with a doctor's note.
Generic Skills	The faculty is committed to ensuring that students have the full range of knowledge and skills required for full participation in all aspects of their lives, including skills enabling them to be life-long learners. To ensure graduates have this preparation, such generic skills as literacy and numeric, computer, interpersonal communications, and critical thinking skills will be embedded in all courses.

Physical Pharmacy

1	**Course name**	**Physical pharmacy**
2	**Course Code**	**PH103**
3	**Course type: /general/specialty/optional**	**General**
4	**Accredited units**	**3 units (Theoretical 2 Lecture/Week + Practical 1 lab/Week)**
5	**Educational hours**	**4hrs/week**
6	**Pre-requisite requirements**	**passed examination in physics**
7	**Program offered the course**	**Department of Pharmaceutics and Industrial pharmacy**
8	**Instruction Language**	**English Language**
9	**Date of course approval**	**12/2021**

Course Duration	50 hours	
Delivery	Lectures (Tools: board, data show). The lectures were added on the internet site of the faculty to be available to the students all the time as an *e*-learning. Practical Session (Tools: labs., boards, instruments, chemicals, glassware, equipment). Assignments, seminars, research and posters.	
Course Objectives:	Upon the completion of the course student shall be able to 1. Understand various physicochemical properties of States of matter. 2. Know the principles of phase equilibrium and phase rule, solutions of non-electrolytes, adsorption, solubility, buffers and isotonic solutions and rheology. 3. Differentiate surface and interfacial tension; describe methods of determination of surface/interfacial laws; describe the solubilization phenomenon. 4- Understanding the characteristic, types of solutions, colloids and Incompatibility.	
Course Assessments	Midyear exam	20%
	Quizzes, reports, presentation	10%
	Practical continuous assessment, exam	10%
	Final Practical exam	20%
	Final theoretical exam	40%
	Total	100%
Content Breakdown Topical Coverage	Content Breakdown Topical Coverage	
Session 1 (Week 1)	**Unit I**: **Mathematical preparation (1 hr.)** • Units • Dimensions and statistical analysis of errors **Unit II: States of matter (3hr.)** • Liquid state, vapor pressure, boiling point, surface tension	
Session 2 (Week 2)	• Solid state. • Crystalline and amorphous state, crystal systems habits and imperfections . • Polymorphism, hydrates, other solvates, clathrates and hygroscopicity. • Melting point and x-ray diffraction.	
Session 3 (Week 3)	**Unit III: Micrometrics 4 hrs.** • Definition & significance of particle size, particle size distribution • Particle size analysis and separation • Determining particle size shape and surface area	
Session 4 (Week 4)	• Calculation of particle porosity and density • Flow property of powder (Hausner ratio, Carr's index, Angle of repose).	
Session 5 (Week 5)	**Unit IV: The phase rule: (2 hr.)** • One, two and three component systems. • One, two and three component systems. Eutectic mixtures, solid solutions and glass solutions.	
Session 6 (Week 6)	**Unit V: Interfacial phenomena (8 hr.)** • Classification of interfaces. • Intermolecular forces. • Surface tension and surface free energy .	

	• Interfacial tension. • Measurement of surface and interfacial tension. a. Capillary rise method. b. Du nouytensiometer.
Session 7 (Week 7)	• Adsorption as liquid interfaces. a. Surface active agents. b. HLB system.
Session 8 (Week 8)	• Types of monolayers at liquid surfaces. • Liquid/vapor system, Liquid/liquid system. • Adsorption at solid interfaces: Solid / liquid interfaces. • Factor affection the extent of adsorption. • Logmuir adsorption isotherm, Freundlich adsorption isotherm, Brunaure, Emmett, and taller.
Session 9 (Week 9)	• Electric properties of interfaces. • The electric double layer. • Nernst zeta potentials.
Session 10 (Week 10)	**Unit VI: Solution and solubility: (6 hr.):** • Definition. • Solubility expressions. • Solubility of liquids. • Complete miscibility. • Partial miscibility.
Session 11 (Week 11)	Midyear Exam
Session 12 (Week 12)	
Session 13 (Week 13)	
Session 14 (Week 14)	
Session 15 (Week 15)	• Extended Hildebrand solubility approach. • Solubility parameters. • Solubility of salts in water. • Solubility of slightly water soluble electrolytes. • Solubility of weak electrolytes.
Session 16 (Week 16)	• Calculating of the solubility of weak electrolytes influenced by pH. • Influence of solvents on solubility of drug. • Combined effect of pH and solvents. • Influence of complexation and particle size
Session 17 (Week 17)	**Unit VII: Distribution of solutes between immiscible solvent: (4 hr.)** • Determination of partition coefficient. • Effect of ionic dissociation and molecular association on partition coefficient.
Session 18 (Week 18)	• Solubility and partition coefficient. • Extraction. • Preservative action of weak acids in oil-water system. Drug action and partition coefficient.
Session 19 (Week 19)	**Unit VIII: Colligative properties of solutions**: **(3 hr):** • Vapor pressure. • Boiling point. • Freezing point. • Osmotic pressure.

	• Diffusion. • Osmosis. • M. Wt. Determination. • Choice of colligative properties.
Session 20 (Week 20)	**Unit IX: Buffered and isotonic solution**: **(4 hr.)** • Definition, buffer equation (for weak acid and base). • Drugs as buffers, buffer capacity, pharmaceutical buffers, tissue irritation.
Session 21 (Week 21)	• Buffered isotonic solutions, measurement of tonicity, methods of adjusting tonicity and pH.
Session 22 (Week 22)	**Unit X: Rheology (2 hr.)** • Newtonain systems. • Non-Newtonian systems. • Thixotropy • Determination of rheological properties. • Applications to pharmacy.
Session 23 (Week 23)	**Unit XI: Polymers: (4 hr)** • Definition and classification of polymers. • Properties of polymers. • Pharmaceutical applications of polymers. • Behavior of polymers in solution (effect on viscosity, gel formation, heterogels, syneresis, estimation of molecular weight).
Session 24 (Week 24)	• Plasticization of polymers, glass transition temperature, the behavior of polymers during dissolution testing, aging of polymers.
Session 25 (Week 25)	**Unit XII: Colloids: (5 hr):** • Definition of colloid. • Types of colloidal system. • Preparation of colloids, • Pharmaceutical applications of colloids.
Session 26 (Week 26)	• Kinetic properties of colloids. a) Brownian motion. b) Diffusion. c) Sedimentation. d) Viscosity. • Properties of colloids, (electrical, optical, osmotic properties, and particle size).
Session 27 (Week 27)	• **Electrokinetic phenomena.** • **Donnan membrane equilibrium.** • **Stability of colloidal systems.** **Unit XIII: Incompatibility (3 hrs.)** • Definition. • Types of physical incompatibilities.
Session 28 (Week 28)	• Types of chemical incompatibilities. • Factors affecting incompatibility. • Prevention of incompatibility.

	Final theoretical exam
Practical Work	The purpose of the laboratory in this course is to provide students with: 1- Identification of laboratory apparatus and specific techniques which are essential in understanding this course and how to Improve report writing skills. 2- Analysis of Errors. 3- Ternary phase diagram. 4- Intermolecular binding forces. 5- Determination of surface tension of given liquids. 6- Determination the solubility of drug at room temperature. 7- Solubility of benzoic acid in water. 8- The effect of Tween 80 on the solubility of benzoic acid in water. 9- Determination of viscosity using Stoke's equation. 10- Determination of partition coefficient of benzoic acid in benzene and water. 11-Evaluation of the particle size of solids and measure their flowability. 12- Methods of improving the flowability of solids. 13. Estimation of the molecular weight of polymers. 14. Prediction of the shelf life of dosage forms. 15.Determination of % composition of NaCl in a solution using phenol-water system by CST method 16. Determination of pKa value by Half Neutralization/ Henderson Hasselbalch equation.
	17-Practical Exam
Attendance Expectations	Students are expected to attend every session of class, arriving on time, returning from breaks promptly and remaining until class is dismissed. Absences are permitted only for medical reasons and must be supported with a doctor's note.
Generic Skills	The faculty is committed to ensuring that students have the full range of knowledge and skills required for full participation in all aspects of their lives, including skills enabling them to be life-long learners. To ensure graduates have this preparation, such generic skills as literacy and numeric, computer, interpersonal communications, and critical thinking skills will be embedded in all courses.
Course Change	Information contained in this course outline is correct at the time of publication. Content of the courses is revised on an ongoing basis to ensure relevance to changing educational employment and marketing needs. The instructor will endeavor to provide notice of changes to students as soon as possible. Timetable may also be revised.

Pharmaceutics II

1	**Course name**	**Pharmaceutics II**
2	**Course Code**	**PH 204**
3	**Course type: /general/specialty/optional**	**Specialty**
4	**Accredited units**	**3 units (2 hours theory + 2 hours lab)**
5	**Educational hours**	**4 hours**
6	**Pre-requisite requirements**	**Pharmaceutics I**
7	**Program offered the course**	**Department of pharmaceutics and industrial pharmacy**
8	**Instruction Language**	**English**
9	**Date of course approval**	**12/2021**

Brief Description:	This course is designed to impart a fundamental knowledge on the preparatory pharmacy with arts and science of preparing the different conventional dosage forms.	
Textbooks required for this Course:	1. Alfonso R. Gennaro Remington. The Science and Practice of Pharmacy, Lippincott Williams, New Delhi. 2. Carter S.J., Cooper and Gunn's. Tutorial Pharmacy, CBS Publications, New Delhi. 3. E.A. Rawlins, Bentley's Text Book of Pharmaceutics, English Language Book Society, Elsevier Health Sciences, USA. 4. Isaac GhebreSellassie: Pharmaceutical Pelletization Technology, Marcel Dekker, INC, New York. 5. Dilip M. Parikh: Handbook of Pharmaceutical Granulation Technology, Marcel Dekker, INC, New York. 6. Francoise Nieloud and Gilberte Marti-Mestres: Pharmaceutical Emulsions and Suspensions, Marcel Dekker, INC, New York.	
Course Duration	28 weeks	
Delivery	• Lecture-based, Group interaction and discussion, Use of video technique, practical classes.	
Course Objectives:	Upon completion of this course the student should be able to: Know the history of profession of pharmacy Understand the basics of different dosage forms, pharmaceutical incompatibilities and pharmaceutical calculations Understand the professional way of handling the prescription Preparation of various conventional dosage forms	
Course Assessments	- Midyear exam	20%
	Quizzes, reports, presentation,discussion	10%
	Practical continuous assessment, exam	10%
	Final Practical exam	20%
	Final theoretical exam	40%
	Total	100%
Content Breakdown Topical Coverage	**Content Breakdown Topical Coverage**	
Session 1 (Week 1)	**Unit I. Emulsions (6 hr)** • Definition. • Purposes of emulsification. • Theories of emulsification.	
Session 2 (Week 2)	• Types of emulsifying agents. • Tests for determination of emulsion type.	
Session 3 (Week 3)	• Preservation of emulsions. • Manufacturing.	
Session 4 (Week 4)	**Unit II: Semi - solid dosage forms (18 hr)** **a) Ointments. (6 hr)**	

	• Definition. • Function of ointments and ointments bases.Excipients used in semi solid dosage forms. Evaluation of semi solid dosage forms. • Release rate of semi-solid dosage form.
Session 5 (Week 5)	• Classification of ointments bases.
Session 6 (Week 6)	• Considerations in compounding and dispensing, e.g. quality, suitability
Session 7 (Week 7)	**b) Creams and gels. (6 hr)** • Types of creams and gels. • Formulation. • Filling and Packaging. • Type of base & Functions.
Session 8 (Week 8)	• Packaging.
Session 9 (Week 9)	• Type of base & Functions.
Session 10 (Week 10)	**c) Suppositories (6 hr)** • History • Types and therapeutic uses, advantages and disadvantages, types of bases, methods of preparations. Displacement value & its calculations, evaluation of suppositories.
Session 11 (Week 11)	Midyear Exam
Session 12 (Week 12)	
Session 13 (Week 13)	
Session 14 (Week 14)	
Session 15 (Week 15)	• Anatomy of rectum & factors affecting drug absorption
Session 16 (Week 16)	• Classification of suppository bases • General consideration of compounding & dispensing • Manufacturing, packaging, evaluation and stability of semidolid dosage forms.
Session 17 (Week 17)	**Unit III: Modified-release Pharmaceutical Dosage forms (MRPD) (5 hrs)** • Pharmaceutical Concepts. • Formulation of (MRPD).
Session 18 (Week 18)	• Mechanisms of drug release from MRPD.
Session 19 (Week 19)	**Unit IV: Complexation and protein binding. (10 hr)** • Definitions and Introduction. • Types of complexes.
Session 20 (Week 20)	• Types of complex reactions. • Methods of complex analysis.
Session 21 (Week 21)	• Protein binding. • Equilibrium dialysis.
Session 22 (Week 22)	• Dynamic dialysis.
Session 23 (Week 23)	• Complexation and drug action.

Session 24 (Week 24)	**Unit V: Kinetics. (4 hrs)** • Rate and order of reactions. • Determination of order of reactions. • Factors influencing the reaction rate.
Session 25 (Week 25)	**Unit VI: Product stability (8-hrs)** • Factors affecting drug stability. • Reactions causing drug decompositions.
Session 26 (Week 26)	• Types of stability tests. • Prediction of shelf life and expiry dates.
Session 27 (Week 27)	• Stability tests of pharmaceutical dosage forms.
Session 28 (Week 28)	• Stabilization of pharmaceutical products
	Final theoretical Exam.
Practical work (one/week)	**Practical Part:** 1. Preparation of arachis oil emulsion 2. Preparation of liquid paraffin emulsion 3. Preparation of calamine lotion 4. Preparation of salicylic acid lotion 5. Preparation of aminobenzoic acid lotion 6. Preparation of lubricating jelly 7. Preparation of zinc oxide paste 8. Preparation of vanishing cream 9. Preparation of cold cream 10. Preparation of suppositories using theobroma oil and displacement value (calculation (theoretical) 11. Preparation of suppositories using glycerol-gelatin base and displacement value (calculation (theoretical) 12. Determination of rate, rate constant and half-life of zero order reaction (theoretical) 13. Determination of rate, rate constant and half-life of first order reaction (theoretical)
	Final Practical Exam
Attendance Expectations	Students are expected to attend every session of class, arriving on time, returning from breaks promptly and remaining until class is dismissed. Absences are permitted only for medical reasons and must be supported with a doctor's note.
Generic Skills	The faculty is committed to ensuring that students have the full range of knowledge and skills required for full participation in all aspects of their lives, including skills enabling them to be life-long learners. To ensure graduates have this preparation, such generic skills as literacy and numeric, computer, interpersonal communications, and critical thinking skills will be embedded in all courses.

Pharmaceutical technology

1	**Course name**	**Pharmaceutical technology**
2	**Course Code**	**PH 208**
3	**Course type: /general/specialty/optional**	**Specialty**
4	**Accredited units**	**4 Units (Theoretical 3 Lecture/Week** **Practical 2 hours/Week)**
5	**Educational hours**	**6 hr/week**
6	**Pre-requisite requirements**	**Pharmaceutics I, II**
7	**The program offered the course**	**Department of Pharmaceutics and Industrial pharmacy**
8	**Instruction Language**	**English**
9	**Date of course approval**	**12/2021**

Brief Description:	This course focuses on the study of the interrelationships betweenformulation and physiological factors and pharmacokinetic aspects of drug absorption, distribution, metabolism, and excretion.	
Textbooks required for this Course:	1. Remington's pharmaceutical sciences 2. Aulton's pharmaceutics 3. Sciences direct web	
Course Duration	72 hours for theory	
Delivery	Lecture-based, Group interaction and discussion, self-directed activities, active participation, computer lab , lab experiments …..etc.	
Course Objectives:	1**. To have the expertise and knowledge needed to be involved in different pharmaceutical care settings in community pharmacies, industrial sector, pharmaceutical sales and marketing.** 2. Supplying information about pharmaceutical packaging, GMP, validation, contamination, sterilization and pharmaceutical plant. 3.Supplying information about aerosol.	
Course Assessments	Midyear exam	20%
	Quizzes, reports, presentation	10%
	Practical continuous assessment, exam	10%
	Final Practical exam	20%
	Final theoretical exam	40%

	Total	100%
Content Breakdown Topical Coverage	Content Breakdown Topical Coverage	
Session 1 (Week 1)	**Unit I: size reduction and size separation: (powder, granulation technology)** • Definitions, factors affecting size reduction • Principles, laws and factors affecting energy requirements	
Session 2 (Week 2)	• Methods of size reduction • Hammer mill, fluid energy mill and disintegrator.	
Session 3 (Week 3)	• Size separation: various methods and equipments employed for size separation: e.g. sieving, sedimentation, centrifugal elutriation microscopic methods… etc. • Pelletization.	
Session 4 (Week 4)	• Dust control	
Session 5 (Week 5)	• Safety measuring and industrial hazards	
Session 6 (Week 6)	• Introduction to production management	
Session 7 (week 7)	• Heat transfer	
Session 8 (Week 8)	• Evaporation	
Session 9 (Week 9)	• Drying	
Session 10 (Week 10)	• Drying continue.	
Week (11.12.13.14)	**Midyear Exam**	
Session 15 (Week 15)	Mass transfer and fluid mechanics	
Session 16 (Week 16)	Filtration Centrifugation	
Session 17 (Week 17)	Crystallization Mixing	
Session 18 (Week 18)	Mixing continue.	
Session 19 (Week 19)	Pharmaceutical Packaging Technology	
Session 20 (Week 20)	Pharmaceutical Packaging Technology continue.	
Session 21 (Week 21)	Topical and transdermal drug delivery techniques	
Session 22 (Week 22)	Pulmonary drug delivery techniques (Aerosols)	
Session 23 (Week 23)	Pharmaceutical nanotechnology and nanomedicines	
Session 24 (Week 24)	Sterile products	
Session 25 (Week 25)	Pilot plane and scale up	
Session 26 (Week 26)	Structure of pharmaceutical plan	
Session 27 (Week 27)	Surgical ligature	
Session 28 (Week 28)	Current good manufacturing practice	
Session 29 (Week 29)	Current good manufacturing practicecontinue.	

	Manufacturing authorization and product registration
Final theoretical Exam	
Practical work	1. preparation of simple ointment and Sulphur ointment. 2. preparation of emulsifying ointment and Whitfield ointment. 3. preparation of non-staining iodine ointment 4. preparation of vanishing cream 5. preparation of cold cream 6. preparation of salicylic acid and sulphuric cream 7. preparation of cetrimide cream 8. preparation of tragacanth jelly 9. preparation of boric acid suppositories 10. preparation of zinc oxide suppositories 11. preparation of tooth paste 12. solubility curves 13. calculation of filter media resistance and cake resistance 14. rate of sedimentation 15. particle size analysis.
	Final Practical Exam
Attendance Expectations	Students are expected to attend every session of class, arriving on time, returning from breaks promptly and remaining until class is dismissed. Absences are permitted only for medical reasons and must be supported with a doctor's note.
Generic Skills	The faculty is committed to ensuring that students have the full range of knowledge and skills required for full participation in all aspects of their lives, including skills enabling them to be life-long learners. To ensure graduates have this preparation, such generic skills as literacy and numeric, computer, interpersonal communications, and critical thinking skills will be embedded in all courses.
Course Change	Information contained in this course outline is correct at the time of publication. Content of the courses is revised on an ongoing basis to ensure relevance to changing educational employment and marketing needs. The instructor will endeavor to provide notice of changes to students as soon as possible. Timetable may also be revised.

Industrial Pharmacy

1	Course name	Industrial Pharmacy
2	Course Code	PH 302
3	Course type: /general/specialty/optional	Specialty
4	Accredited units	4 units (Theoretical 3 Lecture/Week Practical 1 lab/Week)
5	Educational hours	5hrs/week
6	Pre-requisite requirements	passed examination in Pharmaceutics
7	Program offered the course	Department of Pharmaceutics and Industrial Pharmacy
8	Instruction Language	English Language
9	Date of course approval	12/2021

Brief Description:	The course deals with the basic pharmaceutical operations that take place in the pharmaceutical industry, as well as how to establish a pharmaceutical factory. The course also focuses in the devices industry. Course enables the student to understand and appreciate the influence of pharmaceutical additives and various pharmaceutical dosage forms on the performance of the drug product.	
Textbooks required for this Course:	1- Modern Pharmaceutics by Gilbert S. Banker & C.T. Rhodes, 3rd Edition 2-. Remington: The Science and Practice of Pharmacy, 20th edition Pharmaceutical Science (RPS) 3- . Theory and Practice of Industrial Pharmacy by Liberman& Lachman 4- . Pharmaceutics- The science of dosage form design by M.E.Aulton, Churchill Livingstone, Latest edition 5- Additional Resources: Lectures Notes	
Course Duration	28 weeks	
Delivery	Lectures (Tools: board, data show). The lectures were added on the internet site of the faculty to be available to the students all the time as an *e*-learning. Practical Session (Tools: labs., boards, instruments, chemicals, glassware, equipment). Assignments, seminars, researches and posters.	
Course Objectives:	Upon successful completion of this course, the students should be able to 1. Know the various pharmaceutical dosage forms and their manufacturing techniques. 2. Understand the process of technology transfer from lab scale to commercial batch 32. Know various considerations in development of pharmaceutical dosage forms 4. Formulate solid, liquid and semisolid dosage forms and evaluate them for themquality .	
Course Assessments	Midyear Examination	20%
	Practical continuous Assessment, Exam	10%
	Quiz, reports , presentation	10.0%
	Final practical Examination	20%
	Final written Examination	40%
	Total	100%
Content Breakdown Topical Coverage	Content Breakdown Topical Coverage	
Session 1 (Week 1)	**I. Solid dosage forms (6 hr)** **a) Free powder dosage forms**	
Session 2 (Week 2)	**b) Granules**	
Session 3 (Week 3)	**c) Tablets (9 hrs)** • History, advantages and classification • Single compressed tablets • Recipients (diluents, binders, disintegrants, lubricants, colorants and flavoring agents)	
Session 4 (Week 4)	Manufacture	

	i) Dry methods • Direct compression • Granulation by compression – slugging ii) Wet methods • Wet granulation • Special procedures: Spray drying granulation, fluidized-bed granulation- Tablet machines (single punch, intermediate type and rotary tablet machines)
Session 5 (Week 5)	• Processing problems - capping, picking, weight variation, non-disintegrating tablet, etc. • Classification: Chewable, buccal, sublingual and effervescent tablets. • Evaluation -Hardness, friability, disintegration, dissolution rate, weight and content uniformity, etc.
Session 6 (Week 6)	**d) Capsules and microencapsulation** Hard gelatin capsules **(6 hr)** • Extemporaneous filling methods - Machine filling methods
Session 7 (Week 7)	- Quality control: Weight variation, content uniformity, capsule disintegration, dissolution test.
Session 8 (Week 8)	• Soft gelatin capsules **(3 hrs)** - Plate process, rotary die process, Norton capsule machine, Accogel capsule machine
Session 9 (Week 9)	• Microencapsulation **(5 hrs)** - Definition, materials used, equipment, methodsof applications
Session 10 (Week 10)	• Microencapsulation (continue) - Definition, materials used, equipment, methods of applications
Session 11 (Week 11)	
Session 12 (Week 12)	**Midterm Assessment**
Session 13 (Week 13)	
Session 14 (Week 14)	
Session 15 (Week 15)	• Coating of solids **(5 hrs)** o Reasons, equipment, core tablet characteristics, types o Sugar coating, film coating (non enteric and enteric)
Session 16 (Week 16)	• Equipment: Pan coating, air suspension coating, compression coating, multiple compressed tablets, long acting tablets.
Session 17 (Week 17)	**II. Prolonged acting pharmaceuticals (6 hr)** • Terminology, sustained release, prolonged action, repeat action, Coated slow release beads, Tablets and slow release granules, Tablet mixed release granules, Porous inert carrier, Ion exchange resins,
Session 18 (Week 18)	• Multiple layer tablets/Repeat action tablets, Slightly soluble salts or complex, Evaluation of prolonged released dosage forms, *In vitro* and *In vivo* evaluation

	III. Cosmetology (12hr) Classification of cosmetic and cosmeceutical products Definition of cosmetics as per Indian and EU regulations, Evolution of cosmeceuticals from cosmetics, cosmetics as quasi and OTC drugs **Cosmetic excipients:** Surfactants, rheology modifiers, humectants, emollients, preservatives. Classification and application **Skin:** Basic structure and function of skin. **Hair:** Basic structure of hair. Hair growth cycle. **Oral Cavity:** Common problem associated with teeth and gums**.**
Session 19 (Week 19)	• Lather shaving creams and brushless shaving cream,
Session 20 (Week 20)	• Shampoos, • Lipsticks, Face powders (loose and compact), • Different types of creams,
Session 21 (Week 21)	• Tooth paste (Formulation, manufacture and evaluation) • Principles of Cosmetic Evaluation: Principles of sebumeter, corneometer. Measurement of TEWL, Skin Color, Hair tensile strength, Hair combing properties Soaps, and syndet bars. Evolution and skin benefits.
Session 22 (Week 22	**IV. Fermentation technology (6 hr)** - Production of penicillin and streptomycin
Session 23 (Week 23)	Fermentation technology Production of penicillin and streptomycin (continue)
Session 24 (Week 24)	**V. Blood products and preparations (5 hr)**
Session 25 (Week 25)	Blood products and preparations (continue)
Session 26 (Week 26)	**V. Structure of pharmaceutical factory (3 hr)** • Structure of pharmaceutical factory, structure of each division, duties and responsibilities of each department.
Session 27 (Week 27)	**VI. Pilot-plant scale-up (3 hr)** • Lay out of pharmaceutical factory. • Materials used in construction.
Session 28 (Week 28)	**VII. Industrial safety and industrial hazards. (3 hr)**
	Final theoretical Exam
Practical Work	1- preparation of effervescent granules by dry method and wet method.
	2- preparation of tablet containing different types of drug substances by wet granulation, dry granulation and direct compression methods.
	3- evaluation of prepared tablets/ commercial tablets, capsules. Weight evaluation test, disintegration test, hardness, friability.
	4- formulation and filling of capsules.
	5- preparation of cosmetics such as cold cream, vanishing cream, shaving cream, tooth paste, shampoo, face-powders etc. Evaluation of the quality of these products.
	6- preparation of non-staining iodine ointment.
	7- preparation of prolonged release formulations such as microspheres.

	8- determination of bulk properties of granules such as bulk, density , true density, compressibility, flow properties (angle or repose) etc.
	9- Final Practical Examination
Attendance Expectations	Students are expected to attend every session of class, arriving on time, returning from breaks promptly and remaining until class is dismissed. Absences are permitted only for medical reasons and must be supported with a doctor's note.
Generic Skills	The faculty is committed to ensuring that students have the full range of knowledge and skills required for full participation in all aspects of their lives, including skills enabling them to be life-long learners. To ensure graduates have this preparation, such generic skills as literacy and numeric, computer, interpersonal communications, and critical thinking skills will be embedded in all courses.
Course Change	Information contained in this course outline is correct at the time of publication. Content of the courses is revised on an ongoing basis to ensure relevance to changing educational employment and marketing needs. The instructor will endeavor to provide notice of changes to students as soon as possible. Timetable may also be revised.

Biopharmaceutics and Pharmacokinetics

1	**Course name**	**Biopharmaceutics and Pharmacokinetics**
2	**Course Code**	**PH301**
3	**Course type: /general/specialty/optional**	**Specialty**
4	**Accredited units**	**4 units (3 hrs / week Theory** **2 hrs / week lab)**
5	**Educational hours**	**5 hr/week**
6	**Pre-requisite requirements**	**Pharmaceutics 1, 2 , Physical Pharmacy**
7	**Program offered the course**	**Pharmaceutics**
8	**Instruction Language**	**English**
9	**Date of course approval**	**1/2022**

Brief Description:	This course focuses on the study of the interrelationships between formulation and physiological factors and pharmacokinetic aspects of drug absorption, distribution, metabolism, and excretion.
Textbooks required for this Course:	1.Leon Shargel, Andrew B.C. Yu, eds. Applied Biopharmaceutics and Pharmacokinetics, 7th edition. New York: McGraw Hill, 2016. ISBN: 978-0-07-183093-5. 2. Derendorf, Hartmut; Schmidt, Stephan. Rowland and Tozer's Clinical Pharmacokinetics and Pharmacodynamics – Concepts and Applications, 5th Ed, Walters-Kluwer: 2020, ISBN: 978-1-49-638504-8. 3. Principles and Applications of Biopharmaceutics and Pharmacokinetics: for Pharmacy. Late Dr. H.P Tipnis and Dr. Amrita Bajaj ISBN: 8188739146, 9788188739141 Additional Resources: Lecture slides Microsoft Office Excel software with PK Solver tool Winnonlin or Phoenix Software Small ruler and scientific calculator or laptop calculator/calculation tool (in class) Rectilinear and semi logarithmic graph papers
Course Duration	28 weeks
Delivery	Lecture-based, Group interaction and discussion, self-directed activities, active participation, computer lab , lab experiments …..etc.
Course Objectives:	Upon completion of the course student should be ableto:

	1. Understand the basic concepts in biopharmaceutics and pharmacokinetics and their significance. 2. Use of plasma drug concentration-time data to calculate the pharmacokinetic parameters to describe the kinetics of drug absorption, distribution, metabolism, excretion, elimination. 3. To understand the concepts of bioavailability and bioequivalence of drug products and their significance. 4. Understand various pharmacokinetic parameters, their significance & applications.	
Course Assessments	Midyear exam	20%
	Quizzes, reports, presentation	10%
	Practical continuous assessment, exam	10%
	Final Practical exam	20%
	Final theoretical exam	40%
	Total	100%
Content Breakdown Topical Coverage	Content Breakdown Topical Coverage	
Session 1 (Week 1)	**I. BIOPHARMACEUTICS (21-Hrs)** **1. Introduction 3–hrs** **1.1** Definition and concepts. **1.2** Fundamental principles of biopharmaceutics. **1.3** Biopharmaceutical Classification System **1.4** Concept of bioavailability.	
Session 2 (Week 2)	**2. Drug adsorption from gastrointestinal tract (G.I.T) 9–hrs** **2.1** Anatomic and physiologic considerations. **2.2** Physicochemical factors influencing drug absorption from the G.I.T. - Drug dissolution constant (pka) and lipid solubility. - Dissolution rate of drugs (Particle size and Surface area, Crystal form, Polymorphism, Solvation, Salt forms, Complexation, Solid solutions, Adsorption, Eutectics, Surfactants). - Chemical stability of drugs in the G.I.T.	
Session 3 (Week 3)	**2.3 Physiological factors influencing drug absorption from the G.I.T** - Surface area of the G.I. absorption sites. - pH of the G.I. fluids. - Gastric emptying. - Intestinal motility. **Dosage form factors influencing drug absorption from the G.I.T.** - General consideration (design of the appropriate dosage from, bioavailability**,** rate-limiting steps**).** - Influence of the type of dosage form **(**solution**,** suspension**,** capsules compressed tablets**,** modified-release dosage forms**).** - Influence of excipients **(**diluents**,** surfactants**,** viscosity-enhancing agents**).**	
Session 4 (Week 4)	**4. Mechanisms of drug transport the G.I / blood barrier**	

	- Passive diffusion. - Carrier-mediated transport (Active & Facilitated diffusion). - Other mechanisms (Ion-pair transport, Pore transport, Pinocytosis).
Session 5 (Week 5)	**5. Drug absorption via different routes of administration 3-hrs** **5.1** Drug absorption via buccal, sublingual, pharyngeal and nasogastric mucosa. **5.2** Rectal drug absorption. **5.3** Ophthalmic drug absorption. **5.4** Parenteral drug absorption. **5.5** Inhalation drug delivery systems. **5.6** Percutaneous drug absorption. **5.7** Absorption through other routes.
Session 6 (Week 6)	**6. Disposition factors influencing drug activity 6-hrs** **6.1** Drug distribution. - Binding to blood components. - Tissue distribution. - Membrane transport (PH partition, uptake into CSF). **6.2 Drug metabolism** - Principles and pathways of biotransformation. - Factors affecting drug biotransformation.
Session 7 (week 7)	**6.3 Drug excretion** - Renal excretion (Glomerular filtration, Active tubular secretion, Passive tubular reabsorption). - Non-renal excretion (Biliary, Salivary, Mummary, Pulmonary. Skin, Genital). - Relative contribution of renal excretion in bioavailability
Session 8 (Week 8)	**II. PHARMACOKINETICS (51-hrs)** **1. Introduction 3-hrs** **1.1** Definition and aims (Pharmacokinetic, Pharmacodynamics, Therapeutic window .... etc.). **1.2** Kinetic concepts of drug absorption, distribution & elimination. - Compartments and models. - Rates and order of kinetics. - Volume of distribution.
Session 9 (Week 9)	**2. Basic Pharmacokinetics 21–hrs** **2.1** Pharmacokinetics of IV bolus single dose. - Compartmental Approach - non- compartmental approach
Session 10 (Week 10)	**2.2** Drug clearance. - Renal clearance. - Hepatic clearance. - Biliary and salivary clearance

Week (11.12.13.14)	**Midyear Exam (Biopharmaceutics)**
Session 15 (Week 15)	**2.3** Pharmacokinetics of IV bolus doseusing urine data
Session 16 (Week 16)	**2.4** Pharmacokinetics of oral-single dose**.**
Session 17 (Week 17)	**2.5** Pharmacokinetics of Intravenous Infusion
Session 18 (Week 18)	**2.6** Pharmacokinetics of Multiple dosing
Session 19 (Week 19)	**2.7** Non-linear pharmacokinetics**.** - Causes and characteristics**.** - Determination **(**Michaelis–Menten kinetics**)**
Session 20 (Week 20)	**3. Bioavailability and Bioequivalence Studies 6-hrs** **3.1** Definition and concept. **3.2** Relative and Absolute bioavailability **3.3** Bioequivalence requirements and design.
Session 21 (Week 21)	**3.4** Bioequivalence studies. **3.5** Methods of documenting bioequivalency and therapeutic equivalence.
Session 22 (Week 22)	**4. In Vitro- In Vivo correlation 6-hrs** **4.1** Introduction **4.2** Correlation levels
Session 23 (Week 23)	**4.3** Development and assessment of *IVIVC* **4.4** Application of *IVIVC*
Session 24 (Week 24)	**5. Therapeutic Drug Monitoring monitoring 12-hrs** 5.1. Clinical Pharmacokinetic conceptsand equations
Session 25 (Week 25)	5.2. Dosage Regimen adjustment and equations in renal impairment**.**
Session 26 (Week 26)	5.3. Dosage Regimen adjustment and equations in hepatic impairment**.**
Session 27 (Week 27)	5.4 Selected Problems in Clinical Pharmacokinetics • Antibiotics**.** • Cardiovascular drugs**.** • Anticonvulsants**.** • Immunosuppressants**.** • Anticoagulants**.** • Other drugs**.**
Session 28 (Week 28)	**6. Plasma Drug Concentration and Therapeutic Response**: **3-hrs** An Introduction to Pharmacodynamics
Final theoretical Exam	
Practical work	**1.Using Winnonlin, Phoenix or Excel-Pk-solver Software to:** **1.1.** Determination of AUC using Trapezoidal rule **1.2.** Determination of absolute and relative bioavailability **1.3.** Determine Pharmacokinetics parameters from plasma concentration profile after IV bolus drug administration **1.4.** Determine Pharmacokinetics parameters from plasma

	concentration profile oral drug administration **1.5.** Determine Pharmacokinetics parameters from plasma concentration profile after IV infusion drug administration. **1.6.** Determine Pharmacokinetics parameters from plasma concentration profile after Multiple dosing **1.7.** Determine Pharmacokinetics parameters using non-compartmental approach. **1.8.** Determine Pharmacokinetics parameters of Aspirin and Riboflavin using urine excretion data **1.9.** Applications of *IVIVC* **2. Lab experiments:** **2.1.** Study the effect of pH of site on In Vitro absorption of weakly acidic drugs. **2.2.** Effect of permeation enhancers on the Percutaneous absorption of drugs. **2.3.** Study the dissolution profile of marketed paracetamol tablets **2.4.** Study the effect of urine pH on urinary excretion of Aspirin **2.5** Effect of surface area and particle size of drug on the dissolution and absorption of drug. **2.6.** Bioavailability of acetaminophen in saliva. **2.7.** Effect of drug concentration, pH and polysorbate 80 on drug absorption in Goldfish.
	Final Practical Exam
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المحاسبة وإدارة الأعمال الصيدلية

1	اسم المقرر الدراسي	المحاسبة وإدارة الأعمال الصيدلية
2	رمز المقرر	PH 408
3	طبيعة المقرر: عام/تخصص/اختياري	تخصص
4	عدد الوحدات المعتمدة	2
5	عدد الساعات التعليمية	2
6	المتطلبات المطلوبة مسبقا	/
7	البرنامج التعليمي الذي يُقدم المقرر	الصيدلانيات
8	لغة التدريس	اللغة العربية والانجليزية
9	تاريخ اعتماد المقرر	2022

وصف موجز للمقرر	المحاسبة وإدارة الأعمال الصيدلية أولا: المحاسبة: يحتوي منهج المحاسبة التعريفات والأهداف والمصطلحات المحاسبية. .ومعادلة الميزانية كذلك الدورة المحاسبية بخطواتها بشكل مختصر وقد تم التطرق إلى بعض الأمثلة الافتراضية عن عمليات البيع والشراء لشركات الأدوية والصيدليات حتى يسهل استيعاب الدورة لدى طالب الصيدلة ثانياً: إدارة الأعمال الصيدلية: يسلط الضوء على عمليات التسويق والدعاية والتسعير، وأيضا دراسة اتفاقيه الجات سنه 1994وأثارها الإيجابية والسلبية. والتي ركزت على تجاره الأدوية وأثر هذه الاتفاقية على الدول النامية كما تم دراسة الرقابة على شركات الأدوية، وتقييم الأداء المالي ، ومشاكل التسويق والإنتاج والجودة ومستقبل شركات الأدوية في القرن ال 21،والفرق بين شركات الأدوية العربية والأجنبية
الكتب المقررة	مبادئ المحاسبة / إدريس اشتيوي إدارة الأعمال الصيدلية / محمد احمد بغدادي إدارة المستشفيات وشركات الأدوية /فريد النجار
المدة الزمنيةللمقرر	عدد الساعات المطلوب لتدريس المقرر 46ساعة نظرية من المتوقع أن يتم تخصيص ساعات إضافية من الواجبات المنزلية يومياً خلال هذا المقرر
طريقة التدريس	المحاضرات، التفاعل والنقاش الجماعي، الأنشطة الموجهة ذاتيا، المشاركة النشطة، ...إلخ
الأهداف والمستهدف من المقرر	بدراسة المقرر، سيكون الطالب قد أثبت بشكل موثوق القدرة على: • فهم الدورة المحاسبية ومشاكل شركات الأدوية ووضع الحلولالمقترحة. • كيفية تحديد الأرباح لدى شركات الأدوية وتقييمها • التعرف على مجالات الرقابة الدوائية ومستقبل شركات الأدوية العربية. • تحديد المشكلة والأحكام والشروط عند استيراد الأدوية وتخزينها

	• تطوير مهارات الطالب في عمليات البيع والشراء في شركات الأدوية والصيدليات ومعرفه العمليات المدينة والدائنة
طريقة التقييم	الامتحان النصفي الامتحان النهائي الواجبات المنزلية .....
محتويات المقرر	محتوى المقرر الدراسي
الأسبوع الأول	الإطار النظري لعلم المحاسبة
الأسبوع الثاني	معادلة الميزانية
الأسبوع الثالث	معادلة الميزانية
الأسبوع الرابع	الدورة المحاسبية
الأسبوع الخامس	إجراء القيود أليوميه
الأسبوع السادس	الترحيل إلى حساب الأستاذ
الأسبوع السابع	ترصيد الحسابات
الأسبوع الثامن	مثال شامل وحلول تمارين
الأسبوع التاسع	إعداد ميزان المراجعة
الأسبوع العاشر	إعداد قائمة الدخل
الأسابيع 14.13.12.11	الامتحان الجزئي
الأسبوع الخامس عشر	إعداد الميزانية العمومية
الأسبوع السادس عشر	مثال شامل وحلول تمارين
الأسبوع السابع عشر	إدارة الأعمال الصيدلية: التسويق
الأسبوع الثامن عشر	التسويق
الأسبوع التاسع عشر	الدعاية
الأسبوع العشرون	التسعير
الأسبوع الحادي والعشرون	اتفاقيه الجات
الأسبوع الثاني والعشرون	مشاكل الإنتاج والجودة لدى شركات الأدوية العربية
الأسبوع الثالث والعشرون	الرقابة على شركات الأدوية
الأسبوع الرابع والعشرون	تقييم أداء شركات الأدوية
الأسبوع الخامس والعشرون	مستقبل شركات الأدوية في القرن 21
الأسبوع السادس والعشرون	مقارنه شركات الأدوية العربية والأجنبية
الأسبوع السابع والعشرون	الحلول المقترحة وسبل التطوير
الأسبوع الثامن	مراجعة عامة

والعشرون	
الامتحان النهائي	
ملاحظة	تم إعداد المواضيع المقررة والمدة الزمنية المرتبطة بها . مع مراعاة الأسابيع المتعلقة بالامتحان الجزئي بعض الأسابيع التي ستجرى بها حلول تمارين واختبارات.
الحضور والغياب	يجب على الطلاب حضور كل المقرر الدراسي في الوقت المحدد ، ولا يسمح بالتغيب إلا لأسباب طبية ويجب دعمه بتقرير طبي.
مهارات عامة	تلتزم الكلية بضمان حصول الطلاب على كامل المعرفة والمهارات اللازمة للمشاركة الكاملة في جميع جوانب حياتهم، بما في ذلك المهارات التي تمكنهم من أن يكونوا متعلمين مدى الحياة. لضمان حصول الخريجين على هذا الإعداد، سيتم تضمين مهارات عامة مثل الكمبيوتر والاتصالات الشخصية ومهارات التفكير .
التغيير والتعديل في المقرر الدراسي	المعلومات الواردة في مخطط المقرر الدراسي هذا صحيحة وقت النشر. وينقح محتوى المقررات الدراسية على أساس مستمر لضمان ملائمتها لتغير العملية التعليمية واحتياجات سوق العمل. وسيسعى أستاذ المقرر إلى تقديم إشعار بالتغييرات للطلاب في الوقت المناسب. ويمكن أيضا تنقيح الجدول الزمني.