جامعة سلمان بن عبدالعزيز
Salman bin Abdulaziz University

كلية الصيدلة
College of Pharmacy

STUDENT'S GUIDE FOR ACADEMIC PROGRAMS

Content

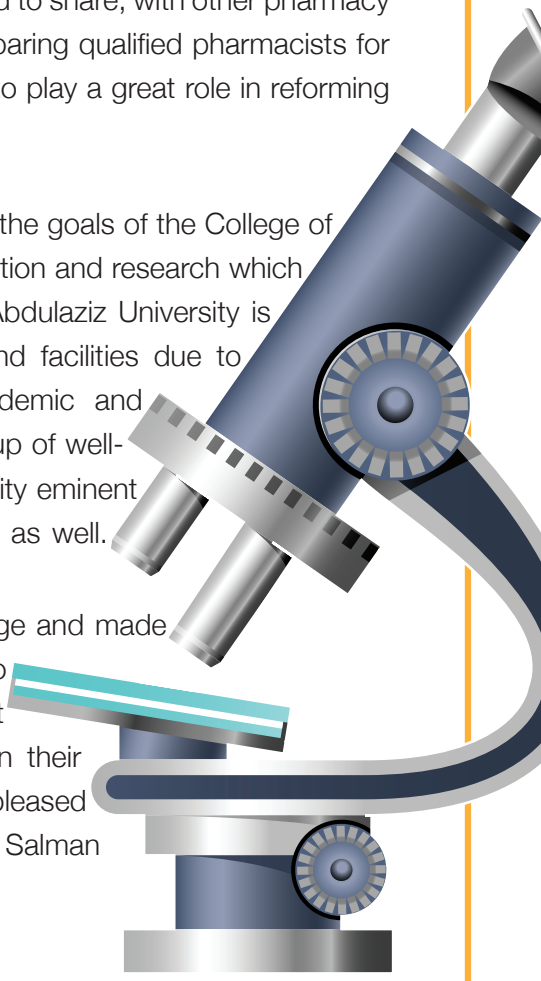
College of Pharmacy in

Salman bin Abdulaziz University
Kingdom of Saudi Arabia

Dean's Message

The College of Pharmacy at Salman bin Abdulaziz University is one of the most recent scientific edifices. It was established to share, with other pharmacy institutions in Saudi Arabia, the mission of preparing qualified pharmacists for the future. Those pharmacists are anticipated to play a great role in reforming the kingdom health care system.

In spite of its recent establishment, one of the goals of the College of Pharmacy is to be a leader in Pharmacy education and research which is line with the University vision. Salman bin Abdulaziz University is distinguished by tremendous infrastructure and facilities due to the strong governmental support. The academic and administrative staff of the college is also a group of well-prepared personnel that can make the University eminent in teaching, research and community services as well.



Candidates who gained sufficient knowledge and made a notable success will have the opportunity to join the College of Pharmacy. It is expected that those students will perform with excellence in their Pharmaceutical education and career. I'm very pleased to welcome you to the College of Pharmacy at Salman bin Abdulaziz University.

Prof. Khalid M. Alkharfy

College Dean

Introduction

The renaissance taking place in the overall health sector in the Kingdom of Saudi Arabia does not coincide with the pharmaceutical services available at the present time, where pharmaceutical services are still incapable of coping with this renaissance. This is due to the suffering of the pharmaceutical service sector from the severe shortage in the number of pharmacists and the level of service provided to patients, where studies affirmed that the job market in Saudi Arabia needs five times more Pharmacists than the existing number until 1445 H (2026). To cover this shortage more than twelve governmental and private Pharmacy Colleges were recently established in the last five years, among which was the College of Pharmacy at Al Kharj province that was approved in 1428 H.

College in Brief

The college of Pharmacy is one of the Colleges belonging to Salman bin Abdulaziz University which are distributed in many provinces in the Kingdom of Saudi Arabia planned to provide graduate and under graduate studies for both male and female. One of the basic purposes of establishing the College of Pharmacy is to cope with the international development in Pharmaceutical Education especially in the USA that was the pioneer in upgrading the Pharmacy profession and the level of Health care services. Among the goals also is to fulfill the requirements for Academic accreditation. Due to the conviction that the role of Pharmacist is not only limited to discovering, preparing and dispensing medicines but also extended to effectively and directly taking care of patients, the planning committee for the academic programs was keen to take the five best Universities in the USA and the academic accreditation standards set forth by the Accreditation Council of pharmacy Education (ACPE) as benchmarks.

Vision

College of Pharmacy – Salman bin AbdulAziz University Aspiring, to provide competitive pharmaceutical education and patient's care, outstanding scientific research, and effective community partnership in Kingdom of Saudi Arabia.

Mission

College of Pharmacy – Salman bin AbdulAziz University Working on the preparation of competitive efficient pharmacists through a distinct academic environment, promising scientific research and fruitful community partnership

Strategic objectives of the College of Pharmacy

1. Focus on Pharmaceutical care jobs for college graduates.
2. Emphasize that our pharmacy students exhibit the attributes necessary for success and strong competitors.
3. Recruit, develop and retain of outstanding faculty and staff member who inspire their students to pursue lifelong learning and maintain the service of human health.
4. Establish and implement clear quality systems.
5. Enabling best teaching and learning environment in which every student is valued.
6. Fostering excellence, innovation in research and achieve greater accountability.
7. Develop the community service.
8. Create variety of funding resources.

After completing the scientific degree requirements the graduates must have the following:

- Developing a mastery of the knowledge in basic, Pharmaceutical and Clinical sciences essential to fulfill all of the roles of pharmacy practitioners as health care providers
- Demonstrating skills in the technical, social, and behavioral aspects of pharmacy, including communication skills
- Illustrating the integration of knowledge and skills in the optimization of medication management and use in different circumstances.
- Acquiring the skills and attitudes necessary for a commitment to life-long learning, including skills to retrieve, critically appraise, disseminate, and apply new knowledge.
- Deep understanding of the pharmacist's role in health care and illness prevention and the ability to perform this role.

Academic Departments

The College consists of five academic Departments namely: Pharmaceutics, Pharmacology, Pharmacognosy, Pharmaceutical Chemistry and Clinical Pharmacy. Below is a brief description for the teaching load and courses of each Department to provide the students with the desired level of knowledge, understanding and skills enable them from active competition for available jobs in the field after graduation.

1- **Department of Pharmaceutics**: The Department teaches eight courses (Theoretical and Practical) for both B. Pharm. Sc. and Pharm. D. degrees during the fist four years. In addition, the Department teaches five courses (Theoretical and Practical) for the B. Pharm. Sc. degree students during the fifth year.

2- Department of Pharmacology: The Department teaches ten courses (Theoretical and Practical) for both B. Pharm. Sc. and Pharm. D. degrees during the fist four years. In addition, the Department teaches one theoretical course for the Pharm. D. degree students during the fifth year.

3- Department of Pharmacognosy: The Department teaches seven courses (Theoretical and Practical) for both B. Pharm. Sc. and Pharm. D. degrees during the fist four years. In addition, the Department teaches one course (Theoretical and Practical) for the B. Pharm. Sc. degree students and another course (Theoretical and Practical) for the Pharm. D. degree students during the fifth year.

4- Department Pharmaceutical Chemistry: The Department teaches four courses (Theoretical and Practical) for both B. Pharm. Sc. and Pharm. D. degrees during the fist four years. In addition, the Department teaches one theoretical course for the Pharm. D. degree students and three courses (Theoretical and Practical) for the B. Pharm. Sc. degree students during the fifth year.

5- **Department of Clinical Pharmacy:** The Department teaches eleven courses (Theoretical and Practical) for both B. Pharm. Sc. and Pharm. D. degrees during the fist four years. In addition, the Department teaches twelve courses (Theoretical and Practical) for Pharm. D. degree students and one theoretical course for the B. Pharm. Sc. degree students during the fifth year. The Department also supervise the clinical training for the Pharm. D. degree students during the sixth year.

Programs and Offered Scientific Degrees:

The programs are designed to include Pharm. D. program in addition to the B. Pharm. Sc. program. The offered degrees at the College of Pharmacy, Salman bin Abdulaziz University are:

1- B. Pharm. Sc.:
This degree requires five years of study. The students must complete the whole program including 170 credit hours of which 3 hours for graduation project in the final year.

2- Pharm. D.: This degree requires six years of study. The program composed of 204 credit hours including 30 hours of Clerkships during the final year.

The first 140 credit hours during the first four years of study are common between the two programs. Of these 12 credit hours are among the University requirements

and 26 credit hours are required for the joined Health colleges' program preparatory year. All students should complete two session of summer Pharmacy training, 320 training hours each, in one of the Pharmaceutical Institutions between 3rd and 4th , 4th and 5th years of study. After the 4th year students will have separate study for each program.

Capacity

Due to the recent establishment the College capacity is limited to 200 male and female students. However, after completion of the infrastructure, buildings and facilities the capacity will hopefully doubled to reach up to 450 male and female students.

Career Opportunities

The profession of pharmacy is not limited to counting and dispensing pills. It is a rewarding profession that involves working closely with other health care professionals and patients.

Traditionally, the role of the pharmacist is to dispense drugs as prescribed by physicians. A pharmacist is responsible for checking pill count and dosage as well as ensuring that the drugs prescribed do not adversely interact with any medication or food that the patient is already taking. In addition, a pharmacist is responsible for consulting patients about medication and answering any questions a patient may have concerning drug therapy (prescription and/ or over-the-counter medication). In addition now the role of pharmacist expanded to follow up the level of drugs with narrow therapeutic indexes in the blood, supervising the preparation of medication administered through intravenous infusions and highly active medications. However, the role of pharmacists is broadening, allowing for added opportunities in clinical settings, hospitals, drug companies and biotechnology companies.

Below is a brief description of the exciting opportunities in the pharmacy field such as:

- Hospital Pharmacy - Staff Pharmacist, Clinical Pharmacist, Pharmacy Administrator.
- Pharmaceutical Industry - Research and Development, Manufacturing, Marketing, Pharmacokinetics, Pharmacogenomics.
- Government Agencies - Ministry of Health Medical Supply, Governmental Hospitals and Clinics, Other Governmental health facilities.
- Colleges and Universities - Professor/Lecturer/Demonstrator.
- Nuclear Pharmacy - Chemotherapy Pharmacist.
- Alternative and Herbal medicine.

Study Plan for Programs:

1) B. Pharm. Sc. Professional Degree

2) Pharm. D. Professional Degree Program

Pharmacy Study Plan for
B. Pharm. Sc. Professional Degree Program
Pharm. D. Professional Degree Program

First Year
(Pre-Pharmacy Year)
(Unified Program for Colleges of Health Sciences)

First Semester

Code	Course Title	Hours
ENGL 131	English Language: Listening and Speaking	2 (1+1) @
ENGL 132	English Language: Reading	2 (1+1)
ENGL 133	English Language: Writing	2 (1+1)
STAT 106	Biostatistics	2 (1+1)
CT 140	Computer Skills	3 (2+1)
IC 101	Introduction to Islamic Culture *	2 (2+0)
ARAB 101	Linguistic Skills *	2 (2+0)
Total		**15 (10+5)**

Second Semester

Code	Course Title	Hours
ENGL 134	English Language for Health Sciences	3 (2+1)
CHEM 105	General Chemistry for Health Sciences	2 (2+0)
CHEM 106	Organic Chemistry for Health Sciences	2 (2+0)
BIOL 106	General Biology	4 (3+1)
PHYS 106	General Physics	4 (3+1)
Total		**15 (12+3)**

@ (Theoretical Lectures + Practical Sessions)
*** KU Requirement Courses**

Pharmacy Study Plan for
B. Pharm. Sc. Professional Degree Program
Pharm. D. Professional Degree Program

Second Year

First Semester

Code	Course Title	Hours
PHL 212	Anatomy	3 (2+1)
PHL 213	Biochemistry-I	2 (2+0)
PHL 215	Physiology-I	3 (2+1)
PHC 211	Pharmaceutical Organic Chemistry	3 (2+1)
PHC 213	Pharmaceutical Analytical Chemistry	3 (2+1)
Math 109	Mathematics for Pharmacy	3 (2+1)
IC 102	Islam and the Construction of Society *	2 (2+0)
Total		**19 (14+5)**

Second Semester

Code	Course Title	Hours
PHL 224	Biochemistry-II	3 (2+1)
PHL 226	Physiology-II	2 (2+0)
PHC 222	Medicinal Chemistry-I	2 (2+0)
PHT 224	Pharmaceutics-I	3 (2+1)
PHT 226	Pharmaceutical Microbiology-I	3 (2+1)
PHCL 222	Introduction to Pharmacy Profession	1 (1+0)
PHG 222	Pharmacognosy-I	3 (2+1)
IC 103	Economic System in Islam *	2 (2+0)
Total		**19 (15+4)**

*** KU Requirement Courses**

Pharmacy Study Plan for
B. Pharm. Sc. Professional Degree Program
Pharm. D. Professional Degree Program

Third Year

First Semester

Code	Course Title	Hours
PHC 313	Medicinal Chemistry-II	2 (2+0)
PHT 312	Pharmaceutics-II	3 (2+1)
PHT 313	Pharmaceutical Microbiology-II	3 (2+1)
PHCL 311	Pharmacy Practice	2 (2+0)
PHL 313	Pharmacology-I	4 (3+1)
PHG 311	Drug Discovery and Development	1 (1+0)
ARAB 103	Expository Writing *	2 (2+0)
Total		**17 (14+3)**

Second Semester

Code	Course Title	Hours
PHT 322	Pharmaceutics-III	3 (2+1)
PHT 324	General Immunology	2 (2+0)
PHCL 324	Pathophysiology-I	2 (2+0)
PHCL 326	Clinical Skills for Pharmacists	2 (2+0)
PHG 322	Pharmacognosy-II	3 (2+1)
PHL 322	Pharmacology-II	3 (2+1)
PHCL 328	Introduction to Drug and Poison Information	2 (0+2)
IC 104	Fundamentals of Islamic Political System *	2 (2+0)
Total		**19 (14+5)**

*** KU Requirement Courses**

Students should perform the summer pharmacy training-1 (PHTR 301) which is consisted of 320 training hours during the summer vacation between the third and the fourth year of study.

Pharmacy Study Plan for
B. Pharm. Sc. Professional Degree Program
Pharm. D. Professional Degree Program

Fourth Year

First Semester

Code	Course Title	Hours
PHG 413	Pharmacognosy-III	2 (1+1)
PHCL 415	Pathophysiology-II	2 (2+0)
PHCL 416	Pharmacotherapy-I	3 (3+0)
PHT 414	Pharmaceutics-IV	3 (2+1)
PHT 415	Basic Pharmacokinetics	3 (2+1)
PHL 418	Pharmacology-III	2 (2+0)
PHL 419	Toxicology	2 (2+0)
PHG 414	Substances of Abuse	1 (0+1)
Total		**18 (14+4)**

Second Semester

Code	Course Title	Hours
PHCL 420	Pharmacy Management	2 (1+1)
PHCL 429	Pharmaceutical Care-I	3 (2+1)
PHCL 430	Pharmacotherapy-II	3 (2+1)
PHG 423	Antimicrobial Agents	3 (3+0)
PHG 424	Pharmaceutical Biotechnology	3 (3+0)
PHCL 437	Pharmacy Regulations and Ethics	2 (2+0)
PHL 425	Pharmacology-IV	2 (2+0)
Total		**18 (15+3)**

Students should perform the summer pharmacy training-2 (PHTR 401) which is consisted of 320 training hours during the summer vacation between the fourth and the fifth year of study.

Pharmacy Study Plan for
B. Pharm. Sc. Professional Degree Program

Fifth Year

First Semester

Code	Course Title	Hours
PHC 426	Medicinal Chemistry-III	2 (2+0)
PHC 427	Pharmaceutical Instrumental Analysis	4 (3+1)
PHT 432	Industrial Pharmacy	4 (2+2)
PHT 433	Nuclear Pharmacy	2 (1+1)
PHT 434	Sterile Dosage Forms	2 (1+1)
PHCL 438	Pharmaceutical Marketing	2 (2+0)
Total		**16 (11+5)**

Second Semester

Code	Course Title	Hours
PHC 428	Medicinal Chemistry-IV	3 (2+1)
PHT 435	Cosmetic Preparations	1 (0+1)
PHT 436	Pharmaceutical Quality Control and Good Manufacturing Practice	3 (2+1)
PHG 434	Recent Approaches in Medicinal Plants Analyses	4 (2+2)
PHTR 499	Research Project	3 (0+3)
Total		**14 (6+8)**

Pharmacy Study Plan for
Pharm. D. Professional Degree Program

Fifth Year

First Semester

Code	Course Title	Hours
PHCL 439	Applied Pharmacokinetics	2 (2+0)
PHCL 463	Pharmacotherapy-III	4 (3+1)
PHCL 464	Pharmacometrics and Literature Evaluation	3 (2+1)
PHCL 465	Pathophysiology-III	3 (3+0)
PHCL 466	Clinical Immunology	2 (2+0)
PHC 429	Scientific Writing	1 (1+0)
PHG 462	Pharmacy Seminar-I	2 (1+1)
Total		**17 (14+3)**

Second Semester

Code	Course Title	Hours
PHCL 467	Pharmacoeconomics	2 (2+0)
PHCL 468	Pharmacoepidemiology	2 (2+0)
PHCL 469	Pharmacotherapy-IV	4 (3+1)
PHL 437	Pharmacogenomics	2 (2+0)
PHCL 470	Pharmaceutical Care-II	2 (2+0)
PHCL 480	Clinical Nutrition	2 (2+0)
PHCL 481	Evidence-Based Therapy	2 (2+0)
PHCL 482	Pharmacy Seminar-II	1 (0+1)
Total		**17 (15+2)**

Clerkship Rotations

Fifth Year Summer Session

No.	Title	Hours
1	Clerkship (I)	3 (0+3)
2	Clerkship (II)	3 (0+3)
Total		**6 (0+6)**

Pharmacy Study Plan for Pharm. D. Professional Degree Program

Sixth Year

First Semester

No.	Title	Hours
3	Clerkship (III)	3 (0+3)
4	Clerkship (IV)	3 (0+3)
5	Clerkship (V)	3 (0+3)
6	Clerkship (VI)	3 (0+3)
Total		**12 (0+12)**

Second Semester

No.	Title	Hours
7	Clerkship (VII)	3 (0+3)
8	Clerkship (VIII)	3 (0+3)
9	Clerkship (IX)	3 (0+3)
10	Clerkship (X)	3 (0+3)
Total		**12 (0+12)**

Pharmacy Study Plan For Pharm. D. Professional Degree Program

List of Required and Elective Clerkship Rotations

Rotation Code	Rotation Title
PHCL 440	Critical Care *
PHCL 443	Drug and Poison Information *
PHCL 444	Internal Medicine-I *
PHCL 445	Internal Medicine-II *
PHCL 446	Ambulatory Care *
PHCL 447	Internal Medicine-III
PHCL 448	Nutritional Support
PHCL 449	Internal Medicine-IV
PHCL 450	Geriatrics
PHCL 457	Infectious Diseases
PHCL 458	Pain Management
PHCL 459	Pharmacoeconomics
PHCL 460	Community Practice
PHCL 483	Organ Transplantation
PHCL 484	Nephrology
PHCL 485	Neonatal Intensive Care
PHCL 486	Therapeutic Drug Monitoring
PHCL 487	Pediatrics
PHCL 488	Hematology/Oncology
PHCL 489	Psychiatry
PHG 463	Herbal and Alternative Medicine
PHL 438	Toxicology

*** Required clerkship rotations**
Students must also select five other elective clerkship rotations.

Requirements for the Degrees:

1) B. Pharm. Sc.

2) Pharm. D.

1- Requirements for B. Pharm. Sc. Professional Degree

1) KU requirement courses:

Course Code	Course Title	Hours
IC 101	Introduction to Islamic Culture	2
IC 102	Islam and the Construction of Society	2
IC 103	Economic System in Islam	2
IC 104	Fundamentals of Islamic Political System	2
ARAB 101	Linguistic Skills	2
ARAB 103	Expository Writing	2
Total		**12**

2) Unified Program for Colleges of Health Sciences Requirement Courses:

Course Code	Course Title	Hours
ENGL 131	English Language: Listening and Speaking	2
ENGL 132	English Language: Reading	2
ENGL 133	English Language: Writing	2
ENGL 134	English Language for Health Sciences	3
STAT 106	Biostatistics	2
CT 140	Computer Skills	3
CHEM 105	General Chemistry for Health Sciences	2
CHEM 106	Organic Chemistry for Health Sciences	2
BIOL 106	General Biology	4
PHYS 106	General Physics	4
Total		**26**

3) College of Pharmacy Requirement Courses:

Course Code	Course Title	Hours
PHL 212	Anatomy	3
PHL 213	Biochemistry-I	2
PHL 215	Physiology-I	3
PHL 224	Biochemistry-II	3
PHL 226	Physiology-II	2
PHL 313	Pharmacology-I	4
PHL 322	Pharmacology-II	3
PHL 418	Pharmacology-III	2
PHL 419	Toxicology	2
PHL 425	Pharmacology-IV	2
MATH 109	Mathematics for Pharmacy	3
PHCL 222	Introduction to Pharmacy Profession	1
PHCL 311	Pharmacy Practice	2
PHCL 324	Pathophysiology-I	2
PHCL 326	Clinical Skills for Pharmacists	2
PHCL 328	Introduction to Drug and Poison Information	2
PHCL 415	Pathophysiology-II	2
PHCL 416	Pharmacotherapy-I	3
PHCL 420	Pharmacy Management	2
PHCL 429	Pharmaceutical Care-I	3
PHCL 430	Pharmacotherapy-II	3
PHCL 437	Pharmacy Regulations and Ethics	2
PHCL 438	Pharmaceutical Marketing	2
PHT 224	Pharmaceutics-I	3
PHT 226	Pharmaceutical Microbiology-I	3
PHT 312	Pharmaceutics-II	3
PHT 313	Pharmaceutical Microbiology-II	3
PHT 322	Pharmaceutics-III	3

Course Code	Course Title	Hours
PHT 324	General Immunology	2
PHT 414	Pharmaceutics-IV	3
PHT 415	Basic Pharmacokinetics	3
PHT 432	Industrial Pharmacy	4
PHT 433	Nuclear Pharmacy	2
PHT 434	Sterile Dosage Forms	2
PHT 435	Cosmetic Preparations	1
PHT 436	Pharmaceutical Quality Control and Good Manufacturing Practice	3
PHG 222	Pharmacognosy-I	3
PHG 311	Drug Discovery and Development	1
PHG 322	Pharmacognosy-II	3
PHG 413	Pharmacognosy-III	2
PHG 414	Substances of Abuse	1
PHG 423	Antimicrobial Agents	3
PHG 424	Pharmaceutical Biotechnology	3
PHG 434	Recent Approaches in Medicinal Plants Analyses	4
PHC 211	Pharmaceutical Organic Chemistry	3
PHC 213	Pharmaceutical Analytical Chemistry	3
PHC 222	Medicinal Chemistry-I	2
PHC 313	Medicinal Chemistry-II	2
PHC 426	Medicinal Chemistry-III	2
PHC 427	Pharmaceutical Instrumental Analysis	4
PHC 428	Medicinal Chemistry-IV	3
PHTR 499	Research Project	3
Total		**132**

In Addition to:

PHTR 301	Summer Pharmacy Training-1	320 training hours
PHTR 401	Summer Pharmacy Training-2	320 training hours

2- Requirements for Pharm. D. Professional Degree

1) KU requirement courses:

Course Code	Course Title	Hours
IC 101	Introduction to Islamic Culture	2
IC 102	Islam and the Construction of Society	2
IC 103	Economic System in Islam	2
IC 104	Fundamentals of Islamic Political System	2
ARAB 101	Linguistic Skills	2
ARAB 103	Expository Writing	2
Total		**12**

2) Unified Program for Colleges of Health Sciences Requirement Courses:

Course Code	Course Title	Hours
ENGL 131	English Language: Listening and Speaking	2
ENGL 132	English Language: Reading	2
ENGL 133	English Language: Writing	2
ENGL 134	English Language for Health Sciences	3
STAT 106	Biostatistics	2
CT 140	Computer Skills	3
CHEM 105	General Chemistry for Health Sciences	2
CHEM 106	Organic Chemistry for Health Sciences	2
BIOL 106	General Biology	4
PHYS 106	General Physics	4
Total		**26**

3) College of Pharmacy Requirement Courses:

Course Code	Course Title	Hours
PHL 212	Anatomy	3
PHL 213	Biochemistry-I	2
PHL 215	Physiology-I	3
PHL 224	Biochemistry-II	3
PHL 226	Physiology-II	2
PHL 313	Pharmacology-I	4
PHL 322	Pharmacology-II	3
PHL 418	Pharmacology-III	2
PHL 419	Toxicology	2
PHL 425	Pharmacology-IV	2
PHL 437	Pharmacogenomics	2
MATH 109	Mathematics for Pharmacy	3
PHCL 222	Introduction to Pharmacy Profession	1
PHCL 311	Pharmacy Practice	2
PHCL 324	Pathophysiology-I	2
PHCL 326	Clinical Skills for Pharmacists	2
PHCL 328	Introduction to Drug and Poison Information	2
PHCL 415	Pathophysiology-II	2
PHCL 416	Pharmacotherapy-I	3
PHCL 420	Pharmacy Management	2
PHCL 429	Pharmaceutical Care-I	3
PHCL 430	Pharmacotherapy-II	3
PHCL 437	Pharmacy Regulations and Ethics	2
PHCL 439	Applied Pharmacokinetics	2
PHCL 463	Pharmacotherapy-III	4
PHCL 464	Pharmacometrics and Literature Evaluation	3

Course Code	Course Title	Hours
PHCL 465	Pathophysiology-III	3
PHCL 466	Clinical Immunology	2
PHCL 467	Pharmacoeconomics	2
PHCL 468	Pharmacoepidemiology	2
PHCL 469	Pharmacotherapy-IV	4
PHCL 470	Pharmaceutical Care-II	2
PHCL 480	Clinical Nutrition	2
PHCL 481	Evidence-Based Therapy	2
PHCL 482	Pharmacy Seminar-II	1
PHT 224	Pharmaceutics-I	3
PHT 226	Pharmaceutical Microbiology-I	3
PHT 312	Pharmaceutics-II	3
PHT 313	Pharmaceutical Microbiology-II	3
PHT 322	Pharmaceutics-III	3
PHT 324	General Immunology	2
PHT 414	Pharmaceutics-IV	3
PHT 415	Basic Pharmacokinetics	3
PHG 222	Pharmacognosy-I	3
PHG 311	Drug Discovery and Development	1
PHG 322	Pharmacognosy-II	3
PHG 413	Pharmacognosy-III	2
PHG 414	Substances of Abuse	1
PHG 423	Antimicrobial Agents	3
PHG 424	Pharmaceutical Biotechnology	3
PHG 462	Pharmacy Seminar-I	2
PHC 211	Pharmaceutical Organic Chemistry	3
PHC 213	Pharmaceutical Analytical Chemistry	3

Course Code	Course Title	Hours
PHC 222	Medicinal Chemistry-I	2
PHC 313	Medicinal Chemistry-II	2
PHC 429	Scientific Writing	1
---	Clerkship (I)	3
---	Clerkship (II)	3
---	Clerkship (III)	3
---	Clerkship (IV)	3
---	Clerkship (V)	3
---	Clerkship (VI)	3
---	Clerkship (VII)	3
---	Clerkship (VIII)	3
---	Clerkship (IX)	3
---	Clerkship (X)	3
Total		**166**

In Addition to:

PHTR 301	Summer Pharmacy Training-1	320 training hours
PHTR 401	Summer Pharmacy Training-2	320 training hours

Academic Departments and Courses Descriptions

1- Department of Pharmaceutics:.
2- Department of Pharmacology:
3- Department of Pharmacognosy:
4- Department Pharmaceutical Chemistry:
5- Department of Clinical Pharmacy:

Department of Pharmacology

Course Name, Credit Hours and Description

PHL 212 = Anatomy, 3 (2+1).

The theoretical part of the course is concerned with the fundamental anatomical knowledge of the integumental structures and locomotive skeleton (joints and skeletal muscle) as well as nervous, cardiovascular, respiratory, digestive and genitourinary systems. The practical part of the course is devoted to tutorials and studying on anatomical models the different body organs in each system mentioned within the context of the theoretical part.

PHL 213 = Biochemistry-I, 2 (2+0).

The course deals with the following topics in biochemistry: amino acids and proteins including enzymes, biological oxidation, porphyrins and nucleic acids. The effects of certain xenobiotics (foreign chemicals) including drugs and toxic agents on molecular level and the basis of their clinical impact are emphasized whenever possible.

PHL 215 = Physiology-I, 3 (2+1).

The theoretical part of the course covers the fundamental basis of electrophysiological properties of the cell membrane and the physiological background of the various types of muscles (skeletal, smooth and cardiac), the peripheral nervous system particularly the autonomic subdivision and the cardiovascular system including blood. Regulation and control of the function of each of the aforementioned systems as well as their integrated functions with each other are also emphasized. The practical part of the course is devoted to some relevant physiological experiments belonging to the various topics covered within the context of the theoretical part.

PHL 224 = Biochemistry-II, 3 (2+1).

The theoretical part of the course includes the metabolism of carbohydrates, lipids, proteins and minerals. The effects of certain xenobiotics (foreign chemicals) including drugs and toxic agents on the various metabolic pathways and the basis of their clinical impact are emphasized whenever possible. The practical part of the course is concerned with the determination of some basic biochemical parameters in blood and urine samples and the clinical relevance of their levels is discussed.

PHL 226 = Physiology-II, 2 (2+0).

The course is concerned with the study of the basic physiological functions of the respiratory, renal, gastrointestinal and the central nervous system in addition to the study of the basic physiological pathways responsible for pain sensation. Regulation and control of the function of each of the aforementioned systems as well as their integrated functions with each other are also emphasized.

PHL 313 = Pharmacology-I, 4 (3+1).

The theoretical part of the course deals with general introduction which elaborates on the basic principles of pharmacology. In addition, autonomic nervous system-acting drugs, cardiovascular system-acting drugs, local anesthetics, autacoids and drugs affecting them are discussed. For each one of the given drugs, the pharmacological actions (desirable and undesirable), mechanism(s) of action, therapeutic uses, contraindication(s) and interaction(s) are emphasized. The practical part of the course is devoted to some relevant qualitative and quantitative pharmacological experiments of the in vitro type i.e. carried out on isolated organ preparations.

PHL 322 = Pharmacology-II, 3 (2+1).

The theoretical part of the course covers, in general, the various drugs affecting the central nervous system. The basic principles of central synaptic neurotransmission and drugs used in the management of certain disorders such as: epilepsy, depression, anxiety, insomnia, psychosis, attention deficit syndrome, Parkinson's and Alzheimer's disease, eating problems, inflammation and pain are discussed. A special emphasis on drug abuse and dependence is also given. For each one of the given drugs, the pharmacological actions (desirable and undesirable), mechanism(s) of action, therapeutic uses, contraindication(s) and interaction(s) are elaborated. The practical part of the course deals with some relevant experiments of the in vivo type i.e. carried out on intact animals to demonstrate the pharmacological effects of certain drugs belonging to some topics covered within the context of the theoretical part.

PHL 418 = Pharmacology-III, 2 (2+0).

The course includes drugs used in the management of the following disorders: vomiting, constipation and diarrhea, peptic ulcer, bronchial asthma, anemia, hyperlipoproteinemias, in addition to thromboembolic disorders. The course covers also the various types of anti-parasitic drugs, immunomodulators, aphrodisiacs and drugs used in erectile dysfunctions. For each one of the given drugs, the pharmacological actions (desirable and undesirable), mechanism(s) of action, therapeutic uses, contraindication(s) and interaction(s) are emphasized.

PHL 419 = Toxicology, 2 (2+0).

The course is concerned with the study of the general principles of toxicology and the general mechanism(s) of cellular injury in addition to studying the toxicity of some commonly encountered drugs and chemicals. Signs and symptoms of acute and/or chronic toxicity as well as the general and specific measures used in the management of poisoning are stressed. The course deals also with chemical carcinogens and drugs affecting maternal, fetal and neonatal health.

PHL 425 = Pharmacology-IV, 2 (2+0).

The course deals in general with various drugs affecting the endocrine system. The basic principles of the endocrine system regulation and feedback mechanisms are involved. The course is also concerned with various anti-cancer drugs and drugs used in the management of some skin diseases such as acne and psoriasis in addition to melanizing, demelanizing and local sclerosing agents. For each one of the given drugs, the pharmacological actions (desirable and undesirable), mechanism(s) of action, therapeutic uses, contraindication(s) and interaction(s) are emphasized.

PHL 437 = Pharmacogenomics, 2 (2+0).

The course aims to develop rational means to optimize drug therapy with respect to the patient's genotype in order to ensure maximum efficacy with minimal side effects. The course provides students with a comprehensive overview of the genetic basis for differences in drug response. Genetic variabilities in enzymes, drug receptors, transporters and regulatory proteins involved in promoting and inhibiting transcription and translation processes are discussed.

PHL 438 = Toxicology (Elective Clerkship Rotation), 3 (0+3).

The toxicology rotation is designed for clinical service, education and research. It aims to familiarize the students with the toxicity of substances found in the surrounding environment. Toxicity signs and symptoms as well as subsequent management of exposures to major drug categories, industrial chemicals, household consumer products, plants, animals and substances of abuse are covered. The course involves a weekly presentation and a few hours of laboratories. The unit to be employed is the Drug and Poison Information Centre where the students are properly trained to access clinical histories, utilize information resources and suggest appropriate recommendations for toxicity management.

Department of Pharmaceutical Chemistry

Course Name, Credit Hours and Description

PHC 211 = Pharmaceutical Organic Chemistry, 3 (2+1).

The theoretical part of the course covers an in-depth knowledge of organic chemistry with particular emphasis on the synthesis, reactions and their mechanism, as well as stereochemistry of organic molecules. The course includes also details of heterocyclic compounds chemistry in addition to giving outlines on the importance of different organic classes in nature and in pharmaceutical as well as in chemical industries. The practical part of the course deals with the identification of different classes of organic compounds based on differences in their physicochemical properties.

PHC 213 = Pharmaceutical Analytical Chemistry, 3 (2+1).

The theoretical part of the course includes a general introduction to pharmaceutical analytical chemistry in addition to giving the fundamentals of both volumetric analysis and instrumental methods of analysis. The basic principles of each method and its applications are also covered. The practical part of the course is concerned with some relevant analytical procedures covered within the context of the theoretical part of the course.

PHC 222 = Medicinal Chemistry-I, 2 (2+0).

The course is designed to provide pharmacy students with the essential basis of medicinal chemistry. It is focused on the physicochemical properties of various drug molecules and how these properties can alter the fate (absorption, distribution, biotransformation and elimination) of the drug in the body and the interaction of the drug with its specific biological targets (receptors). The fundamental principles of drug biotransformation (metabolism) are also covered.

PHC 313 = Medicinal Chemistry-II, 2 (2+0).

The course deals with the chemistry of drugs affecting the activity of the autonomic nervous system (sympathetic and parasympathetic) and cardiovascular system, including those drugs that affect the biological actions of neurotransmitters and other endogenous substances. The interactions of these endogenous ligands with their specific biological targets (receptors, enzymes, etc.) are discussed along with the molecular effects of various specific agonists and antagonists. The course

covers also the chemistry of diuretics and anti-histaminic drugs. Mechanism(s) of action, structure-activity relationship, stereochemistry, and biotransformation pathway(s) of the studied drug categories are also included.

PHC 426 = Medicinal Chemistry-III, 2 (2+0).

The course is concerned with the chemistry of drugs affecting the activity of the central nervous system such as anti-psychotics, sedative-hypnotics, anti-depressants, analgesics and general anesthetics. Mechanism(s) of action, structure-activity relationship, stereochemistry, and biotransformation pathway(s) of the studied drug categories are also emphasized. In addition, general knowledge about drug abuse and its hazards are outlined.

PHC 427 = Pharmaceutical Instrumental Analysis, 4 (3+1).

The course is designed to give pharmacy students an overview of the various modern instrumental analytical techniques and procedures used in the pharmaceutical research and industry. Basic principles, components, and operation of each analytical technique are given in an integrative manner between the theoretical part (lectures) and the practical part (laboratory sessions) of the course.

PHC 428 = Medicinal Chemistry-IV, 3 (2+1).

The theoretical part of the course covers in general, the chemistry of various chemotherapeutic agents as well as the chemistry of drugs used in certain endocrine system dysfunctions. Chemotherapeutic agents include anti-microbial, anti-viral, anti-fungal, and anti-protozoal drugs in addition to chemotherapeutic anti-cancer drugs while the selected drugs used in endocrine system dysfunctions include thyroid and anti-thyroid agents and oral anti-diabetic drugs. Mechanism(s) of action, structure-activity relationship, stereochemistry, and biotransformation pathway(s) of the studied drug categories are also emphasized. The practical part of the course deals with relevant qualitative and quantitative experiments of some drugs belonging to certain topics covered within the context of the theoretical part.

PHC 429 = Scientific Writing, 1 (1+0).

The course is designed to enable students to write an official scientific article. The students are taught various standard approaches for scientific style writing and are trained to author a scientific manuscript suitable for publication.

Department of Pharmaceutics

Course Name, Credit Hours and Description

PHT 224 = Pharmaceutics-I, 3 (2+1).

The theoretical part of the course is designed to integrate the basic principles of physics, mathematics and chemistry with other pharmaceutical sciences and to apply them in pharmacy practice. The fundamentals of the following topics are covered: measurement and calculation, interpretation of prescription and calculation of doses, states of matter, solubility and distribution phenomena, rheology and surface phenomenon, Surface tension phenomena, stability of pharmaceuticals, reaction kinetics, buffer and isotonic solutions, and colligative properties of solutions. The practical part of the course is devoted to some experiments relevant to certain issues mentioned within the context of the theoretical part.

PHT 226 = Pharmaceutical Microbiology-I, 3 (2+1).

The course is, in general, an introductory background of microbiology. The theoretical part of the course emphasizes on various aspects of viruses, bacteria and fungi and covers the following issues: classification, basic structure and ultra-structure, growth and physiology, genetics, acquired resistance, and mechanism(s) of infection and pathogenecity. The course includes also sterilization (physical and chemical methods), antiseptics and preservatives. The practical part of the course is devoted to some experiments relevant to certain topics given within the context of the theoretical part.

PHT 312 = Pharmaceutics-II, 3 (2+1).

The course is designed to familiarize pharmacy students with the basic concepts about liquid and semisolid pharmaceutical dosage forms. The theoretical part of the course covers the various types of these dosage forms such as solutions, suspensions, emulsions, colloidal, liposomal and nano-particles preparations in addition to aerosols, ointments, creams, gels and pastes. The following issues are discussed: formulation, methods of preparation, rationales of their use, applications as well as advantages and disadvantages. The practical part of the course is devoted to some relevant experiments belonging to various topics covered within the context of the theoretical part.

PHT 313 = Pharmaceutical Microbiology-II, 3 (2+1).

This course is complementary to what is taught in pharmaceutical microbiology-I (PHT 226). The theoretical part of the course emphasizes on medical mycology and covers also the pathogenesis, transmission, infection signs and symptoms, diagnosis and control of the following microbes: *Staphylococci*, *Streptococci*, *Enterococci*, *Corynebacterium*, *Bacillus*, *Clostridium*, *Listeria*, *Enteroacteriaceae*, *Pseudomonas*, *Brucella*, *Bordella*, H. influenza, *Legionella*, *Campylobacter*, *Helicobacter*, *Neissria*, *Bacteriodes*, *Mycobacterium* and branched bacteria, *Spirochetes*, *Rickettsiae*, *Chlamydiae*, and *Mycoplasma*. The practical part of the course is concerned with some experiments relevant to certain issues given within the context of the theoretical part.

PHT 322 = Pharmaceutics-III, 3 (2+1).

The course is devoted to familiarize pharmacy students with the basic concepts about solid pharmaceutical dosage forms. The theoretical part of the course deals with the various types of this dosage form such as powders (bulk and divided), tablets, effervescent granules, capsules, and suppositories. The following issues are discussed: formulation, methods of preparation, evaluation and manufacturing. The practical part of the course deals with some relevant experiments belonging to various topics covered within the context of the theoretical part.

PHT 324 = General Immunology, 2 (2+0).

The course gives a general introduction about the basic principles of the immune system and its components which include: central lymphoid tissue, thymus gland, bone marrow stem cells, peripheral lymphoid tissue, lymph nodes and immune cells namely, T and B lymphocytes. The fundamentals of the following topics are discussed: description of the innate and acquired (humoral and cellular) immune responses, structure and function of the various immunoglobulins (antibodies), histocompatibility system and its relation to the immune response, complement system and its role in defense situations as well as in pathological conditions, various cytokines as mediators of the immune system, immunity to infections and vaccines, immunopathology including: hypersensitivity reactions, autoimmunity, immunodeficiency, tumor and transplantation immunology, immunopharmacology and immunotherapy, and immunosuppressants and their clinical applications.

PHT 414 = Pharmaceutics-IV, 3 (2+1).

This course discusses what is known as biopharmaceutics which is the science dealing with the influence of drug's physicochemical properties, its dosage form and its route of administration on the rate and extent of drug absorption. The theoretical part of the course is designed to: familiarize pharmacy students with the biological factors the affect absorption of drugs, show how the drug's physicochemical characteristics influence its absorption from the gastrointestinal tract, emphasize the importance of dosage form selection and how it affects the clinical outcome, study the factors affecting bioavailability of drugs including pharmacokinetics variability, and study the biopharmaceutics of sustained release and new drug delivery systems. The practical part of the course deals with some relevant experiments belonging to certain topics covered within the context of the theoretical part.

PHT 415 = Basic Pharmacokinetics, 3 (2+1).

The theoretical part of the course is devoted to introduce the pharmacy students to mathematical and conceptual aspects of basic pharmacokinetics. Particular emphasis are discussed to obtain, understand and employ some important pharmacokinetic terms such as clearance, apparent volume of distribution, elimination rate constant, and elimination half life. Prediction of plasma and urine drug concentrations based upon the determination of certain pharmacokinetic parameters after oral and intravenous administration (single and multiple doses) as well as after intravenous infusion are also stressed. In addition the course covers the general renal and hepatic handling of drugs as well as distributional aspects leading to two-compartment models. The practical part of the course deals with certain relevant experiments belonging to some topics covered within the context of the theoretical part.

PHT 432 = Industrial Pharmacy, 4 (2+2).

The theoretical part of the course deals with the main operations that take place in industrial pharmacy and the equipment utilized in such processes. Emphases are given on pharmaceutical machines and operations such as size reduction and analysis, blending and mixing, filtration, centrifugation, extraction, heat flow, cooling and refrigeration, drying process, freeze and spray drying, evaporation, distillation, crystallization, and super-critical fluids. The practical part of the course is designed to familiarize pharmacy students with some relevant operations belonging to certain topics covered within the context of the theoretical part.

PHT 433 = Nuclear Pharmacy, 2 (1+1).

The theoretical and practical parts of the course are designed to be integrated together and to familiarize pharmacy students with the basic concepts of nuclear pharmacy. The following topics about radiopharmaceuticals are elaborated: general introductory background, characteristics and handling, radiation regulation and protection, quality control, biodistribution, and diagnostic and therapeutic uses in nuclear medicine.

PHT 434 = Sterile Dosage Forms, 2 (1+1).

The theoretical and practical parts of the course are designed to be integrated together and to familiarize pharmacy students with some basic aspects of the various injectable and ophthalmic dosage forms including the physicochemical properties, design and formulation, isotonicity and acid-base properties. The following issues about sterile dosage forms are thus emphasized: introduction, composition and characteristics, sterilization (principles and techniques), handling and administration, large-scale preparation, large volume sterile solutions parenteral manufacturing in hospitals, parenteral admixture and incompatibilities, convenience of parenteral preparations, and packaging.

In addition the course covers also the fundamentals of fluid and electrolyte therapy as well as ophthalmic preparations.

PHT 435 = Cosmetic Preparations, 1 (0+1).

The course covers different topics such as the skin and its functions, historical development of cosmetics, different cosmetic products, different ingredients including the prohibited or limited ones, preparation and evaluation of cosmetic products, food and drug administration (FDA) authority over cosmetics and preservatives used in cosmetic preparations. The aforementioned issues are discussed either through devoted sessions or during the practical labs.

PHT 436 = Pharmaceutical Quality Control and Good Manufacturing Practice, 3 (2+1).

This course is offered with the collaboration of another department namely, department of pharmaceutical chemistry. The theoretical and practical parts of the course are designed to familiarize pharmacy students with the quality assurance and regulatory affairs which include good manufacturing practice (GMP) and quality control aspects of raw material and finished product. The quality control involves the final testing of the product beside the in-process quality control of the different dosage forms including tablets, capsules, ointments, creams, suppositories, parenteral products, solutions, suspensions and emulsions.

Department of Pharmacognosy

Course Name, Credit Hours and Description

PHG 222 = Pharmacognosy-I, 3 (2+1).

The theoretical part of the course is concerned with some fundamental knowledge of drugs derived from natural origin and it includes the following issues: history, sources and importance of natural products, general botanical and microscopic characters of medicinal plants and their different chemical constituents, natural health products such as herbal medicines, homeopathy, complementary and alternative medicine, and other related subjects, some selected examples to illustrate contemporary usage of natural products, various steps involved in the production of drugs derived from natural sources (either as crude form or as extract) such as collection, preparation, storage conditions, etc., introduction to different biogenetic pathways of secondary metabolites formation and their classification, general principles about natural products containing carbohydrates, tannins, volatile oils and lipids as well as unorganized drugs, and chromatographic principles and methodologies especially column and planer chromatography as well as their important applications in the evaluation of natural products. The practical part of the course is devoted to give some experimental guidance in the processes of screening of medicinal plants and their constituents mentioned within the context of the theoretical part.

PHG 311 = Drug Discovery and Development, 1 (1+0).

This course is offered with an equal collaboration of another department namely, department of pharmaceutical chemistry and is focused on the role of the pharmacist as one of the scientists involved in the discovery and development of new drugs either from natural or synthetic origins. The course is designed to give an overview of the main steps involved in the process of discovery and development of new drugs from the start till reaching the final stages of clinical trials. The following topics are emphasized: various stages including screening of natural sources, bases of selection, isolation and purification of active constituents, identifying and selecting a target, selecting and optimizing a lead compound, carrying out in vitro and in vivo testing to determine biological activity and/or toxicity, and evaluating acceptable "drug-like" properties, as well as certain concepts such as selecting of targets and leads based on pharmacogenetic and epidemiologic perspectives.

PHG 322 = Pharmacognosy-II, 3 (2+1).

The theoretical part of the course is concerned with the study of the medicinal plants that contain active principles belonging chemically to glycosides and alkaloids. Some narcotic and toxic plants, especially those present in the Kingdom are covered in an attempt to provide pharmacy students with some information about their identification and the management of their poisoning. The course deals also with some drugs derived from marine natural products in addition to the basic principles of herb-drug interactions. The practical part of the course is devoted to some relevant phytochemical procedures belonging to the various topics covered within the context of the theoretical part.

PHG 413 = Pharmacognosy-III, 2 (1+1).

The theoretical part of the course includes a comprehensive study of hormones, enzymes, vitamins and minerals with reference to other steroids of pharmaceutical interest. Within the course content the following issues are covered: conventional and biotechnological sources, commercial production, chemistry, deficiency, toxicity and clinical indications. The course deals also with some other biological products such as vaccines, toxins, venoms and anti-sera in addition to discussion of the types and sources of allergens. Natural colorants technology and their applications in nutrition and food industry as well as food analyses are in principle emphasized. The practical part of the course is concerned with some relevant experiments belonging to certain topics covered within the context of the theoretical part.

PHG 414 = Substances of Abuse, 1 (0+1).

The course is concerned with a comprehensive overview of the abuse of certain drugs such as central nervous system stimulants and depressants, hallucinogens, and anabolic steroids. The study includes natural sources, geographic origin, distribution, constituents, harmful effects, qualitative chemical methods of identification, and quantitative chromatographic methods of analysis. Emphasis is given on licit and illicit products of abused drugs as well as the universally approved methods used for their identification in forensic medicine.

PHG 423 = Antimicrobial Agents, 3 (3+0).

This course is offered in an equal collaboration with two other departments namely, department of pharmacology and department of pharmaceutics. The course deals with the study of anti-microbial, anti-fungal, and anti-viral drugs. The emphasized areas in this course include structure-activity relationship, mechanism(s) of action and resistance, therapeutic uses, adverse effects as well as contraindications and drug interactions.

PHG 424 = Pharmaceutical Biotechnology, 3 (3+0).

The course is offered in an equal collaboration with another department namely, department of pharmaceutics. The course covers, in general, an extensive study of the various techniques used to produce clinically useful drugs such as fermentation and plant tissue culturing as well as recombinant DNA technology. The course is also concerned with a comprehensive study of protein production and the technologies employed to enhance their stability, purity, formulation and delivery. In addition, basic principles of gene therapy, production of transgenic and knock-out animals, monoclonal antibodies, vaccines, nano-biotechnology are emphasized together with protein-protein interaction and some economic consideration in the field of medical biotechnology.

PHG 434 = Recent Approaches in Medicinal Plants Analyses, 4 (2+2).

The theoretical part of the course includes the various methods and techniques employed for screening medicinal plants for their bioactive constituents. The course covers also recent developments in the methods of extraction, isolation, purification, and spectroscopic identification of the various plant bioactive constituents. In addition, the general concepts of the following issues are emphasized: medicinal plants information resources, phytochemical screening, screening for bioactive plant constituents, specific extraction procedures, applications of chromatographic separation techniques, characterization of the active constituents by physical and chemical means, and application of the spectroscopic techniques for the identification of the isolated constituents and interpretation of their spectral data. The different methods for evaluation of herbal products and drugs derived from them as stated in the various Pharmacopeias as well as methods of detection of foreign matters and impurities are discussed. The practical part of the course includes some relevant procedures belonging to some topics given within the context of the theoretical part.

PHG 462 = Pharmacy Seminar-I, 2 (1+1).

The theoretical and practical parts of the course are integrated together and aim at developing the student's skills in preparing and delivering scientific seminars in any one of the various pharmaceutical disciplines.

PHG 463 = Herbal and Alternative Medicine (Elective Clerkship Rotation), 3 (0+3).

The herbal and alternative medicine rotation addresses the rapid growth of the non-prescription herbal products marketed in pharmacies and in herbal and food supplement stores. The rotation is therefore designed to assist the pharmacy students in selecting non-prescription products for patients who choose self-medication. The rotation involves discussion of therapeutic uses, mechanism(s) of action, adverse effects, contraindications, precautions, drug-drug interactions as well as drug-herb interactions of non-prescription products. The Pharmacopeial standards and quality control procedures for herbal products are also covered. By the end of this rotation the students will be able to:1- understand the therapeutic use and side effects of natural products as well as over-the-counter drugs used to manage common illnesses. 2- determine possible contraindications and drug interactions. 3- select appropriate non-prescription and/or herbal products if indicated. 4- counsel the patient on the proper dosage and use of the product. 5- monitor the patient's response to the recommended therapy. 6- become familiarized with a wide variety of home-health care specialty products. The course is offered in the Herbal and Alternative Medicines Unite.

Department of Clinical Pharmacy

Course Name, Credit Hours and Description

PHCL 222 = Introduction to Pharmacy Profession, 1(1+0).

This course highlights the progress of pharmacy over time, its impact on community attitudes, and how that has lead to its widespread acceptance.

PHCL 311 = Pharmacy Practice, 2(2+0).

The course highlights the fundamental concepts of pharmacy practice with an emphasis on the role of the pharmacist.

PHCL 324 = Pathophysiology-I, 2(2+0).

This course provides students with a basic understanding of pathophysiology. It focuses on those basic biologic processes that lead to alteration in body structure and function and how this ultimately results in disease. The following subjects will be covered: introduction to general pathology and mechanism of diseases, cardiovascular system disorders, respiratory system disorders, gastrointestinal and hepatobiliary system disorders.

PHCL 326 = Clinical Skills for Pharmacists, 2(2+0).

This course deals with general rules that should be applied when first aid is required. The goal of first aid care includes prevention of further injury, restoration of circulation and respiration, control of bleeding, and stabilization of the patient.

PHCL 328 = Introduction to Drug and Poison Information, 2(0+2).

This course explores the fundamental aspects of drug information and poison management. It is designed to teach students the basic principles of drug information retrieval utilizing a variety of literature resources.

PHCL 415 = Pathophysiology-II, 2(2+0).

This course builds upon the material covered in Pathophysiology-I. The following topics will be covered: renal system disorders, fluid and electrolyte disorders, hematologic system disorders, endocrine and metabolic disorders, musculoskeletal system and connective tissue disorders.

PHCL 416 = Pharmacotherapy-I, 3(3+0).

The purpose of this course is to integrate the student's understanding of pathophysiology with concepts of drug action and therapy. State-of-the-art pharmacotherapy will be reviewed with pertinent pathophysiology and pharmacology. Emphasis will be placed on drug selection, dosing regimen design, and therapeutic drug monitoring to assess therapeutic efficacy and prevent adverse reactions. This course also gives an opportunity to students to review recent guidelines in the treatment of various disease states. This understanding will be enhanced through the use of case studies.

PHCL 420 = Pharmacy Management, 2(1+1).

The course prepares students for future pharmacy management positions in both hospital and community settings. The concept of management by objectives, as well as, other key management functions will be covered. In addition, students will learn how to use financial statements, budgeting techniques, inventory control, and purchasing skills to manage their pharmacies.

PHCL 429 = Pharmaceutical Care-I, 3(2+1).

This Course includes demonstrations and explanations for all services a pharmacist should perform in the concept of pharmaceutical care to the patients and that includes:

- Setting the basics and work procedures for each service
- Managing inventory of pharmaceutical products
- Outpatient pharmacy and mobile pharmacy care
- Inpatient pharmacy and its branches
- Committees in which the pharmacist can participate
- Patient counseling on medications and diseases through hospital and community pharmacies

PHCL 430 = Pharmacotherapy-II, 3(2+1).

The purpose of this course is to integrate the student's understanding of pathophysiology with concepts of drug action and therapy. State-of-the-art pharmacotherapy will be reviewed with pertinent pathophysiology and pharmacology. Emphasis will be placed on drug selection, dosing regimen design, and therapeutic drug monitoring to assess therapeutic efficacy and prevent adverse reactions. This course also gives an opportunity to students to review recent guidelines in the treatment of various disease states. This understanding will be enhanced through the use of case studies.

PHCL 437 = Pharmacy Regulations and Ethics, 2(2+0).

This Course describes and explains all the rules, regulations and legislations that controls and regulates pharmaceutical products trading and the rules to practice it in KSA. The course also emphasize on the nature of pharmacy practice , its relation to the community , the ways to preserve and improve pharmacy profession and its rules. This Course will cover the Ethical Aspects of Pharmacy Practice in the Kingdom and it includes:

A) the rules and regulations for herbal and pharmaceutical products :

1- Rules and regulations on pharmaceutical institutions , pharmaceutical products and herbal (herbs with medical use) products
2- Over the counter drugs (OTC)
3- Rules and regulations for health care professional practice
4- Rules and regulations for psycho-active and mental distorting drugs
5- Rules and regulations of the ministry of health on controlled substances
6- Updates on the practice of the pharmacy profession in the kingdom

B) Ethics of Pharmacy Profession

1- Saudi Ethical Guidelines for pharmacy profession practice
2- Saudi guide for Pharmaceutical products marketing
3- Updates on the rules and regulations about Ethics of pharmacy profession in the kingdom.

PHCL 438 = Pharmaceutical Marketing, 2(2+0).

This course introduces the student to marketing and how it has evolved within the pharmaceutical industry, the responsibilities of the marketing department, types of market research, ethics in marketing, and typical staffing of a marketing department. The student will also be exposed to the types of communication activities and materials used in pharmaceutical marketing, and their regulation by public and private health care organizations.

PHCL 439 = Applied Pharmacokinetics, 2(2+0).

This course deals with uses and clinical implementation of informations related to pharmacokinetics and its clinical aspects in some diseased states according to the nature of the medicine and disease nature and effects of that on pharmacokinetics and pharmacodynamics of the drugs during disease period. Also deals with medications known as narrow spectrum medications which are a type of drugs that

requires frequent monitoring and specific serum level examples are aminoglycosides , theophylline , digoxin, phenytoin , valproic acid , vancomycin ,carbamazepine and cyclosporine.

PHCL 463 = Pharmacotherapy-III, 4(3+1).

The purpose of this course is to integrate the student's understanding of pathophysiology with concepts of drug action and therapy. State-of-the-art pharmacotherapy will be reviewed with pertinent pathophysiology and pharmacology. Emphasis will be placed on drug selection, dosing regimen design, and therapeutic drug monitoring to assess therapeutic efficacy and prevent adverse reactions. This course also gives an opportunity to students to review recent guidelines in the treatment of various disease states. This understanding will be enhanced through study of various cases.

PHCL 464 = Pharmacometrics and Literature Evaluation, 3(2+1).

This course is designed to provide a framework for the understanding and application of the concepts and techniques of pharmacometrics and literature evaluation. The course introduces the student to the different study designs commonly encountered in clinical research. It is also intends to equip the students with fundamental understanding of how to choose and interpret biostatistical tests commonly applied in clinical literature, scientific research method and various parts of research reports.

- The critical evaluation of the components of a published clinical trial for appropriate study design, inclusion/exclusion criteria, randomization, and outcomes measure; and assessment of the subsequent results and conclusions of the study.
    - Assessment of the appropriateness of statistical analyses of data.
- Interpretation of descriptive statistics and the inferential statistical tests and procedures commonly used in the medical and pharmaceutical literature.
- Interpret descriptive and inferential statistics commonly encountered in clinical studies.

PHCL 465 = Pathophysiology-III, 3(3+0).

This course completes what has been studied in Pathophysiology 1 and pathophysiology 2 courses and it deals with the study of abnormality that occurs in the functions of various body organs and systems which results from development and progression of disease and its clinical expression. This course also study laboratory standards and how it changes with disease states. The course

will discuss the following topics: Psychiatric diseases, Neurological diseases, Infectious disease, Dermatological diseases, Reproductive system diseases, Ophthalmological diseases, Ear, nose and throat diseases (ENT).

PHCL 466 = Clinical Immunology, 2(2+0).

This course is intended to provide the student with clinical experience in immunology. Main emphasis will be on immune mechanisms against infections, disease prevention (Immunization), consequences of immune insufficiencies (AIDS), disorders developed by immunological mechanisms as well as the utilization of immunological mechanisms and technology in clinical laboratory.

These well be covered by the following subjects:

- Immunomanipulation: immunosuppressant and immunopotentiation; **a)** immunization, **b)** immunotherapy.
- Immune mediated soft tissue diseases,
- AIDS and viral hepatitis,
- Immunological techniques in clinical laboratory testing.

PHCL 467 = Pharmacoeconomics, 2(2+0).

This course provides basic understanding of the science of pharmacoeconomics. It describes the primary methods of pharmacoeconomic analysis and uses case studies to illustrate their applications in healthcare.

PHCL 468 = Pharmacoepidemiology, 2(2+0).

This course is designed to familiarize the student with principles of epidemiology as they apply to the impact of drugs on disease occurrence. The practical implications of research in this branch of pharmacy will be emphasized.

PHCL 469 = Pharmacotherapy-IV, 4(3+1).

The purpose of this course is to integrate the student's understanding of pathophysiology with concepts of drug action and therapy. State-of-the-art pharmacotherapy will be reviewed with pertinent pathophysiology and pharmacology. Emphasis will be placed on drug selection, dosing regimen design, and therapeutic drug monitoring to assess therapeutic efficacy and prevent adverse reactions. This course also gives an opportunity to students to review recent guidelines in the treatment of various disease states. This understanding will be enhanced through the use of case studies.

PHCL 470 = Pharmaceutical Care-II, 2(2+0).

The course is a continuation of the previous course (PHCL 429). Case studies will be used to reinforce the student's understanding of therapeutics. Students will be exposed to the use of information technology to assist in the evaluation of patient-specific medical information with the goal of assuring positive outcomes.

PHCL 480 = Clinical Nutrition, 2(2+0).

This course is intended to explore a wide variety of clinical problems related to parenteral and enteral nutrition. The course will emphasize the justifications, advantages, disadvantages, contraindications, and complications of nutritional therapy and how to monitor its efficacy and consequences.

This will be covered through the following subjects:

- Introduction and patient assessment,
- Daily fluid, electrolytes and nutritional requirements and their calculations,
- Fluid and electrolyte assessment and replacement,
- Total parenteral nutritional formulae in different disease states and patient conditions,
- "Intralipid" and special total parenteral nutrition formulae in different diseases,
- Parenteral incompatibilities,
- Enteral feeding: composition, supplementation techniques and special formulae,
- Enteral feeding: indications and contraindications,
- Drugs and nutritional techniques incompatibilities and interactions.

PHCL 481 = Evidence-Based Therapy, 2(2+0).

This course reinforces concepts of evidence-based medical (EBM) practice, and introduces students to the challenges of translating research into practice both at a patient level and at a program level. The course also focuses on how to identify and utilize the best evidence available when making decisions regarding patients. The topics covered in this course include:

- The concepts and a brief history of evidence-based medicine,
- An interactive searching skills workshop entitled "Finding the Evidence",
- Small group tutorials that will address the following areas:

- Critical appraisal of randomized controlled trials addressing issues of therapeutic interventions,
- The scientific basis for the clinical assessment (history and physical) of patients,
- Research into the prognosis associated with a given illness and factors associated with better or worse outcomes.

PHCL 482 = Pharmacy Seminar-II, 1(0+1).

The course is designed to direct student to deliver a seminar in one of the clinical problems encountered in clinical practice.

Required Clerkship Rotations:

PHCL 440 = Critical Care, 3(0+3).

The rotation system for students provides an opportunity to develop broad knowledge and personal skills necessary to meet the individual needs of the critically-ill patient. Students will be in direct involvement in aiding their patients, which will develop their ability in various areas: critical care pharmacology, fluid and electrolyte balance, cardiovascular hemodynamics and ventilatory support. The students will also be able to make therapeutic decisions such as drug therapy, appropriate dosing and monitoring. The student will participate as a member of the healthcare team, thereby instilling a multidisciplinary attitude.

PHCL 443 = Drug and Poison Information, 3(0+3).

This course provides students with an opportunity to provide drug information in a real life pharmacy setting. Receiving and responding to drug information requests, evaluating medications for formulary inclusion, taking part in a variety of medication use policy programs and training hospital staff on the safe and useful use of medications are some of the services included. Moreover, students will also be required to handle various IT requests within the healthcare system and comprehend how these systems affect the medication use process.

PHCL 444 = Internal Medicine-I, 3(0+3).

This course is a rotation that provides students with experience and training in managing internal medicine patients. This training allows students the opportunity to participate in the therapeutic decision making process by selecting appropriate drug therapy and monitoring that therapy. Patient counseling is also an integral part of the coursework.

PHCL 445 = Internal Medicine-II, 3(0+3).

This course is a rotation that provides students with experience and training in managing internal medicine patients. This training allows students the opportunity to participate in the therapeutic decision making process by selecting appropriate drug therapy and monitoring that therapy. Patient counseling is also an integral part of the coursework.

PHCL 446 = Ambulatory Care, 3(0+3).

In this rotation, students practice pharmacy in an ambulatory care setting. Students will work as full-time employees in a community hospital pharmacy providing patient counseling, pharmaceutical care and drug monitoring to hospital outpatients.

Elective Clerkship Rotations:

PHCL 447 = Internal Medicine-III, 3(0+3).

This rotation provides students with experience and training in managing internal medicine patients. This training allows students the opportunity to participate in the therapeutic decision making process by selecting appropriate drug therapy and monitoring that therapy. Patient counseling is also an integral part of the coursework.

PHCL 448 =Nutritional Support, 3(0+3).

This rotation focuses on the role of the pharmacist as an integral part of a multidisciplinary nutritional support team. The student will gain unique insight into adult and pediatric intravenous nutritional support. They will observe the entire range of pharmacy services that support this discipline including compounding and monitoring.

PHCL 449 = Internal Medicine-IV, 3(0+3).

This rotation provides students with experience and training in managing internal medicine patients. This training allows students the opportunity to participate in the therapeutic decision making process by selecting appropriate drug therapy and monitoring that therapy. Patient counseling is also an integral part of the coursework.

PHCL 450 = Geriatrics, 3(0+3).

This rotation offers students training in the management of the geriatric patient. Students will develop skills in dealing with the unique pharmaceutical care needs of this patient population. Students will participate in the therapeutic decision making process by selecting appropriate drug therapy, monitoring that therapy, and providing patient-specific medication counseling.

PHCL 457 = Infectious Diseases, 3(0+3).

This rotation offers students training in the management of infectious diseases and antimicrobial usage. Students will be working with the general infectious disease consult team and antimicrobial management program.

PHCL 458 = Pain Management, 3(0+3).

Providing pharmaceutical care and appropriate pain management to both inpatient and outpatient oncology patients and others are the main focus of the pain service rotation. It is a multidisciplinary consult team that screens and evaluates adult inpatients daily. Students will be able to take part in the panel case discussion. Students will also improve skills in designing specific pain management plans, as well as, gaining skills in assessing pain.

PHCL 459 = Pharmacoeconomics, 3(0+3).

This rotation is designed to provide the student with exposure to the application of pharmacoeconomic principles in a variety of health care settings. The student will develop an understanding of the contemporary health care system in both public and private sectors with a specific emphasis on using pharmacoeconomics in the drug approval process and drug utilization review.

PHCL 460 = Community Practice, 3(0+3).

In this rotation, students practice pharmacy in an ambulatory care setting. Students will work as full-time employees in a community hospital pharmacy providing patient counseling, pharmaceutical care and drug monitoring to hospital outpatients.

PHCL 483 = Organ Transplantation, 3(0+3).

This rotation provides students with an insight into the unique medical problems facing patients who have undergone organ transplantation. Students will be expected to recognize immunosuppressant pharmacotherapy as well as medical and surgical concerns that surround a transplant patient. Students will accompany multidisciplinary transplant teams on daily rounds, and there will be daily discussions with the preceptor regarding the patients.

PHCL 484 = Nephrology, 3(0+3).

This rotation provides students with experience in managing acute and chronic renal failure patients. The rotation's aim is for students to develop the self-reliance and ability to deliver appropriate pharmaceutical care in this area by allowing them to take part in therapeutic decision making process and monitoring therapy.

PHCL 485 = Neonatal Intensive Care, 3(0+3).

This rotation offers students training in the management of the neonatal intensive care unit patient. Students will develop skills in dealing with the unique pharmaceutical care needs of this patient population. Students will participate in

the therapeutic decision making process by selecting appropriate drug therapy, monitoring that therapy, and providing patient-specific medication counseling to parents or caregivers.

PHCL 486 = Therapeutic Drug Monitoring, 3(0+3).

This rotation exposes the student to the clinical applications of therapeutic drug monitoring. The student will apply therapeutic drug monitoring data to design appropriate dosing regimens, which will be monitored by the student. This will be done in a team, thereby, instilling a multidisciplinary attitude.

PHCL 487 = Pediatrics, 3(0+3).

This rotation offers students training in the management of the pediatric patient. Students will develop skills in dealing with the unique pharmaceutical care needs of this patient population. Students will participate in the therapeutic decision making process by selecting appropriate drug therapy, monitoring that therapy, and providing patient-specific medication counseling to parents or caregivers.

PHCL 488 = Hematology/Oncology, 3(0+3).

This rotation offers students training in the management of the hematology/oncology patients. Services provided by the hematology malignancy unit include induction, consolidation, or salvage chemotherapy, as well as, supportive care. Students will develop skills in dealing with the unique pharmaceutical care needs of this patient population. Moreover, students will become experienced in the various infectious diseases inflicting the immunocompromised patient.

PHCL 489 = Psychiatry, 3(0+3).

This rotation offers students training in the management of the psychiatric patient. Students will develop skills in dealing with the unique pharmaceutical care and adjunctive support needs of this patient population. Students will participate in the therapeutic decision making process by selecting appropriate drug therapy, monitoring that therapy, and providing patient-specific medication counseling to patients or caregivers.