Kingdom of Saudi Arabia

Ministry of Higher Education

King Faisal University

College of Clinical Pharmacy

STUDY PLAN

for

Pharm D Program

College of Clinical Pharmacy, King Faisal University

PO Box 400, Al-Ahsa -31982

Phone: +966 3 5817175, Fax +9663 8517174

Email: clinicalpharmacy@kfu.edu.sa

Contents

1. The College

1.1. Vision:

The college to be recognized nationally and internationally for preparing role models and leaders in pharmacy practice, education and research through its commitment to community engagement.

1.2. Mission:

College of Clinical Pharmacy is committed to serve the community by providing programs of excellence in Pharmacy teaching and training, research and continuing professional development, aiming at improved patient centered care and generation of new knowledge in drug development and application

1.3. Value statement:

Based on Islamic Principles, the College of Clinical Pharmacy promotes an environment of mutual respect and collaboration, where we value:

- Excellence and innovation
- Responsibility to community
- Lifelong, self directed learning
- Creativity and quality
- Integrity

at all levels of teaching, training, research and patient care

1.4. College Objectives:

1.4.1 The College of Pharmacy is designed to achieve the following objectives:

1. To educate, at undergraduate and postgraduate level, and train professionals to acquire the necessary knowledge, skills and attitudes to become competent pharmacy practitioners for provision of patient centered care with strong social commitment. .
2. To instill the habit of continuous and reflective learning, through excellence in teaching and training that will enable them to meet the challenges of future development in Clinical Pharmacy.
3. To provide organized educational programs, at all levels, to facilitate continuous professional development and community service.
4. To promote basic and applied research that focuses on pre-clinical and clinical development of pharmaceuticals, therapeutic management and prevention of disease.
5. To establish channels of collaboration with other related national and international institutions.

1.4.2. Evaluation of College Objectives

Objective	Tools for Evaluation
Graduate with patient centered care:	Preceptors' evaluation during institutional Pharmacy Experience and Advanced Pharmacy Practice Experience. Feedback from stakeholders where college graduate work
Excellence in teaching and training:	Course evaluation by the students. Training site and preceptors' evaluation by the students.
Research:	Faculty research projects approved by the KFU deanship and other funding agencies. Amount of funding got by the faculty members every year. Number of students involved in research each year. Faculty publications each year.
Continuous Professional Development:	Faculty members' participation in faculty development programs: workshops, Symposia, and conferences.
Community Services:	Number of lectures for community. Professional Development program for community pharmacists
Collaborations: National and International:	Number of collaborative research proposals and paper published. Number of health institutions having collaboration with the college for training and research

Pharm D Program:

Program Outcomes:

The Doctor of Pharmacy curriculum prepares graduates to

1. Apply fundamental scientific knowledge and principles as basis of Pharmaceutical and Clinical Sciences
2. Apply knowledge of biomedical sciences for understanding of disease process and its diagnosis
3. Develop patient data base from patient interview, examination, hospital record and communication with other health professionals
4. Apply knowledge of clinical Sciences in designing patient specific therapeutic plan based on best evidence and counseling the patient regarding it.
5. Retrieve interpret and report drug information from pharmaceutical and biomedical science recourses and apply information to specific patient care situation
6. Recognize basic principles of drug development, formulation and bioequivalence studies to contribute in pharmaceutical industry and in research institutes.
7. Appreciate necessary knowledge in organizational and administrative domains for management of Pharmaceutical services and practice
8. Recognize basic principles to design, implement and conduct research studies in drug and/or patient specific area

Instructional Strategies:

Several teaching and learning strategies that will stimulate student-centered, active learning are adopted to provide a strong educational foundation so that our students will become pharmacists who embrace the concept of being a life-long learner with critical thinking and problem solving abilities.

1. Didactic Lectures
2. Lab sessions/demonstrations
3. Small Group Session and tutorials
4. Experiential training: in clinical sciences
    a. **PBL: C**ase-**A**ssisted **S**tudent **C**entered **L**earning (**CASCL**), in real time clinical settings
    b. CAL: computer assisted learning:

Assessment Stratigies

Assessment tools are constructed to allow one to determine the student's knowledge base and the extent to which a student can integrate concepts and solve basic or clinical-based problems. It is stressed that all examinations should fulfill the basic characteristics of assessment, i.e. reliability, objectivity, validity and feasibility:

1. Written examination comprising of;
    a. SEQ's
    b. EMQ
    c. MCQ's
    d. Fill in the blanks
    e. Mathematical problems
    f. Case base questions
2. Performance based assessment for practical segments of the basic and clinical courses (OSCEs)
3. Portfolio assessment for clinical rotations and practical segment of Therapeutics
4. Presentations, Assignments and projects

Curricular Map

Preparatory Year

Chemistry, Biology, Physics, Math, Intensive English

First Year Pharm D

Basic Pharmaceutical Sciences

Basic Biomedical Sciences

Second Year Pharm D

Transition from Basic to Applied/ Clinical

Pharmacology, Medicinal Chemistry, Pharmaceutics Introduction to Experiential Learning: Pharmaceutical Care,

Pathophysiology, Clinical Biochemistry, research and Biostatistics

Third and Fourth Year Pharm D

Applied, Clinical

Therapeutics, Clinical Toxicology, Clinical Pharmacokinetics, Drug information Services, Drug Delivery and dosage form, Self Care and Non Prescription Drugs etc, Hospital and Industry Visits

Fifth Year Pharm.D.

PATIENT CARE

Advanced Pharmacy Practice Experience

Internal Medicine, Ambulatory Care, Institutional Pharmacy Experience

Cardiology and CCU, Pediatrics, , Infectious Diseases

Program Outline

1- University requirements:	**8 Credit hours.**
2- College requirements:	**175 Credit hours.**
Total:	**183 Credit hours**

A- University Requirements:

Islamic Courses	Credit Hours
Islamic Faith	2
Contemporary cultural issues	2
Elective university required course (1)	2
Elective university required course (2)	2
Total	**8**

The elective university required courses include:

1. Islamic Ethics
2. Economic System in Islam
3. Social System in Islam
4. Political System and Human Rights in Islam
5. Scientific and Technical Issues in Islam
6. Feqh Al Syra (Jurisprudence of Prophetic Biography)

B- College Requirements:

a. Core courses:

Department	Credit Hours
1- Pharmaceutical Sciences	56
2- Biomedical Sciences	31
3-Pharmacy practice	88
Total	**175**

b. Elective courses:

Course Name	Credit Hours
1- Principles of Drug Design 2- Pharmacogenomics.	2
3- Industrial pharmacy. 4-Pharmaceutical Biotechnology.	2
Total	**4**

Pharm D Study Plan

First Year

First Semester

Course No.	Course Title	Units				Pre
		Lectures	Practical	Cr. Hr	Cont. Hr	
2030111	Pharmacy Orientation	2	0	2	2	--
2010111	Fundamentals of Pharmaceutics	2	1	3	5	--
2010112	Pharmaceutical Organic Chemistry-1	3	1	4	6	--
2020111	Physiology-1	2	1	3	5	--
2020112	Anatomy & Histology-1	1	1	2	4	--
2020113	Biochemistry-1	2	0	2	2	--
7401101	Islamic faith	2	0	2	2	--
		14	**4**	**18**	**26**	

Second Semester

Course No.	Course Title	Units				Pre
		Lectures	Practical	Cr. Hr	Cont. Hr	
2010121	Physical Pharmacy	2	1	3	5	--
2010122	Pharmaceutical Analytical Chemistry	2	1	3	5	--
2010123	Pharmaceutical Organic Chemistry-2	3	0	3	3	2010112
2020121	Physiology-2	2	0	2	2	2020111
2020122	Anatomy & Histology-2	1	1	2	4	2020112
2020123	Biochemistry-2	2	1	3	5	2020113
2010124	Pharmacology-1	2	0	2	2	2020111
	Total	**14**	**4**	**18**	**26**	

Second Year

Third Semester

Course No.	Course Title	Units				Pre
		Lectures	Practical	Cr. Hr	Cont. Hr	
2010211	Pharmacology-2	2	1	3	5	2010124
2010212	Medicinal Chemistry-1	3	0	3	3	2010123
2020211	Pathophysiology-1	2	0	2	2	2020111
2010213	Pharmacognosy	2	1	3	5	--
2020212	Clinical Biochemistry & Nutrition	2	1	3	5	2020123
2020213	Molecular Biology	2	0	2	2	--
740130	Contemporary Cultural issues	2	0	2	2	--
	Total	**15**	**3**	**18**	**24**	

Fourth Semester

Course No.	Course Title	Units				Pre
		Lectures	Practical	Cr. Hr	Cont. Hr	
2010221	Pharmacology-3	3	0	3	3	2020121
2010222	Medicinal Chemistry-2	3	0	3	3	2010212
2010223	Pharmaceutical Dosage Forms	2	1	3	5	2010111
2020221	Pathophysiology-2	2	0	2	2	2020121
2020222	Immunology	2	0	2	2	2020121
2020223	Microbiology	3	1	4	6	2020211
2030221	Pharmaceutical Care-1	0	1	1	3	--
	Total	**15**	**3**	**18**	**24**	

Third Year

Fifth Semester

Course No.	Course Title	Units				Pre
		Lectures	Practical	Cr. Hr	Cont. Hr	
2010311	Pharmacology-4	3	0	3	3	2020121
2010312	Pharmaceutical Delivery System	2	0	2	2	2010223
2010313	Medicinal Chemistry-3	3	0	3	3	2010222
2010314	Biopharmaceutics	2	1	3	5	--
2030311	Therapeutics-1	3	1	4	6	2010211
2030312	Pharmaceutical Care-2	2	1	3	5	2030221
	Total	**15**	**3**	**18**	**24**	

Sixth Semester

Course No.	Course Title	Units				Pre
		Lectures	**Practical**	**Cr. Hr**	**Cont. Hr**	
2030321	Therapeutics-2	3	1	4	6	2010221
2030322	Pharmaceutical Care-3	2	0	2	2	2030312
2030323	Institutional Pharmacy Practice	1	0	1	1	--
2030324	First Aid and Emergency Medicine	0	1	1	3	2020121
2010325	Scientific Writing	2	1	3	5	2020213
2010321	Natural Products & Alternative Medicine	3	0	3	3	2010213
	Elective University Required Course	2	0	2	2	
2010322/2010323	*Electives* Industrial Pharmacy/Principles of Drug Design	2	0	2	2	2010223/2010313
	Total	**15**	**3**	**18**	**24**	

Summer training

2030331	Institutional Pharmacy Practice Rotation	0	2	2	40	

Fourth Year

Seventh Semester

Course No.	Course Title	Units				Pre
		Lectures	Practical	Cr. Hr	Cont. Hr	
2030411	Law & Ethics in Pharmacy Practice	1	0	1	1	2030111
2030412	Therapeutics-3	3	1	4	6	2010221
2030413	Therapeutics-4	3	1	4	6	2010311
2030414	Evidence Based Practice	1	0	1	1	2030311
2030415	Clinical Pharmacokinetics	2	1	3	5	2010314
2030416	Total Parentral Nutrition	1	0	1	1	2020212
2030417	Pharmaco-economics	1	0	1	1	--
	Elective Islamic Course	2	0	2	2	--
	Total	**14**	**3**	**17**	**23**	

Eighth Semester

Course No.	Course Title	Units				Pre
		Lectures	Practical	Cr. Hr	Cont. Hr	
2010421	Clinical Toxicology	2	0	2	2	2010124
2030421	Therapeutics-5	3	**1**	4	**6**	2010311
2030422	Pharmacy management	2	0	2	2	2030323
2030423	Pharm.D. Seminar	0	1	1	3	2030325
2030424	Self care & Non prescription Drugs	2	0	2	2	2010312
2030425	Drug Information Services	2	0	2	2	2030414
2030426	Pharmaco-epidemiology	2	0	2	2	2030414
2020421/2030427	*Elective* Pharmaceutical Biotechnology /Pharmacogenomics:	2	0	2	2	2020213/2020213
		15	**2**	**17**	**21**	

Summer semester

Course No.	Course Title	Units				Pre
		Lectures	Practical	Cr. Hr	Cont. Hr	
2030431	Advanced Pharmacy Practice Experience-1 (APPE1)	0	5	5	40	
	Total	**0**	**5**	**5**	**40**	

Fifth Year

Ninth semester

Course No.	Course Title	Units				Pre
		Lectures	Practical	Cr. Hr	Cont. Hr	
2030511	Advanced Pharmacy Practice Experience-2 (APPE2)	0	15	15	120	
	Total	**0**	**15**	**15**	**120**	

Tenth semester

Course No.	Course Title	Units				Pre
		Lectures	Practical	Cr. Hr	Cont. Hr	
2030521	Advanced Pharmacy Practice Experience-3 (APPE 3)	0	15	15	120	
	Total	**0**	**15**	**15**	**120**	

Departmental Distribution of Courses

(01) Department of Pharmaceutical Sciences

Serial	Course Code	Course No.	Subject	Units	Contact hours
1	PS-1	2010111	Fundamentals of Pharmaceutics	(2 + 1)	**5**
2	PS-2	2010112	Pharmaceutical Organic Chemistry-1	(3+ 1)	**6**
3	PS-3	2010121	Physical Pharmacy	(2 + 1)	**5**
4	PS-4	2010122	Pharmaceutical Analytical Chemistry	(2 + 1)	**5**
5	PS-5	2010123	Pharmaceutical Organic Chemistry-2	(3 + 0)	**3**
6	PS-6	2010124	Pharmacology-1	(2 + 0)	**2**
7	PS-7	2010211	Pharmacology-2	(2 + 1)	**5**
8	PS-8	2010212	Medicinal Chemistry-1	(3 + 0)	**3**
9	PS-9	2010213	Pharmacognosy	(2 + 1)	**5**
10	PS-10	2010221	Pharmacology-3	(3 + 0)	**3**
11	PS-11	2010222	Medicinal Chemistry-2	(3 + 0)	**3**
12	PS-12	2010223	Pharmaceutical Dosage Forms.	(2 + 1)	**5**
13	PS-13	2010311	Pharmacology-4	(3 + 0)	**3**
14	PS-14	2010312	Pharmaceutical Delivery System	(2+0)	**2**
15	PS-15	2010313	Medicinal Chemistry-3	(3 + 0)	**3**
16	PS-16	2010314	Biopharmaceutics	(2 + 1)	**5**
17	PS-17	2010321	Natural Products & Alternative Medicine	(2 + 0)	**2**
18	PS-18	2010421	Clinical Toxicology	(3 + 0)	**3**
19	PS-19	2010322	Industrial Pharmacy (elective)	(2+0)	**2**
20	PS-20	2010323	Principles of Drug Design (elective)	(2+0)	**2**
			Total credit hours	**56(48+8)**	**72**

(02) Department of Biomedical Sciences.

Serial	Course Code	Course No.	Subject	Units	Contact Hours
1	BMS-1	2020111	Physiology-1	(2+1)	**5**
2	BMS-2	2020112	Anatomy and Histology-1	(1+1)	**4**
3	BMS-3	2020113	Biochemistry-1	(2+0)	**2**
4	BMS-4	2020121	Physiology-2	(2+0)	**2**
5	BMS-5	2020122	Anatomy and Histology-2	(1+1)	**4**
6	BMS-6	2020123	Biochemistry-2	(2+1)	**5**
7	BMS-7	2020211	Pathophysiology-1	(2+0)	**2**
8	BMS-8	2020212	Clinical Biochemistry and Nutrition	(2+1)	**5**
9	BMS-9	2020213	Molecular Biology	(2+0)	**2**
10	BMS-10	2020221	Pathophysiology-2	(2+0)	**2**
11	BMS-11	2020222	Immunology	(2+0)	**2**
12	BMS-12	2020223	Microbiology	(3+1)	**6**
13	BMS-13	2020421	Pharmaceutical Biotechnology (elective)	(2+0)	**2**
			Total credit hours	31 (25+6)	**43**

(03) Department of Pharmacy Practice

Serial	Course Code	Course No.	Subject	Units	Contact Hours
1	PP-1	2030111	Pharmacy Orientation	(2+0)	**2**
2	PP-2	2030221	Pharmaceutical Care-1	(0+1)	**3**
3	PP-3	2030311	Therapeutics-1	(3+1)	**6**
4	PP-4	2030312	Pharmaceutical Care-2	(2+1)	**5**
5	PP-5	2030321	Therapeutics-2	(3+1)	**6**
6	PP-6	2030322	Pharmaceutical Care-3	(2+0)	**2**
7	PP-7	2030323	Institutional Pharmacy Practice	(1+0)	**1**
8	PP-8	2030324	First Aid and Emergency Medicine	(0+1)	**3**
9	PP-9	2030325	Scientific Writing	(2+1)	**5**
10	PP-10	2030331	Institutional Pharmacy Practice Rotation	(0+2)	**6**
11	PP-11	2030411	Law and Ethics in Pharmacy Practice	(1+0)	**1**
12	PP-12	2030412	Therapeutics-3	(3+1)	**6**
13	PP-13	2030413	Therapeutics-4	(3+1)	**6**
14	PP-14	2030414	Evidence Based Practice	(1+0)	**1**
15	PP-15	2030415	Clinical Pharmacokinetics	(2+1)	**5**
16	PP-16	2030416	Total Parentral Nutrition	(1+0)	**1**
17	PP-17	2030417	Pharmacoeconomics	(1+0)	**1**
18	PP-18	2030421	Therapeutics-5	(3+1)	**6**
19	PP-19	2030422	Pharmacy management	(2+0)	**2**
20	PP-20	2030423	Pharm.D. Seminar	(0+1)	**3**
21	PP-21	2030424	Self care and Non-prescription Drugs	(2+0)	**2**
22	PP-22	2030425	Drug Information Services	(2+0)	**2**
23	PP-23	2030426	Pharmacoepidemiology	(2+0)	**2**
24	PP-24	2030427	Pharmacogenomics (elective)	(2+0)	**2**
25	PP-25	2030431	Advanced Pharmacy Practice Experience-1	(0+5)	**15**
26	PP-26	2030511	Advanced Pharmacy Practice Experience-2	(0+15)	**45**
27	PP-27	2030521	Advanced Pharmacy Practice Experience-3	(0+15)	**45**
			Total credit hours	88 (40+48)	**184**

Courses' Description

First Year: Sem.1

PP-1	Pharmacy Orientation	2+0	توعية صيدلانية

BMS-1	Physiology-1	2+1	علم وظائف الأعضاء-1

Lectures: Physiology of the cell, muscle and nerve (Resting membrane and action pot.-structure of sk. M.F, Simple M Twitch, tetanus & clonus, blood (Erythropiosis, anemia, W.B.Cs, Coagulation, Blood grouping, immunity), autonomic and central nervous systems (receptors, sensations, vision and hearing, equilibrium), cardiovascular system (properties, heart rate, blood pressure, ECG, cardiac output, hemorrhage & Shock) and respiration (Mechanics of breathing, surfactant, lung vol. & capacities, regulation of breathing, O_2 –CO_2 transport by blood, Hypoxia, Cyanosis, artificial breathing).Practical: Red cell count, total and differential white cell counts, packed cell volume, hemoglobin estimation, haematological indices, determination of blood coagulation time, blood grouping and Rhesus factor, Measurement of blood pressure and ECG tracing identification

The definition of Pharmacy, history of pharmacy, introduction to ancient drugs, Ancient Egyptian, Greek and Roman medicine, Chinese and Indian medicine, Arab medicine in Spain and modern European medicine. Preparation of drugs, Pharmaceutical education, organizations, pharmacopoeias, formularies, regulatory control, and drug management. The course deals with medical and pharmacy terminology related to body systems needed for complete understanding of other courses. Role of pharmacist in health system. Objectives, scope and requirements of Pharm D program. Introduction to various courses, compulsory and electives included in Pharm D Program. Mode of teaching, learning and training in Pharm D program.

PS-1	Fundamentals of Pharmaceutics	2+1	أساسيات الصيدلانيات

Lectures: This course describes parts of prescription, basics of dosage calculation for compounding extemporaneous preparation and related incompatibilities. Preparation of pharmaceutical liquid formulations including aqueous solutions and non-aqueous solutions, suspensions and emulsions. Advantages and disadvantages and their application in pharmaceutical industry and practice.
Practical: Several related experiments on the preparation: syrups, elixirs, tincture, spirit, fluid extracts, mouth wash, douches, enemas, collodions, liniments, gargles, emulsions.

PS-2	Pharmaceutical Organic Chemistry-I	3+1	كيمياء عضوية صيدلية-1

Lectures: General introduction, nomenclature, bonding, structural isomerism, nomenclature and alkanes, stereochemistry and its biological applications, alkyl halides, free-radical reactions, alcohols, ethers, epoxides, sulfides and their pharmaceutical applications.
Practical: Spectrometric Identification of different organic compounds (nuclear magnetic resonance, mass spectrometry and its applications in drug metabolism and infra red spectrophotometry).

BMS-3	Biochemistry-1 2+0	كيمياء حيوية-1

Lectures: It is an introductory course that covers fundamental theoretical concepts of biochemistry and applications of the biochemistry in the life; the chemistry of carbohydrates, amino acids, proteins, nucleic acids, lipids and steroids; enzymes and enzymes regulations.

BMS-2	Anatomy and Histology-1 1+1	علم التشريح والأنسجة-1

Lectures: General features of bones; disposition of organs, muscles, vessels and nerves; anatomy of limbs; development of human embryo and teratogenicity. Microscopic anatomy of the cell and tissues; histology of cardiovascular.
Practical:Demonstration of human body parts. Histology: Microscopic slides of tissues and organs of the body.

First Year Sem.2

PS-3	Physical Pharmaceutics 2+1	صيدلانيات فيزيائية

Lectures: This course describes fundamentals of *physical pharmacy*, physical properties of drug molecules, adsorption, solubility, dissolution, buffering, rheology. Reaction kinetics, drug stability, reaction order, different degradative pathways, prediction of expiry date and good storage of starting materials.
Practical: Several related experiments on: adsorption, viscosity, surface tension, partition coefficient), and reaction kinetics and determination of reaction rate constants.

PS-4	Pharmaceutical Analytical Chemistry 2+1	كيمياء تحليلية صيدلية

Introduction and applications of chemical (Non-aqueous and Complexometric methods) and physical methods of Analysis of pharmaceutical substances. Fundamental concepts and applications of quantitative analysis utilizing different methods of instrumental analysis. These methods include colorimetry, ultra-violet spectroscopy, fluorometry, flame photometry, atomic absorption spectrophotometry. Introduction to Chromatography.
Practical: Drug analysis utilizing the above mentioned methods.

PS-5	Pharmaceutical Organic Chemistry-2 3+0	كيمياء عضوية صيدلية-2

Lectures: Alkenes and alkynes, aromaticity and benzene, substituted benzene, aldehydes and ketones, carboxylic acids and derivatives (amides, anhydrides, esters), heterocyclic compounds, amino acids, carbohydrates, and lipids chemistry.

BMS-4	Physiology-2 2+0	علم وظائف الأعضاء-2

Endocrinology: (pituitary, thyroid, parathyroid, reproductive systems hormones…..etc), mechanism of hormonal action, types of hormones, regulation of hormone secretion & Hormonal effects. Digestion: GIT secretions & motility, liver function & gall bladder function, GIT disorders.
Metabolism: temperature regulation, Basal metabolic rate, obesity.
Renal physiology:, body fluids and acid base balance.

BMS-5	Anatomy and Histology-2 1+1	علم التشريح والأنسجة-2

Lectures: General features and anatomy of central and autonomic nervous systems; development of human embryo and teratogenicity. Microscopic anatomy of the lymphoid, digestive, respiratory systems, urinary, endocrine, reproductive and integumentary.
Practical: Demonstration of human body parts, Microscopic slides of tissues and organs of the body.

BMS-6	Biochemistry-2 2+0	كيمياء حيوية-2

Lectures: Metabolic pathways of biomolecules including; carbohydrates, lipids, steroids, prostaglandins, amino acids, proteins, nucleoproteins, nucleic acids, hemo-proteins, xenobiotics, free radicals and antioxidants in addition to their regulation and their clinical application.
Practical: Biochemical units of measurements, Qualitative and quantitative assessment of carbohydrates, lipids, proteins and enzymes. Urine analysis, renal stone analysis, assessment of renal functions in form of estimation of blood levels of total proteins and non protein nitrogenous compounds including; Creatinine and urea will be estimated.

PS-6	Pharmacology-1 2+0	علم الأدوية-1

Lectures: Introduction to pharmacology, history and its subdivisions; Drugs and their origin, routes of drug administration, General principles in Pharmacology: drug absorption, distribution, metabolism: enzyme induction and inhibition, elimination, excretion and clearance of drugs; essentials of drug action, nature of drug receptors and drug receptor interactions with signaling mechanisms, , concept of agonist-antagonist and their types, dose response relationships, efficacy, potency and therapeutic index, variation in drug responses. Adverse drug reactions

Second Year Sem.1

PS-7	Pharmacology-2	علم الأدوية-2

Lectures: Cholinergic and adrenergic transmission and autonomic receptors, Cholinergic, anticholinergics, adrenergic and antiadrenergic drugs. Drugs used in treatment of hypertension, angina, heart failure and cardiac arrhythmias, Diuretics, Drugs used in treatment of thromboembolic diseases, bleeding disorders and anemias. Drugs used in treatment of dyslipedemias

Practicle: Handling of animals, effect of agonists and antagonists on smooth, Dose-response curves; effects of drugs on the eye, blood pressure and cardiovascular physiology

PS-9	Medicinal Chemistry-1 3+0	كيمياء دوائية-1

This course provides an introduction on drug actions and the chemistry and pharmacological activity of drugs acting on autonomic nervous system and cardiovascular system. The following topics will be addressed: Introduction to medicinal chemistry, drug action on enzymes, drug action on receptors, drug development, quantitative structure-activity relationship, drugs acting on autonomic nervous system, cardiovascular system (cardiotonics, antiarrhythmics, vasodilators, antihypertensive, antihyperlipedemic, drugs affecting blood and diuretics) and drug design for related drugs.

BMS-7	Pathopysiology-1 2+0	علم فسيولوجيا الأمراض-1

Lectures: Physiological basis of pathology, etiology of diseases. Inflammation process and Cell Cycle. Cellular disturbances: Degeneration; regeneration and repair. Basics of neoplasm and Metabolic diseases. Diseases of cardiovascular system, Diseases of respiratory system, Skin transmitted diseases . Dermatology and sexually transmitted diseases. Parasitic and microbial diseases.

PS-16	Pharmacognosy 2+1	عقاقير

An introduction to pharmacognosy, and use of Herbal medicines, Study of medicinal plants in health care systems. Drug evaluation and identification of adulterants. WHO guidelines for herbal drugs assessment. A brief knowledge on Alkaloids, glycosides, volatile oils, tannins, resins and resin combinations (definition, classification, extraction, classifications and few examples). Isolation and extraction methods in phyto-pharmacognosy. Chromatographic applications with respect to Natural products, HPLC etc General concepts of Natural products and phyto-medicines used in clinical practice as alternative medicines.

Practical: Chemical tests and few experiments related to drug evaluation and Identification of naturally occurring powders and organized drugs.

BMS-9	Molecular Biology 2+0	علم الأحياء الجزيئية

This course is intended to provide background knowledge of Molecular biology to future clinical pharmacists. The course includes; Cell structure and functions, Mitosis and Meiosis, Chromosomes to DNA, Intracellular communications and mechanisms of signal transduction, Nucleotides and Nucleic acids, DNA and its organization in the nucleus, Information flow in the cell, DNA replication and its inhibitors, DNA repair mechanisms, Eukaryotic and Prokaryotic replication, Gene expression and its control, Transcription and its control, Genetic code and mutations, Protein synthesis and its inhibitors, Recombinant DNA techniques and Introduction to Bioinformatics.

BMS-9	Clinical Biochemistry and Nutrition 2+1	الكيمياء الحيوية السريرية والتغذية

Lectures: The metabolic disorders related to metabolism of carbohydrates, lipids, steroids, amino acids, proteins, nucleoproteins, nucleic acids and hemoproteins. Also, starvation and obesity will be covered. In addition to the clinical enzymology, vitamins and minerals; electrolyte and trace elements will be taught. Topics also include, biochemical changes occurring in human body under pathological conditions and the related diagnostic lab parameters. Also it deals with evaluation of the disease parameters in biological fluids and their interpretations.

Practical: Investigation of biomedical changes associated with the metabolic diseases. Accuracy and precision of analysis. Assessment of liver functions in form of estimation of serum levels of GPT, GOT, albumin, total and direct bilirubin. Also, Assessment of lipogram in form of estimation of serum levels of total lipids, triglycerides, cholesterol, HDL and LDL. In addition to determination of blood levels of glucose, hemoglobin and serum uric acid.

Second year Sem.2

PS-12	Pharmacology-3 2+!	علم الأدوية-3

Lectures: Sedatives and hypnotics, antiseizure drugs, drugs used in parkinsonism, antidepressants, antipsychotics, local anesthetics, opioid analgesics and drugs of abuse. Hypothalamic and piturity hormones, Thyroid and antithyroid drugs, Corticosteroids and antagonists, Gonadal hormones and antagonists, Antidiabetic agents, drugs affecting bone and mineral homeostasis. Drugs used for acid peptic disease, antiemetic, antidiarrheal and laxatives. Drugs used in asthma, antitussives and mucolytic agents. Nonsteroidal anti-inflammatory drugs and drugs used in rheumatoid arthritis and gout

PS-11	Medicinal Chemistry-2 3+0	كيمياء دوائية-2

This course enables the student to know the chemistry and mode of action of hormones and drugs acting on the central nervous system. The following topics will be addressed: Chemistry and mode of action of drugs acting on the central nervous system (analgesics, anaesthetics, psychotropic drugs, antiepileptics and antiparkinsonism), non steroidal anti-inflammatory, antihistaminic, local anesthetic agents, prostaglandins, steroidal and non-steroidal hormones, adrenocorticoids, oral hypoglycemics and anti-thyroid. Drug design for related drugs.

PS-10	Pharmaceutical Dosage Forms 2+1	أشكال الجرعات الصيدلانية

Lectures: This course covers the design and formulation of dosage forms, including semisolids dosage forms (ointments, creams, pastes, gels, suppositories) and solid dosage forms (powders, tablets, capsules) from raw materials, methods of preparation and quality control tests.
Practical's: Preparations of different semisolids and solid dosage forms and their quality control.

BMS-10	Pathopysiology-2 2+0	علم فسيولوجيا الأمراض-2

Immune disorders (Auto immune diseases..)- GIT disorders (diarrhea- Constipation- Peptic ulcers- gall bladder stones- jaundice and liver diseases: Hepatitis & liver cirrhosis)- Renal disorders (urinary tract obstruction- Renal stones- urinary tract infections- Renal failure-Body fluid disorders) –Endocrine disorders: Pituitary Hyper function (Hyperprolactinemia- Acromegally & Gigantism)-pituitary Hypo function: dwarfism- simmonds disease- ADH disorders-thyroid gland disorders (Goiter- Myxoedema)- Suprarenal gland disorders (Cushing syndrome & Addison's disease)- Hematological disorders : Anemia- polythycemia- leukemia- Leukocytosis & Leucopenia. CNS disorders: Sensory & motor neurological disturbances, upper and lower motor neuron lesions- basal ganglia disorders: parkinsonism- Chorea..)- Headache- Pain- Spinal cord lesions

BMS-12	Microbiology 3+1	علم الأحياء الجزيئية

This course includes; Introduction to Microbiology including History and its need in Pharmacy, General principals of Microbial Concepts including Terminology, Host parasite relationship and Normal Flora, Pathogenicity of Microorganisms, Principals of infectious Disease, Bacterial structure and classification, Bacterial growth, metabolism and its Genetics, Important pathogenic bacteria and Mechanisms of disease production, Fungi, Protozoa and Helminthes, Introduction to Virology including viral classification and important Human diseases causing viruses

BMS-11	Immunology	علم المناعة

This course is divided into Basic and Clinical sections and includes Basic concepts in immunology, adaptive and innate immunity, Immunological products and role of immunological products in prophylaxis, therapy and diagnosis. Antigen-antibody reactions, Immuno-regulation, Immunological memory and tolerance, Aberrations of the immune system including autoimmunity, Transplantation and rejection. Specific topics include Anatomy of the Immune System, Organs, Tissues, Cells and Soluble Factors of Immune System, The Immune Response, The Innate Immune System, The Adaptive Immune System, Humoral Immunity, Cell Mediated Immunity, Hypersensitivity Reactions, Autoimmunity, Immune Deficiency Disorders, Transplantation immunology and Tumour Immunity.

PP-2	Pharmaceutical Care-1 0+1	رعاية صيدلانية-1

This course will provide the students with first experiential interaction with patients, hospitals and its organization, and administration of patient care facilities. Students will retrieve information directly from the patient regarding his health problem and drug therapies (treatment history) as well as from medical chart, database, and from the caregivers using appropriate effective communication. In the first segment of the course , the students will learn the practical techniques in small groups during laboratory exercises in interviewing supervised by the instructors followed by clinical rotations. Student will also observe/study the hospital pharmacy organization in this course.

Third year Sem.1

PS-13	Pharmacology-4 3+0	علم الأدوية-4

Lectures: The students shall be provided with knowledge of the pharmacokinetic and pharmacodynamic principles governing the drug actions, adverse drug reactions and drug interactions both in clinical pharmacy practice as well as in basic and clinical research in the area of pharmacology of chemotherapeutic drugs. This includes the following important groups of drugs: Antibacterial antiviral, antiparasitic, antifungal, anticancer and Immunopharmacology agents. Introductory pharmacogenetics is also part of this course

PS-14 Pharmaceutical Delivery Systems2+1 نظام إعطاء الدواء

Lectures: This course introduces about United States Pharmacopeia and FDA guidelines on sterile compounding including parentral, infusion devices and catheters, ophthalmic preparation and calculations, sterile admixture techniques, and sterility testing. Clean room requirements, HEPA filters. Fundamental considerations of good manufacturing practice (GMP) and quality control. United State Pharmacopeia (USP) Chapter 797 will be covered in this course Practical's: Preparations of different sterile dosage forms and their quality control.

PS-15 Medicinal Chemistry-3 3+0 كيمياء دوائية-3

This course enables the student to know the chemistry and mode of action of drugs acting as antibacterials, antivirals, antifungals, antiparasitics and anti-neoplastics. The following topics will be addressed: Chemistry of antibiotics (Bata lactams, tetracyclines, macrolides, rifamycins, chloramphenicol, aminoglycosides, antifungal and polypeptide), antibacterials, anti-mycobacterials, antivirals, antifungals, antimalarials, anthelmientics, antiscabious, antipedicular agents, antileprotic agents, antiprotozoal, antibilharazial agents and anti-neoplastics. Drug design for related drugs.

PP-3 Therapeutics-1 3+1 علاجيا ت-1

Lectures: Clinical pharmacodynamic, , clinical laboratory tests and their interpretation, racial, ethics and gender differences in response to drugs. Epidemiology, Pathophysiology and management of hypertension, congestive heart failure cardiac arrhythmias, ischemic heart disease, acute myocardial infarction, thromboembolic disease and hyperlipidemia
Practical: Clinical case studies, Case-Assisted Student Centered Learning (CASCL), case presentation in real time clinical settings (in hospitals) followed by case discussion. The students will be required to maintain case histories log book, from hospitals

PP-4 Pharmaceutical Care-2 1+1 رعاية صيدلانية-2

Course Description: Pharmacist will be responsible to actively collect vital patient health information before going forward to design and implement a care plan. This course is aimed at providing the pharmacy students an understanding of patient assessment, laboratory data and provides the necessary skills to perform, participate and understand physical assessments techniques in patient care. Introduces general concepts and methods in physical assessment, medical history taking, , tools used in assessment in normal and abnormal findings, Vital signs assessment (general examination) including blood pressure measurement techniques and their interpretation; Clinical examination of individual organ systems: examination of extremities and back, cardiovascular respiratory, gastrointestinal system, and CNS clinical examination and interpretation, in diagnosis and prognosis of the diseases during Pharmacotherapy
Practical: Introduction to equipment, practical demonstration of techniques of physical examination and clinical assessment in disease states, both in simulation lab and clinical setting. The student will maintain log book of case studied

PS-8 Biopharmaceutics 2+1 صيدلة حيوية

This course includes concept and principles of biopharmaceutics, understanding of clearance, volume of distribution, orders of kinetics, compartmental models, plasma protein binding. First pass and second pass metabolism. Physicochemical and dosage form factors influencing bioavailability, biopharmaceutical properties, bioequivalence, and biopharmaceutical classification scheme (BCS). Influence of dosage regimens on the plasma concentration-time profile of a drug in the body and factors involved in steady-state plasma concentration of a drug.

Practicals: Use of semi log graph paper, order of reaction, half life, clearance, area under curve (AUC), C_{max} and t_{max} and other calculations related to biopharmaceutics

Third year Sem.2

PP-4 Therapeutics-2 3+1 علاجيا ت-2

Lectures: Epidemiology, Pathophysiology and Management of asthma, chronic obstructive pulmonary diseases, cystic fibrosis, peptic ulcer, inflammatory bowel diseases, nausea and vomiting, constipation and diarrhea, hepatitis, cirrhosis, pancreatitis, acute and chronic renal diseases, dialysis, pharmacotherapy of end-stage renal diseases, critical care therapy, total parentral nutrition and transplantation.
Practical: Clinical case studies, Case-Assisted Student Centered Learning (CASCL) case presentation in real time clinical settings (in hospitals) followed by case discussion. The students will be required to maintain case histories log book, from hospitals

PP-6 Pharmaceutical Care-3 2+1 رعاية صيدلانية-3

Lectures: Philosophy and components of pharmaceutical care practice, professionalism, entrepreneurship, patient care process, clinical and economic impact of pharmaceutical care practice, Pharmaceutical care practitioners responsibilities, patients medication experience, Assessment of the problem, drug therapy problems, care plan, follow up evaluation, mandatory knowledge and skills for pharmaceutical care practice, documentation in pharmaceutical Care Practice, SOAP notes, pharmacotherapy patient case presentation, guidelines for establishing pharmaceutical care practice, standards of practice for pharmaceutical care

PP-7 Institutional Pharmacy Practice 1+0 ممارسة صيدلانية مؤسسية

Lectures: This course is aimed at providing the students insight of institutional pharmacy practice and will be followed by experiential summer training in hospital pharmacy. Lecture topics will include: hospital formulary; Inpatient outpatient and satellite/floor pharmacies; hospital pharmacy supplies, storage, indent; inventory control methods and distribution systems, automation in pharmacy practice; unit dose system, iv admixtures, controlled drugs/substance management; Investigational drugs in the hospital pharmacies; prescription and medication errors, medication safety; pharmacy and therapeutics Committee, principles of educations of nurses and other paramedics, ,

PP-8 First Aid and Emergency Medicine الإسعافات الأولية و طب الطوارئ

Introduction to First Aid and Emergency Medicine for all ages and all systems of the body, aims and priorities of First Aid and Emergency Medicine, Management of the injured patient and shock, management of bleeding IV therapy in emergency situations: blood transfusion, use of fluids and plasma expanders, inotropics. Maintenance of airway passages and intravenous line, Cardiovascular resuscitation, Basic Life Support, , open wounds, fractures, epilepsy, coma, sunstroke, animal bites, high grade fever, burns, poisoning, drowning, head injuries and emergency procedures at home, work, or at leisure

PP-9 Research Methodology & Scientific Writing الكتابة العلمية

The course is designed to provide students with an overview to write scientific manuscripts, including case reports, research articles, review articles, grant proposal and dissertations. As the scientific writings are based upon research outcomes, basic principles of biostatistics and research methodology have also been included in this course like, the research process, scales of measurement, accuracy of data, validity and reliability), research design (objective, literature review, sampling, types of design), clinical trial design (controlled multi-centered studies, random allocating, study types, blindness, placebo effect, retrospective and case studies, data collection forms). Individual variation, statistical terminology, errors of sampling, probability concepts, distribution of random variables, non parametric methods, validity of results, analysis of variance and tests for significance, choice of proper tests for significance, statistical methods applied to biological assays and proper experimental design. Introduction to SPSS and other statistics computer programs.

PS-17 Natural Products & Alternative Medicine 3+0 كيمياء النواتج الطبيعية والطب البديل

Introduction to Natural Products,. A systematic approach in herbal drug prescribing. Important Natural products and phytomedicines used as medicine, Drugs acting on CVS system, Drugs acting Central Nervous System, Reproductive and Urinary tracts, Drugs acting on Musculoskeletal system and other miscellaneous drugs. Plant nutraceuticals. Herbal Drug development process. Industrial production of few important drugs used in Medicine.
A brief knowledge of Alternative Medicine viz., Aromatherapy, homeopathy, naturopathy, hydrotherapy, massage, chiropracty, osteopathy, magnetotherapy.

Third year Sem.2 Electives

PS-19 Elective Industrial Pharmacy 2+1 الصيدلة الصناعية

This course describes the manufacturing facilities, main unit operations that take place in the pharmaceutical industry and related equipment carrying out such operations. These operations include heat transfer and the properties and use of steam, particle size reduction, and size analysis, milling and mixing, filtration, centrifugation, extraction, drying process, freeze drying, spray drying, evaporation, distillation, crystallization, and drug stability studies.

PS-20 Elective	**Principles of Drug Design**	**3+0**	**مبادئ تصميم الأدوية**

This course provides an introduction on the principles of drug design and the development of new therapeutic agents from prototype compounds with special emphasis on drug action at the molecular level. The following topics will be addressed: overview of drug discovery and drug development, targets for biologically active molecules, structure-activity relationships, isosterism, prodrug design and applications and drug metabolism.

Fourth Year Sem. 1

PP-9	Law and Ethics in Pharmacy Practice 1+0	أخلاقيات وقانون الصيدلة

Lectures: Governmental laws, regulations, detailed laws that govern and affect the practice of pharmacy such as drugs, narcotics and medical devices. General legal principles, non-controlled prescription requirements and over the counter drug requirements. Responsibilities of the pharmacist on the care of patients. Professional code of conduct, Common ethical issues and considerations, Identification of ethical problems and their workup.

PP-10	Therapeutics-3 3+1	علاجيا ت-3

Lectures: Pathophysiology and management of adrenocortical dysfunction, thyroid and parathyroid disorders, diabetes, rheumatoid arthritis, osteoarthritis, gout and hyperuricemia, systemic lupus erythematosus, osteoporesis and osteomalacia, gynecologic disorders, headache, seizure disorders, parkinsonism, pain management, alzheimer's disease. Contraception, drugs in pregnancy, pediatrics, neonates and geriatric drug therapy will also be covered in this course

Practical: Clinical case studies, Case-Assisted Student Centered Learning (CASCL) case presentation in real time clinical settings (in hospitals) followed by case discussion. The students will be required to maintain case histories log book, from hospitals

PP-11	Therapeutics-4 3+1	علاجيا ت-4

Lectures: Pathophysiology and management of anxiety, mood and sleep disorders, attention deficit/hyperactivity disorders (ADHD), schizophrenia, alcoholism, substance abuse, smoking cessation, supportive care therapy chronic leukemias, lymphomas, breast cancer, liver tumors, GIT, lung and prostate cancers, pediatric solid tumors, gynecologic cancers and skin cancers and melanomas

Practical: Clinical case studies, Case-Assisted Student Centered Learning (CASCL) case presentation in real time clinical settings (in hospitals) followed by case discussion. The students will be required to maintain case histories log book, from hospitals

PP-12	Evidence Based Practice 1+0	الممارسة المبنية على البرهان

This course focuses on scientific literature evaluation using the concepts of evidence based practice; fundamentals of research including measures, reliability, validity, and ethical concerns; an overview of the FDA drug approval process; data analysis, the structure and evaluation of clinical research proposals and reports. Identifying resources to best answer, clinical questions, developing active search strategies and applying such information to clinical scenarios.

PP-13	Clinical Pharmacokinetics 2+1	حركية الدواء الإكلينيكية

Lectures: Pharmacokinetic principles and their application for the purpose of optimizing drug therapy, therapeutic drug monitoring with the emphasis on pharmacokinetics of drugs (such as: aminoglycosides antibiotics, carbamazepine, cyclosporine, digoxin, ethosuximide, lidocaine, lithium, methotrexate, phenpbarbital, phenytoin, procainamide, quinidine, salicylates, theophylline, tricyclic antidepressants, valproic acid and vancomycin).

Practical: Practical sessions in TDM lab for experiential learning and solving the clinical problems by using software like "data-kinetics"

PP-17	Pharmacoeconomics	اقتصاديات الدواء

Introduction to Pharmacoeconomics, Implication of PE in Pharmacy, Investigating Pharma-co- economics Research Question, Quality Of life and Quality adjusted Life years , Measuring Cost, Cost Minimization Analysis, Cost Effective analysis , Cost Benefit Analysis , Cost Utility Analysis , Sensitivity Analysis , Decision Analysis,

PP-14	Total Parentral Nutrition	التغذية الوريدية الكلية

Nutritional Assessment and calculations for TPN for different clinical situations requiring parentral nutrition (critically ill patients, patients of renal and hepatic failures, patients with metabolic and GI disorders. Complications of TPN, facilities and design of TPN preparation room. The students will be provided with clinical scenarios for calculation of various components of TPN, during interactive sessions as well as in the exams, to assess their level of understanding

Fourth Year Sem.2

PP-14 Therapeutics-5 3+1 علاجيا ت-5

Lectures: Pathophysiology and management of upper respiratory infections, pneumonia, tuberculosis, urinary tract, intrabdominal and gastrointestinal tract infections, infective endocarditis, central nervous system infections, bone and joint infections, sexually transmitted diseases, acquired immunodeficiency syndrom (AIDS), mycotic infections, pancreatic infections, surgical antibiotic prophylaxis, infection in immunosuppressed patients, bacteremia and sepsis, skin and soft tissue infections, immunization therapy, iron deficiency and megaloplastic anemia, other types of anemia, coagulation disorders, allergic and drug induced skin disease, common skin disorders, burns, common eye disorders, common ear diseases, glaucoma, Practical: Clinical case studies, Case-Assisted Student Centered Learning (CASCL)case presentation in real time clinical settings (in hospitals) followed by case discussion. The students will be required to maintain case histories log book, from hospitals

PP-19 Pharmacy Management 2+0 إدارة صيدلية

This course introduces basic concepts, principles and methods of pharmacy management in all pharmacy practice, fundamentals of financial accounting, managerial accounting, finance management approaches, skills, styles, organizational principles, behavior and forms, personal, purchasing and inventory control, pricing, professional fees, pharmacy services and patronage. Concepts, tools, techniques and application of marketing in the health care and health insurance plan.

PP-20 Pharm D seminar 0+1 حلقة نقاش

Presentation and discussions of current issues in the profession with research in the area of clinical pharmacy/pharmaceutical sciences. The use of multimedia, slides, overheads, handouts and other visual aids as well as methods of answering questions from the audience will also be discussed in this course. Emphasis will be on evaluation of drug literature, articles for proper research, design and data interpretation, scientific method of quoting the references. The course will also include journal club meetings and presentations of selected articles

PS-18 Clinical Toxicology 2+0 علم السموم التطبيقي

Definitions, toxicodynamics, toxicokinetics, toxic responses, target organ toxicity, carcinigenicity, mutgenicity, teratogenicity, Management of poisoned patient: decontamination, supportive care, antidotes, Clinical toxicology of drugs: digoxin, aminophylline, beta blockers, calcium channel blockers, anticoagulants, benzodiazepines, antidepressants, antipsychotics, opioids, NSAIDs, Antidiabetic agents, Clinical toxicology of air pollutants, solvents: alcohols, insecticides, herbicides and pesticides, , heavy metal toxicity

PP-21 Self Care and Non Prescription Drugs 2+0 العناية الذاتية والأدوية اللاوصفية

Lectures: Use of evidence-based approach to establish the safety and effectiveness of self-care options for particular disorders and pharmacist's role in self-medication. A study of products used by the self–medicating public, including material on the symptoms for which patients seek self-treatment, evaluation and selection of products used to treat them, aspects of patient counseling on the safe and effective use of products and various legal considerations relating to this class of drugs.

PP-22 Drug Information Services 2+0 خدمات المعلومات الدوائية

Lectures: This course introduces the student on how to locate and evaluate drug information, systematically manage and distribute information, perform formulary management, assess quality, utilize, retrieve, interpret and disseminate information during the clinical clerkships and in practice. Primary, secondary and tertiary drug information resources including standard reference texts, computer systems and periodicals. Emphasis will be placed on retrieval of information and communication of a response.

PP-23 Pharmacoepidemiology 2+0 علم وبائيات الدواء

Pharmacoepidemiology and its importance in pharmacy practice, principles of epidemiology applied to the study of drug use study designs (observational study, experimental study, case report, meta-analysis), data sources (pharmacy claims data, validity of data, defining exposure, defining outcomes), medication safety pharmacovigilence continual monitoring for unwanted drug effects (post-marketing surveillance), applications in pharmacy practice, medication adherence, statistics in pharmacopeias, international perspective (global drug surveillance), other methodological issues (causality, confounding), future issues, case studies or examples

Fourth Year Sem.2: Electives

BMS-13	Pharmaceutical Biotechnology 2+1	علم التكنولوجيا الحيوية الصيدلانية

In this course the students will be introduced to pharmaceutical aspects of biotechnology. The topics covered in the course include signal transduction, transcription factors, applied enzymology, introduction to proteomics, gene manipulation and recombinant DNA technology to produce recombinant proteins, various expression systems, introduction to tissue culture, applications of recombinant DNA in the pharmaceutical fields, web resources for biotechnology, formulation of biotech products including biopharmaceutical considerations, gene therapy, DNA vaccines, biotechnology and drug discovery, the pharmacist's role in biotechnology and dispensing biotechnology products.
The students will be given practical assignments to complete in the laboratory in addition to written and practical examinations.

PP-24	Advance Pharmacogenomics 3+0	علم الادوية الجينومبي ألمتقدم

This course is designed to introduce the students to role of genetics in drug responses. The genetic basis of variability in drug response can contribute to drug efficacy and toxicity, adverse drug reactions and drug-drug interactions The students will learn about genomic variation among humans, web resources for bioinformatics, applications of genomics in human health and complex disease, pharmacogenomics of drug metabolizing enzymes, pharmacogenomics of drug transporting proteins and drug receptors, pharmacogenetics of drug metabolism and its clinical applications, pharmacogenomics of drug interactions and their adverse effects, cancer pharmacogenomics and pharmacogenomics in drug discovery and drug development..

Fifth Year

Advance Pharmacy Practice Experience: 40 weeks

Professional Competencies
to be achieved at the end of
Advance Pharmacy Practice Experience

Competency -1:	**Disease State Knowledge**
Competency -2	**Drug therapy planning and evaluation**
Competency -3	**Monitoring for endpoints**
Competency -4	**Patient case presentations, written, oral**
Competency -5	**Patient interviews, education and counseling**
Competency -6	**Drug information**
Competency -7	**Professionalism: team interaction, motivation**
Competency- 8	**Institutional pharmacy operations drug, distribution systems, medication administration**

PP-21	Advance Pharmacy Practice Experience 40 weeks	0+35

During the Advanced Pharmacy Practice Experience (clerkship), student will be involved in the provision of advanced clinical pharmacy services in various medical sub-specialty environments. The student will have experience of responsibilities (under direct supervision of preceptor) of:

- Clinical communication with patients and health care providers,
- Direct Patient care including therapeutic decision making by selecting appropriate drug therapy and monitoring that therapy. Students will be actively involved in the areas of: management of disease state, patients' monitoring, care-planning and follow up, patients chart review including the patients' lab data, medication history, drug information and discharge medication counseling
- Organizational skills for preparation for future internship and professional pharmaceutical care practice.

Student will have to complete total 10 rotations, 4 weeks each; 5 compulsory and 5 of his own choice from the following list B:

A. Compulsory: Internal Medicine, Ambulatory Care, Institutional Pharmacy, and Community Pharmacy

B. Elective: 1. Cardiology & CCU 2. Intensive and Critical Care, 3. Surgery, 4. Nephrology, 5. Oncology and hematology, 6. Infectious Diseases 7.Anticoagulant Clinic/Clinical Pharmacokinetics 9. Nutritional Support 8. Emergency medicine 10. Endocrinology, 11. Pulmonary Medicine, 12. Psychiatry,

PP-21/M	**APPE-1 Internal Medicine 40 Hours**	**الطب الباطني**
This rotation will prepare the student with knowledge base and problem solving skills relating to the drug therapy management of patients in internal medicine with pharmaceutical care perspective		
PP-21/IPP	**APPE-2 Institutional Pharmacy Practice: 40 hours/week**	**التدريب على الممارسة الصيدلة السريرية المؤسسية**
This rotation will expose students to the practice of institutional pharmacy, its organization , operation and management , preparation, storage and supply of various medications, the role of pharmacists in professional decision making, (P&T committee) and how the pharmacist and staff supports the well-being of the patient		
PP-21/AC	**APPE-3: Ambulatory Care 40 h/week**	**الرعاية الاسعافية**
This rotation will prepare the student with knowledge and skills for solving patients' problem relating to the therapeutic management of common disease states in an ambulatory pharmaceutical care setting. Student will work as full time trainee in the Pharmaceutical Care Clinic of a hospital providing patient counseling, pharmaceutical care and drug therapy monitoring to out patients.		
PP-21/C.ICU	**APPE-4: Cardiology & Intensive Cardiology Care40H/week**	**علم أمراض القلب والعناية المركزة لأمراض القلب**
This rotation is to prepare the student with knowledge and skills for solving patients' roblem relating to the therapeutic management of patients with cardiovascular diseases like Ischemic Heart Disease: Angina and Acute Coronary Syndrome Essential hypertension, hypertensive urgencies and emergency Ventricular and atrial arrhythmias Congestive Heart Failure/Cardiomyopathy Cardiogenic Shock Endocarditis Hyperlipidemia Anticoagulation, Cerebrovascular diseases , while working with a team of experts both in ambulatory and ICC environment		
PP-21/P	**APPE-5: Pediatrics 40H/week**	**طب الأطفال**
This rotation will provide the student the opportunity to develop skills in dealing with direct patient care needs of pediatric population with special attention to dosage schedules. Student will participate in therapeutic decision making process by drug therapy management and its monitoring, with a patient specific medication counseling to parents and health professionals		
PP-21/CC.ICU	**APPE-6: Critical Care 40 hours/week**	**العناية المركزة**
Description: This rotation will provide the student the opportunity to develop skills for dealing with critically ill patients, under the supervision of team of multidisciplinary health care experts in an ICU environment. **Main areas covered will be Fliud electrolyte balance, cardiovascular hemodynamics, therapeutic drug monitoring for critically ill patients TPN, glycemic control, prevention of stress ulcers, DVT, ventilator associated pneumonia, sepsis etc**		
PP-21/H&O	**APPE-7: Hematology/Oncology 40H/week**	**أمراض الدم والأورام**
The rotation will provide the student with the opportunity to develop skills in drug therapy management of hematology/oncology patients, like breast lung gastric and colonic cancer, leukemias and lymphomas in relation to supportive, palliative and curative therapy.		

PP-21/N	ACPPE-8:Nephrology 40 H/weeks	أمراض الكلى

This rotation will provide the student with an opportunity to develop his/her skills in drug therapy management of Acute and Chronic Renal Failure along with co-existing morbidities, like hypertension and diabetes mellitus , being an active member of team of health professionals, taking part in therapeutic decision making, its application and monitoring.

PP-21/ID	APPE-9: Infectious Diseases 40 H/week	الأمراض المعدية

This rotation will provide an opportunity to the student to equip with a knowledge base and problem solving skills relating to drug therapy management of infectious diseases with a pharmaceutical care perspective. Student will work with experts team of health professionals in this area and also in an antimicrobial management program.

PP-21/EM	APPE-10 Emergency Medicine 40 H/week	طب الطوارئ

This rotation will provide the student with a knowledge base and problem solving skills relating to the provision of emergency medical care by exposing him to an experience with the EMS System, with a team of health care professionals

The End