Vision:

To be preeminent college locally and internationally for quality and leadership in education, research and community services.

Mission:

The College is committed to provide a comprehensive and progressive education that offers the society with creative and professional graduates who are dedicated to the improvement of direct patient care, innovation in research and public services.

I- Goals and Values to Achieve the Mission:

In striving to fulfill this mission, the college is dedicated and committed to:

A-Education:

- Deliver a comprehensive and dynamic curriculum that prepares the graduate to function as an active member in the health professional team.
- Improve direct patient care.
- Provide innovative, contemporary and high quality of educational experiences.
- Ensure quality of programs through continuous evaluation and improvement.
- Acquire in-depth knowledge of the basic and clinical sciences necessary for the success in pharmacy practice and professional training.
- Train the students professionally to acquire the experience to become competent clinical pharmacists of international standards.
- Transfer new advances in pharmaceutical technology and clinical science.

- Apply knowledge of drugs and drug therapy to solve problems and make decisions on behalf of their patients.
- Demonstrate a reasoning and analytic thinking approach to the proper and rational utilization of medications for the prevention and treatment of disease.
- Establish a system of continued education.

B-Research and Scholarship:

The college pledge is to carry out the mission based upon the highest national and international standards for the quality and success of its research programs in the pharmaceutical sciences and pharmacy practice and to:

- Establish channels for research collaboration with other related national and international institutions.
- Encourage, develop and support research resources, discovery, scholarly pursuits and publications.
- Deliver and promote postgraduate education and training for career and leadership development.
- Advance the scholarship for optimal research and support the scholarly maturation and mentoring of students and faculty.
- Apply principles and ethics of research methods and use results from projects and/or literature to propose changes and reevaluate the problems.

C- Community Service:

One of the faculty goals is to serve the needs of society and to have leadership outreach to the community through:

- Understand and develop the importance of volunteerism and its impact on the community.
- Provide education programs and activities for public awareness.
- Respond and integrate to the daily life needs of the community and provide services to enhance the quality of life for the people of Kingdom.
- Provide services to assist and advance professional organizations, drug companies, agencies, businesses and industries.
- Provide leadership to support the university and health sciences centers.
- Provide resources to assist the stakeholders of the college and community partners.
- Collaborate with health care providers and organizations in a service model that emphasizes the importance of the pharmacists as a key member of an interdisciplinary team.
- Educate pharmacists to promote health and wellness and minimize morbidity and mortality.

D- Core Values:

The college is committed to excellence through the following values:

Attitudes, Values and Ethics

1- Practice with professional attitudes and high ethical standards (compassion, honesty, fairness, wisdom, altruism, consistency and transparency).

2- Maintain a high level of professional competence and professionalism.

3- Create a climate that encourages mutual respect, patience, kindness, dignity, confidence, dependability, social responsibility and commitment.
4- Develop the habit of self audit
5- Recognize the patient professional limitations, rights and seek help willingly.
6- Appreciate the role of the clinical pharmacist as a member of the health team.
7- Implement the concept of quality management and excellence.
8- Show high degree of collaboration with the seniors, subordinates, the patients and their relatives.
9- Inculcate a spirit of respect for authority, citizenship, diversity, follow directives collegial community and pride for the Kingdom.

Skills:

The graduate should acquire the skills and abilities necessary for the provision of pharmacy practice in any setting to:

- Practice and actively involved in community, hospitals, academic, managed care and industrial pharmaceutical settings.
- Communicate effectively with other health professionals and patients to establish a trusting and open relationship in patient counseling.
- Understand group dynamic and collaboration for synergy.
- Develop critical thinking, problem solving and decision-making skills
- Engage in lifelong learning.
- Interact with patients and establish a trusting and open relationship in patient counseling.
- Motivate, encourage, create incentive, and support the patient.
- Nurture cultural sensitivity.

II- Intended Learning Outcomes (ILOs):

The program provides opportunities for students to develop and demonstrate fundamental knowledge and understanding, supported with professional skills appropriate for deserving Pharm.D. degree.

A- Knowledge and Understanding:

Upon completion of the program, students will be able to demonstrate the essential knowledge and understanding of:

1- Basic knowledge about biology, physics, general chemistry, mathematics, information technology, English language, scientific thinking, learning and study skills.

2- The concept and principle of the formulation of different dosage forms, drug delivery systems and theories of physics needed for understanding the biopharmaceutics and clinical pharmacokinetics.

3- Concepts and principles of both organic chemistry and medicinal chemistry including structures, reactions, molecular modeling and design of new chemical entities through computer-aided drug design.

4- Managing medicines: dispensing, pharmacotherapeutics, patient information and reporting of adverse effects of drugs.

5- Pharmacotherapy of individual patients: patient drug therapy outcomes, disease diagnosis, proper choice of therapy, and therapeutic drug monitoring in collaboration with other health care professionals.

6- Pharmacological basis of therapeutics: pharmacokinetics, pharmacodynamics, mechanism of action, uses and adverse effects of medicaments including their interactions and clinical significance.

7- Interactions of drugs and their significance in treatment and the different mechanisms of possible drug interactions.
8-The concepts related to the industrial pharmacy starting from the raw materials and ending with the finished product in the market.
9- Good manufacturing practice (GMP) of pharmaceuticals and its quality assurance of pharmaceutical products.
10- Analytical methods: principles, design, development, validation and application and good laboratory practice.
11- Principles of quality control of drugs including quantitative chromatographic analysis, validation and applications of the proposed schemes, and advanced quality control applying GC and HPLC.
12- The rationale use of drugs, drug and substance misuse and abuse from both a pharmacological and toxicological perspectives.
13- Basic and clinical toxicology and the toxicity of various drugs, gases, heavy metals and poisons of plant and animal origin.
14- Normal and abnormal body function: physiology, pathophysiology clinical biochemistry, nutrition, microbiology and immunology.
15-Microbial contamination and its control, sterilization processes and aseptic procedures.
16-The concepts of molecular biology, pharmacogenomics and pharmaceutical biotechnology techniques for production of biotechnological and recombinant products.
17- The basic knowledge, application of pharmacoepidemiology and challenges for the future of pharmaco- and toxicological epidemiology.
18- The principles, techniques and tools of patient assessment and first aid measures.

19-Identification of medicinal plants, their biologically active constituents, methods of isolation and purification of their active constituents.
20- Concepts of complementary and alternative medicine.
21- The concept of drug and poison information centers and evidence-based medicine, drug monographs and drug toxicity.
22-The medication safety: causes of medication errors/systems approaches, human factors in errors (e.g. iatrogenic diseases), strategies for reducing errors and the pharmacy leadership in medication and patient safety.
23- The role of the pharmacist in health care, health screening and promotion, including diagnostic testing and drug selection.
24- Pharmacists' contribution in future vision of pharmacy practice and contemporary pharmacy practice.
25- The common medical terms, proper spelling, pronunciation and meaning of medical terms pertaining to different body parts and diseased conditions.
26- Principles of pharmacy management, financial and human resources, drug promotion, sales and marketing, business administration, accounting, and pharmacoeconomics.
27- The law relating to pharmacy and medicines, regulatory affairs and legislation especially in the Saudi practice.
28- The social and behavioral sciences relevant to the pharmacy practice.
29- Principles of professional communication with patients and other members of the healthcare team, the patients and their relatives.
30- The basic knowledge of prevention and control of disease.

B-Cognitive Skills:

1-Analyze and interpret information needed in pharmacy practice, making logical deductions and giving clear advice.

2-Apply all the basic pharmaceutical and biomedical knowledge to provide proper pharmaceutical care for the patients and pharmacy practice services.

3- Apply in practice settings the knowledge and understanding required to meet the needs of patients and other health care professionals.

4- Evaluate pharmacotherapy of individual patients.

5- Evaluate and analyze the different methods of infection control and select of the most appropriate method in each case.

6-Apply the knowledge about different microbial and parasitic diseases for prophylaxis and promotion of health.

7- Integrate and utilize the knowledge of physiology, pharmacology, pharmacovigilance and toxicology in the proper selection and use of drug in various disease conditions.

8- Integrate and apply in practice settings the knowledge of pharmaceutical sciences and pharmacy related subjects.

9- Explain the formulation and dispensing of different dosage forms for a particular drug.

10- Interpret prescriptions and other orders for medicines.

11- Judge and adjust dosage and dose regimen of drugs.

12- Solve problems in different disciplines of pharmacy after their recognition, analysis and finding the appropriate strategies for their solution.

13-Apply qualitative and quantitative analytical as well as biological methods for quality control and assay of raw materials and pharmaceuticals.

14-Evaluate and select the appropriate methods of isolation, synthesis, purification, identification, and standardization of active substances from different origins.

15- Critically evaluate and interpret pharmaceutical information and data.
16- Distinguish minor illnesses from those which require prompt medical intervention.
17- Interpret patient and clinical data, including patient records held within practice setting.
18- Analyze pharmaceutical problems and plan strategies for their solution.
19- Evaluate the common pharmacokinetic parameters which can affect the drug plasma concentration time profile.
20- Appraise all possible therapeutic options for the treatment of patients.
21- Predict all possible drug interactions.
22- Predict the side effects of drug classes and toxic agents.
23- Explain the difference between the different available sources of drug information.
24-Apply the principles of clinical pharmacy in the practice of pharmacy.
25-Apply the principles of bio-informatics and computer- aided tools in drug design.
26-Explain the principles of pharmacoeconomics in promoting cost effective pharmacotherapy.
27- Predict the meaning of common medical terms.
28- Promote health improvement, wellness, and disease prevention in cooperation with patients.
29- Explain the concepts of drug misuse and abuse.

C- Interpersonal Skills and Responsibility:

1- Carry out duties in accordance with legal, ethical, social, economic, and professional guidelines.

2- Demonstrate critical thinking, problem-solving and decision making abilities.

3- Cultivate the habit of continuous self learning that will enable him to meet the challenges of future development in clinical pharmacy.

4- Demonstrate accountability and self-assessment for actions and decisions.

5- Act and communicate in a self-assured and confident manner.

6- Recognize his professional limitations and respect patient rights.

7- Demonstrate active listening skills when performing professional functions.

8- Develop financial, sales and market management skills.

9- Demonstrate assertiveness in making recommendations.

10- Work independently or as a part of team in different pharmaceutical fields.

11- Demonstrate managerial skills and awareness.

12- Demonstrate creativity and time management abilities.

13- Demonstrate professionalism in personal conduct and appearance.

14- Work constructively in a group, cooperating with their leaders and seniors.

15- Show professional responsibility and respect the compliance to work through systems.

16- Demonstrate leadership skills that will enable them to mentor and supervise pharmacy staff.

D- Communication, Information Technology and Numerical Skills:

1- Communicate in a facilitative, effective, efficient, and educational manner with patients and their families.

2- Communicate clearly and succinctly to colleagues and other members of the health care team.

3- Interact and/or communicate orally and in writing with other health care professionals in their own specialized language and also express complex issues in terms that lay people can understand.

4- Devise and implement strategies to improve communications skills.

5- Apply biological statistics in different fields of pharmacy.

6- Use numeracy and computation skills such as (natural logarithms, error analysis, order-of-magnitude estimations, correct use of units and modes of data presentation and statistical analysis).

7- Use the language of medicine in communication with other health team members.

8- Perform online computer search to develop information technology skills and knowing how to retrieve information from a variety of sources.

9- Retrieve information from a variety of sources, including libraries, databases and internet.

10- Demonstrate expertise in informatics.

11- Demonstrate effective medication history interviewing skills.

12- Use proper counseling techniques to communicate with the patient on medication use, health and wellness.

13- Maintain a suitable image in manner, dress, speech and relationships that is consistent with the pharmacy profession.

14- Work in a team during laboratory demonstration, clinical cases study and discussion sessions.

E- Psychomotor Skills:

1- Provide patient care in cooperation with the health care team based upon sound therapeutic principles and evidence-based data.

2- Manage and use resources of the health care system, in cooperation with patients, prescribers, other health care providers.

3- Perform in a level meet and consistent the international standards.

5- Implement the concept of quality management in pharmacy practice.

6- Handle and dispose chemical and pharmaceutical materials safely and their correct use in drug manufacture.

7- Handle experimental animals properly in laboratory settings to apply such skills in drug research, approval and development.

8- Implement different methods of analyzing raw materials, inorganic substances and medicinal agents.

9- Monitor, safe handling and diagnosis of microbial and parasitic infections microscopically, biochemically and serologically.

10- Detect, isolate, purify, and predict the method of synthesis of any chemical entity belonging to certain drug class.

11- Detect and predict the biological activity of any compound through computer-aided drug design.

12- Make appropriate responses and selection of medicine to treat presented symptoms.

13- Implement/Perform standard industrial and/or pharmaceutical instrumentation and laboratory procedures and applying such skill in quality control of pharmaceuticals.

14-Analyze herbal drugs for the purpose of using such skill in determining adulteration of herbal drugs.

15- Isolate and analyze their active constituents.

16- Apply validation aseptic effectively.

17- Analyze different drug classes.

18- Design the dosing regimen for patients based on the conditions of each individual patient.

19- Prepare a monitoring plan for the therapeutic and adverse effects of drugs for

each individual patient.

20- Advise the society about the rationale use of drugs, drug misuse and abuse, food regimen, side effects of the drugs and drug interaction.

21-Recommend the society about the rationale use of drugs, drug misuse and drug abuse and create these cultural educations to the surroundings.

22- Prescribe suitable and proper OTC drug s for patient, taking in consideration the history of patient.

23- Use clinical data, patient assessment, biostatistics and appropriate medical literatures to optimize therapeutic drug regimens.

24- Assess, solve and prevent drug related problems.

Admission Requirements:

1. Getting a high school diploma (scientific section) or equivalence from inside or outside the kingdom.
2. Getting a minimum score of 90% in the high school diploma.
3.. Passing the placement examination, which will be organized by the National Center for Measurement and Evaluation.
4. Passing the learning ability evaluation test for medical colleges.
5. Passing professional fitness test.
6. Preference for admission will be given for graduates of the same year.
7. Should fulfill any additional requirements set by the University Council at the admission time.

Departments:

To fulfill the college objectives, there will be three departments that represent the three major disciplines in the curriculum. These departments are:

1. Pharmaceutics.
2. Clinical Pharmacy.
3. Pharmacognosy and Medicinal Herbs.
4. Pharmaceutical Chemistry.

THE CURRICULUM

The Doctor of Pharmacy curriculum is six years; a foundation year as general education university requirements and five professional years of full-time study and the graduate finally will receive a Doctor of Pharmacy (Pharm. D.) degree.

The curricular core of the program contains biomedical, pharmaceutical, clinical and social/behavioral/administrative sciences.

The program contains different experimental educational trainings. An introductory pharmacy practice experiences (internship) in community pharmacy which is incorporated during the summer of the third year and another intermediate pharmacy practice experiences in institutional pharmacy during the summer of the fourth year. Through these internships the students will gain appropriate practice experiences to strengthen their patient care skills and responsibilities and prepare them for the final stages of the curriculum.

The program is also capped by another intensive advanced pharmacy practice experiences (APPEs) 8-month training program (clerkships) started from the summer of fifth year and the total sixth year which is completely devoted for rotations. These are offered in hospitals, outpatient facilities and community clinics. The clerkships involve a variety of experiences, interviewing and counseling patients, developing and utilizing specialized professional skills.

Varieties of electives are offered throughout the curriculum to explore and develop the students' personal interests and the varied dimensions of pharmacy practice. It also helps the students to expand their understanding for professional opportunities and select their pathways in pharmacy practices and to fulfill the objectives of the college.

College Graduation Requirements:

Student should successfully complete the following to be graduated:

Serial	Credit units	Percentage	Item
1	24	11.9	University requirements.
2	143	70.8	College requirements.
3	35	17.3	Clinical training as clerkship year.
4	202	100%	Total units required for graduation.

The University requirements:

Course Title	Units
First Level	
English Language-1	3
Information Technology Skills -1	2
Scientific Thinking Skills	3
Learning and Study Skills	2
The Holy Koran (Recitation Correction)	2
Total	**12**
Second Level	
English Language-2	3
Islamic Education (The Islamic Manners)	2
Islamic Education (The Islamic Civilization)	2
Essay and Research Writing	2
Information Technology Skills -2	2
Health Education	1
Total	**12**
24	

The Numbering System:

The numbering system is based on the university policy, each course identified by eight digits:

• The first and second digits: Specify the college.

• The third and fourth digits: Specify the department.

• The fifth digit: Specifies the program**.**

• The sixth digit: Specifies the academic year**.**

• The seventh digit: Specifies the semester.

• The eighth digit: Specifies the course.

Expression of Unites to Contact Hours:

Lectures: One unit = One theoretical contact hour /week.

Practical: One unit = 2-3 Contact hours in laboratory /week

Clerkship: One unit = Three contact hours in training rotations /week

According to the university regulations the course of study in this college follows the level system.

The following tables show the subjects that will be studied in the various levels and the prerequisites for each, the contact hours and the training hours for clerkships.

Pre-Pharmacy

First Level

Course No.	Course Title	Units				Prereq.
		Lec.	Pr.	Tot.	Cont. Hrs	
11010020	English Language-1	3	-	3	20	-
11020101	Information Technology Skills -1	2	-	2	4	-
11020103	Scientific Thinking Skills	3	-	3	3	-
11020105	Learning and Study Skills	2	-	2	2	-
11020107	The Holy Koran (Recitation Correction)	2		2	2	
				12	**31**	-

Second Level

Course No.	Course Title	Units				Prereq.
		Lec.	Pr.	Tot.	Cont. Hrs	
11010221	English Language-2	3	-	3	24	-
11010101	Islamic Education (The Islamic Manners)	2	-	2	2	-
11010111	Islamic Education (The Islamic Civilization)	2	-	2	2	-
11010112	Essay and Research Writing	2	-	2	2	-
11020202	Information Technology Skills -2	2	-	2	4	-
11020204	Health Education	1	-	1	1	
				12	**35**	

Second Year

Third Level

Course No.	Course Title	Units				Prereq.
		Lec.	Pr.	Tot.	Cont. Hrs	
20040211	Pharmaceutical Organic Chemistry	5	1	6	8	-
20040212	Biochemistry-1	3	-	3	3	-
20020211	Anatomy and Histology	3	1	4	6	-
20020212	Physiology-1	2	1	3	5	-
20040213	Medical Terminology-1	1	-	1	1	-
20020213	Pharmacy Orientation	1	-	1	1	-
				18	**24**	

Fourth Level

Course No.	Course Title	Units				Prereq.
		Lec.	Pr.	Tot.	Cont. Hrs	
20010221	Pharmaceutics-1	2	1	3	5	-
20030221	Pharmacognosy	2	1	3	5	-
20040221	Biochemistry-2	2	1	3	5	20040212
20020221	Physiology-2	3	-	3	3	20020212, 20020211
20040222	Pharmaceutical Analytical Chemistry	2	1	3	5	-
20010222	Pharmaceutical Mathematics	2	-	2	2	-
20040223	Medical Terminology-2	1	-	1	1	20040213
				18	**26**	

Third Year

Fifth Level

Course No.	Course Title	Units				Prereq.
		Lec.	Pr.	Tot.	Cont. Hrs	
20020311	Pathophysiology-1	3	1	4	6	20020211, 20020221
20040311	Pharmacology-1	3	1	4	6	20020221, 20040221
20040312	Medicinal Chemistry-1	3	-	3	3	20040211
20030311	Immunology	2	-	2	2	20020211, 20020221
20010311	Physical Pharmacy	2	-	2	2	20010222
20040313	Biostatistics	2	-	2	2	20010222
20010312	Pharmacy Law and Ethics	1	-	1	2	-
				18	**23**	

Sixth Level

Course No.	Course Title	Units				Prereq.
		Lec.	Pr.	Tot.	Cont. Hrs	
20030321	Microbiology	1	1	2	4	-
20040321	Medicinal Chemistry-2	2	1	3	5	20040312
20010321	Biopharmaceutics and Pharmacokinetics	3	-	3	3	20010311
20020321	Pathophysiology-2	3	-	3	3	20020311
20040322	Pharmacology-2	3	1	4	6	20040311
20020322	Professional Communication Skills	1	-	1	1	-
20040323	Clinical Biochemistry and Nutrition	2	-	2	2	20040221
				18	**24**	

Introductory Pharmacy Practice Experience (internship-1): Students should be committed to their assignments for a minimum of 200 hours training (in a community pharmacy) during the summer.

Fourth Year

Seventh Level

Course No.	Course Title	Units				Prereq.
		Lec.	Pr.	Tot.	Cont. Hrs	
20040411	Pharmacology-3	3	-	3	3	20040322
20030411	Clinical Microbiology	2	1	3	5	20030321
20040412	Medicinal Chemistry-3	3	-	3	5	20040321
20020411	Pharmacotherapeutics-1	5	1	6	8	20040322
20030412	Natural Products Chemistry	3	-	3	3	20030221, 20040211
				18	**22**	

Eighth Level

Course No.	Course Title	Units				Prereq.
		Lec.	Pr.	Tot.	Cont. Hrs	
20020421	Pharmacogenomics and Pharmacogenetics	2	-	2	2	20040411, 20040323
20020422	Medication Safety	2	-	2	2	20040411
20010421	Pharmaceutics-2	2	1	3	5	20010221
20030421	Molecular Biology	2	-	2	2	20030321, 20040221
20020423	Pharmacotherapeutics-2	5	1	6	8	20020411
20030422	Complementary and Alternative Medicine	2	-	2	2	20030412
20020424	Research Methodology	1	-	1	1	20004313
				18	**22**	
Intermediate Pharmacy Practice Experience (internship-2): Students should be committed to their assignments for a minimum of 200 hours training (in an institutional pharmacy) during the summer.						

Fifth Year

Ninth Level

Course No.	Course Title	Units				Prereq.
		Lec.	Pr.	Tot.	Cont. Hrs	
20020511	Pharmacotherapeutics-3	5	1	6	8	20020423
20010511	Pharmaceutics-3	3	-	3	3	20010421
20020512	Clinical Pharmacokinetics	2	-	2	2	20010321
20020513	Patient Assessment	-	1	1	3	20040411, 20020423
20020514	First Aid	-	1	1	3	20040411
20030511	Pharmaceutical Biotechnology	2	-	2	2	20030321
20020515	Drug Information	2	-	2	2	20020423, 20040411
				17	**23**	

Tenth Level

Course No.	Course Title	Units				Prereq.
		Lec.	Pr.	Tot.	Cont. Hrs	
20020521	Pharmacotherapeutics-4	5	1	6	8	20020511
20020522	Pharm. D. Seminar	-	1	1	3	20020511
20020523	Pharmacy Management	2	-	2	2	-
20040521	Toxicology	2	-	2	2	20040411
20020524	Pharmacoepidemology and Pharmacoeconomics	3	-	3	3	20020511
20020525	Social and Behavioral Sciences	1	-	1	1	-
20010521	*Industrial Pharmacy	3	-	3	3	20010511
20020526	* Pharmacy Practice	3	-	3	3	20020511
				18	**22**	

*** = Elective**

Electives: Three hours of elective course are required in the Pharm.D. curriculum.

Summer Semester

Course No.	Course Title	Units				Prereq.
		Lec.	Pr.	Tot.	Cont. Hrs	
20020531	Clerkship-1	-	5	5	15	All the previous courses and internships
				5	**15**	

1 Unit clerkship-1 = 3 contact training hours.

Sixth Year
Eleventh Level

Course No.	Course Title	Units				Prereq.
		Lec.	Pr.	Tot	Cont. Hrs	
20020611	Clerkship-2	-	15	15	45	20020531
				15	**45**	

1 Unit clerkship-1 = 3 contact training hours.

Twelfth Level

Course No.	Course Title	Units				Prereq.
		Lec.	Pr.	Tot.	Cont. Hrs	
20020621	Clerkship-3	-	15	15	45	20020611
				15	**45**	

1 Unit clerkship-2 = 3 contact training hours.

Courses Offered by the Departments

(01)- Department of Pharmaceutics

Serial	Code No.	Subject	Units	Contact Hours
1	20010222	Pharmaceutical Mathematics	(2 + 0)	2
2	20010221	Pharmaceutics-1	(2 + 1)	5
3	20010311	Physical Pharmacy	(2 + 0)	2
4	20010321	Biopharmaceutics and Pharmacokinetics	(3 + 0)	3
5	20010421	Pharmaceutics-2	(2 + 1)	5
6	20010511	Pharmaceutics-3	(3 + 0)	3
7	20010521	Industrial Pharmacy (Elective)	(3 + 0)	3
		Total Credit Units	**19 (17 +2)**	**23**

(02)- Department of Clinical Pharmacy

Serial	Code no.	Subject	Units	Contact Hours
1	20020211	Anatomy and Histology	(3 + 1)	6
2	20020212	Physiology-1	(2 + 1)	5
3	20020213	Pharmacy Orientation	(1 + 0)	1
4	20020221	Physiology-2	(3+ 0)	3
5	20020311	Pathophysiology-1	(3 + 1)	6
6	20020312	Pharmacy Law and Ethics	(1+ 0)	1

7	20020321	Pathophysiology-2	(3 + 0)	3
8	20020322	Professional Communication Skills	(1 + 0)	1
9	20020411	Pharmacotherapeutics-1	(5 + 1)	8
10	20020424	Research Methodology	(1 + 0)	1
11	20020421	Pharmacogenomics and Pharmacogenetics	(2 + 0)	1
12	20020422	Medication Safety	(2 + 0)	1
13	20020423	Pharmacotherapeutics-2	(5+ 1)	8
14	20020511	Pharmacotherapeutics-3	(5 + 1)	8
15	20020512	Clinical Pharmacokinetics	(2 + 0)	2
16	20020513	Patient Assessment	(0 + 1)	3
17	20020514	First Aid	(0 + 1)	3
18	20020515	Drug Information	(2 + 0)	2
19	20020521	Pharmacotherapeutics-4	(5 + 1)	8
20	20020522	Pharm. D. Seminar	(0 + 1)	3
21	20020523	Pharmacy Management	(2 + 0)	2
22	20020524	Pharmacoepidemiology and Pharmacoeconomics	(3 + 0)	3
23	20020525	Social and Behavioral Sciences	(1+ 0)	1
24	20020526	Pharmacy Practice (Elective)	(3 + 0)	3
Total Credit Units			**65 (55+10)**	**84**
26	20020531	Clerkship-1	(0 + 5)	15
27	20020611	Clerkship-2	(0 + 15)	45
28	20020612	Clerkship-3	(0 + 15)	45
Total Clerkship Units			**35 (0+35)**	**105**

(03)- Department of Pharmacognosy and Medicinal Herbs.

Serial	Code No.	Subject	Units	Contact Hours
1	20030221	Pharmacognosy	(2 + 1)	5
2	20030311	Immunology	(2 + 0)	2
3	20030321	Microbiology	(1 + 1)	4
4	20030411	Clinical Microbiology	(2 + 1)	5
5	20030412	Natural Products Chemistry	(3 + 0)	3
6	20030421	Molecular Biology	(2 + 0)	2
7	20030422	Complementary and Alternative Medicine	(2 + 0)	2
8	20030511	Pharmaceutical Biotechnology	(2 + 0)	2
		Total Credit Units	**19 (13+6)**	**25**

(04)- Department of Pharmaceutical Chemistry.

Serial	Code No.	Subject	Units	Contact Hours

1	20040211	Pharmaceutical Organic Chemistry	(5 + 1)	8
2	20040212	Biochemistry-1	(3 + 0)	3
3	20040213	Medical Terminology-1	(1 + 0)	1
4	20040221	Biochemistry-2	(2 + 1)	5
5	20040222	Pharmaceutical Analytical Chemistry	(2 + 1)	5
6	20040223	Medical Terminology-2	(1 + 0)	1
7	20040311	Pharmacology-1	(3 + 1)	6
8	20040312	Medicinal Chemistry-1	(3 + 0)	3
9	20040313	Biostatistics	(1 + 0)	1
10	20040321	Medicinal Chemistry-2	(2 + 1)	5
11	20040322	Pharmacology-2	(3 + 1)	6
12	20040323	Clinical Biochemistry and Nutrition	(2 + 0)	2
13	20040411	Pharmacology-3	(3 + 0)	3
14	20040412	Medicinal Chemistry-3	(3 + 0)	3
15	20040521	Toxicology	(2 + 0)	2
		Total Credit Units	**42(36 +6)**	**54**

Pharmaceutical Organic Chemistry

Course Identification and General Information:

<table>
<tr><td colspan="2">Title: Pharmaceutical Organic Chemistry.</td></tr>
<tr><td>Course number: 20040211.</td><td>Year: Second.</td></tr>
<tr><td>Credit Units: 5 + 1 Units (8 contact hours) per week.</td><td rowspan="2">Level: Third.</td></tr>
<tr><td>Pre-requisites: None.</td></tr>
<tr><td colspan="2">Co-requisites: None.</td></tr>
<tr><td colspan="2">Aims: To provide general knowledge on the chemistry of organic compounds, heterocyclic compounds, aromatic compounds, carbohydrates and spectrometric methods of identification of organic compounds.</td></tr>
<tr><td colspan="2">Description: This course is a comprehensive study in all aspects of organic compounds, heterocyclic compounds, aromatic compounds, carbohydrates and spectrometric methods of identification of organic compounds. Also the nature and mechanisms of the chemical reactions, the physical and chemical properties of the different functional groups, stereochemistry and the chemistry of heterocyclic compounds.</td></tr>
<tr><td colspan="2">Learning Outcomes:
Upon successful completion of the course, students should be able to:
a- Knowledge and Understanding:
- Gain knowledge about classification of organic compounds, aliphatic and heterocyclic compounds.
- Identify the rules the nomenclature of heterocyclic compounds, aromatic compounds and carbohydrates
- Define the different chemical bonds, its function in the different chemical components in the human body.
- Recognize the mechanisms of different reactions.
- Mention the chemical properties of the studied classes of compounds.</td></tr>
</table>

- Understand the relationship between structure, physical and chemical properties and prediction for such properties.
- Define the basis of UV, IR, NMR and MS.

b- Cognitive Skills:

- Appraise the relative stabilities of organic compounds and the course of chemical reactions.
- Predict mechanisms for unknown reactions.
- Apply the principles of stereochemistry and molecular models to explain the relative stabilities of organic compounds and the course of chemical reactions.
- Evaluate the method for synthesis of certain aromatic compounds.
- Convert one compound to the other.
- Plan in self-learning activities and in mentorship activities.
- Predict and establish the chemical structure of organic compounds.

c. Interpersonal Skills and Responsibility

- Work constructively in a group, cooperating with their leaders and seniors.
- Show professional responsibility and respect the compliance to work through systems.
- Demonstrate critical thinking, problem- solving and decision-making abilities.
- Demonstrate active listening skills.

d. Communication, Information Technology and Numerical Skills:

- Communicate in a facilitative, effective, efficient, and educational manner with patients, their families and their relatives.
- Communicate clearly and succinctly to colleagues and other members of the health care team.
- Work in a team during laboratory demonstration.

- Use modes of modern IT communication.
- Retrieve information.

e. Psychomotor Skills:

- Handle chemicals and reagents safely.
- Conduct standard of pharmaceutical laboratory procedures and instrumentation.
- Design method of synthesis of new compounds.
- Detect and identify simple unknown organic groups and compounds.
- Separate and purify simple organic compounds.

-Solve and identify spectrometric problems for identification of organic compounds.

- Perform in a level meet and consistent with the international standards.
- Implement the concept of quality management in clinical pharmacy daily study.

Contents:

Lectures: General introduction, nomenclature, bonding, structural isomerism, and isomerism, aliphatic and aromatic hydrocarbons; alkanes, alkenes, alkynes, cycloalkanes, stereochemistry and its biological applications, alkyl halides, free-radical reactions, alcohols, ethers, epoxides, sulfides and their pharmaceutical applications. Aromaticity and benzene, substituted benzene, aldehydes and ketones, carboxylic acids and derivatives (amides, anhydrides, esters), heterocyclic compounds, amino acids, carbohydrates, and lipids chemistry. Spectrometric methods of identification of organic compounds (nuclear magnetic resonance, mass spectrometry and infra red spectrophotometry).

Practical: Melting point determination, distillation, crystallization identification and purification of organic compounds from the above-mentioned groups.

Identification of different organic compounds from the above mentioned groups and the application of spectrometric methods of identification of organic

compounds.
Minimum Course Requirements: 75 (5 x 15) Unit lectures and 45 practical hours (3 x 15) per level.
Evaluation Methods: - Quizzes 20% - Midterm examination 20% - Practical examinations 20% - Final examination (written) 40%
Principal Text (Latest Edition): 1-Organic Chemistry, Ralph J. Fessenden, Joan S. Fessenden, and Patti Feist, Brooks/Cole publishing Co. Monterey, California.
Supplementary Texts (Latest Edition): 1- Organic Chemistry, Boyd Morrison, Prentice-Hall international editions. 2- Spectrometric Identification of Organic Compounds, Robert M. Silverstein, Francis X. Webster, and David Kiemle, Wiley.

Biochemistry-1

Course Identification and General Information:

Title: Biochemistry-1.	
Course Number: 20040212.	**Year:** Second.
Credit Units: 3 + 0 Units (3 contact hours) per week.	**Level**: Third.
Pre-requisite: None.	
Co-requisite: 20040211**.**	

Aims: It is an introductory course 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.

Description: An introductory course covers fundamental theoretical concepts of biochemistry and applications of the biochemistry in the life. It covers the carbohydrates, amino acids, proteins, nucleic acids, lipids, steroids and enzymes. Structural–functional relationships of biomolecules will be studied.

Learning Outcomes:

Upon successful completion of this course, the students should be able to:

a- Knowledge and Understanding:

- Recognize the general structures and functions of biological molecules.
- Demonstrate the structural differences between DNA and RNA.
- Outline the functions of enzymes functions.
- Describe enzyme kinetics and inhibition.
- List the methods of amino acid sequence of protein.
- Describe the nature of genetic materials and the universal genetic code.
- Identify and describe the molecular processes known as replication, transcription and translation.

b- Cognitive Skills:

- Distinguish interrelationships of biochemistry and medicine.
- Appraise the role of enzymes in life.
- Interpret the chemical structure of DNA.
- Plan and continuously share in self-learning activities and in mentorship activities.

c. Interpersonal Skills and Responsibility:

- Work constructively in a group, cooperating with their leaders and seniors.
- Show professional responsibility and respect the compliance to work through systems.
- Demonstrate critical thinking, problem- solving and decision-making abilities.

d. Communication, Information Technology and Numerical Skills:

- Communicate in a facilitative, effective, efficient, and educational manner with patients and their families.
- Communicate clearly and succinctly to colleagues and other members of the health care team.
- Use modes of modern IT communication.
- Retrieve and evaluate information from different sources to improve professional competencies.

e. Psychomotor Skills:

- Perform in a level meet and consistent with the international standards.
- Implement the concept of quality management in Clinical Pharmacy.
- Assess the concentration of some metabolic and biological compounds present in urine and in blood samples.
- Write reports and present seminars dealing with information and fundamentals of Biochemistry.

Contents: The 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.
Evaluation Methods: - Quizzes 30% - Midterm examination 30% - Final examination (written) 40%
Minimum Course Requirements: 45 (3 x 15) Unit lectures (45 contact hours) per level.
Teaching and Learning Methods: 1-Lectures. 2-Small group discussions.
Principal Text (Latest Edition): 1- Harper's Illustrated Biochemistry, Robert Murray, Victor Rodwell , David Bender , Kathleen M. Botham , P. Anthony Weil and Peter J. Kennelly, McGraw-Hill Medical Publisher.
Supplementary Texts (Latest Edition): 1- Lippincott's Illustrated Reviews: Biochemistry, North American Edition (Lippincott's Illustrated Reviews Series) by Pamela C. Champe, Richard A Harvey, and Denise R. Ferrier, Lippincott Williams & Wilkins Publisher. 2- Biochemistry, Reginald H. Garrett and Charles M. Grisham, Brooks Cole Publisher.

Anatomy and Histology

Course Identification and General Information:

Title: Anatomy and Histology.	
Course number: 20020211.	**Year:** Second.
Credit Units: 3 + 1 Units (6 contact hours) per week.	**Level**: Third.
Pre-requisite: None.	
Co-requisite: 20020212.	
Aims: To develop anatomical concepts and acquire in-depth knowledge of the gross anatomy of the human body, different types of tissues using histological techniques.	
Description: This course introduces the student to the basic knowledge regarding the structural anatomy and histology of the various body systems and organs. The relation between the various systems and organs will be outlined and discussed. Students will also be introduced to basics of cytology, general histology and organohistology of the human body systems.	

Learning Outcomes:

Upon successful completion of the course, the student should be able to:

a-Knowledge and Understanding:

- Recognize fundamentals of anatomy and histology.
- Illustrate the structure of the human body and its component organs and cells.
- Mention the bases of anatomy of different body systems including respiratory system, cardiovascular system, lymphatic system, gastrointestinal system, nervous system, musculoskeletal system and urogenital system.
- Describe the differential microscopic appearance of cells, tissues and organs.
- Identify the structural -functional of the integumentary system.
- Define the principles of normal and abnormal bodily functions in healthy and diseased**.**

- Mention the causes, development, and consequences of diseases.

b- Cognitive Skills:

- Make complete differentiation of the anatomy of body organs studied.
- Properly use different anatomical terminology.
- Make a complete differential description of the different tissues.

c. Interpersonal Skills and Responsibility:

- Work constructively in a group, cooperating with their leaders and seniors.
- Respect the compliance to work through systems.
- Show professional responsibility and respect the compliance to work through systems.
- Demonstrate critical thinking, problem- solving and decision-making abilities.

d. Communication, Information Technology and Numerical Skills:

- Communicate in a facilitative, effective, efficient, and educational manner with patients and their families.
- Communicate clearly and succinctly to colleagues and other members of the health care team.
- Work in a team during laboratory demonstration.
- Use the language of medicine in communication with other health team members.
- Use modes of modern IT communication.
- Perform online computer search to develop information technology skills and know how to retrieve information from a variety of sources.

e. Psychomotor Skills:

- Perform in a level consistent with the international standards.
- Implement the concept of quality management in clinical pharmacy daily study
- Write reports dealing with the information and fundamentals of anatomy of

different body systems.

Contents: General features of bones; disposition of organs, muscles, vessels and nerves; central and autonomic nervous systems; anatomy of limbs; development of human embryo and teratogenicity. Microscopic anatomy of the cell and tissues, histology of cardiovascular, lymphoid, digestive, respiratory, urinary, endocrine, reproductive and integumentary systems.

Practical:

Anatomy: Demonstration of human anatomy and identification of different body organs.

Histology: Microscopic identification of cellular structure and body tissues.

The students will be use simulated plastic human models to clarify and confirm the theoretical lectures.

Minimum Course Requirements: 45 (3 x 15) Unit lectures and 45 practical hours (3 x 15) per level.

Teaching and Learning Methods:

1- Lectures.

2- Small group discussions.

3- Practical sessions.

Evaluation Methods:

- Quizzes	20%
- Midterm examination	20%
- Practical examinations	20%
- Final examination (written)	40%

Principal Text (Latest Edition):

1- Gray's Anatomy for Students, Richard L. Drake, A. Wayne Vogl, and Adam W. M. Mitchell, Churchill Livingstone Publisher.

Supplementary Texts (Latest Edition):

1- Clinical Anatomy for Medical Students, Richard S. Snell, Lippincot. Williams and Wilkins.

2- Histology: A Text and Atlas, Michael H. Ross and Wojciech Pawlina, Lippincott Williams and Wilkins.

Physiology-1

Course Identification and General Information:	
Title: Physiology-1.	
Course Number: 20020212.	**Year:** Second.
Credit Units: 2 + 1 Units (5 contact hours) per week.	**Level**: Third.
Pre-requisite: None.	
Co-requisite: 20020211.	
Aims: To provide basic knowledge on cell physiology, hematology, physiology of autonomic and central nervous systems, cardiovascular and respiratory systems.	
Description: Fundamental systematic approach to understand the normal human structure and functions. It describes the physiology of cell membrane, nerve, muscle, functions of the cells, tissues and organ systems, autonomic nervous system, blood and cardiovascular system and respiratory.	

Learning Outcomes:

By the end of the course, student should be able to:

a-Knowledge and Understanding:

- Define the fundamentals of physiology.
- Mention the normal homeostatic mechanisms in human body
- Explain the bases of physiology, normal physiology and metabolism of different body systems including autonomic nervous system, central nervous system, cardiovascular, respiratory system and blood.

B-Cognitive Skills:

- Distinguish the differentiation of the physiology of body systems studied.
- Properly use different physiological terminology.
- Apply the knowledge of physiology in proper understanding of pharmacology.
- Participate in self-learning activities.

c. Interpersonal Skills and Responsibility:

- Work constructively in a group, cooperating with their leaders and seniors.
- Show professional responsibility and respect the compliance to work through systems.
- Demonstrate critical thinking, problem- solving and decision-making abilities.
- Develop the habit of self audit, and participate in the different processes.

d. Communication, Information Technology and Numerical Skills:

- Communicate in a facilitative, effective, efficient, and educational manner with patients, their families and their relatives.
- Communicate clearly and succinctly to colleagues and other members of the health care team.
- Work in a team during laboratory demonstration.
- Use the language of medicine in communication with other health team members.
- Use modes of modern IT communication.
- Perform library search and retrieval of information.

e. Psychomotor Skills:

- Conduct standard physiological laboratory procedures and instrumentation.
- Perform functional physiological test e.g. blood group testing and erythrocyte sedimentation rate (ESR).
- Write reports dealing with the fundamentals of physiology of different body systems.
- Perform laboratory techniques safely and accurately.
- Implement the concept of quality management in clinical pharmacy daily practice.

Contents: Introduction to cellular physiology, blood and homeostasis. Autonomic

nervous system, central nervous system and special senses; physiology of muscles and nerves, cardiovascular and respiratory systems. Particular emphasis shall be given to the integration of control mechanisms and correlation of normal function with clinical manifestation of diseases.

Practical: Complete and differential blood count, hemoglobin estimation, red cell indices, determination of blood coagulation time, bleeding time, blood grouping and Rhesus factor. Measurements of heart beats and blood pressure.

Minimum Course Requirements: 30 (2 x 15) Unit lectures and 45 practical hours (3 x 15) per level.

Teaching and Learning Methods:

1- Lectures.

2- Small group discussions.

3-Practical sessions.

Evaluation Methods:

- Quizzes	20%
- Midterm examination	20%
- Practical examinations	20%
- Final examination (written)	40%

Principal Text (Latest Edition):

1-Textbook of Medical Physiology, C. Guyton and J.E. Hall. Saunders publisher, Elsevier.

Supplementary Texts (Latest Edition):

1- Ganong's Review of Medical Physiology, Kim E. Barrett, Susan M. Barman,

Scott Boitano, and Heddwen Brooks, McGraw-Hill Medical publisher.

2- Human Physiology, Stuart Ira Fox, McGraw-Hill Science publisher.

Medical Terminology-1

Course Identification and General Information:	
Title: Medical Terminology-1.	
Course Number: 20040213.	**Year**: Second.
Credit Units: 1 + 0 Unit (1 contact hour) per week.	**Level**: Third.
Pre-requisite: None.	
Co-requisite: None.	
Aims: To teach the student to analyze the word structure by dividing the medical terms to their basic components and to predict the meaning of unfamiliar medical term and improve his spelling and pronunciation skills.	
Description: This course is an introductory base for system based terminology. It explains fundamentals of medical terms through an analysis of their construction including prefix, suffix, root, connecting and combining forms. The student acquires an understanding of medical meanings applicable to the structure, function, and diseases of the human body. Abbreviations and their appropriate usage are represented.	
Learning Outcomes: Upon completion of the course, the student should be able to: **a-Knowledge and Understanding:** - Identify the meaning of medical words and unfamiliar medical terms. - Define descriptive terminology. - Recognize terminology pertaining to numbers, colors, positions, directions and time. - List prefixes pertaining to degree, size, comparison and negative prefixes**.** - Outline the roots pertaining to physical factors, chemistry and miscellaneous roots.	

b- Cognitive Skills:

- Analyze, evaluate and interpret different meanings of medical terms.
- Analyze the Analyze the word structure (prefixes, roots and suffixes).
- Apply the knowledge of medical terminology in communication with health team members.
- Correlate medical terms to standard English descriptions for communication.
- Interpret and follow the general rule in handling the unfamiliar medical terms.
- Participate in self-learning activities.

c. Interpersonal Skills and Responsibility:

- Work constructively in a group, cooperating with their leaders and seniors.
- Show professional responsibility and respect the compliance to work through systems.
- Demonstrate critical thinking, problem- solving and decision-making abilities.

d. Communication, Information Technology and Numerical Skills:

- Communicate in a facilitative, effective, efficient, and educational manner with patients, their families and their relatives.
- Communicate clearly and succinctly to colleagues and other members of the health care team.
- Use the language of medicine in communication with other health team members.
- Use modes of modern IT communication.
- Perform library search and retrieval of information.

e. Psychomotor Skills:

- Perform and practice a proper spelling and pronunciation of the medical terms.
- Use general protocol in splitting the word and predict the meaning.

Contents: Programmed course of study building medical words from Greek and

Latin prefixes, suffixes, word roots and combining forms. The course deals with medical and pharmaceutical terms related to descriptive terminology (pertaining to numbers, colors, positions, directions, time, degree, size and comparison). In addition to, negative prefixes, roots pertaining to physical factors and chemistry which will be needed for complete understanding of other courses.
Minimum Course Requirements: 15 (1 x 15) Unit lectures (15 contact hours) per level.
Teaching and Learning Methods: 1-Lectures. 2-Small group discussions.
Evaluation Methods: - Quizzes 30% - Midterm examination 30% - Final examination (written) 40%
Principal Text (Latest Edition): 1-Medical Terminology for health Professions, Ann Ehrich and Carol L. Schroeder, Delmar Thomson Learning**.**
Supplementary Texts (Latest Edition): 1- Medical Terminology: A Programmed Learning Approach to the Language of Health Care by Marjorie Canfield Willis, Lippincott Williams & Wilkins. 2- Medical Terminology: The Language Of Health Care, Marjorie Canfield Willis, Lippincott Williams & Wilkins.

Pharmacy Orientation

Course Identification and General Information:	
Title: Pharmacy Orientation.	
Course Number: 20020213.	**Year:** Second.
Credit Units: 1 + 0 Unit (1 contact hour) per week.	**Level**: Third.
Pre-requisite: None.	
Co-requisite: None.	
Aims: To provide a survey to the history of pharmacy, pharmacy profession and preparing the new students with necessary needs to be successful in the pharmacy curriculum and profession.	
Description: This course designed to provide students with a broad perspective on pharmacy as a profession in a changing health care environment. Students will learn to think critically about health and health care from the patient's perspective and about the historical and philosophical contexts of the profession as it continues to evolve toward patient focused care.	
Learning Outcomes: Upon completion of this course, students should be able to: **a- Knowledge and Understanding:** - Recognize the history of pharmacy. - Outline the career options for the pharmacist. - Identify the recent evolution in pharmacy education and clinical pharmacy. - Mention the international health organizations. - Define all aspects of pharmacy profession. **b- Cognitive Skills:** - Correlate the history of drugs with the recent development in the field of pharmacy.	

- Participate in self-learning activities.

c. Interpersonal Skills and Responsibility:

- Work constructively in a group, cooperating with their leaders and seniors.
- Show professional responsibility and respect the compliance to work through systems.
- Engages in lifelong learning.
- Prepare students to cultivate the habit of continuous self learning**.**

d. Communication, Information Technology and Numerical Skills:

- Apply their career options as a pharmacist and know how to deal with the health care team.
- Recognize the different sources of pharmaceutical information.
- Communicate properly with colleagues and other members of the health care team.
- Use the computer to deal with the pharmaceutical information available on the internet through different web sites.
- Use the library search properly.
- Retrieve information.

e. Psychomotor Skills:

- Calibrate the different career options of the pharmacist.
- Take a complete history for pharmacy development from the ancient periods to the clinical pharmacy.
- Implement the concept of quality management in clinical pharmacy daily practice.

Contents: 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, scope of pharmacy, regulatory control, and drug management. Hospital, industrial, clinical pharmacist and rational use of drugs.
Minimum Course Requirements: 15 (1 x 15) Unit lectures (15 contact hours) per level.
Teaching and Learning Methods: 1-Lectures. 2-Class discussions.
Evaluation Methods: - Quizzes 30% - Midterm examination 30% - Final examination (written) 40%
Principal Text (Latest Edition): 1- An Introduction to the Profession, L. Michael Posey, American Pharmacists Association, Washington D.C.
Supplementary Texts (Latest Edition): 1. Pharmacy Career Opportunities, Merritt V., Madiscon C.T., Mark Powely Associates Inc. 2. Pharmacy History, Nigel Tallis and Kate Arnold-Foster, Royal Pharmaceutical Society of Great Britain.

Pharmaceutics-1

<table>
<tr><td colspan="2">Course Identification and General Information:</td></tr>
<tr><td colspan="2">Title: Pharmaceutics-1.</td></tr>
<tr><td>Course Number: 20010221.</td><td>Year: Second.</td></tr>
<tr><td>Credit Units: 2 + 1 Units (5 contact hours) per week.</td><td rowspan="2">Level: Fourth.</td></tr>
<tr><td>Pre-requisite: None.</td></tr>
<tr><td colspan="2">Co-requisite: None.</td></tr>
<tr><td colspan="2">Aims: To enable the student to understand prescriptions and calculations of different dosage forms and dispersion systems.</td></tr>
<tr><td colspan="2">Description: This course provides an understanding of various dosage forms and drug delivery systems, and how medicinal and pharmaceutical substances are incorporated into them. The fundamental principles of interfacial phenomena, dispersion system, and their impacts on the preparation and design of stable dosage forms will be discussed.</td></tr>
<tr><td colspan="2">Learning Outcomes:
At the end of the course, the student should be able to:
a-Knowledge and Understanding:
- Describe the different dosage forms.
- Recognize the different classes of disperse systems and their application in pharmacy.
- Identify the importance of patient medical report.
- Define the concept of formulation of different dosage forms.
- Mention the prescriptions, calculations, manipulation with pharmaceutical ingredients and preparation of some dosage forms such as solutions, mixtures and powders.</td></tr>
</table>

b-Cognitive Skills:

- Calculate correctly the proportions of the different ingredients needed to prepare a pharmaceutical preparation.
- Appraise the concept of formulation of different dosage forms.
- Interpret the different prescriptions.
- Explain the most suitable and easy methods to overcome the formulation problems.

c. Interpersonal Skills and Responsibility:

- Work constructively in a group, cooperating with their leaders and seniors.
- Show professional responsibility and respect the compliance to work through systems.
- Demonstrate critical thinking, problem- solving and decision-making abilities.
- Demonstrate creativity and time management abilities.
- Exhibit the alertness about the doses, and compounding of prescriptions.
- Exhibit practical skills in weighing.

d. Communication, Information Technology and Numerical Skills:

- Communicate in a facilitative, effective, efficient, and educational manner with patients, their families and their relatives.
- Communicate clearly and succinctly to colleagues and other members of the health care team.
- Use the language of medicine in communication with other health team members.
- Maintain a suitable image in manner, dress, speech and relationships that is consistent with the medical profession.
- Work in a team during laboratory demonstration.
- Use modes of modern IT communication.
- Perform library search and retrieval of information.

- Use the numerical skills to formulate and design exact final pharmaceutical product.

e. Psychomotor Skills:

- Manage and deal accurately with prescriptions of different dosage forms.
- Prepare and manipulate different pharmaceutical preparations.
- Select the suitable ingredients, additives free form incompatibilities between each other.
- Manipulate the results of in-vitro quality control tests of different dosage forms.
- Disseminate the good practice in dispensing and compounding of different dosage forms.
- Perform laboratory techniques safely and accurately.

Contents: Prescriptions, dosage calculation and compounding incompatibilities. Formulation of dosage forms (liquid, solid, semisolid, molded), and their properties including advantages and disadvantages, preparation, pharmaceutical application. Dispersion systems including true solutions, colloidal solutions, suspensions and emulsions (physical properties and application in pharmacy).

Practical: Weights and measures, compounding of simple solutions, colloidal solutions, suspensions, emulsions and ointments.

Minimum Course Requirements: 30 (2 x 15) Unit lectures and 45 practical hours (3 x 15) per level.

Teaching and Learning Methods:

1-Lectures.

2-Small group discussions.

3-Practical sessions.

Evaluation Methods:

- Quizzes	20%
- Midterm examination	20%
- Practical examinations	20%
- Final examination (written)	40%

Principal Text (Latest Edition):

1- Ansel's Pharmaceutical Dosage Forms and Drug Delivery Systems, Loyd V Allen, Nicholas G Popovich and Howard C Ansel, Lippincott Williams and Wilkins.

Supplementary Texts (Latest Edition):

1- Pharmaceutics: the Science of Dosage Form Design, Aulton, M.E., Churchill Livining Stone.

2-Pharmaceutical Calculations, The Pharmacist's Handbook, Howard C. Ansel and Shelly J. Prince, Lippincott Williams and Wilkins.

Pharmacognosy

Course Identification and General Information:	
Title: Pharmacognosy.	
Course Number: 20030221.	**Year:** Second.
Credit Units: 2 + 1 Units (5 contact hours) per week.	**Level**: Fourth.
Pre-requisite: None.	
Co-requisite: None.	
Aims: The course aims to provide the knowledge and understanding of the medicinal plants and drugs from natural sources to encourage students to take a broad and continuing interest in medicinal plants with emphasis to those available in the Saudi Arabia.	
Description: This course is designed to give primary knowledge of natural product drugs. It includes the origin, bioactive constituents, folk use, modern use, chemical tests, product forms, dosage and cautions. The course gives some practical guidance in the process of identification of medicinal plants.	
Learning Outcomes: At the end of the course, the student should be able to: **a-Knowledge and Understanding:** - Identify the origin and preparation of crude drugs. - Recognize the methods of protection of drugs from deterioration. - Describe cell contents and powders - Gain knowledge about the nature, chemical constituents and uses of medicinal plants. **b-Cognitive Skills:** - Classify plants macroscopically and microscopically.	

- Analyze information and the use to predict a similar or related situation.
- Predict the use and type of the active constituents of an unknown plant.
- Distinguish between the leaves, barks, flowers, seeds, fruits, roots and rhizomes in the entire and powdered forms.
- Predict the use and type of the active constituents of unknown medicinal plants.

c. Interpersonal Skills and Responsibility:

- Work constructively in a group, cooperating with their leaders and seniors.
- Show professional responsibility and respect the compliance to work through systems.
- Demonstrate critical thinking, problem- solving and decision-making abilities.

d. Communication, Information Technology and Numerical Skills:

- Communicate in a facilitative, effective, efficient, and educational manner with patients, their families and their relatives.
- Counsel the patients and their families about rationale management of herbal medicine.
- Communicate clearly and succinctly to colleagues and other members of the health care team.
- Work in a team during laboratory demonstration.
- Use the language of medicine in communication with other health team members.
- Maintain a suitable image in manner, dress, speech and relationships that is consistent with the medical profession.
- Demonstrate written and oral communication skills.
- Use modes of modern IT communication.
- Perform library search and retrieval of information.

e. Psychomotor Skills:

- Perform professional collection, drying and storage of medicinal plants.

- Perform the macroscopical and microscopical examinations for identification of medicinal plants. - Plan a complete scheme for detection of adulteration for detection of medicinal plants. - Identify the unknown medicinal plants by specific chemical tests. - Detect substitution and adulteration of medicinal plants. - Rationalize the use of medicinal herbs and recommend disseminating this culture. - Perform in a level meet and consistent with the international standards.
Contents: An introduction to pharmacognosy, study of certain organized drugs, leaves, barks, flowers, woods, seeds, fruits, herbs, roots, rhizomes and unorganized drugs. The study of each organ includes origin, definition, collection, geographical source, constituents, diagnostic elements, chemical tests for identity, purity and uses. **Practical:** Chemical tests and identity of naturally occurring powders and organized drugs.
Minimum Course Requirements: 30 (2 x 15) Unit lectures and 45 practical hours (3 x 15) per level.
Teaching and Learning Methods: 1-Lectures. 2-Small group discussions. 3-Practical sessions.
Evaluation Methods: - Quizzes 20% - Midterm examination 20%

- Practical examinations	20%
- Final examination (written)	40%

Principal Text (Latest Edition):

1- Trease and Evans' Pharmacognosy by William Charles Evans, Saunders Ltd.

Supplementary Texts (Latest Edition):

1-Modern Pharmacognosy، A. P. Purohit, Alpha Science Int.Ltd.

2- Fundamentals of Pharmacognosy & Phytotherapy, Michael Heinrich, Churchill Livingstone.

Biochemistry-2

Course Identification and General Information:	
Title: Biochemistry-2.	
Course Number: 20040221.	**Year:** Second.
Credit Units: 2 + 1 Units (5 contact hours) per week.	**Level**: Fourth.
Pre-requisite: 20040212.	
Co-requisite: None.	
Aims: The metabolic pathways of biomolecules: carbohydrates, lipids, steroids, prostaglandins, amino acids, proteins, nucleoproteins, nucleic acids, hem proteins and their regulations.	
Description: This course deals with the metabolism of biomolecules. Clinical correlations and the action of certain therapeutic as well as toxic agents are explained, whenever possible. Much of the laboratory is devoted to the determination of blood and urine biochemical parameters.	
Learning Outcomes: Upon successful completion of the course, the student should be able to: **a-Knowledge and Understanding:** - Recognize the catabolic and anabolic pathways of glucose and glycogen. - Mention the regulation of blood glucose by hormones. - Identify how the body gets energy from metabolism. - Describe the ATP synthesis. - Outline lipid synthesis and degradation. - Gain knowledge about the utilization and disposal of amino acid. - List how metabolic disorders can result in diseases. - Recognize how specific metabolic steps can be target for therapy.	

- Mention how genetic information flows from DNA to RNA to synthesize proteins in ribosomes.

b- Cognitive Skills:

- Evaluate the energy production from different food stuffs to adjust daily energy requirements.
- Integrate the biochemistry with pharmacy and medicine.
- Elucidate the biochemical basis of genetic diseases.
- Interpret some clinical disorders and metabolism-related diseases.
- Correlate biochemical investigations to diseases and suggest their causes.

c. Interpersonal Skills and Responsibility:

- Demonstrate critical thinking, problem- solving and decision-making abilities.
- Demonstrate creativity and time management abilities.
- Work constructively in a group, cooperating with their leaders and seniors.
- Show professional responsibility and respect the compliance to work through systems.

d. Communication, Information Technology and Numerical Skills:

- Communicate in a facilitative, effective, efficient, and educational manner with patients, their families and their relatives.
- Communicate professionally to colleagues and other members of the health care team.
- Use the language of medicine in communication with other health team members.
- Maintain a suitable image in manner, dress, speech and relationships that is consistent with the medical profession.
- Work in a team during laboratory demonstration.
- Use modes of modern IT communication.
- Perform library search and retrieval of information.

e. Psychomotor Skills:

- Assess and determine the concentration of some biological compounds present in urine or in blood samples**.**
- Handle laboratory glass-wares and instruments used for determination of the different components in the biological fluids.
- Analyze the obtained data and their diagnostic significance value compared with their reference values.
- Implement with the concept of quality management in clinical pharmacy.
- Perform in a level meet and consistent with the international standards.

Contents: The metabolic pathways of biomolecules: carbohydrates, lipids, steroids, prostaglandins, amino acids, proteins, nucleoproteins, nucleic acids, hemproteins, xenobiotics, free radicals and antioxidants and their regulations. Metabolic disorders, body fluids including; urine, semen and milk compositions and importances.

Practical: Urine and blood analysis.

Minimum Course Requirements: 30 (2 x 15) Unit lectures and 45 practical hours (3 x 15) per level.

Teaching and Learning Methods:

1-Lectures.

2-Small group discussions.

3-Practical sessions.

Evaluation Methods:

- Quizzes	20%
- Midterm examination	20%

- Practical examinations	20%
- Final examination (written)	40%

Principal Text (Latest Edition):

1- Harper's Illustrated Biochemistry, Robert Murray, Victor Rodwell , David Bender , Kathleen M. Botham , P. Anthony Weil and Peter J. Kennelly, McGraw-Hill Medical Publisher.

Supplementary Texts (Latest Edition):

1-Lippincott's Illustrated Reviews: Biochemistry, North American Edition (Lippincott's Illustrated Reviews Series), Pamela C. Champe, Richard A Harvey, and Denise R. Ferrier, Lippincott Williams & Wilkins Publisher.

2- Biochemistry, Reginald H. Garrett and Charles M. Grisham, Brooks Cole Publisher.

Physiology-2

Course Identification and General Information:	
Title: Physiology-2.	
Course Number: 20020221.	**Year:** Second.
Credit Units: 3 + 0 Units (3 contact hours) per week.	**Level**: Fourth.
Pre-requisite: 20020212 and 20020211**.**	
Co-requisite: None.	
Aims: To provide general knowledge on endocrinology, digestion, metabolism and renal physiology.	
Description: This course provides a fundamental systematic approach to understanding of normal human structure and functions. It describes the physiology of endocrinology, digestion, metabolism and renal physiology.	

Learning Outcomes:

Upon successful completion of the course the student should be able to:

a- Knowledge and Understanding:

- Recognize fundamentals of physiology.
- Outline the bases of physiology of different body systems including the endocrine glands, renal physiology, digestion and metabolism.

b- Cognitive Skills:

- Differentiate the physiology of body systems studied.
- Appraise the role of endocrine glands in controlling homeostasis.
- Explain different physiological terminology.
- Apply the knowledge of physiology in understanding of pharmacology.

c. Interpersonal Skills and Responsibility:

- Work constructively in a group, cooperating with their leaders and seniors.

- Demonstrate critical thinking, problem- solving and decision-making abilities.
- Demonstrate creativity and time management abilities.
- Show professional responsibility and respect the compliance to work through systems.

d. Communication, Information Technology and Numerical Skills:

- Communicate in a facilitative, effective, efficient, and educational manner with patients, their families and their relatives.
- Communicate clearly and succinctly to colleagues and other members of the health care team.
- Use the physiology terminology for communication with other health team members.
- Maintain a suitable image in manner, dress, speech and relationships that is consistent with the medical profession.
- Use modes of modern IT communication.
- Perform library search and retrieval of necessary information.

e. Psychomotor Skills:

- Choose the appropriate physiological tests to interpret the body state.
- Calibrate the necessary hormonal assays.
- Write reports and present seminars dealing with information and fundamentals of physiology of different body systems.
- Perform in a level meet and consistent with the international standards.

Contents: Endocrinology (pituitary, thyroid, parathyroid, pancreas, adrenal and gonads), digestion, metabolism and temperature regulation, renal physiology, body fluids and acid base balance.

Minimum Course Requirements: 45 (3 x15) Unit lectures (45 contact hours) per

level.

Teaching and Learning Methods:

1-Lectures.

2-Small group discussions.

Evaluation Methods:

- Quizzes	30%
- Midterm examination	30%
- Final examination (written)	40%

Principal Text (Latest Edition):

1-Textbook of Medical Physiology, C. Guyton and J.E. Hall. Saunders publisher, Elsevier.

Supplementary Texts (Latest Edition):

1- Ganong's Review of Medical Physiology, Kim E. Barrett, Susan M. Barman, Scott Boitano, and Heddwen Brooks, McGraw-Hill Medical publisher.

5- Human Physiology, Stuart Ira Fox, McGraw-Hill Science publisher.

Pharmaceutical Analytical Chemistry

Course Identification and General Information:	
Title: Pharmaceutical Analytical Chemistry.	
Course Number: 20040222.	**Year:** Second.
Credit Units: 2 + 1 Units (5 contact hours) per week.	**Level**: Fourth.
Pre-requisite: None.	
Co-requisite: None.	
Aims: To introduce students to key concepts in analytical chemistry To provide information on dissociation reactions, reaction equilibrium, applications of quantitative and instrumental analyses.	
Description: The course will cover chemical methods of analysis with special emphasis on volumetric and analytical techniques necessary to analyze drugs and dosage forms.	
Learning Outcomes: Upon completion of this course, student will be able to: **a-Knowledge and Understanding:** - Identify the fundamentals of analytical chemistry. - Mention chemical structure and reactivity of drugs. - List the classical methods of analysis of drugs (gravimetry and titrimetry) and laboratory techniques. - Recognize the importance and uses of instruments in drug analysis. **b- Cognitive Skills:** - Analyze and evaluate and interpret the obtained data. - Calculate the difference ionic species in different equilibrium problems. - Apply different physical constants (pKw, pka, pKb…etc) to solve analytical	

problems.

- Solve different analytical problems.
- Apply qualitative and quantitative analytical and biological methods for quality control and assay of raw materials as well as pharmaceutical preparations.
- Analyze and interpret experimental results as well as published literature.

c. Interpersonal Skills and Responsibility:

- Demonstrate critical thinking, problem- solving and decision-making abilities.
- Demonstrate creativity and time management abilities.
- Work constructively in a group, cooperating with their leaders and seniors.
- Show professional responsibility and respect the compliance to work through systems.

d. Communication, Information Technology and Numerical Skills:

- Communicate in a facilitative, effective, efficient, and educational manner with patients, their families and their relatives.
- Communicate clearly and succinctly to colleagues and other members of the health care team.
- Use the language of medicine in communication with other health team members.
- Work in a team during laboratory demonstration.
- Use modes of modern IT communication.
- Perform library search and retrieval of information.
- Use the numerical skills properly for statistical treatment of analytical results and data.

e. Psychomotor Skills:

- Handle and dispose chemicals and pharmaceutical preparations safely.
- Design and implement different methods of analysis for raw materials and medicinals.

- Conduct research analytical studies and analyze the results.
- Write reports and present seminars dealing with the fundamentals of analytical chemistry and methodologies to solve analytical problems.
- Conduct standard pharmaceutical laboratory procedures and instrumentation.

Contents: General considerations, reactions, equilibrium, fundamental concepts and applications of quantitative analysis utilizing different methods of instrumental analysis. These methods include colorimetry, fluorometry, flame photometry, atomic absorption spectrophotometry, polarimetry and refractometry.

Practical: Drug analysis utilizing the above mentioned methods.

Minimum Course Requirements: 30 (2 x 15) Unit lectures and 45 practical hours (3 x 15) per level.

Teaching and Learning Methods:

1-Lectures.

2-Small group discussions.

3-Practical sessions.

Evaluation Methods:

- Quizzes	20%
- Midterm examination	20%
- Practical examinations	20%
- Final examination (written)	40%

Principal Text (Latest Edition):

1- Analytical Chemistry and Quantitative Analysis, David S. Hage and James R. Carr, Prentice Hall.

Supplementary Texts (Latest Edition):

1-Vogel's Textbook of Quantitative Inorganic Analysis: Including Elementary

Instrumental Analysis, Arthur Vogel and John Bassett, Longman Publisher.
2-Student Solutions Manual For Analytical Chemistry and Quantitative Analysis, David S. Hage and James R. Carr, Prentice Hall.

Pharmaceutical Mathematics

Course Identification and General Information:	
Title: Pharmaceutical Mathematics.	
Course Number: 20010222.	**Year:** Second.
Credit Units: 2 + 0 Units (2 contact hours) per week.	**Level**: Fourth.
Pre-requisite: None.	
Co-requisite: None.	
Aims: This course aims to provide the pharmacy students with the bases and applications of mathematics relevant to pharmacy.	
Description: Calculations applicable to the practice of pharmacy including: prescription format and interpretations, metric and common systems of measure and conversions, dosages, density and specific gravity, percentages, ratio strength, milliequivalents and milliosmols, reductions and enlargements of formulas, dilution, concentration and concepts of differential and integral calculus.	
Learning Outcomes: Upon successful completion of this course, the student should be able to: **a-Knowledge and Understanding:** - Know the probabilities principles. - Explain derivatives as rates of change, and be able to calculate derivatives of algebraic and trigonometric functions. - Identify sampling and estimation for the parameters. - Recognize the definite and indefinite integrals, and the relationship between derivative and integrals. - Enumerate the kinds of algebraic and trigonometric functions. - Define the inverse of a square matrix.	

- Demonstrate the properties of determinants.
- Mention the statistical tests.
- Illustrate different methods of statistical analysis and pharmaceutical calculations.
- Gain the essential knowledge of mathematic to apply in physical pharmacy, basic and applied clinical pharmacokinetics.

b-Cognitive Skills:

- Solve mathematical problems with or without a calculator.
- Apply algebraic, logarithmic and exponential functions.
- Apply mathematical functions to complex pharmaceutical calculations and business analyses.
- Derive different types of functions and combinations.
- Compute and plot the maxima and minima of some functions and plot them as well.
- Integrate the inverse operations to differentiations.
- Interpret definitions and theorems of limits and continuity of functions.
- Develop the knowledge of differential and integral calculus and their application skills needed in pharmacy based problems.
- Apply mathematics as aid in building concepts and solving problems.
- Apply the principles of pharmaceutical informatics.
- Participate in self-learning activities.

c. Interpersonal Skills and Responsibility:

- Work constructively in a group, cooperating with their leaders and seniors.
- Show professional responsibility and respect the compliance to work through systems.
- Demonstrate critical thinking, problem- solving and decision-making abilities.

d. Communication, Information Technology and Numerical Skills:

- Communicate in a facilitative, effective, efficient, and educational manner with patients and their families.
- Communicate clearly and succinctly to colleagues and other members of the health care team.
- Use modes of modern IT communication.
- Use numerical skills to calculate efficiently the numeric and computation methods.
- Use and integrate the numerical skills to make appropriate decisions and recommendations.

e. Psychomotor Skills:

- Perform bio-statistical analyses both manually and using available software packages.
- Design solving strategies for mathematical problems.
- Use calculations to evaluate clinical parameters, safely and accurately prepare, dispense and administer medications, perform business math and bio-statistical analyses.
- Practice mathematics as an art and as a means of logical thinking.
- Practice mathematics as a powerful tool in solving problems that commonly arise in pharmacy.
- Calibrate statistical tests.
- Calibrate and resolve estimation of unknown parameters.
- Resolve problems and make correct decisions and recommendations.

Contents: Arithmetic, algebra, algebraic equations, graphs, series e and natural logarithm, trigonometry, differential calculus, integration, trigonometric functions

and its relations, differential equations, partial differential equations; equations and series for describing experimental measurements. The bases of geometrical interpretation of many aspects of mathematics relevant to the biologist equations and series for describing experimental measurements and their applications in pharmacy.
Minimum Course Requirements: 30 (3 x 15) Unit lectures (30 contact hours) per level.
Teaching and Learning Methods: 1-Lectures 2-Small group discussions
Evaluation Methods: - Quizzes 30% - Midterm examination 30% - Final examination (written) 40%
Principal Text (Latest Edition): 1- A Textbook of Pharmaceutical Mathematics: (Advanced Mathematics), N.P. Bali, P.N. Gupta, and C.P. Gandhi, Laxmi Publications**.**
Supplementary Texts (Latest Edition): 1- Practical Algebra: A Self-Teaching Guide, Peter H. Selby. 2-Pharmaceutical and Laboratory Mathematics, Hart-Barrows**,** Kendall Hunt Pub Co**.**

Medical Terminology-2

Course Identification and General Information:	
Title: Medical Terminology-2.	
Course Number: 20040223.	**Year:** Second.
Credit Units: 1 + 0 Unit (1 contact hour) per week.	**Level**: Fourth.
Pre-requisite: 20040213.	
Co-requisite: None.	
Aims: To acquaint students with medical terminology of the circulatory, nervous, digestive, respiratory, urinary, musculoskeletal, reproductive systems, endocrinology and cancer terminology.	
Description: Advanced course introduces the most common and important terminology in circulatory, nervous, digestive, respiratory, urinary, musculoskeletal, reproductive systems, endocrinology and cancer terminology. Students will gain an understanding of basic elements, rules of building and analyzing medical words, and medical terms associated with the body as a whole.	
Learning Outcomes: At the end of the course, the student should be able to: **a-Knowledge and Understanding:** - Identify the meaning of unfamiliar medical terms. - Recognize how to analyze complicated medical terms and determine correct usage of word elements. - Gain knowledge how use medical terminology associated with different body systems. **b- Cognitive Skills:** - Spell and pronounce the different terms.	

- Analyze the medical terms.

c. Interpersonal Skills and Responsibility:

- Demonstrate critical thinking, problem- solving and decision-making abilities.
- Demonstrate creativity and time management abilities.
- Work constructively in a group, cooperating with their leaders and seniors.
- Show professional responsibility and respect the compliance to work through systems.

d. Communication, Information Technology and Numerical Skills:

- Use the language of medicine in communication with other health team members.
- Communicate in a facilitative, effective, efficient, and educational manner with patients, their families and their relatives.
- Communicate clearly and succinctly to colleagues and other members of the health care team.
- Use modes of modern IT communication.
- Perform library search and retrieval of information.

e. Psychomotor Skills:

- Perform a proper spelling and pronunciation of the medical terms.
- Use general protocol in splitting the word and predict the meaning.

Contents: Continuation study building to medical words from Greek and Latin prefixes, suffixes, word roots and combining forms that will be needed for complete understanding of other courses. The course deals with medical terminology related to circulatory, nervous, digestive, respiratory, urinary, musculoskeletal, endocrine, male and female reproductive systems and cancer terminology.

Minimum Course Requirements: 15 (1 x 15) Unit lectures (15 contact hours) per

level.

Teaching and Learning Methods:

1-Lectures.

2-Small group discussions.

3-Practical sessions.

Evaluation Methods:

- Quizzes	30%
- Midterm examination	30%
- Final examination (written)	40%

Principal Text (Latest Edition):

1- Medical Terminology for health Professions, Ann Ehrich and Carol L. Schroeder, Delmar Thomson Learning**.**

Supplementary Texts (Latest Edition):

1- Medical Terminology: A Programmed Learning Approach to the Language of Health Care by Marjorie Canfield Willis, Lippincott Williams & Wilkins.

2- Medical Terminology: The Language Of Health Care, Marjorie Canfield Willis, Lippincott Williams & Wilkins.

Pathophysiology-1

<table>
<tr><td colspan="2">Course Identification and General Information</td></tr>
<tr><td colspan="2">Title: Pathophysiology-1.</td></tr>
<tr><td>Course Number: 20020311.</td><td>Year: Third.</td></tr>
<tr><td>Credit Units: 3+ 1 Units (6 contact hours) per week.</td><td rowspan="2">Level: Fifth.</td></tr>
<tr><td>Pre-requisite: 20020211 and 20020221.</td></tr>
<tr><td colspan="2">Co-requisite: None.</td></tr>
<tr><td colspan="2">Aims: To provide basic knowledge on mechanisms, etiologies, pathogenesis, risk factors, pathophysiologcal changes and complications for commonly encountered disease states and to develop skills of observation, interpretation and integration needed to analyze human diseases.</td></tr>
<tr><td colspan="2">Description: This course provides the students with the disorders or altered functions, i.e. the physiologic mechanisms altered by disease in the living organism to understand the rationale for diagnosis and therapeutic interventions in disease processes. The framework is designed to present the general concepts of disease processes and prepare the students for their subsequent clinical careers.</td></tr>
<tr><td colspan="2">Learning Outcomes:
Upon completion of this course, student will be able to:
a-Knowledge and Understanding:
- Identify the etiological and epidemiologic basis of different diseases.
- Describe and discuss characteristic gross and microscopic pictures of different pathologic lesions and the associated functional disturbances.
- Outline the complications of cardiovascular and respiratory systems, dermatology, sexually transmitted, parasitic and microbial diseases.
- Identify the measures of disease control.</td></tr>
</table>

b- Cognitive Skills:

- Analyze various gross and microscopic pathologic data.
- Evaluate the disease as a problem and suggest the solution.
- Interpret the pathological report.
- Correlate the pathologic features of the disease with its clinical presentation, laboratory investigations and complications.
- Distinguish minor illnesses from those which require prompt medical intervention.
- Stimulate creative thinking for problem identification and solving.

c. Interpersonal Skills and Responsibility:

- Work constructively in a group, cooperating with their leaders and seniors.
- Show professional responsibility and respect the compliance to work through systems.
- React appropriately according to the seriousness of pathologic diagnosis in acceptable human manner.
- Demonstrate critical thinking, problem- solving and decision-making abilities.
- Counsel the patients and their families about different management strategies.

d. Communication, Information Technology and Numerical Skills:

- Communicate in a facilitative, effective, efficient, and educational manner with patients, their families and their relatives.
- Communicate clearly and succinctly to colleagues and other members of the health care team.
- Work in a team during laboratory demonstration.
- Use the language of medicine in communication with other health team members.
- Use modes of modern IT communication.
- Perform library search and retrieval of information.

e. Psychomotor Skills:

- Perform routine sample preparations.
- Investigate different pathological cases and prepare final reports.
- React appropriately according to the seriousness of pathologic diagnosis in acceptable human manner.
- Response and select appropriate medicine to treat presented symptoms.
- Perform laboratory techniques safely and accurately.
- Perform in a level meets and consistent with the international standards.
- Implement the concept of quality management in clinical pharmacy.

Contents: Physiological basis of pathology, etiology of diseases, signs and symptoms, complications, diagnosis, treatment and relationship between pathophysiology and clinical picture. Inflammation and repair, degeneration circulatory and cellular disturbances and degeneration; regeneration and repair, basics of neoplasm and metabolic diseases. Diseases of cardiovascular and respiratory systems, dermatology, sexually transmitted, parasitic and microbial diseases.

Practical: Demonstration of slides and diseased specimens; laboratory findings of major diseases are discussed.

Minimum Course Requirements: 45 (3 x 15) Unit lectures and 45 practical hours (3 x 15) per level.

Teaching and Learning Methods:

1-Lectures.

2-Small group discussions.

3-Practical sessions.

Evaluation Methods:

- Quizzes	20%
- Midterm examination	20%
- Practical examinations	20%
- Final examination (written)	40%

Principal Text (Latest Edition):

1-Pathophysiology, Lee-Ellen C. Copstead-Kirkhorn RN and Jacquelyn L. Banasik, Saunders.

Supplementary Texts (Latest Edition):

1-Study Guide for Pathophysiology: The Biological Basis for Disease in Adults and Children, Kathryn L. McCance RN and Sue E. Huether RN, Mosby.

2- Pathophysiology of Disease An Introduction to Clinical Medicine, (Lange Medical Books), Stephen J. McPhee and Gary D. Hammer, McGraw-Hill Medical.

Pharmacology-1

Course Identification and General Information:	
Title: Pharmacology-1.	
Course Number: 20040311.	**Year:** Third.
Credit Units: 3 + 1 Units (6 contact hours) per week.	**Level**: Fifth.
Pre-requisite: 20020221 and 20040221**.**	
Co-requisite: 20010312.	
Aims: The course provides students with the basic knowledge of pharmacokinetics, pharmacodynamics and pharmacotherapeutics. It also helps students to understand the pharmacological basis of drugs acting on the autonomic nervous system, cardiovascular system and autacoids.	
Description: This course is designed to introduce the student to the general principles of pharmacology with regard to the general pharmacological terms and the principles of drug pharmacokinetics and pharmacodynamics: administration, absorption, distribution, metabolism, excretion as well as drug effects and mechanism actions. It provides the basic information of the physiology and pharmacology of autonomic nervous system, cardiovascular system and autacoids.	
Learning Outcomes: Upon completion of this course, the student will be able to: **a-Knowledge and Understanding:** - Understand the principals of basic and clinical pharmacokinetics, - Identify the theories and principles of drug action and factors affecting drug action and dosage. - Define the Receptors for Physiological Regulatory Molecules: classification of receptors, drug-target interactions and Regulation of Receptors.	

- Understand the principals of Pharmacogenetics
- Identify the Science of Drug Therapy and the basis of Pharmacotherapeutics: Clinical Trials, Patient-centered Therapeutics, Drug Interactions, the Therapeutic Index, Adverse Drug reactions and Drug Toxicity and Therapeutic Drug Monitoring.
- Understand the basis of pharmacotherapeutics,
-Describe the basis of drug nomenclature, and drug development and its Regulations.
- Outline the pharmacological actions of drugs on the autonomic nervous system, cardiovascular drugs and autacoids.
- Understand the pharmacological basis of therapeutics, uses, adverse effects and side effects of drugs from different pharmacological classes.
- Gain the knowledge of the role of pharmacovigilance in the proper selection and rationale use of drugs.

b- Cognitive Skills:

- Predict drug effects at all levels of biological organization.
- Evaluate and detect any adverse drug reactions and recognize contra-indications of drugs from different pharmacological classes.
- Criticize different treatment modalities in order to provide optimum drug therapy for patients and avoid therapeutic failure.
- Evaluate the mechanism of action and pharmacological effects of drugs.
- Prepare students for continuous long-life learning.

c. Interpersonal Skills and Responsibility:

- Work creatively in a group, cooperating with their leaders and advisors.
- Show professional responsibility and respect the compliance to work through systems.

- Demonstrate critical thinking, problem-solving, self-learning and decision-making abilities.
- Demonstrate creativity and time management abilities**.**

d. Communication, Information Technology and Numerical Skills:

- Communicate and counsel the patients and their families about different management strategies and methods of prevention of their illness.
- Communicate clearly and succinctly to colleagues and other members of the health care team.
- Work in a team during laboratory demonstration.
- Use the language of medicine in communication with other health team members.
- Use modes of modern IT communication.
- Perform library search and retrieval of information.

e. Psychomotor Skills:

- Handle laboratory animals in a correct and safe way to obtain optimum real and reproducible results without harmful effects on animals.
- Solve health care problems with a multidisciplinary and integrative approach.
- Design and perform different in-vitro and in-vivo pharmacological experiments using different drug classes.
- Calibrate and evaluate the dose–response effect relationships.
- Write structural reports or essay according to the standard scientific guidelines and present reports in-group meetings.
- Design and calibrate relationship between drug dose and clinical response.
- Calibrate the basic pharmacokinetic and pharmacodynamic parameters of drugs.
- Prescribe the rationale use of drugs.
- Perform in a level meet and consistent with the international standards.

Contents: General principles, pharmacokinetics and pharmacodynamics, pharmacogenetics, pharmacotherapeutics and drug interactions. Pharmacological actions, adverse effects and contraindications of drugs acting on autonomic nervous system, cardiovascular system, autacoids and renal pharmacology.

Practical: Handling of experimental animals, effect of agonists and antagonists on smooth, cardiac and skeletal muscles. Dose-response curves; Demonstration of the effect of certain known drugs on animals and isolated organs to predict their mechanism of action.

Minimum Course Requirements: 45 (3 x 15) Unit lectures and 45 practical hours (3 x 15) per level.

Teaching and Learning Methods:

1-Lectures

2- Small group discussions.

3- Practical sessions.

4- Self-directed learning.

Evaluation Methods:

- Quizzes	20%
- Midterm examination	20%
- Practical examinations	20%
- Final examination (written)	40%

Principal Text (Latest Edition):

1- Goodman & Gilman's The Pharmacological Basis of Therapeutics, Joel Griffith Hardman, Lee E. Limbird, Alfred G. Gilman. Publisher**,** MacMillan Publishing Co.

Supplementary Texts (Latest Edition):

1- Lippincott's Illustrated Reviews: Pharmacology, (Lippincott's Illustrated Reviews Series), Richard A Harvey, Pamela C. Champe, Richard Finkel, and Luigi X. Cubeddu**,** Lippincott Williams & Wilkins.

2-Principles of Pharmacology: The Pathophysiologic Basis of Drug Therapy, David E Golan, Armen H Tashjian, and April W Armstrong, Lippincott Williams and Wilkins.

Medicinal Chemistry-1

<table>
<tr><td colspan="2">Course Identification and General Information:</td></tr>
<tr><td colspan="2">Title: Medicinal Chemistry-1.</td></tr>
<tr><td>Course Number: 20040312.</td><td>Year: Third.</td></tr>
<tr><td>Credit Units: 3 + 0 (3 contact hours) per week.</td><td rowspan="2">Level: Fifth.</td></tr>
<tr><td>Pre-requisite: 20040211.</td></tr>
<tr><td colspan="2">Co-requisite: 20040311.</td></tr>
<tr><td colspan="2">Aims: To provide introduction basic principles of drug actions, fundamental concepts governing the relation between chemical structures and biological activity (Structure-Activity-Relationship “SAR”). It also provides the chemistry, pharmacological activity and molecular mode of action of drugs acting on autonomic nervous system and cardiovascular system.</td></tr>
<tr><td colspan="2">Description: This is an introductory course to medicinal chemistry comprising the physicochemical properties in relation to biological action, drug-receptor interactions, drug metabolism and principle of drug design. The rational design of molecules to produce safe and effective therapeutic responses. Drugs acting on autonomic nervous system and cardiovascular system.</td></tr>
<tr><td colspan="2">Learning Outcomes:
Upon completion of this course, the student will be able to:
a- Knowledge and Understanding:
- Outline the mechanism of action of drugs at molecular level.
- Identify the relationship between molecular structure and biological action.
- Define the structure activity relationship in relation to drug-target interactions.
- Describe the physico-chemical properties of drug molecules in relation to drug absorption, distribution, metabolism, and excretion.</td></tr>
</table>

- Mention the chemical pathways of drug metabolism.
- Enumerate the chemical and metabolic instabilities in each class of drugs.
- Identify the drugs acting on autonomic nervous system and cardiovascular system.
- Define the toxicity and side effects of drugs.
- Illustrate the analysis of drugs and the laboratory techniques used for that.

b-Cognitive skills:

- Predict the biological activity from general structure or pharmacophore.
- Correlate the structural features of a compound to physicochemical properties that may affect its biological response.
- Predict methods of drug synthesis and analysis.
- Predict the possible side effects, development of drug resistance and drug interactions.

c. Interpersonal Skills and Responsibility:

- Work constructively in a group, cooperating with their leaders and seniors.
- Demonstrate critical thinking, problem- solving and decision-making abilities.
- Demonstrate creativity and time management abilities.
- Show professional responsibility and respect the compliance to work through systems.

d. Communication, Information Technology and Numerical Skills:

- Communicate in a facilitative, effective, efficient, and educational manner with patients, their families and their relatives.
- Communicate clearly and succinctly to colleagues and other members of the health care team.
- Use the language of medicine in communication with other health team members.

- Maintain a suitable image in manner, dress, speech and relationships that is consistent with the medical profession.
- Use modes of modern IT communication.
- Perform library search and retrieval of information.

e. Psychomotor Skills:

- Calibrate the activity of related compounds within a pharmacological class based on structural activity relationships.
- Examine a drug structure and deduce relative receptor affinity, metabolic pathways, distribution potential, and potential side effects or toxicities.
- Justify therapeutic recommendations based on an understanding of drug chemistry**.**
- Design suitable analytical methodology for assay of active pharmaceutical ingredients.
- Calibrate the drug efficiency.

Contents: 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, antihypertensives, antihyperlipidemics, drugs affecting blood and diuretics) and drug design for related drugs.

Teaching and Learning Methods:

1-Lectures.

2-Small group discussions.

Minimum Course Requirements: 45 (3 x 15) Unit lectures (45 contact hours) per level.

Evaluation Methods:

- Quizzes	30%
- Midterm examination	30%
- Final examination (written)	40%

Principal Text (Latest Edition):

1- An Introduction to Medicinal Chemistry, Graham L. Patrick, Oxford University Press, USA.

Supplementary Texts (Latest Edition):

1- Burger's Medicinal Chemistry, Drug Discovery and Development, Donald J. Abraham and David P. Rotella, Wiley.

2- Essentials of Pharmaceutical Chemistry, Donald Cairns, Pharmaceutical Press.

Immunology

Course Identification and General Information:	
Title: Immunology.	
Course Number: 20030311.	**Year:** Third.
Credit Units: 2+ 0 Units (2 contact hours) per week.	
Pre-requisite: 20020211 and 20020221.	**Level**: Fifth.
Co-requisite: None.	
Aims: To provide detailed knowledge on cellular immunology, molecular immunology, functional immunity and immune disorders and clinical significance of the immune system and clinical immunology are also included.	
Description: This course introduces students to the basics of immunology including, cells, organs and effecter systems involved in both cell mediated and humoral mediated immune activity. Topics include regulatory interactions between different components of the immune system and the deleterious effects of aberrant immune processes. Understanding of disease state immunopathology, immunopharmacology and immunotherapeutics.	
Learning Outcomes: At the end of the course the student be able to: **a-Knowledge and Understanding:** - Identify the different types of human immunity and immune response. - Outline the mechanisms involved in the immune response. - Recognize principles of antigen-antibody relationships. - Describe the biology of the immune system. - Define the role of the complement system. - Demonstrate the genetic basis for antibody synthesis, development, function, and	

immunopathology.

- Mention the cellular interactions and activation of immune cells.
- Demonstrate the cellular and physiological consequences of immunological responses.
- Outline the autoimmune disease and other diseases and conditions with immunological aspects.

b- Cognitive Skills:

- Differentiate between the natural and acquired immunity.
- Distinguish between the primary and secondary immune response.
- Evaluate the role of complement.
- Design a mechanism of antigen-antibody interaction.
- Integrate knowledge and making informed judgments about application of immunology in pharmacy.
- Cultivate the habit of continuous self learning.

c. Interpersonal Skills and Responsibility:

- Carry out duties in accordance with legal, ethical, social, economic, and professional guidelines.
- Work constructively in a group, cooperating with their leaders and seniors.
- Show professional responsibility and respect the compliance to work through systems.
- Demonstrate critical thinking, problem- solving and decision-making abilities.
- Demonstrate creativity and time management abilities.

d. Communication, Information Technology and Numerical Skills:

- Communicate in a facilitative, effective, efficient, and educational manner with patients, their families and their relatives.

- Communicate clearly and succinctly to colleagues and other members of the health care team.
- Use the language of medicine in communication with other health team members.
- Maintain a suitable image in manner, dress, speech and relationships that is consistent with the medical profession.
- Use modes of modern IT communication.

e. Psychomotor Skills:

- Explain the HLA typing reports.
- Choose the appropriate drugs for some immunological diseases.
- Read and interpret primary research papers in the area of immunology.
- Prepare posters and present brief seminars.
- Present data in an appropriate form (graphs, tables, figures, or descriptive paragraphs).
- Implement the concept of quality management in clinical pharmacy daily practice.
- Perform in a level meet and consistent with the international standards.

Contents: Mechanisms of immune recognition, antigens and antibodies relationships, major histocompatibility complex, complement, B cell differentiation and function, T cell differentiation and function, Regulation of immune responses, cytokines (colony-stimulating factors, tumor necrosis factor, interferons, and interleukins), immune deficiency states, autoimmunity, genetic basis for antibody synthesis, immunity in transplantation, molecular biology of immune response. Clinical immunology, genetic basis for antibody synthesis, development, function, and immunopathology, the effects and outcomes of drugs and drug therapy and drug therapy on the immune system and their clinical applications.

Minimum Course Requirements: 30 (2 x 15) Unit lectures (30 contact hours) per level.
Evaluation Methods: - Quizzes 30% - Midterm examination 30% - Final examination (written) 40%
Principal Text (Latest Edition): 1- Basic Immunology: Functions and Disorders of the Immune System, Abul K. Abbas and Andrew H. Lichtman, Saunders.
Supplementary Texts (Latest Edition): 1-Lippincott's Illustrated Reviews: Immunology (Lippincott's Illustrated Reviews Series), Thao Doan, Roger Melvold, Susan Viselli, and Carl Waltenbaugh, Lippincott Williams & Wilkins. 2- Clinical Immunology and Serology: A Laboratory Perspective (Clinical Immunology and Serology (Stevens), Christine Dorresteyn Stevens, F A Davis Company.

Physical Pharmacy

<table>
<tr><td colspan="2">Course Identification and General Information:</td></tr>
<tr><td colspan="2">Title: Physical Pharmacy.</td></tr>
<tr><td>Course Number: 20010311</td><td>Year: Third.</td></tr>
<tr><td>Credit Units: 2 + 0 Units (2 contact hours) per week.</td><td rowspan="2">Level: fifth.</td></tr>
<tr><td>Pre-requisite: 20010222.</td></tr>
<tr><td colspan="2">Co-requisite: None.</td></tr>
<tr><td colspan="2">Aims: To provide the student with knowledge of physical pharmacy, reaction kinetics and stability necessary to understand pharmaceutical dosage forms and their design.</td></tr>
<tr><td colspan="2">Description: Discussion of the fundamental principles of interfacial phenomena, dispersion system, rheology, polymorphism and their impact on the preparation and design of thermodynamically stable heterogeneous dosage form. Drug kinetics and models for drug stability are also illustrated.</td></tr>
<tr><td colspan="2">Learning Outcomes:
Upon successful completion of this course, the student should be able to:
a-Knowledge and Understanding:
- Identify the classification of buffer systems, colloidal sols and complexes.
- Illustrate the solubility phenomena.
- Define the factors affecting rheological properties in pharmaceutical products, chemical factors and physical factors.
- Recognize the pharmaceutical applications and medical importance of surface active agents.
- Mention the factors affecting adsorption at solid and liquid interfaces.</td></tr>
</table>

- Describe the isotonic, hypertonic and hypotonic solutions and permeability of biologic membranes and determination of tonicity.
- Gain knowledge about the determination of kinetics of drug degradations.

b- Cognitive Skills:

- Develop a testable hypothesis.
- Predict expected results.
- Predict the expiry date of drugs.
- Evaluate the appropriate storage for drugs.
- Integrate physical pharmacy knowledge and with pharmaceutical industry conclusions to the theoretical information.

c. Interpersonal Skills and Responsibility:

- Show professional responsibility and respect the compliance to work through systems.
- Demonstrate critical thinking, problem- solving and decision-making abilities.
- Demonstrate creativity and time management abilities.
- Work constructively in a group, cooperating with their leaders and seniors.

d. Communication, Information Technology and Numerical Skills:

- Communicate in a facilitative, effective, efficient, and educational manner with patients, their families and their relatives.
- Communicate clearly and succinctly to colleagues and other members of the health care team.
- Use the language of medicine in communication with other health team members.
- Maintain a suitable image in manner, dress, speech and relationships that is consistent with the medical profession.
- Use modes of modern IT communication.

- Perform library search and retrieval of information.
- Use the numerical mathematical skills to determine of kinetics of drug degradations and viscosity coefficients.

e. Psychomotor Skills:

- Design reaction kinetics, drug stability and reaction order reaction studies.
- Calibrate the different degradative pathways of drugs.
- Choose and design buffer systems for pharmaceutical preparations.
- Calibrate the expiry date of drugs.
- Calibrate the Newtonian and non-Newtonian systems, thixotropy and determine the rheological properties.
- Perform in a level meet and consistent with the international standards.
- Implement the concept of quality management in physical pharmacy.

Contents: Fundamentals of physical pharmacy, physical properties of drug molecules, adsorption, solubility, isotonicity, diffusion and dissolution, emulsions and suspensions, micrometrics, dissolution, buffering, surfactant, coarse dispersion, complexation and protein binding and rheology. Reaction kinetics, drug stability, reaction order, different degradative pathways, prediction of expiry date and good storage of starting materials.

Minimum Course Requirements: 30 (2 x 15) Unit lectures (30 contact hours) per level.

Teaching and Learning Methods:

1-Lectures.

2- Small group discussions.

Evaluation Methods:

- Quizzes 30%

- Midterm examination	30%
- Final examination (written)	40%

Principal Text (Latest Edition):

1- Martin's Physical Pharmacy and Pharmaceutical Sciences, Patrick J Sinko, Lippincott Williams & Wilkins.

Supplementary Texts (Latest Edition):

1-Applied Physical Pharmacy, Mansoor Amiji and Beverly Sandmann, McGraw-Hill Medical.

2-Physical Pharmacy: Physical Chemical Principles in the Pharmaceutical Sciences, Alfred N. Martin, Pilar Bustamante and A. H. C. Chun, Lippincott Williams and Wilkins.

Biostatistics

Course Identification and General Information:	
Title: Biostatistics.	
Course Number: 20040313.	**Year:** Third.
Credit Units: 2+ 0 Units (1contact hours) per week.	**Level**: Fifth.
Pre-requisite: 20010222.	
Co-requisite: None.	
Aims: To provide basic concepts of statistics in general and specially in the pharmaceutical field, also the students should be able to carry out statistical calculations regarding any problems in the pharmaceutical field including various statistical tests for testing the hypotheses.	
Description: This course is designed to provide students with a basic understanding of biostatistics. The course covers descriptive statistics with concepts of dispersion, central tendency measurements. Graphical and tabular displays are also covered. Simple inferential statistics involving probability, sampling, confidence intervals and tests of significance are presented. Simple linear regression and correlations are also covered. Understanding concepts and rational for various methods are emphasized with use of computer statistical software (such as Excel, SPSS) for graphs and calculations.	
Learning Outcomes: At the end of the course the student should be able to: **a- Knowledge and understanding:** - Recognize the commonly used statistical tests and their basis. - Identify the different terms and methods of calculation of mean, median, mode, variance, standard deviation, normal distribution, estimation theories,	

tests of hypothesis and analysis variance.

- Describe the statistical versus clinical significance.
- Identify the individual variation, terminology, errors of sampling.

b- Cognitive Skills:

- Evaluate the statistical results.
- Interpret the test significance.
- Interpret the statistical application in biological assays.
- Correlate the statistical and clinical significance.
- Differentiate between mean, median, mode, variance, standard deviation, standard error and normal distribution.

c. Interpersonal Skills and Responsibility:

- Work constructively in a group, cooperating with their leaders and seniors.
- Show professional responsibility and respect the compliance to work through systems.
- Demonstrate critical thinking, problem- solving and decision-making abilities.
- Demonstrate creativity and time management abilities.

d. Communication, Information Technology and Numerical Skills:

- Communicate in a facilitative, effective, efficient, and educational manner with patients, their families and their relatives.
- Communicate clearly and succinctly to colleagues and other members of the health care team.
- Demonstrate written and oral communication skills.
- Use mathematical and numerical skills to apply in biostatistics studies.
- Demonstrate critical thinking, problem- solving and decision-making abilities.

- Demonstrate creativity and time management abilities. - Use modes of modern IT communication. - Perform library search and retrieval of information. **e. Psychomotor Skills:** - Calculate mean, median, mode, variance and standard deviation of a given data. - Organize and graph the given data. - Apply laws and probability models in developing methods of biostatistician interference (i.e. Conclusions from samples to the corresponding populations). - Manage data sets. - Calculate the mean, median, mode, variance, standard deviation, standard error and normal distribution. - Represent all the data in graphs.
Contents: Collection of data, types of variables, presentation of data mathematically and graphically, individual variation, statistical terminology, errors of sampling, probability concepts, distribution of random variables, non parametric methods, validity of results, analysis of data groups (standard deviation and standard error) and evaluation of variance and tests for significance, choice of proper tests for significance, statistical methods applied to biological assays and proper experimental design.
Minimum Course Requirements: 30 (2 x 15) Unit lectures (30 contact hours) per level.
Teaching and Learning Methods: 1-Lectures.

2-Class discussions.
Evaluation Methods: - Quizzes 30% - Midterm examination 30% - Final examination (written) 40%
Principal Text (Latest Edition): 1- Biostatistics, Student Solutions Manual: A Foundation for Analysis in the Health Sciences (Wiley Series in Probability and Statistics) , Wayne W. Daniel , Wiley.
Supplementary Texts (Latest Edition): 1-Biostatistics for the Biological and Health Sciences, Marc M. Triola and Mario F. Triola, Addison Wesley. 2- Biostatistics for the Health Sciences, R. Clifford Blair and Richard Taylor, Prentice Hall.

Pharmacy Law and Ethics

Course Identification and General Information:	
Title: Pharmacy Law and Ethics.	
Course number: 20020312.	**Year:** Third.
Credit Units: 1+ 0 Units (1 contact hours) per week.	**Level**: Fifth.
Pre-requisite: None.	
Co-requisite: None.	
Aims: To study the governmental law, regulations and ethics related to all aspects of the profession of pharmacy.	
Description: This course emphasizes the application of pertinent laws, rules and regulations to the practice of pharmacy in Saudi Arabia. It considers both the legal and ethical issues surrounding different practice situations. Also emphasized is where and how to obtain reliable and accurate information as laws, rules and regulations change. It also clarifies the obligations of pharmacists to use their knowledge and skills for the benefit of others to be fair and just in their services to the public. The student also, becomes familiar with governmental requirements for handling and some pharmaceuticals especially the poisons and narcotics.	
Learning Outcomes: Upon successful completion of the course, the student will be able to: **A-Knowledge and Understanding:** - Identify the basis of pharmacy law affecting the daily practice. - Illustrate the purpose and progress of pharmacy law. - Recognize responsibility, accountability, liability and limits under the law. - Know the laws, which govern the pharmacy profession. - Describe the ethical issues related to the development, promotion, sales,	

prescription and use of drugs.

- Recognize the legal responsibility of a pharmacist to counsel patients, monitor drug therapy, and ensure the confidentiality of patient's health information.
- Identify the registration of pharmacists, pharmacies, wholesale drug distribution warehouses, pharmaceutical companies and industries.
- Identify the criminal liability with narcotic, hypnotic and hallucinogenic drugs.
- List and clarify the obligations of pharmacists to use their knowledge and skills for the benefit of others to be fair and just in their services to the public.
- Recognize patient rights and the clinical pharmacist professional limitations.

b-Cognitive Skills:

- Apply the principles of professional behavior and ethical issues related the use of drugs and profession.
- Explain the ethical issues in delivery of patient-centered care and clinical research.
- Discuss the ethical principles of end-of-life care.
- Apply the laws a in the field pharmacy which control the behavior of pharmacist.
- Explain the registration for new pharmacy.
- Interpret the legislation affecting pharmacy and the laws and regulations relevant to pharmacy profession.
- Evaluate the legal responsibility of a pharmacist involved in marketing-related activities, the conduct of investigational clinical trials, and filings with regulatory agencies.
- Distinguish legal responsibilities from ethical responsibilities in the practice of pharmacy by analyzing relevant cases involving a pharmacist in community, hospital and industry practice settings.
- Appraise the steps for importing and exporting drugs.

- Discuss the registrations of new formulations.
- Participate in self-learning activities and in mentorship activities.

c. Interpersonal Skills and Responsibility:

- Carry out duties in accordance with legal, ethical, social, economic, and professional guidelines.
- Maintain a high level of professional competence and professionalism.
- Create a climate that encourages mutual respect, patience, kindness, dignity, confidence, dependability, social responsibility and commitment.
- Comprehend the sensitivity to issues regarding cultural diversity, employing appropriate attitudes, behaviors, and skills.
- Demonstrate professional justice, honesty, integrity and fidelity.
- Work constructively in a group, cooperating with their leaders and seniors.
- Work constructively in a group, cooperating with their leaders and seniors.
- Show professional responsibility and respect the compliance to work through systems.

d. Communication, Information Technology and Numerical Skills:

-Apply communication skills in interpersonal relationships to improve the clinical, economical, and humanistic outcomes of patients
- Maintain a suitable image in manner, dress, speech and relationships that is consistent with the pharmacy profession.
- Control the relation with patients and other medical representatives.
- Dress professionally when engaging patients, health-care professionals, colleagues and care givers.
- Identify one's strengths and weaknesses in communications and devise and implement strategies to improve skills.
- Use the language of medicine in communication with other health team members.

- Use modes of modern IT communication.
- Retrieve and evaluate information from different sources to improve professional competencies.

e- Psychomotor Skills:

- Perform in a level meet the international standards.
- Implement the concept of quality management in clinical pharmacy.
- Design ideal protocol for conflict of interest between the clinical pharmacists dealing with ethical and legal considerations.
- Solve the problems encountered in the pharmacy especially those related to the misunderstanding of the pharmacy laws.
- Manage the narcotics with high legal and ethical standards.
- Design business contracts by law.
- Inspect professionally the adulterated and misbranded drugs and malpractice.

Contents: Governmental laws, regulations, detailed laws that govern and affect the practice of pharmacy such as drugs, narcotics, poisons and medical devices. Legal basis of pharmacy practice, non-controlled prescription requirements and over the counter drug requirements with emphasis on the responsibilities and limits under the law of the pharmacist in the care of patients. principles of professional behavior, professional ethical issues related to the development, promotion, sales, prescription, and use of drugs, dealing with ethical dilemmas, conflict of interest, ethical issues in delivery of patient-centered care and clinical research, principles of end-of-life care, ethical issues in teamwork and professional ethics in order to help his/her future success in pharmacy practice.

Minimum Course Requirements: 15 (1 x 15) Unit lectures (15 contact hours) per level.

Teaching and Learning Methods:

1-Lectures.

2-Class discussions.

Evaluation Methods:

- Quizzes	30%
- Midterm examination	30%
- Final examination (written)	40%

Principal Text (Latest Edition):

1- FASTtrack: Law and Ethics in Pharmacy Practice, Ruth Rodgers, Catherine Dewsbury, and Andrew Lea, Pharmaceutical Press.

Supplementary Texts (Latest Edition):

1-Law and Ethics for Pharmacy Technicians, Jahangir Moini, Delmar Cengage Learning.

2-Essentials of Law and Ethics for Pharmacy Technicians, Kenneth M. Strandberg, CRC Press.

Microbiology

Course Identification and General Information:	
Title: Microbiology.	
Course Number: 20030321.	**Year:** Third.
Credit Units: 1 + 1 Units (4 contact hours) per week.	**Level**: Sixth.
Pre-requisite: None.	
Co-requisite: None.	
Aims: To enable the student to understand basic and pharmaceutical microbiology.	
Description: This course provides an overview of basic and pharmaceutical microbiology. The study will be focused on bacterial taxonomy, basic structure of bacterial cell, bacterial physiology, bacterial genetics, growth curve, general properties of virus and fungi. In addition, methods of sterilization and sterilizing agents, principles of culture, staining, microscopy, sterilization of media and equipment; the cultural, morphological, biochemical characteristics and identification scheme for bacteria, fungi, and viruses.	
Learning Outcomes: At the end of the course, the student should be able to: **a- Knowledge and Understanding*:*** - Recognize microbial taxonomic classification, structure and morphology. - Outline the microbial metabolism. - Mention different media for isolation and identification of different organisms. - Identify microbial genetics and the uses of genetic engineering. - Define different methods of disinfections and sterilization. - Describe the different levels of host-parasite relationship. - State virulence factor of each organism.	

b- Cognitive Skills:

-Differentiate between Gram positive, Gram negative and acid fast organisms.

-Integrate knowledge and making informed judgments about microbiology in everyday life.

-Discuss the knowledge about disinfectants and sterilization to in pharmacy practice.

-Predict expected results.

c- Interpersonal Skills and Responsibility:

-Work constructively in a group, cooperating with their leaders and seniors.

- Design in certain situations, together with other specialties an appropriate treatment plan thus initiating the value of team work and compliance to work through systems.

-Counsel the patients and their families about different management strategies and methods of prevention of their illness.

d- Communication, information Technology and Numerical Skills:

- Communicate in a facilitative, effective, efficient, and educational manner with patients and their families.

- Communicate clearly and succinctly to colleagues and other members of the health care team.

- Use modes of modern IT communication.

e. Psychomotor Skills:

-Handle and describe microorganisms safely.

- Perform general laboratory safety and aseptic techniques protocols.

- Present data in an appropriate form (graphs, tables, figures, or descriptive paragraphs).

- Draw appropriate conclusions based on the results obtained in the laboratory. - Present lab. results or findings in the laboratory in reasonable reports. - Advise the patients on the effective ways to avoid infections. - Calibrate the dose effect relationship. - Perform in a level meet and consistent with the international standards. - Implement the concept of quality management in clinical pharmacy.
Contents: History, properties, taxonomy, classification, morphology, physiology, of microorganisms. Genetics of microorganisms, viruses and fungi, culture media, growth, metabolism and multiplication of these organisms. Pharmaceutical microbiology (fermentation, sterilization, disinfection, antisepsis, preservation, , evaluation of drug and analytical microbiology, evaluation of antiseptics, preservatives, disinfectants, sterilants). **Practical:** Staining methods, laboratory microbiological apparatus, aseptic technique, different types of culture media, bacterial culture techniques, isolation of microorganism and evaluation of disinfectants.
Minimum Course Requirements: 15 (1 x 15) Unit lectures and 45 (3 x15) practical hours per level.
Teaching and Learning Methods: 1- Lectures 2-Small group discussions. 3-Practical sessions.
Evaluation Methods: - Quizzes 20%

- Midterm examination	20%
- Practical examinations	20%
- Final examination (written)	40%

Principal Text (Latest Edition):

1- Microbiology: Principles and Explorations, Jacquelyn G. Black, Wiley.

Supplementary Texts (Latest Edition):

1-Microbiology: A Systems Approach, Marjorie Kelly Cowan and Kathleen Park Talaro, McGraw-Hill Science**.**

2- Pharmaceutical Microbiology, S.S. Purohit, Agrobios India.

Medicinal Chemistry-2

<table>
<tr><td colspan="2">Course Identification and General Information:</td></tr>
<tr><td colspan="2">Title: Medicinal Chemistry-2</td></tr>
<tr><td>Course Number: 20040321.</td><td>Year: Third.</td></tr>
<tr><td>Credit Units: 2+ 1 Units (5 contact hours) per week.
Pre-requisite: 20040312.</td><td>Level: Sixth.</td></tr>
<tr><td colspan="2">Co-requisite: 20040322.</td></tr>
<tr><td colspan="2">Aims: This course aims to provide structure activity relationship, mode of action, the toxicity and side effects of drugs acting on the central nervous system, vitamins, hormones and hypoglycemics.</td></tr>
<tr><td colspan="2">Description: The study of the chemical structures, nomenclature, synthesis, interaction of drugs with the receptor sites, structure-activity relationships and the metabolites of the different chemical classes.</td></tr>
<tr><td colspan="2">Learning Outcomes:
At the end of the course, the student should be able to:
a-Knowledge and Understanding:
- Gain knowledge about the physico-chemical properties of drug molecules in relation to drug absorption, distribution, metabolism, and excretion.
- Illustrate the chemical structure, nomenclature, pharmacophoric moieties.
- Identify mode of action of drugs and structure activity relationship in relation to drug-target interactions.
- Demonstrate the process of drug design and synthesis.
- Enumerate methods for the analysis of drugs.
- Recognize the chemical basis of pharmacology and therapeutics.</td></tr>
</table>

- Mention the chemical and metabolic instabilities in each class of drugs.
- Outline the pharmacologic effects of drugs acting on the selected body systems.
- Describe the toxicity and side effects of the drugs.
- Identify the chemical pathways of drug metabolism.

b- Cognitive Skills:

- Predict pharmacokinetic and pharmacodynamic properties of the drugs.
- Discuss the methods of drug synthesis and analysis.
- Explain the biological activity from general structure or pharmacophore.
- Correlate the structural features of a compound to physicochemical properties that may affect its biological response.
- Participate in self-learning activities

c. Interpersonal Skills and Responsibility:

- Work constructively in a group, cooperating with their leaders and seniors.
- Show professional responsibility and respect the compliance to work through systems.
- Demonstrate critical thinking, problem- solving and decision-making abilities.

d. Communication, Information Technology and Numerical Skills:

- Communicate in a facilitative, effective, efficient, and educational manner with patients, their families and their relatives.
- Communicate clearly and succinctly to colleagues and other members of the health care team.
- Provide education to a group of patients or healthcare providers.
- Work in a team during laboratory demonstration.
- Use the language of medicine in communication with other health team members.
- Use modes of modern IT communication.

- Perform library search and retrieval of information.

e. Psychomotor Skills:

- Calibrate the activity of related compounds within a pharmacological class based on structural activity relationships.
- Examine a drug structure and deduce relative receptor affinity, metabolic pathways, distribution potential, and potential side effects or toxicities based on functional group properties and structural similarity to other pharmacophores.
- Justify and design the therapeutic recommendations based on an understanding of drug chemistry.
- Implement methods of analysis of therapeutic agents.
- Design analytical methodology for assay of active pharmaceutical ingredients.
- Analyze drugs in different dosage forms.
- Perform in a level meet and consistent with the international standards.

Contents: 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, vitamins, prostaglandins, steroidal and non-steroidal hormones, adrenocorticoids, oral hypoglycemic, anti-thyroid agents and drug design for related drugs.

Practical: Quantitative determination of selected drugs either in crude form or in different pharmaceutical dosage forms including: titremetric, colorimetric, refractometric, potentiometric, spectrophotometeric and chromatographic methods of analysis.

Minimum course requirements: 30 (2 x 15) Unit lectures and 45 (3 x 15) practical hours per level.

Teaching and Learning Methods:

1-Lectures.

2-Small group discussions.

3-Practical sessions.

Evaluation Methods:

- Quizzes	20%
- Midterm examination	20%
- Practical examinations	20%
- Final examination (written)	40%

Principal Text (Latest Edition):

1- Foye's Principles of Medicinal Chemistry, Thomas L Lemke and David A. Williams, Lippincott Williams & Wilkins.

Supplementary Texts (Latest Edition):

1-Medicinal Chemistry: A Molecular and Biochemical App, roach, Thomas Nogrady and Donald F. Weaver, Oxford University Press, USA.

2-Fundamentals of Medicinal Chemistry, Gareth Thomas, Wiley-Blackwell.

Biopharmaceutics and Pharmacokinetics

Course Identification and General Information:	
Title: Biopharmaceutics and Pharmacokinetics.	
Course Number: 20010321.	**Year:** Third.
Credit Units: 3+ 0 Units (3 contact hours) per week.	**Level**: Sixth.
Pre-requisite: 20010311.	
Co-requisite: None.	
Aims: To provide comprehensive knowledge on absorption, distribution, metabolism and excretion of drugs and the basic concepts of pharmacokinetics calculations of pharmacokinetic parameters.	
Description: This course introduces students to the principles of biopharmaceutics and pharmacokinetics. During this course, students learn how to calculate and interpret pharmacokinetic parameters from blood/ urine. It will also cover the elementary compartmental modeling design and how to adjust drug dosage regimens, as well as predict and explain the mechanism(s) involved in drug interactions.	
Learning Outcomes: Upon successful completion of this course, the student should be able to: **a-Knowledge and Understanding:** - Identify the factors affecting absorption, distribution, metabolism and excretion of drugs - Describe the different pathways of drug metabolism. - Define the methods of studying drug metabolism. - Recognize the difference between the open and closed system. - Outline the basic concepts of pharmacokinetics.	

- Mention drug product bioequivalency.
- Gain knowledge about the design of new drugs and their formulations as well as the proper use of medicines in the treatment of disease and improvement of patient's quality of life.
- Recognize the therapeutic management, case studies and drug monitoring for hospital patients.

b- Cognitive Skills:

- Appraise the biopharmaceutic considerations in drug product design.
- Predict the relationship between product design and the drug absorption, distribution and elimination.
- Derive the pharmacokinetics parameters and models that best describe the process of drug absorption, distribution and elimination.
- Analyze and interpret information needed in pharmacy practice.
- Evaluate critically the biopharmaceutical studies.
- Solve problems in different disciplines of pharmacy after their recognition, analysis and finding the appropriate strategies for their solution.
- Explain and discuss the results of the in-vitro and in-vivo studies.

c. Interpersonal Skills and Responsibility:

- Demonstrate critical thinking, problem- solving and decision-making abilities.
- Demonstrate creativity and time management abilities.
- Work constructively in a group, cooperating with their leaders and seniors.
- Show professional responsibility and respect the compliance to work through systems.

d. Communication, Information Technology and Numerical Skills:

- Communicate in a facilitative, effective, efficient, and educational manner with

patients, their families and their relatives.

- Communicate clearly and succinctly to colleagues and other members of the health care team.
- Use the language of medicine in communication with other health team members.
- Use the numeric skills and computation methods such as natural logarithms, exponential and mathematical functions including differentiation and integration.
-Use modes of modern IT communication.
- Perform library search and retrieval of information.

e. Psychomotor Skills:

- Design the dosage regimens of drugs using pharmacokinetic and biopharmaceutic parameters.
- Calibrate the influence of different physicochemical, physiological and dosage form factors on the drug bioavailability.
- Design bioavailability and bioequivalence studies.
- Assess the accumulation of drugs in laboratory animals in evaluation of chronic toxicity of new drugs.
- Perform accurate evaluation of the physicochemical characteristics of drug substances and drug product.
- Calibrate and adjust the dose.
- Perform in a level meet and consistent with the international standards.

Contents: Basic concepts of pharmacokinetics with a special emphasis on the different pharmacokinetic models. Absorption, distribution, elimination (metabolism and excretion), calculations of pharmacokinetic parameters of these processes will be discussed, biopharmaceutics, bioavailability, and drug disposition including the effects of the physicochemical properties of the drug; the formulation factors the dosage form, the route of administration and the physiological factors

on the rate and extent of systemic drug absorption. Oral and some other non-oral delivery systems will be covered in this course. Graphical and mathematical data analysis will be employed throughout the curse using on appropriate computer software (e.g. Excel). One- and two-compartment models following different routes of administration will be discussed.
Minimum Course Requirements: 45 (3 x 15) Unit lectures (45 contact hours) per level.
Teaching and Learning Methods: 1-Lectures. 2-Small group discussions.
Evaluation Methods: - Quizzes 30% - Midterm examination 30% - Final examination (written) 40%
Principal Text (Latest Edition): 1- Principles and Applications of Biopharmaceutics and Pharmacokinetics, H.P. Tipnis and Bajaj Amrita**,** Career Publications**.**
Supplementary Texts (Latest Edition): 1-Biopharmaceutics and Pharmacokinetics, A.R. Paradkar and S.R. Bakliwal, Nirali Prakashan, Nirali Prakashan Publisher. 2-Biopharmaceutics and Pharmacokinetics: A Practical Guide for Teachers and Support Staff, P.L. Madan, Jaypee Brothers Medical Pub.

Pathophysiology-2

<table>
<tr><td colspan="2">Course Identification and General Information</td></tr>
<tr><td colspan="2">Title: Pathophysiology-2.</td></tr>
<tr><td>Course Number: 15020321.</td><td>Year: Third.</td></tr>
<tr><td>Credit Units: 3+ 0 Units (3 contact hours) per week.</td><td rowspan="2">Level: Sixth.</td></tr>
<tr><td>Pre-requisite: 20020311.</td></tr>
<tr><td colspan="2">Co-requisite: None.</td></tr>
<tr><td colspan="2">Aims: To provide basic knowledge on mechanisms, etiologies, pathogenesis, pathophysiologcal changes, risk factors and complications of system specific diseases commonly encountered disease states and to develop skills of observation, interpretation and integration needed to analyze human diseases.</td></tr>
<tr><td colspan="2">Description: This course provides the students with the physiological changes that underline pathologic conditions. The relationship between the pathophysiology and the clinical picture and laboratory findings for system specific diseases are also discussed.</td></tr>
<tr><td colspan="2">Learning Outcomes:
Upon successful completion of the course, students will be able to:
a- Knowledge and Understanding:
- Identify the etiology of diseases and how the disease develops in response to the etiologic agents.
- Describe and discuss characteristic gross and microscopic pictures of different pathologic lesions within specific organ system and the associated functional disturbances.
- Recognize the fate, the complications of immune system, renal, endocrine, hematologic and central nervous systems in disease states.</td></tr>
</table>

- Outline the basis of diseases in pediatric and geriatric.

b- Cognitive Skills:

- Evaluate and interpret a pathological report.
- Integrate the data from symptoms, signs and investigations**.**
- Distinguish minor illnesses from those which require prompt medical intervention.
- Participate in self-learning activities**.**

c. Interpersonal Skills and Responsibility:

- Work constructively in a group, cooperating with their leaders and seniors.
- Show professional responsibility and respect the compliance to work through systems.
- Develop the habit of self audit and participate in the different processes.
- Demonstrate critical thinking, problem- solving and decision-making abilities.
- Demonstrate creativity and time management abilities.

d. Communication, Information Technology and Numerical Skills:

- Communicate in a facilitative, effective, efficient, and educational manner with patients, their families and their relatives.
- Communicate clearly and succinctly to colleagues and other members of the health care team.
- Use the language of medicine in communication with other health team members.
- Use modes of modern IT communication.
- Perform library search and retrieval of information.

e. Psychomotor Skills:

-Take a complete history for a given patient.

- Analyze various gross and microscopic pathologic data.

- Present data in an appropriate form (graphs, tables, figures, or descriptive paragraphs).
- Investigate and report different pathological cases.
- React appropriately according to the seriousness of pathologic diagnosis in acceptable human manner.
- Implement the concept of quality management in clinical pharmacy daily practice.

Contents: Emphasis is placed on the in disease as well as on the disorders that occur to normal physiology of the renal, endocrine, hematology, immune and central nervous systems. Basis for diseases in pediatric and geriatric.

Minimum Course Requirements: 45 (3 x 15) Unit lectures (45 contact hours) per level.

Teaching and Learning Methods:

1-Lectures.

2-Small group discussions.

Evaluation Methods:

- Quizzes	30%
- Midterm examination	30%
- Final examination (written)	40%

Principal Text (Latest Edition):

1- Pathophysiology, Lee-Ellen C. Copstead-Kirkhorn RN and Jacquelyn L. Banasik, Saunders.

Supplementary Texts (Latest Edition):

1-Study Guide for Pathophysiology: The Biological Basis for Disease in Adults and Children by Kathryn L. McCance RN and Sue E. Huether RN, Mosby.

2- Pathophysiology of Disease An Introduction to Clinical Medicine, (Lange Medical Books), Stephen J. McPhee and Gary D. Hammer, McGraw-Hill Medical.

Pharmacology-2

Course Identification and General Information:	
Title: Pharmacology-2.	
Course Number: 20040322.	**Year:** Third.
Credit Units: 3+ 1 Units (6 contact hours) per week.	**Level**: Sixth.
Pre-requisite: 20040311.	
Co-requisite: 20040321.	
Aims: To provide general knowledge about drugs acting on the central nervous system, drug abuse, endocrine system, locally acting drugs.	
Description: It provides information about the mechanism of action, pharmacologic effects, and side effects of the various drug classes. The drugs will be analyzed to permit the choice of a certain agent for the treatment of a certain disease.	
Learning Outcomes: Upon successful completion of the course, students will be able to: **a-Knowledge and Understanding:** - Gain the information and basic knowledge about drugs from different categories. - Recognize the basic pharmacokinetic and pharmacodynamic parameters of drugs. - Mention the basic principles of structure activity relationship of drugs. - Identify the role of pharmacology in the choice of drugs used for the treatment of disease - Recognize and identify the pharmacological actions, therapeutic uses, adverse effects of drugs on different body systems. - List the drug-target as well as the drug-drug interactions. - Gain the basic knowledge of how to utilize of physiology and pharmacovigilance	

in the proper selection and rationale use of drugs.

b- Cognitive Skills:

- Evaluate and interpret clinical cases.
- Explain the mechanism of action of drugs.
- Interpret and evaluate drug effects at all levels of biological organization.
- Predict any adverse reactions and contra-indications of drugs from different pharmacological classes.
- Discuss therapeutically relevant details of pharmacological agents used in pharmacy practice.
- Criticize different treatment modalities in order to provide optimum drug therapy for patients and avoid therapeutic failure.
- Plan to avoid the adverse effects and drug interactions due to the use of drugs.

c. Interpersonal Skills and Responsibility:

- Demonstrate critical thinking, problem- solving and decision-making abilities.
- Demonstrate creativity and time management abilities.
- Work creatively in a group, cooperating with their leaders and seniors.
- Show professional responsibility and respect the compliance to work through systems.

d. Communication, Information Technology and Numerical Skills:

- Communicate in a facilitative, effective, efficient, and educational manner with patients, their families and their relatives.
- Communicate clearly and succinctly to colleagues and other members of the health care team.
- Use the language of medicine in communication with other health team members.
- Work in a team during laboratory demonstration.

- Use modes of modern IT communication.
- Retrieve information.

e. Psychomotor Skills:

- Handle laboratory animals in a correct and safe way to obtain optimum reproducible results without harmful effects on animals.
- Design and perform different in-vitro and in- vivo pharmacological experiments on different drug classes.
- Assess the mechanism of action and pharmacological actions of drugs.
-Advise and recommend patients about the rationale use of drugs.
- Prioritize the drug of choice in each case for the different diseases.
- Utilize therapeutic agents in a rationale and responsible manner in treatment of patients.
- Solve health care problems with a multidisciplinary and integrative approach.
- Write structural reports or essay according to the standard scientific guidelines and present reports in-group meetings.
- Implement the concept of quality management in clinical pharmacy daily practice.
- Perform in a level that will be consistent with the international standards.

Contents: Drugs acting on central nervous system, antipyretic analgesic drugs, drug of abuse, anti-inflammatory agents, local anesthetics and antihyperlipidaemic drugs. Locally acting drugs and drugs acting on G.I.T., respiratory tract, endocrine, reproductive systems, blood and blood forming elements.

Practical: Effects of drugs on the C.N.S, analgesics, local anesthetics and other related practical experiments.

Minimum Course Requirements: 45 (3 x 15) Unit lectures and 45 (3 x 15)

practical hours per level.

Teaching and Learning Methods:

1-Lectures.

2-Class group discussions.

3-Practical sessions.

Evaluation Methods:

- Quizzes	20%
- Midterm examination	20%
- Practical examinations	20%
- Final examination (written)	40%

Principal Text (Latest Edition):

1-Goodman & Gilman's The Pharmacological Basis of Therapeutics, Joel Griffith Hardman, Lee E. Limbird, Alfred G. Gilman. Publisher**,** MacMillan Publishing Co.

Supplementary Texts (Latest Edition):

1- Lippincott's Illustrated Reviews: Pharmacology,(Lippincott's Illustrated Reviews Series) by Richard A Harvey, Pamela C. Champe, Richard Finkel, and Luigi X. Cubeddu**,** Lippincott Williams & Wilkins.

2- Principles of Pharmacology: The Pathophysiologic Basis of Drug Therapy, David E. Golan, Armen H. Tashjian, and April W. Armstrong, Lippincott Williams & Wilkins.

Professional Communication Skills

Course Identification and General Information:	
Title: Professional Communication Skills	
Course Number: 20020322.	**Year:** Third.
Credit Units: 1+ 0 Units (1 contact hours) per week.	**Level**: Sixth.
Pre-requisite: None.	
Co-requisite: None.	
Aims: To provide the student with the principles of communication skills in pharmacy practice and the basic steps for patient counseling and education.	
Description: This course is designed to provide students with an opportunity to learn, observe, apply and receive feedback on effective communication skills and techniques. Students will be instructed on important principles required to develop positive relationships and promote positive therapeutic outcomes: engage, counsel, empathize, educate and enlist. It improves listening skills, apply essential knowledge, and attitudes required for a successful professional career in the pharmacy practice.	
Learning Outcomes: At the end of the course, the student should be able to: **a. Knowledge and Understanding:** - Recognize how to educate the patient on use of therapeutic agents. - Identify how to educate the patients on the prevention of communicable disease. - Gain knowledge about education of patients about the abuse of drugs and narcotics. - Outline the acute primary care to patients who have episodic self limiting diseases.	

- Describe the chronic primary care to patients who have chronic diseases.
- Mention the recommendation about the therapy and medical care to the patients.

b-Cognitive Skills:

- Analyze and interpret verbal messages for content and context.
- Develop nonverbal, verbal, written and graphic communication skills.
- Participate in self-learning activities.
- Develop and convey ideas and information.

c. Interpersonal Skills and Responsibility:

- Carry out duties in accordance with legal, ethical, social, economic, and professional guidelines.
- Apply the interpersonal relationships to improve the clinical, economical, and humanistic outcomes of patients.
- Work constructively in a group, cooperating with their leaders and seniors.
- Demonstrate critical thinking, problem- solving and decision-making abilities.
- Demonstrate creativity and time management abilities.
- Show professional responsibility and respect the compliance to work through systems.
- Demonstrate effective listening skills.
- Demonstrate professionalism in personal conduct and appearance.
- Act and communicate in a self-assured, confident manner.
- Demonstrate accountability for actions and decisions.
- Students can speak effectively in front of a group or as a part of a group.

d. Communication, Information Technology and Numerical Skills:

- Communicate in a facilitative, effective, efficient, and educational manner with patients, their families and their relatives.

- Communicate clearly and succinctly to colleagues and other members of the health care team.
- Use communication skills in interpersonal relationships to improve the clinical, economical, and humanistic outcomes of patients.
- Maintain a suitable image in manner, dress, speech and relationships that is consistent with the pharmacy profession
- Demonstrate active counseling skills.
- Present oral communications in a clear, concise and logical manner at the level appropriate for the audience.
- Use the language of medicine in communication with other health team members.
- Use modes of modern IT communication.
- Retrieve information.
- Record information accurately, legibly and succinctly.
- Use multimedia technology to communicate effectively.

e. Psychomotor Skills:

- Take a complete history for a given patient.
- Use correct grammar, punctuation, spelling, sentence and paragraph structure.
- Write clearly and concisely.
- Educate patients, care givers, and other health care practitioners.
- Write personal response/reflection papers, analytical essays, and persuasive essays.
- Advise and recommend the patients about pharmaceutical care services.
- Implement the concept of quality management in clinical pharmacy daily practice.
- Perform in a level meet and consistent with the international standards.

Contents: Communication skills (principles, elements, oral, written, importance, methods, models, barriers, promotions). Health literacy, communicating with diverse patients, families, pharmacists, and other health professionals, interviewing techniques, active listening skills and empathy, assertiveness and problem-solving techniques, patient education and counseling, interpersonal persuasion, cultural influences on communication of health information; cultural competency, group presentation skills, strategies for handling difficult situations, documentation of pharmacist recommendations and consultations and
principles of behavior modification.

Minimum Course Requirements: 15 (1 x 15) Unit lectures (15 contact hour) per level.

Teaching and Learning Methods:

1-Lectures.

2-Class discussions.

Evaluation Methods:

- Quizzes	30%
- Midterm examination	30%
- Final examination (written)	40%

Principal Text (Latest Edition):

1-Communication Skills in Pharmacy Practice: A Practical Guide for Students and Practitioners, Robert S Beardsley, Carole Kimberlin, and William N Tindall, Lippincott Williams & Wilkins.

Supplementary Texts (Latest Edition):

1-Communication Skills for Pharmacists: Building Relationships, Improving Patient Care, Bruce A. Berger, American Pharmacists Association.

2- Communication Skills in Pharmacy Practic, Robert S. Beardsley, Lippincott William.

Clinical Biochemistry and Nutrition

Course Identification and General Information:	
Title: Clinical Biochemistry and Nutrition.	
Course Number: 20040323.	**Year:** Third.
Credit Units: 2+ 0 Units (2 contact hours) per week.	
Pre-requisite: 20040221.	**Level**: Sixth.
Co-requisite: None.	
Aims: To provide the student with knowledge on the use of biochemical molecules as with other clinical features in diagnosis. In addition to nutritional aspects and disorders, nutritional assessment and nutritional therapy.	
Description: The course deals with biochemical changes occurring in human body under pathological conditions and the related diagnostic lab parameters. The course reviews the foundation of nutrition with emphasis on nutritional aspects of food stuffs. Nutrition for growth and developments and nutrition/clinical care of selected disease states will be covered. Institutionalized nutritional therapy in specific disease states such as metabolic stress, liver and gall bladder diseases, renal disease and the care of premature neonates will be addressed. The role of pharmacist as a "nutritionist" and specialist in drug-nutrition interaction will be emphasized.	
Learning Outcomes: Upon successful completion of the course, the student should be able to: **a- Knowledge and understanding:** - Define normal and abnormal bodily functions in healthy and diseased states. - Identify the biochemical features of disease and appropriate medical intervention - Recognize techniques of biochemistry lab and their applications in addressing	

issues related to human diseases.

- Mention the different case studies of biochemical abnormalities in various diseases.
- List the basic elements of nutrition.
- Recognize and distinguish various types of malnutrition.
- Differentiate between different types of malnutrition.
- Enumerate functions, sources and recommended daily allowances.

B- Cognitive skills:

- Explain how to prevent diseases and their complications and health promotion among public.
- Appraise the biochemical information quickly.
- Distinguish minor illnesses from those need medical intervention.
- Evaluate and interpret abnormal blood tests results.
- Apply biochemistry knowledge in the field of medicinal lab.
- Interpret clinical information needed to reach logical deductions in cases diagnosis.
- Suggest clear advice and critical decisions about patient's state of health.
- Discuss steps of nutritional assessment.
- Evaluate the effect of psychosocial factors on nutritional steps.
- Compare and contrast clinical manifestations of malnutrition.
- Evaluate drug-nutrient interactions and make appropriate recommendations for management.

c. Interpersonal Skills and Responsibility:

- Work constructively in a group, cooperating with their leaders and seniors.
- Show professional responsibility and respect the compliance to work through systems.

- Demonstrate critical thinking, problem- solving and decision-making abilities.
- Demonstrate creativity and time management abilities.
- Demonstrate active listening skills.
- Carry out duties in accordance with legal, ethical, social, economic, and professional guidelines.
- Demonstrate respect for patients and other healthcare personnel.
- Practice self-assessment by recognizing one's limitation.

d. Communication, Information Technology and Numerical Skills:

- Effectively present group presentations using appropriate media aids to peers and health care professionals.
- Effectively communicate information in writing.
- Apply appropriate interaction behavior and assertiveness in communications with health care professionals.
- Demonstrate effective counseling skills.
- Collaborate with the patient and other health care professionals in the drug use decision making process.
- Effectively educate patients about their medications to ensure safe and effective use and compliance.
- Provide drug information to health care professionals.
- Communicate with different personalities and attitudes.

e. Psychomotor Skills:

- Maintain health by means of life-style and adequate balanced nutrition.
- Handle chemicals, blood samples and biological fluids safely
- Conduct standard biochemistry laboratory procedures and instrumentation
- Implement different methods of analyzing blood sample constituents for efficient

diagnostic testing. - Perform nutritional assessment accurately. - Advise the patient about his condition, diet regimen and life style and write a nutritional consult for a patient including conclusions and recommendations. - Calculate nutritional needs and caloric content of nutrient sources. - Perform clinical laboratory data and their critical evaluation in term of their significance and their theoretical basis - Produce laboratory reports and presentation of laboratory information.
Contents: fundamentals of laboratory medicine and its importance to screening, diagnosis and evaluation of patients, Clinical enzymology, cardiac markers, the liver, lipids & lipoproteins disorders, prenatal diagnosis and inborn errors of metabolism, disorders of carbohydrate metabolism, endocrine disorders, , oxidative stress and antioxidants, tumor markers. Introduction, nutritional aspects and disorders, nutritional assessment, nutritional therapy, parenteral and enteral nutrition for the hospitalized patient, (principles, concepts of parenteral and enteral nutrition feeding, total parenteral nutrition (TPN), calculations, admixture incompatibilities, chemotherapy solution, quality assurance). Role of the hospital pharmacist in formulation and administration of parentral and enteral nutrition and patient monitoring.
Minimum Course Requirements: 30 (2 x 15) Unit lectures (30 contact hours) per level.
Teaching and Learning Methods: 1-Lectures. 2-Class discussions.
Evaluation Methods:

- Quizzes	30%
- Midterm examination	30%
- Final examination (written)	40%

Principal Texts (Latest Edition):

1-Clinical Biochemistry, Allan Gaw, Michael J. Murphy Edin, Robert A. Cowan, and Denis St. J. O'Reilly, Churchill Livingstone.

2- Nutrition: An Applied Approach, Janice Thompson and Melinda Manore**,** Benjamin Cummings

Supplementary Texts (Latest Edition):

1-Clinical Biochemistry, (Biomedical science explained series), R. Luxton, Scion Publishing Ltd.

2-Pharmacotherapy: A Pathophysiologic Approach, Joseph T. Dipiro, Robert L. Talbert, and Michael Posey, Appleton and Lange: Norwalk, Connecticut. McGraw-Hill Medical Publisher.

Introductory Pharmacy Practice Experience

Title: Introductory Pharmacy Practice Experience (Internship-1, IPPE-1).
Year: Third Year.
Level: Summer Internship-1.
Credit Units: zero; (about 50 contact hours) per week.
Prerequisites: None.
Aims: To incorporate the student with the medication therapy management and have an active role in patient care and medication management.
Description: Pharmacy internship program established to provide the students with a structured learning practical experience intended to provide a comprehensive exposure to community pharmacy. Students should be committed to participate in an early pharmacy practice experiences for a minimum of 200 hours training in a community pharmacy during the summer of the third year. The practice strengthens their patient care skills and familiarizes them with the fundamentals of pharmacy practice in the community pharmacy to provide early exposure to the philosophy and practice of the profession of pharmacy. IPPE-1 is interfaced with didactic courses leading to the advanced pharmacy practice experiences.
Learning Outcomes: Upon successful completion of the internship, the student should be able to: **a-Knowledge and Understanding:** - Identify how to dispense medicines. - Recognize the pharmaceutical products. - Outline the drug products by their generic, trade and/or common name. - Describe the rationale use of drugs.

- Mention the use of automation in pharmacy practice.
- Define the medication errors and adverse drug reactions.
- Outline the professional role of the pharmacist in the community pharmacy.

b-Cognitive Skills:

- Apply commitment to lifelong learning with the ability to use knowledge, reflect upon and develop existing skills and adapt to a changing environment.
- Evaluate by observing the student's interaction with patients.
- Interpret laboratory data.
- Develop and support the implementation of a therapeutic plan.
- Evaluate and design how medication errors are reported and handled.
- Demonstrate the pricing structure/ revenue/ cost for pharmaceuticals.
- Discuss the pharmacists' roles and responsibilities in clinical trials.
- Interpret mechanism of action, indications, contraindications, adverse effects, and drug interactions when reviewing a patient's medication list.
- Appraise the treatment goals and appropriate follow up plan for patients.

c. Interpersonal Skills and Responsibility:

- Carry out duties in accordance with legal, ethical, social, economic, professional guidelines under the framework in the context of the Saudi pharmacy practice environment.
- Demonstrate strong problem solving skills and ability to apply professional judgment in a range of areas including prescription, therapeutic and legal and ethical problems.
- Demonstrate critical thinking skills.
- Demonstrate leadership skills that will enable them to mentor other students and supervise pharmacy staff.
- Use listening skills consistently when performing professional functions.

- Demonstrate respect for patients and other healthcare personnel.
- Utilize time efficiently and is punctual.
- Demonstrate accountability for actions and decisions.
- Interact and communicate with health care professionals.
- Exhibit professionalism and social responsibility.

d. Communication, Information Technology and Numerical Skills:

- Counsel the patients and their families about different management strategies and methods of prevention of their illness.
- Consult with patients regarding self-care products**.**
- Use informatics to support communication.
- Work in a team during daily internship.
- Use multimedia technology to communicate effectively.
- Adhere to professional attire.
- Use the language of medicine in communication with other health team members.

e. Psychomotor Skills:

- Dispense medicines.
- Prepare pharmaceutical prescriptions.
- Provide primary health care.
- Educate the patients the rationale use of drugs, drug abuse and drug misuse.
- Manage the drug regimen through monitoring and assessing patient information.
- Perform in a level meet the international standards.

Contents: Processing and dispensing medication orders, creating patient profiles using information, interpreting and evaluating patient information, assessing patient health literacy and compliance, interacting with pharmacy technicians in

the delivery of pharmacy services, interviews with real patients, service learning, real practice experiences in community, and long-term care pharmacies.
Minimum Requirements: 200 Training hours per the summer.
Evaluation methods:
- Preceptor evaluations.
Principal Text (Latest Edition):
1- Community Pharmacy Practice Case Studies, Jean-Venable Kelly R. Goode, Lynne M. Roman, and Kristin W. Weitzel, American Pharmacists Association.
Supplementary Texts (Latest Edition):
1- Community Pharmacy: Symptoms, Diagnosis and Treatment , Paul Rutter, Churchill Livingstone. 2- Drug Misuse and Community Pharmacy, Janie Sheridan and John Strang, Taylor & Francis.

Pharmacology-3

Course Identification and General Information:	
Title: Pharmacology-3.	
Course Number: 20040411.	**Year:** Fourth.
Credit Units: 3+ 0 Units (3 contact hours) per week.	**Level**: Seventh.
Pre-requisite: 20040322.	
Co-requisite: 20040412.	
Aims: To provide the pharmacological basis for the use of anti-bacterial, anti-parasitic, anti-viral and anti-neoplastic agents.	
Description: This course is designed to give basic knowledge on the principles of pharmacology, pharmacokinetics, pharmacological actions, mechanism of action, adverse effect and contraindication of the selected drug groups.	
Learning Outcomes: At the end of the course, the student should be able to know: **a-Knowledge and Understanding:** - Gain knowledge about the mechanism of action of drugs in various categories. - Identify the basic principles of drug actions and pharmacokinetic of the drugs. - Understand the pharmacological basis for the use of different drugs. - Recognize the structure activity relationship of the selected drugs on different body systems. - Demonstrate the drug-target interactions. - Mention the role of pharmacology in drug choice and the treatment of disease. - Describe the therapeutic uses, adverse effects and dosage of drugs from different pharmacological classes. - Recognize the contraindication of the drugs.	

- Outline the basic principles of drug –drug and drug- food interactions.
- Recognize the general principles of clinical or applied pharmacology.
- Illustrate clinical features of some diseases with appropriate medical intervention in emergency situations.
- Identify the drug discovery and development.

b- Cognitive Skills:

- Explain the mechanism of action of drugs.
- Predict drug effects at all levels of biological organization.
- Predict and evaluate the adverse reactions and contra-indications of drugs from different pharmacological classes.
- Distinguish minor illnesses from those requiring prompt medical intervention.
- Analyze, evaluate and interpret clinical cases.
- Criticize different methods for the management of emergency situations.
- Apply and utilize the knowledge of physiology and pharmacology in the proper selection and use of drug in various disease conditions.
- Participate in self-learning activities.

c. Interpersonal Skills and Responsibility:

- Demonstrate critical thinking, problem-solving and decision-making skills.
- Demonstrate creativity and time management abilities.
- Work constructively in a group, cooperating with their leaders and seniors.
- Show professional responsibility and respect the compliance to work through systems.
- Demonstrate professionalism in personal conduct and appearance.
- Demonstrate active listening skills.

d. Communication, Information Technology and Numerical Skills:

- Communicate in a facilitative, effective, efficient, and educational manner with patients, their families and their relatives.
- Communicate clearly and succinctly to colleagues and other members of the health care team.
- Counsel the patients and their families about different management strategies and methods of prevention of their illness.
- Use the language of medicine in communication with other health team members.
- Use modes of modern IT communication.
- Perform library search and retrieval of information.

e. Psychomotor Skills:

- Advise patients on the safe, rational and effective use of drugs.
- Prioritize the drug of choice in different diseases.
- Utilize therapeutic agents in a rationale and responsible manner in treatment of patients.
- Plan to avoid the adverse effects and drug interactions due to the use of drugs.
- Assess the mechanism of action and pharmacological actions of drugs.
- Calibrate the drug –drug interactions and drug- food interactions.
- Design an escalating dose curves and draw withdrawal dose curves.
- Perform a recovery plan of drug abuse.
- Implement the concept of quality management in clinical pharmacy daily practice.
- Perform in a level meet and consistent with the international standards.

Contents: Anti-bacterials, anti-parasitics, anti-virals, antifungals, antimicrobials, anti-neoplastics, hormones, hormones antagonists, drug interactions, immunopharmacology, pharmacogenetics, drug interactions and clinical pharmacology.

Minimum Course Requirements: 45 (3 x 15) Unit lectures (45 contact hours) per level.

Teaching and Learning Methods:

1- Lectures.

2-Class discussions.

Evaluation Methods:

- Quizzes	30%
- Midterm examination	30%
- Final examination (written)	40%

Principal Text (Latest Edition):

1-Goodman & Gilman's The Pharmacological Basis of Therapeutics, Joel Griffith Hardman, Lee E. Limbird, Alfred G. Gilman. Publisher, MacMillan Publishing Co.

Supplementary Texts (Latest Edition):

1-Lippincott's Illustrated Reviews: Pharmacology, (Lippincott's Illustrated Reviews Series) Richard A. Harvey, Pamela C. Champe, Richard Finkel, and Luigi X. Cubeddu**,** Lippincott Williams & Wilkins.

2- Principles of Pharmacology: The Pathophysiologic Basis of Drug Therapy, David E. Golan, Armen H. Tashjian, and April W Armstrong, Lippincott Williams & Wilkins.

Clinical Microbiology

<table>
<tr><td colspan="2">Course Identification and General Information:</td></tr>
<tr><td colspan="2">Title: Clinical microbiology.</td></tr>
<tr><td>Course Number: 20030411.</td><td>Year: Fourth.</td></tr>
<tr><td>Credit Units: 2 + 1 Units (5 contact hours) per week.</td><td rowspan="2">Level: Seventh.</td></tr>
<tr><td>Pre-requisite: 20030321.</td></tr>
<tr><td colspan="2">Co-requisite: None.</td></tr>
<tr><td colspan="2">Aims: To enable the student to understand antimicrobial agents, clinical microbiology and parasitology.</td></tr>
<tr><td colspan="2">Description: This course provides an overview of, different methods of classification of antimicrobial agents, their mode of action, mechanism of resistance and different methods of antibiotic assay as well. Finally, , characteristic features of etiological agent(s), mode of transmission, virulence factors, pathogenesis, laboratory diagnosis, prevention and control of the most important medically infectious diseases.</td></tr>
<tr><td colspan="2">Learning Outcomes:
At the end of the course, the student should be able to:
a- Knowledge and Understanding:
- Define antimicrobial agents, their classification and mode of action.
- Outline the mechanisms of resistance to different antimicrobial agents and different methods of assays.
- Recognize medically important bacteria based on microscopic examination of stained preparations.
- Describe culture media and biochemical tests commonly used for bacterial identification and distinguish positive and negative results.</td></tr>
</table>

- State different etiological agents of microbial infections, their mode of transmission, and their virulence factors.
- Identify the clinical features of microbial infections.
- Mention the different laboratory methods for diagnosis and their prevention and control.

b- Cognitive Skills:

- Appraise the microbiological methods for antibiotic assay.
- Interpret of information acquired from primary literature sources, then organizing and communicating it in oral and written form.
- Discuss the result of antimicrobial sensitivity to give the patient the most suitable antimicrobial agents
- Analyze and evaluate the different methods of infection control and selecting the most appropriate method in each case
- Integrate knowledge and making informed judgments about microbiology in everyday life.
- Apply the knowledge about chemotherapeutic agents and disinfectants and sterilization to in pharmacy practice.
- Predict expected results.

c. Interpersonal Skills and Responsibility:

- Demonstrate critical thinking, problem- solving and decision-making abilities.
- Demonstrate creativity and time management abilities
- Work constructively in a group, cooperating with their leaders and seniors.
- Show professional responsibility and respect the compliance to work through systems.

d. Communication, Information Technology and Numerical Skills:

- Communicate in a facilitative, effective, efficient, and educational manner with patients, their families and their relatives.
- Communicate clearly and succinctly to colleagues and other members of the health care team.
- Use the language of medicine in communication with other health team members.
- Maintain a suitable image in manner, dress, speech and relationships that is consistent with the medical profession.
- Work in a team during laboratory demonstration.
- Use modes of modern IT communication.
- Perform library search and retrieval of information.

e. Psychomotor Skills:

- Classify antibiotics and differentiate between each others.
- Perform antibiotic assays techniques protocols.
- Handle microorganisms and parasites safely.
- Collect and organize data in a systematic fashion.
- Present data in an appropriate form (graphs, tables, figures, or descriptive paragraphs).
- Draw appropriate conclusions based on the results obtained in the laboratory.
- Present lab. results or findings in the laboratory in reasonable reports.
- Advise the patients on the effective ways to avoid infections.
- Select the drug of choice for the treatment of microbes and parasites.
- Calibrate the dose effect relationship.
- Perform in a level meet and consistent with the international standards.
- Implement the concept of quality management in clinical pharmacy.

Contents: Antimicrobial agent; definition, classification, mechanism of action, mechanism of resistance, methods of assays. Clinical microbiology; causative agents of microbial infections, mode of transmission, virulence factors, laboratory diagnosis, prevention and control, vaccination if any to most Gram positive and Gram negative bacteria as well as fungi and viruses, parasitology

Practical: Antibiotic assay, antibiotic sensitivity test, staining methods, culture media, biochemical reactions, used for laboratory diagnosis of different bacterial and fungal species.

Minimum Course Requirements: 30 (2 x 15) Unit lectures and 45 (3 x 15) practical hours per level.

Teaching and Learning Methods:

1- Lectures

2-Small group discussions.

3-Practical sessions.

Evaluation Methods:

- Quizzes	20%
- Midterm examination	20%
- Practical examinations	20%
- Final examination (written)	40%

Principal Text (Latest Edition):

1- Medical Microbiology, (Jawetz, Melnick ,Adelberg's Medical Microbiology) Geo. Brooks, Karen C. Carroll, Janet Butel, Stephen Morse, Lange.

Supplementary Texts (Latest Edition):

1-Clinical Microbiology Made Ridiculously Simple, Mark Gladwin and Bill

Trattler , Medmaster Publisher.

2-Foundations of Parasitology, Larry Roberts and Jr., John Janovy, McGraw-Hill Science.

Medicinal Chemistry-3

Course Identification and General Information:	
Title: Medicinal Chemistry-3.	
Course Number: 20040412.	**Year:** Fourth.
Credit Units: 3 Units (3 contact hours) per week.	**Level**: Seventh.
Pre-requisite: 20040321.	
Co-requisite: 20040411.	
Aims: To enable the student to know the chemistry and mode of action of drugs acting as antibacterials, antivirals, antifungals, antiparasitics and anti-neoplastics	
Description: The course describes the chemical structures, nomenclature, synthesis, interaction of drugs with the receptor sites, structure-activity relationships, and the metabolites of the different chemical classes and biological activity of the selected drugs.	
Learning Outcomes: At the end of the course, the student should be able to: **a-Knowledge and Understanding:** - Illustrate the chemical structure, nomenclature and fundamental pharmacophores for drugs used to treat disease. - Recognize the physico-chemical properties of drug molecules in relation to drug absorption, distribution, metabolism and excretion. - Identify mode of action of drugs and structure activity relationship in relation to drug-target interactions. - Demonstrate the process of drug design and synthesis. - Mention the chemical basis of pharmacology and therapeutics. - Understand methods for the analysis of drugs.	

- Outline the pharmacologic effects of some selected drugs.
- Illustrate the chemical and metabolic instabilities in each class of drugs.
- Mention the chemical pathways of drug metabolism.
- Describe the toxicity and side effects and adverse effects of the drugs.

b- Cognitive Skills:

- Predict the biological activity from general structure or pharmacophore.
- Correlate the structural features of a compound to the physicochemical properties and biological response.
- Distinguish the pharmacokinetic and pharmacodynamic properties of the drugs.
- Investigate the methods of drug synthesis and analysis.
- Predict the biological activity from general structure or pharmacophore.

c. Interpersonal Skills and Responsibility:

- Demonstrate critical thinking, problem- solving and decision-making abilities.
- Demonstrate creativity and time management abilities.
- Work constructively in a group, cooperating with their leaders and seniors.
- Show professional responsibility and respect the compliance to work through systems.

d. Communication, Information Technology and Numerical Skills:

- Communicate in a facilitative, effective, efficient, and educational manner with patients, their families and their relatives.
- Communicate clearly and succinctly to colleagues and other members of the health care team.
- Counsel the patients and their families about different management strategies.
- Use the language of medicine in communication with other health team members.
- Use modes of modern IT communication.

- Perform library search and retrieval of information's.

e- Psychomotor Skills:

- Calibrate the activity of related compounds within a pharmacological class based on structure.
- Examine a drug structure and calibrate relative receptor affinity, metabolic pathways, distribution potential, and potential side effects or toxicities.
- Recommend the therapeutic drugs according to their chemistry.
- Design analytical methodology for assay of active pharmaceutical ingredients.
- Implement methods of analysis of therapeutic agents.
- Calibrate the concept of quality management in clinical pharmacy daily practice.
- Perform in a level meet and consistent with the international standards.

Contents: Chemistry of antibiotics (β lactams, tetracyclines, macrolides, rifamycins, chloramphenicol, aminoglycosides, antifungal and polypeptide), antibacterials, anti-mycobacterials, antivirals, antifungals, antimalarials, anthelmientics, antiscabious, antipedicular agents, antileprotic agents, antiprotozoals, antibilharazial agents and anti-neoplastics. Drug design for related drugs.

Minimum Course Requirements: 45 (3 x 15) Unit lectures (45 contact hours) per level.

Teaching and Learning Methods:

1-Lectures.

2-Class discussions.

Evaluation Methods:

- Quizzes	30%
- Midterm examination	30%
- Final examination (written)	40%

Principal Text (Latest Edition):

1- Foye's Principles of Medicinal Chemistry, Thomas L. Lemke and David A. Williams, Lippincott Williams & Wilkins.

Supplementary Texts (Latest Edition):

1-Medicinal Chemistry: A Molecular and Biochemical App, roach, Thomas Nogrady and Donald F. Weaver, Oxford University Press, USA.

2-Fundamentals of Medicinal Chemistry, Gareth Thomas, Wiley-Blackwell.

Pharmacotherapeutics-1

Course Identification and General Information:	
Title: Pharmacotherapeutics-1.	
Course Number: 20020411.	**Year:** Fourth.
Credit Units: 5+ 1 Units (8contact hours) per week.	**Level**: Seventh.
Pre-requisite: 20040322.	
Co-requisite: 20040411.	
Aims: To provide knowledge on clinical pharmacokinetics and pharmacodynamics, clinical use of drugs in treating cardiovascular, pulmonary, gastrointestinal and geriatric diseases.	
Description: The course integrates pharmacology, biochemistry, anatomy, physiology, disease etiology, pathophysiology, medicinal chemistry, pharmacotherapeutics, clinical reasoning and toxicology to obtain the maximum benefit from drugs. It focuses on the clinical applications of different drugs in treating disease states (cardiovascular, pulmonary, gastrointestinal diseases and gerontology). Using a patient database, students will learn how to evaluate, integrate and conceptualize in a concise organized manner the patient drug therapy at a competency level necessary for effective communication with other health professionals utilizing the concept of pharmaceutical care.	
Learning Outcomes: Upon successful completion of the course, the student should be able: **a-Knowledge and Understanding:** - Recognize the normal laboratory values. - List the pharmacotherapeutic modalities. - Identify the drug therapy, pharmacotherapeutic duplications and interactions.	

- Describe the mechanism of action, adverse reactions, drug-induced diseases and avoid drug misuse and abuse.
- Recognize iatrogenic diseases.
- Gain detailed knowledge about the rationale use of drugs.
- List indications, contraindications, warnings, and precautions associated with a drug product's active and inactive ingredients
- Identify drug products by their generic, trade and/or common name.

b-Cognitive Skills:

- Integrate core scientific and systems-based knowledge in patient care decisions
- Predict the prognosis.
- Suggest therapy protocol.
- Interpret and apply pharmacokinetic principles to calculate and determine appropriate drug dosage regimens.
- Analyze and interpret information needed in pharmacy practice.
- Apply and utilize the knowledge of physiology, pharmacology, pharmacovigilance and toxicology in the proper selection and use of drug in various disease conditions, and in predicting the side effects of drug classes and toxic agents.
- Interpret the clinical laboratory data and their critical evaluation in term of their significance and their theoretical basis.
- Participate in self-learning activities and in mentorship activities.

c. Interpersonal Skills and Responsibility

- Carry out duties in accordance with legal, ethical, social, economic, and professional guidelines.
- Work constructively in a group, cooperating with their leaders and seniors.
- Show professional responsibility and respect the compliance to work through

systems.

- Demonstrate critical thinking, problem- solving and decision-making abilities.
- Demonstrate creativity and time management abilities.
- Demonstrate active listening skills.

d. Communication, Information Technology and Numerical Skills:

- Communicate in a facilitative, effective, efficient, and educational manner with patients, their families and their relatives.
- Interact and/or communicate orally and in writing with other health care professionals in their own specialized language and also express complex issues in terms that lay people can understand.
- Interact and/or communicate orally and in writing with other health care professionals in their own specialized language and also express complex issues in terms that lay people can understand.
- Work in a team during clinical cases study and discussion sessions.
- Use the language of medicine in communication with other health team members.
- Maintain a suitable image in manner, dress, speech and relationships that is consistent with the medical profession.
- Use modes of modern IT communication.
- Perform library search and retrieval of information**.**

e. Psychomotor Skills:

- Take a complete history for a given patient.
- Advise patients by properly informing and effectively influencing decisions.
- Design the development of health care through reflective practice, innovation and the interpretation.
- Recommend the rational use of drugs and prevent drug misuse or abuse.

- Design of patient-centered, culturally relevant treatment plans. - Assess and monitor the patient's drug therapy. - Choose the best drug, dose, frequency and duration. - Diagnose and treat the patients based on scientific and reasonable rationale. - Calibrate cost effective pharmacotherapeutic regimen to achieve desired therapeutic outcomes. - Implement the concept of quality management in clinical pharmacy daily practice. - Perform in a level meet and consistent with the international standards.
Contents: Clinical pharmacodynamics, clinical laboratory tests and their interpretation, concepts of pathophysiology and pharmacology in treatment cardiovascular diseases (hypertension, heart failure, arrhythmias, ischemic disease, stroke, acute myocardial infarction, thromboembolic disease and hyperlipidemia); respiratory diseases (asthma, chronic obstructive pulmonary diseases, pulmonary hypertension, drug-induced pulmonary diseases, cystic fibrosis); gastrointestinal disorders (evaluation of GIT, gastroesophageal reflux disease, peptic ulcer, inflammatory bowel diseases, nausea, vomiting, constipation, diarrhea, pancreatitis, hepatitis, cirrhosis, viral hepatitis) and geriatric drug therapy. **Practical:** Clinical cases study and discussion sessions.
Minimum Course Requirements: 75 (5 x 15) Unit lectures and 45 (3 x 15) practical hours per level.
Evaluation Methods: - Quizzes 10% - Assignments 10% - Midterm examination 20%

- Practical examinations	20%
- Final examination (written)	40%

Principal Text (Latest Edition):

1-Pharmacotherapy: A Pathophysiologic Approach, Joseph T. Dipiro, Robert L. Talbert, and Michael Posey, Appleton and Lange: Norwalk, Connecticut. McGraw-Hill Medical Publisher.

Supplementary Texts (Latest Edition):

1-Pharmacotherapy Principles and Practice, Marie Chisholm-Burns, Terry Schwinghammer, Barbara Wells, and Patrick Malone, McGraw-Hill Medical.

2- Pharmacotherapy Principles and Practice Study Guide, Michael Katz, Marie Chisholm-Burns, and Kathryn R. Matthias, McGraw-Hill Medical.

Natural Products Chemistry

<table>
<tr><td colspan="2">Course Identification and General Information:</td></tr>
<tr><td colspan="2">Title: Natural Products Chemistry.</td></tr>
<tr><td>Course Number: 20030412.</td><td>Year: Fourth.</td></tr>
<tr><td>Credit Units: 3 + 0 Units (3 contact hours) per week.</td><td rowspan="2">Level: Seventh.</td></tr>
<tr><td>Pre-requisite: 20030221 and 20040211.</td></tr>
<tr><td colspan="2">Co-requisite: None.</td></tr>
<tr><td colspan="2">Aims: To provide general knowledge, chemistry and biological activity of major groups of natural products, alkaloids, carbohydrates, glycosides, bitter principles, volatile oils, resins, tannins and chromatography.</td></tr>
<tr><td colspan="2">Description: The course provides a primary knowledge of phytochemicals and enables the student to gain an understanding of the following general areas of study of different classes of the natural compounds, methods of extraction, isolation, identification, assay, pharmacological activity and uses of natural compounds. The course will also covers chromatographic principles and methodologies specially column and planer chromatography as well as their applications in evaluation of natural products.</td></tr>
<tr><td colspan="2">Learning Outcomes:
Upon completion of the course, the student will be able to:
a- Knowledge and Understanding:
- Identify the chemistry of several groups (alkaloids, volatile oils, glycosides, resins and tannins).
- Describe the mechanism of action of these biologically active components and their structure activity relationship.
- Illustrate the methods for separation the biologically active principles from their</td></tr>
</table>

extracts.

- Recognize or draw the chemical structure of such biologically active compounds.
- Describe the different chromatographic techniques and types.
- Define the basic concept of chromatographic techniques as TLC, HPLC and GC and its applications.

b- Cognitive Skills:

- Appraise the appropriate methods of isolation, synthesis, purification, identification, and standardization of active substances from different origins.
- Analyze, evaluate and interpret the obtained data.
- Apply qualitative and quantitative analytical methods for quality control and assay of raw materials as well as pharmaceutical preparations.
- Predict of possible leads to new drugs depending on natural product templates.
- Participate in self-learning activities.

c. Interpersonal Skills and Responsibility:

- Work constructively in a group, cooperating with their leaders and seniors.
- Show professional responsibility and respect the compliance to work through systems.
- Demonstrate critical thinking, problem- solving and decision-making abilities.
- Demonstrate creativity and time management abilities.

d. Communication, Information Technology and Numerical Skills:

- Communicate in a facilitative, effective, efficient, and educational manner with patients, their families and their relatives.
- Communicate clearly and succinctly to colleagues and other members of the health care team.
- Use the language of medicine in communication with other health team members.

- Use modes of modern IT communication.
- Perform library search and retrieve the information.

e. Psychomotor Skills:

- Design analysis techniques for plant extracts.
- Perform all chemical qualitative and quantitative chemical tests for identification and assessment of natural compounds from different chemical classes.
- Design schematic procedures for extraction, isolation and identification of each class of natural compounds.
- Calibrate chromatographic methods and techniques for the isolation and quantitative determinations of each class of compounds.
- Perform in a level meet and consistent with the international standards.

Contents: Alkaloids, bitter principles, volatile oils, carbohydrates, glycosides, resins and resin combinations (definition, classification, extraction, identification, estimation and detailed study of some examples belonging to different chemical groups) and chromatography.

Minimum Course Requirements: 45 (3 x 15) Unit lectures (45 contact hours) per level.

Teaching and Learning Methods:

1-Lectures.

2-Small group discussions.

Evaluation Methods:

- Quizzes	30%
- Midterm examination	30%
- Final examination (written)	40%

Principal Text (Latest Edition):

1- Medicinal Natural Products: A Biosynthetic Approach, Paul M. Dewick , Wiley.
Supplementary Texts (Latest Edition): 1- Bioactive Natural Products, (Studies in Natural Products Chemistry), Atta-Ur-Rahman, Elsevier Science. 2- Chromatography: Concepts and Contrasts by James M. Miller, Wiley-Interscience.

Pharmacogenomic and Pharmacogenetic

<table>
<tr><td colspan="2">Course Identification and General Information:</td></tr>
<tr><td colspan="2">Title: Pharmacogenomic and Pharmacogenetic.</td></tr>
<tr><td>Course Number: 20020421.</td><td>Year: Fourth.</td></tr>
<tr><td>Credit Units: 2+ 0 Units (2 contact hours) per week.</td><td rowspan="2">Level: Eighth.</td></tr>
<tr><td>Pre-requisite: 20030411 and 20040323.</td></tr>
<tr><td colspan="2">Co-requisite: None.</td></tr>
<tr><td colspan="2">Aims: The course provides an introduction to the basic principles of genetics and pharmacogenomics and how they are used in the genetics evaluation of health care policies and programs. Also to all aspects related to pharmacogenetic.</td></tr>
<tr><td colspan="2">Description: This course provided pharmacy students with an understanding of pharmacogenetics ranging from genetic principles and the inheritance of complex traits to specific examples of pharmacogenomics in drug therapy. Also to study how the actions of and reactions to drugs vary with the patient's genes.</td></tr>
<tr><td colspan="2">Learning Outcomes:
Upon completion of the course, the student will be able:
a-Knowledge and Understanding:
- Identify the genetic bases of diseases.
- Outline pharmacogenetic ranging from genetic principles and the inheritance of complex traits in drug therapy.
- Define the genome and proteomic principles in relation to disease and drug development.
- Describe the applications of pharmacogenomics in various aspects of pharmacy practice.
- Mention the importance and future role of pharmacogenomics in health care.</td></tr>
</table>

- Understand all aspects of pharmacogenetics.

b-Cognitive Skills:

- Explain the genetic basis for alteration of drug metabolism.
- Correlate t he genetic bases of diseases with the pharmacogenomics the basic theory, concepts and principles of pharmacogenomics and its future applications in pharmacogenomic.
- Evaluate and explain the aspects of pharmacogenomics and pharmacogenetics.
- Interpret the people different responses to medications.
- Predict the adverse drug reactions due to genetic basis.
- Investigate the pharmacogenetics mechanisms of human response.

c. Interpersonal Skills and Responsibility:

- Apply the ethical in pharmacogenomic studies.
- Show professional responsibility and respect the compliance to work through systems.
- Work constructively in a group, cooperating with their leaders and seniors.
- Demonstrate critical thinking, problem- solving and decision-making abilities.
- Demonstrate creativity and time management abilities.

d. Communication, Information Technology and Numerical Skills:

- Communicate in a facilitative, effective, efficient, and educational manner with patients, their families and their relatives.
- Communicate clearly and succinctly to colleagues and other members of the health care team.
- Demonstrate written and oral communication skills.
- Use the language of medicine in communication with other health team members.
- Maintain a suitable image in manner, dress, speech and relationships that

is consistent with the medical profession.

- Use modes of modern IT communication.
- Perform library search and retrieval of information.

e. Psychomotor Skills:

- Detect the genetic basis for individualizing drug doses.
- Plan for the future application of pharmacogenomic and pharmacogenetics.
- Design a definitive drug response according the patient genetic basis.
- Perform in a level meet and consistent with the international standards.

Contents: Principles of genetics, definition, historical perspective, important principles, theoretical basis, goals and anticipated benefits of pharmacogenomics; people different responses to medications, ethical, social and legal issues concerning pharmacogenomics techniques, adverse drug reactions, the pros and cons of pharmacogenomics, pharmacogenomics and the future of drug therapy and pharmacogenetics versus pharmacogenomics. Pharmacogenetic mechanisms of human response, age related pharmacology, epigenetics, genomics tools. Novel sites for drug development, gene therapy, role of pharmacist, application of pharmacogenetic data to disease management.

Minimum Course Requirements: 15 (1 x 15) Unit lectures (15 contact hours) per level.

Evaluation Methods:

- Quizzes	30%
- Midterm examination	30%
- Final examination (written)	40%

Principal Text (Latest Edition):

1-Principles and Applications of Pharmacogenomics, Alain Li Wan Po, Wiley-Blackwell.

Supplementary Texts (Latest Edition):

1- Pharmacogenetics (Oxford Monographs on Medical Genetics) , Wendell Weber, copy right materials, Oxford Press.

2- Concepts in Pharmacogenomics, Martin M., Zdanowicz, American Society of Health-System Pharmacists.

Medication Safety

Course Identification and General Information:	
Title: Medication Safety.	
Course Number:. 20020422.	**Year:** Fourth.
Credit Units: 2 + 0 Units (2 contact hours) per week.	**Level**: Eighth.
Pre-requisite: 20040411.	
Co-requisite: None.	
Aims: To provide the students with advanced knowledge and skills in medication safety and pharmacovigilance in the managed care setting. Students will learn the mechanism, roots of medication errors, its consequences on patients and health care in general. Mechanisms to promote medication safety will be examined.	
Description: This course will provide a comprehensive review of the field of medication errors. Medication errors and human perspectives, the shared responsibility in preventing medication errors, and specific medication errors relating to specific diseases and conditions will be examined. Emphasis will be placed on the identification to prevent medication errors. The student will also learn key strategies related to identifying, reporting, managing, and preventing medication errors, as well as current legislative and professional issues.	
Learning Outcomes: Upon completion of the course, the student will be able: **a- Knowledge and understanding:** - Identify the issues surrounding medication errors, patient safety, and the design of error-free medication systems. - Recognize the principles of human and systems errors and compare its incidence and cost to other major health-related problems.	

- Gain knowledge about the evolution, concerns of medication errors, adverse drug events, medical error and patient safety.
- Mention the principles, techniques, and technology for reducing errors and their effect on patients.
- Identify practice patterns that increase the likelihood of errors by healthcare professionals and patients.
- Identify present and future trends influencing healthcare and medication safety within the pharmacy practice.
- Introduce to medication therapy management (MTM) as a method to maximize patient benefits and minimize errors/safety.

b- Cognitive Skills:

- Explain the ways how pharmacists can help prevent medication errors.
- Predict appropriate responses when errors are detected.
- Plan for pursuit of the vision of a safe medication system and optimal pharmacovigilance and post marketing surveillance efforts.
- Apply medication safety data, techniques and technology for reducing errors and their effect on patients.

c. Interpersonal Skills and Responsibility:

- Work constructively in a group, cooperating with their leaders and seniors.
- Show professional responsibility and respect the compliance to work through systems.
- Demonstrate critical thinking, problem- solving and decision-making abilities.
- Demonstrate creativity and time management abilities.

d. Communication, Information Technology and Numerical Skills:

- Communicate in a facilitative, effective, efficient, and educational manner with patients, their families and their relatives.

- Communicate clearly and succinctly to colleagues and other members of the health care team.
- Demonstrate written and oral communication skills.
- Collaborate with pharmacists, clinicians, and other health care professionals in optimizing patient care and medication safety.
- Use the language of medicine in communication with other health team members.
- Maintain a suitable image in manner, dress, speech and relationships that is consistent with the medical profession.
- Use modes of modern IT communication.
- Perform library search and retrieval of information.

e. Psychomotor Skills:

- Plan and implement a medication safety program and design effective new policies and procedures for maintaining drug safety.
- Manage changes in the medication system.
- Design, conduct, coordinate, and evaluate medication safety research.
- Implement and develop the "safety net" procedures that insulate patients maximally from errors.
- Manage the principles and practices associated with the prevention and identification of medication errors.

Contents: Types of medication errors, promoting safety in the delivery of medicines; stages in the medication process (safety in prescribing, dispensing and administering drugs. Adverse reactions, parenteral administration, dosage calculations, safety with controlled drugs), and reporting errors and near misses are all addressed in evidence-based contributions from a highly experienced team of contributors. Causes of medications errors/systems approaches, human factors in errors, strategies of reducing errors, pharmacy leadership in medication errors,

critique new prescriptions for legal requirements, drug interactions, correct dose, counsel patients for OTC, medication, medication error analysis**.**
Minimum Course Requirements: 30 (2 x 15) Unit lectures (30 contact hours) per level.
Teaching and Learning Methods: 1-Lectures 2-Class discussions.
Evaluation Methods: - Quizzes 30% - Midterm examination 30% - Final examination (written) 40%
Principal Text (Latest Edition): 1- Medication Safety: A Workbook for the Pharmacy, Robert M. Cisneros, Jones and Bartlett Pub.
Supplementary Texts (Latest Edition): 1-Medication Safety: A Guide for Health Care Facilities, Henri R., Jr. Manasse and Kasey K. Thompson, American Society of Health-System Pharmacists. 2- Medication Safety, Molly Courtenay, Cambridge University Press.

Pharmaceutics-2

Course Identification and General Information:	
Title: Pharmaceutics-2.	
Course Number: 20010421.	**Year:** Fourth.
Credit Units: 2+ 1 Units (5 contact hours) per week.	**Level**: Eighth.
Pre-requisite: 20010221.	
Co-requisite: None.	
Aims: To provide the student with general knowledge on formulation of dosage forms and preparation of semisolid and solid dosage forms.	
Description: Principles and techniques involved in the formulation, preparation, evaluation and bioavailability aspects of solid and semisolid dosage forms. Physical properties and flow characteristics of powders, preparation of bulk and divided powders, and methods of tablet and capsules manufacturing, as well as rectal drug absorption, formulation and evaluation of suppositories are presented.	

Learning Outcomes:

At the end of the course the student should be able to:

a-Knowledge and Understanding:

- Recognize the different of dosage forms.
- Identify the nature of different pharmaceutical dosage forms.
- State the basic principles that govern the formulation of the dosage forms and the additives for different dosage forms.
- Characterize the factors affecting drug absorption.
- Optimize drug release and dissolution from the different dosage forms.
- Classify suppository bases, methods of their preparations, storage and their packaging.

-Mention the basic principles of diffusion through membranes.

- List the tools and apparatus required for the quality control tests of all the studied formulations.

b- Cognitive Skills:

- Integrate knowledge and making informed judgment about pharmaceutical formulation, physical pharmacy and industrial pharmacy.
- Evaluate the concepts of cosmetic product design.
- Select the proper pharmaceutical form for a given cosmetic function.
- Employ the advanced pharmaceutical systems such as liposomes and other vesicles in cosmetic preparations.
- Evaluate the techniques on a given batch of different dosage forms.
- Evaluate and predict the relationship between the method of preparation and the formulation additives and the drug product effectiveness.
- Correlate the relationship between the physicochemical characteristics of the drug product and its in-vivo performance.

c. Interpersonal Skills and Responsibility:

- Work constructively in a group, cooperating with their leaders and seniors.
- Show professional responsibility and respect the compliance to work through systems.
- Demonstrate critical thinking, problem- solving and decision-making abilities.
- Demonstrate creativity and time management abilities.

d. Communication, Information Technology and Numerical Skills:

- Communicate in a facilitative, effective, efficient, and educational manner with patients, their families and their relatives.
- Communicate clearly and succinctly to colleagues and other members of the health care team.

- Demonstrate written and oral communication skills.
- Use the language of medicine in communication with other health team members.
- Maintain a suitable image in manner, dress, speech and relationships that is consistent with the medical profession.
- Use modes of modern IT communication.
- Perform library search and retrieval of information.

e. Psychomotor Skills:

- Design and formulate different dosage forms for preparation of semisolid and solid dosage forms.
- Calibrate the results of the in-vitro quality control tests of different dosage forms.
- Access and analyze the expected results.
- Calibrate practically the in- vitro characteristics of drug product (i.e. dissolution rates, stability,…etc).
- Manipulate the results of in-vitro quality control tests of different dosage forms

Lectures: This course covers the design and formulation of dosage forms, physicochemical and biological factors that are core topics in design and formulation of different dosage forms. Semisolid (ointments, creams, gels and pastes); solid dosage from raw materials (powders, granules, tablets, capsules); dermatological preparations and suppositories, pessaries; introduction to rectal and vaginal dosage forms; methods of preparation and standards required.

Practical: Preparations of different semisolids, solid dosage forms, dermatological preparations and suppositories, and their quality control.

Minimum Course Requirements: 30 (2 x 15) Unit lectures and 45 practical hours (3 x 15) per level.

Teaching and Learning Methods:

1-Lectures. 2-Class discussions. 4-Practical sessions.
Evaluation Methods: - Quizzes 20% - Midterm examination 20% - Practical examinations 20% - Final examination (written) 40%
Principal Text (Latest Edition): 1- Ansel's Pharmaceutical Dosage Forms and Drug Delivery Systems, Loyd V. Allen, Nicholas G Popovich, and Howard C. Ansel, Lippincott Williams & Wilkins.
Supplementary Texts (Latest Edition): 1-Handbook of Pharmaceutical Manufacturing Formulations,: Uncompressed Solid Products by Sarfaraz K. Niazi, Informa Healthcare. 2- Developing Solid Oral Dosage Forms: Pharmaceutical Theory & Practice by Yihong Qiu, Yisheng Chen, Geoff G.Z. Zhang, and Lirong Liu, Academic Press.

Molecular Biology

Course Identification and General Information:	
Title: Molecular Biology.	
Course Number: 20030412.	**Year:** Fourth.
Credit Units: 2+ 0 Units (2 contact hours) per week.	**Level**: Eighth.
Pre-requisite: 20030321 and 20040221.	
Co-requisite: None.	
Aims: To enable the student to comprehend the basic principles, techniques and applications of molecular biology and genetics.	
Description: Introduction to the theory, concepts and techniques of molecular biology. This course integrates discussion and analyses of concepts, theories, and techniques of the molecular biosciences and explores how they are applied in various fields, including basic and applied biological research, biotechnological efforts, medical procedures, and pharmaceutical development.	
Learning Outcomes: Upon successful completion of this course the student should be able to: **a-Knowledge and Understanding:** - Identify the major structures and biological rules of nucleic acids. - Outline how molecular experiments are used to comprehend processes occurring at the molecular level. - Define the biological dogma. - Mention the regulatory processes of protein biosynthesis - Recognize the recomobiant DNA technology. - Identify the role of splicing process in gene expression. - Recognize the human genome. **b- Cognitive Skills:**	

- Integrate complex information and advanced concepts in a critical appraisal of a topic.
- Discuss the inheritance patterns and molecular biology of a variety of heritable human disorders.
- Explain the methodological approaches used in analyzing the human genome.
- Evaluate techniques for transcriptomic and proteomic investigations.
- Discuss the current state of gene therapy.
- Discuss key aspects of the molecular genetics of the immune system.
- Investigate the findings and outcomes of the human genome project.

c. Interpersonal Skills and Responsibility

- Demonstrate critical thinking, problem- solving and decision-making abilities.
- Demonstrate creativity and time management abilities.
- Work constructively in a group, cooperating with their leaders and seniors.
- Show professional responsibility and respect the compliance to work through systems.
- Demonstrate planning and organization skills.

d. Communication, Information Technology and Numerical Skills:

- Communicate in a facilitative, effective, efficient, and educational manner with patients, their families and their relatives.
- Communicate clearly and succinctly to colleagues and other members of the health care team.
- Use the language of medicine in communication with other health team members.
- Maintain a suitable image in manner, dress, speech and relationships that is consistent with the medical profession.
- Use information technology, electronically available journals, reviews and web-

sites, to access suitable information.

- Perform library search and retrieval of information.

e. Psychomotor Skills:

- Take a complete history for a given patient.
- Design advanced comprehension studies on the relationship between human genes and chromosomes and inherited disease.
- Calibrate the techniques and strategies used to characterize the human genome and its expression.
- Assess the organization of the human genome as revealed by various sequencing investigations, including the human genome project.
- Review the particular human genes and therapeutic opportunities.
- Prepare reports and presentations on the modern concepts of molecular biology and genomics.
- Design how new drugs are rationally designed, and then rationally chosen for use in individual patients.

Contents: Cell structure and components, DNA and RNA structure, chromosomes and DNA , ion channels and receptor physiology , mitosis and meiosis replication, repair, transcription, translation, cloning, gene coding, genetic engineering, labeling, gene mutation, recombinant DNA technology, tumor markers, gene therapy, stem cells, pharmacogenomics, human genome, genetic counseling, mutation and inherited disease. Techniques, applications of molecular biology, concepts of bioengineering, bioreactor types and biotechnology products.

Minimum Course Requirements: 30 (2 x 15) Unit lectures per level.

Teaching and Learning Methods:

1-Lectures. 2-Class discussions.
Evaluation Methods: - Quizzes 30% - Midterm examination 30% - Final examination (written) 40%
Principal Text (Latest Edition): 1-Molecular Cell Biology , Harvey Lodish, Arnold Berk, Chris A. Kaiser, and Monty Krieger, W.H.Freeman & Co Ltd.
Supplementary Texts (Latest Edition): 1-Molecular Biology, Robert Franklin Weaver, McGraw-Hill Science. 2-Molecular Biology made simple and fun, David P. Clark and Lonnie D. Russell, Cache River Pr.

Pharmacotherapeutics-2

Course Identification and General Information:	
Title: Pharmacotherapeutics-2.	
Course Number: 20020423.	**Year:** Fourth.
Credit Units: 5 + 1 Units (8 contact hours) per week.	**Level**: Eighth.
Pre-requisite: 20020411.	
Co-requisite: None.	
Aims: To provide knowledge and therapy of common renal diseases, neurologic disorders, psychiatric, gynecologic-obstetric, and endocrinology disorders.	
Description: This course is designed to integrate the pathophysiologic abnormalities of disease states (renal, neurologic, psychiatric, gynecologic-obstetric, and endocrinology disorders) 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 the attainment of therapeutic efficacy and avoidance of adverse reactions.	
Learning Outcomes: Upon successful completion of the course, the student should be able: **a-Knowledge and Understanding:** - Recognize the normal laboratory values. - List the pharmacotherapeutic modalities. - Identify the drug therapy, pharmacotherapeutic duplications and interactions. - Describe the mechanism of action, remedy adverse reactions and iatrogenic or drug-induced illness of drugs and avoid drug misuse and abuse. - Recognize the rationale use of drugs.	

- List indications, contraindications, warnings, and precautions associated with a drug product's active and inactive ingredients
- Identify drug products by their generic, trade and/or common name.

b-Cognitive Skills:

- Integrate core scientific and systems-based knowledge in patient care decisions
- Predict the prognosis.
- Suggest therapy protocol.
- Interpret and apply pharmacokinetic principles to calculate and determine appropriate drug dosage regimens.
- Analyze and interpret information needed in pharmacy practice.
-Apply and utilize the knowledge of physiology, pharmacology, pharmacovigilance and toxicology in the proper selection and use of drug in various disease conditions, and in predicting the side effects of drug classes and toxic agents.
- Interpret the clinical laboratory data and their critical evaluation in term of their significance and their theoretical basis.
- Participate in self-learning activities and in mentorship activities.

c. Interpersonal Skills and Responsibility:

- Carry out duties in accordance with legal, ethical, social, economic, and professional guidelines.
- Work constructively in a group, cooperating with their leaders and seniors.
- Show professional responsibility and respect the compliance to work through systems.
- Demonstrate critical thinking, problem- solving and decision-making abilities.
- Demonstrate creativity and time management abilities.

- Demonstrate active listening skills.

d. Communication, Information Technology and Numerical Skills:

- Communicate in a facilitative, effective, efficient, and educational manner with patients, their families and their relatives.
- Interact and/or communicate orally and in writing with other health care professionals in their own specialized language and also express complex issues in terms that lay people can understand.
- Interact and/or communicate orally and in writing with other health care professionals in their own specialized language and also express complex issues in terms that lay people can understand.
- Work in a team during clinical cases study and discussion sessions.
- Use the language of medicine in communication with other health team members.
- Maintain a suitable image in manner, dress, speech and relationships that is consistent with the medical profession.
- Use modes of modern IT communication.
- Perform library search and retrieval of information**.**

e. Psychomotor Skills:

-Take a complete history for a given patient.
- Advise patients by properly informing and effectively influencing decisions.
- Design the development of health care through reflective practice, innovation and the interpretation.
- Recommend the rational use of drugs and prevent drug misuse or abuse.
- Design of patient-centered, culturally relevant treatment plans.
- Assess and monitor the patient's drug therapy.
- Choose the best drug, dose, frequency and duration.
- Diagnose and treat the patients based on scientific and reasonable rationale.

- Calibrate cost effective pharmacotherapeutic regimen to achieve desired therapeutic outcomes. - Implement the concept of quality management in clinical pharmacy daily practice. - Perform in a level meet and consistent with the international standards.
Contents: Concepts of pathophysiology and pharmacology in treatment of renal diseases (kidney injury, renal failure, transplantation, dialysis, chronic kidney diseases, drug-induced kidney diseases, glomerulonephritis, metabolic acidosis and alkalosis, electrolyte abnormalities and end-stage renal diseases); neurologic disorders (evaluation of neurologic illness, multiple sclerosis, epilepsy, Parkinson's disease, pain management, headache); psychiatric disorders (evaluation of psychiatric illness, Alzheimer's, substance-and drug abuse, schizophrenia, seizure depression, anxiety, mood, sleep, seizure disorders, attention deficit/hyperactivity disorders); endocrinology disorders (diabetes, thyroid, parathyroid, adrenal and pituitary gland disorders); gynecologic-obstetric disorders(pregnancy and lactation, contraception, menstruation–related disorders, hormonal deficiency and therapy) **Practical:** Study of clinical cases and discussion sessions.
Minimum Course Requirements: 75 (5 x 15) Unit lectures and 45 practical hours (3 x 15) per level.
Teaching and Learning Methods: 1-Lectures. 2-Class discussions. 3-Practical sessions.

Evaluation Methods:

- Quizzes 10%
- Assignments 10%
- Midterm examination 20%
- Practical examinations 20%
- Final examination (written) 40%

Principal Text (Latest Edition):

1-Pharmacotherapy: A Pathophysiologic Approach, Joseph T. Dipiro, Robert L. Talbert, and Michael Posey, Appleton and Lange: Norwalk, Connecticut. McGraw-Hill Medical Publisher.

Supplementary Texts (Latest Edition):

1-Pharmacotherapy Principles and Practice, Marie Chisholm-Burns, Terry Schwinghammer, Barbara Wells, and Patrick Malone, McGraw-Hill Medical.

2- Pharmacotherapy Principles and Practice Study Guide, Michael Katz, Marie Chisholm-Burns, and Kathryn R. Matthias, McGraw-Hill Medical.

Complementary and Alternative Medicine

Course Identification and General Information:	
Title: Complementary and Alternative and Medicine	
Course Number: 20030422.	**Year:** Fourth.
Credit Units: 2 + 0 Units (2 contact hours) per week.	
Pre-requisite: 20030412**.**	**Level**: Eighth.
Co-requisite: None.	
Aims: To give an introduction to the different types of complementary and alternative medicine with an emphasis on their basic philosophies and procedures as compared to those of conventional medicine and pharmacy.	
Description: The course presents an overview of the many types of alternative/complementary healing methods which are being practiced today especially in Saudi Arabia. This course explores general patterns of CAM use. It Identifies and describes components of the major areas within CAM as identified by the National Institutes of Health: alternative medical systems, body-based systems, mind body medicine, biological approaches (herbal medicine, nutritional approaches, pharmacological therapies), and bioelectromagnetics (energy healing).	
Learning Outcomes: Upon successful completion of the course, the student should be able: **a-Knowledge and Understanding:** - Identify the general patterns of CAM use. - Outline the components of the major areas within CAM - List the different applications of CAM. - Demonstrate knowledge of research into the use of CAM therapies. - Identify appropriate sources of information on CAM therapies.	

- Recognize the economics aspects of CAM and traditional medicine.
- Describe the concepts of healing and models of care.

b-Cognitive Skills:

- Distinguish the clinical practice of a CAM modality.
- Interpret the evidence safety and efficacy of primary areas of CAM for treatment of major disease entities.
- Distinguish the differences among CAM practices and between CAM and conventional medicine.
- Evaluate of alternative and complementary medicine purity, bioavailability, safety, and efficacy.
- Evaluate information sources for CAM Care.
- Discuss the regulatory, safety and legal aspects of complementary and alternative therapies.
- Integrate a variety of the convergence CAM therapies into conventional medical settings.
- Predict the herbal-drug interactions.

c. Interpersonal Skills and Responsibility:

- Work constructively in a group, cooperating with their leaders and seniors.
- Show professional responsibility and respect the compliance to work through systems.
- Demonstrate critical thinking, problem- solving and decision-making abilities.
- Demonstrate creativity and time management abilities.

d. Communication, Information Technology and Numerical Skills:

- Communicate in a facilitative, effective, efficient, and educational manner with patients, their families and their relatives.

- Communicate clearly and succinctly to colleagues and other members of the health care team.
- Demonstrate written and oral communication skills.
- Use the language o medicine in communication with other health team members.
- Maintain a suitable image in manner, dress, speech and relationships that is consistent with the medical profession.
- Use modes of modern IT communication.
- Retrieve and evaluate information from different sources to improve professional competencies.

e-Psychomotor Skills:

- Advise the rationale uses of CAM and the professional personal recommendation.
- Recommend a specific CAM modality for a specific disease.
- Carry out a comparative study between the traditional and CMA modalities in definite disease.
- Assess the integration of CAM therapies into conventional medical settings.
- Plan a protocol of CAM therapy integrated with a traditional one.
- Assess the effectiveness and safety issues of CAM.

Contents: This course covers the five major domains of CAM. Alternative medical systems (traditional oriental medicine homeopathy, anthroposophic medicine and naturopathy). Mind-body interventions (meditation, hypnosis, music, and art therapy, and prayer and spiritual healing). Biologically-based interventions (herbal medicine, special dietary, orthomolecular, and individual biological therapies); Manipulative and Body-Based Interventions (chiropractic care, massage therapies and acupuncture/pressure). Energy Therapies (Therapeutic Touch, Reiki, as well as biomagnetics). National Center for Complementary and Alternative Medicine (NCCAM) and National Institutes of Health (NIH) and standardization CAM

modalities.
Minimum Course Requirements: 30 (2 x 15) Unit lectures (30 contact hours) per level.
Teaching and Learning Methods: 1-Lectures using overhead projector. 2-Class discussions.
Evaluation Methods: - Quizzes 30% - Midterm examination 30% - Final examination (written) 40%
Principal Text (Latest Edition): 1-Fundamentals of Complementary and Alternative Medicine, Marc S. Micozzi, Saunders.
Supplementary Texts (Latest Edition): **1-** Complementary and Alternative Medicine, Steven B. Kayne, Pharmaceutical Press. 2- Mosby's Complementary & Alternative Medicine: A Research-Based Approach (Mosby's Complementary and Alternative Medicine), Lyn W. Freeman, Mosby.

Research Methodology

Course Identification and General Information:	
Title: Research Methodology.	
Course Number: 20020424.	**Year:** Fourth.
Credit Units: 1+ 0 Units (1 contact hours) per week.	**Level**: Eighth.
Pre-requisite: 20040313.	
Co-requisite: None.	
Aims: To provide the student with the fundamentals of research design and methodology and principles of research design and analysis in practicing evidence-based pharmacy.	
Description: This is an introductory course in research methods and proposal writing. The course is designed to give students experience in hypothesis and specific aims development and an overview of scientific study design. The course objectives will be accomplished through didactic lecture and small group and individual assignments. Ultimately, each student will write a brief research proposal that follows a similar format to the Pharm.D. . Investigations proposal. In addition, students will present their research idea to peers in a poster/abstract format.	
Learning Outcomes: Upon completion of this course, students should be able to: **a-Knowledge and Understanding:** - Identify the fundamentals of research design and methodology. - Recognize the principles of evaluation of the primary literature. - Describe principles of research design and analysis in practicing evidence-based	

pharmacy.

- Know the basic principles of research methodology.
- Gain knowledge and understanding of the research process and steps in clinical research protocols to allow them to critically analyze published research and/or be able to conduct independent research.
- Identify principles of reviewing and defense of research results.

b-Cognitive Skills:

- Justify the choice of appropriate research methodology.
- Formulate and analyze the hypothesis to be addressed and select the means by which it is to be tested, generate original data.
- Participate in self-learning activities and in mentorship activities.

c. Interpersonal Skills and Responsibility:

- Compromise ethical considerations in pharmacy practice researches.
- Work constructively in a group, cooperating with their leaders and seniors.
- Show professional responsibility and respect the compliance to work through systems.
- Demonstrate critical thinking, problem- solving and decision-making abilities.
- Demonstrate creativity and time management abilities.

d. Communication, Information Technology and Numerical Skills:

- Communicate in a facilitative, effective, efficient, and educational manner with patients, their families and their relatives.
- Communicate clearly and succinctly to colleagues and other members of the health care team.
- Use the language of medicine in communication with other health team members.
- Maintain a suitable image in manner, dress, speech and relationships that is consistent with the medical profession.

- Use modes of modern IT communication.
- Perform library search and retrieval of information.
- Effectively present group presentations using appropriate media aids to peers and health care professionals.
- Communicate effectively in information writing.
- Apply appropriate interaction behavior and assertiveness in communications with health care professionals.

e. Psychomotor Skills:

- Design biological experiments and analyze and interpret data and the results.
- Design a research model using hypothetical drug.
- Formulate a hypothesis according to research results.
- Perform a literature search related to a research project of interest.
- Conduct common research techniques related to a specific project.
- Write a formal report in a style required for publication in an appropriate scientific or professional journal.
- Make a formal oral presentation of scientific results utilizing appropriate audiovisual backup.

Contents: Basic concepts (the research process, scales of measurement, accuracy of data, validity and reliability), steps of conducting medical research (selecting a research topic, listing of review of literature and other existing information, construction of a research proposal, implementing the study) and research design (variables, data collection, data processing and analysis, interpretation of results and final report writing), clinical trial design (controlled multicentre studies, random allocating, study types, blindness, placebo effect, retrospective and case studies, data collection forms), analysis in practicing evidence-based pharmacy. Each step is accompanied by a set of exercises that reinforce the concepts and help

to develop a research proposal.
Minimum Course Requirements: 15 (1 x 15) Unit lectures (15 contact hours) per level.
Teaching and Learning Methods: 1- Lectures using overhead projector. 2-Class discussions.
Evaluation Methods: - Quizzes 30% - Midterm examination 30% - Final examination (written) 40%
Principal Text (Latest Edition): 1-Research Methodology in the Medical and Biological Sciences, Petter Laake, Haakon Breien Benestad, and Bjorn Reino Olsen, Academic Press.
Supplementary Texts (Latest Edition): 1-Research Methods: A Modular Approach, Sherri L. Jackson, Wadsworth Publishing. 2- Research Design: Qualitative, Quantitative, and Mixed Methods Approaches, John W. Creswell, Sage Publications, Inc.

Intermediate Pharmacy Practice Experience

Title: Internship-2.
Year: Fourth Year
Level: Summer.
Credit Units: zero; (about 50 contact hours) per week.
Prerequisites: None**.**
Aims: To allow the student to gain additional educational knowledge, professional communications and behavior skills with the medication therapy management.
Description: Additional pharmacy internship program established to provide the students with a structured learning practical experience intended to provide a comprehensive exposure to hospital pharmacy. Students should be committed to participate in an early pharmacy practice experiences for a minimum of 200 hours training in a hospital pharmacy during the summer of the fourth year.
Learning Outcomes: Upon successful completion of the rotations the student should be able to: **a-Knowledge and Understanding:** - Identify how to dispense medicines. - Recognize the pharmaceutical products. - Describe the drug products by their generic, trade and/or common name. - Mention the rationale uses of drugs. - Define the medication errors and adverse drug reactions. - Outline the professional role of the pharmacist in the community pharmacy. **b-Cognitive Skills:**

- Apply organizational skills in the practice of pharmacy.
- Apply commitment to lifelong learning with the ability to use knowledge, reflect upon and develop existing skills and adapt to a changing environment.
- Interpret laboratory data.
- Develop and support the implementation of a therapeutic plan.
- Discuss at least three inpatient disease states encounter on your rotation with his preceptor.
- Evaluate and design how medication errors are reported and handled.
- Participate critical thinking, problem- solving and decision-making abilities.
- Apply the mentorship activities.
- Interpret mechanism of action, indications, contraindications, adverse effects, and drug interactions when reviewing a patient's medication list.
- Appraise the treatment goals and appropriate follow up plan for patients.

c. Interpersonal Skills and Responsibility:

- Carry out duties in accordance with legal, ethical, social, economic, professional guidelines under the framework in the context of the Saudi pharmacy practice environment.
- Analyze issues using knowledge of pharmaceutical sciences and therapeutics to underpin sound judgment, consider different options and viewpoints, and make informed decisions.
- Demonstrate strong problem solving skills and ability to apply professional judgment in a range of areas including prescription, therapeutic and legal and ethical problems.
- Demonstrate critical thinking skills.
- Demonstrate leadership skills that will enable them to mentor other students and supervise pharmacy staff.

- Use listening skills consistently when performing professional functions.
- Demonstrate respect for patients and other healthcare personnel.
- Utilize time efficiently and is punctual.
- Demonstrate accountability for actions and decisions.
- Interact and communicate with health care professionals.
- Identify and act upon learning opportunities proactively and independent from instructor prompting.

d. Communication, Information Technology and Numerical Skills:

- Counsel the patients and their families about different management strategies and methods of prevention of their illness.
- Consult with patients regarding self-care products**.**
- Show understanding for the cultural diversity.
- Exhibit professionalism and an ethical approach to decision making and situation handling, to have working knowledge of ethics and social responsibility.
- Identify one's strengths and weaknesses in communications and devise and implement strategies to improve skills.
- Use informatics to support communication.
- Work in a team during daily rotations.
- Use multimedia technology to communicate effectively.
- Apply communication skills in interpersonal relationships to improve the clinical, economical, and humanistic outcomes of patients.

-Adhere to professional attire.

- Use the language of medicine in communication with other health team members.

e. Psychomotor Skills:

- Solve simple and complex pharmaceutical calculations.

- Dispense medicines - Prepare and finalize the pharmaceutical products - Provide primary health care - Educate the patients the rationale use of drugs, drug abuse and drug misuse. - Manage the drug regimen through monitoring and assessing patient information. - Perform in a level meet the international standards.
Contents: Processing and dispensing medication orders, creating patient profiles using information, interpreting and evaluating patient information, assessing patient health literacy and compliance, interacting with pharmacy technicians in the delivery of pharmacy services, interviews with real patients, patient counseling service learning, monitoring drug therapy for safety and efficacy, real practice experiences in community, and long-term care pharmacies. This experience is designed to give the student further experience in documenting pharmaceutical care interventions in hospital pharmacy practice.
Minimum Internship Requirements: 200 Training contact hours per the summer.
Evaluation methods:
- Preceptor evaluations.
Principal Text (Latest Edition):
1-Best Practices for Hospital Health System Pharmacy (Best Practices for Hospital & Health Systems Pharmacy), American Society of Health-System Pharmacists**.**
Supplementary Texts (Latest Edition):
1-Hospital Pharmacy , Martin Stephens, Pharmaceutical Press.

2-Pharmacy: Pharmacist, Hospital pharmacy, Clinical pharmacy, Compounding, Consultant pharmacist, Online pharmacy, Nuclear pharmacy, Health informatics by Frederic P. Miller, Agnes F. Vandome, and John McBrewster, Alphascript Publishing.

Pharmacotherapeutics-3

Course Identification and General Information:	
Title: Prmacotherapeutics-3.	
Course Number: 20020511.	**Year**: Fifth.
Credit Units: 5+ 1 Units (8 contact hours) per week.	
Pre-requisite: 20020423.	**Level**: Ninth.
Co-requisite: None.	
Aims: To provide knowledge and therapy of common diseases of male reproductive, immune and blood disorders, infectious diseases, rheumatology, pediatric, neonatal therapy and critical care.	
Description: This course is designed to provide students with basic introduction to the therapy of (male reproductive, blood and immune system, infectious diseases, rheumatology, pediatric, neonatal therapy and critical care). Considerations and precautions in selection, dosing and monitoring of drug used to treat commonly encountered pharmacotherapeutic problems. Given a patient database students will learn how to evaluate, integrate and conceptualize in a concise organized manner the patient drug therapy at a competency level necessary for effective communication with other health professionals utilizing the concept of pharmaceutical care.	
Learning Outcomes: Upon successful completion of the course, the student should be able: **a-Knowledge and Understanding:** - Recognize the normal laboratory values. - List the pharmacotherapeutic modalities. - Identify the drug therapy, pharmacotherapeutic duplications and interactions.	

- Describe the mechanism of action, remedy adverse reactions and iatrogenic or drug-induced illness of drugs and avoid drug misuse and abuse.
- Recognize the rationale use of drugs.
- List indications, contraindications, warnings, and precautions associated with a drug product's active and inactive ingredients
- Identify drug products by their generic, trade and/or common name.

b-Cognitive Skills:

- Integrate core scientific and systems-based knowledge in patient care decisions
- Predict the prognosis.
- Suggest therapy protocol.
- Interpret and apply pharmacokinetic principles to calculate and determine appropriate drug dosage regimens.
- Analyze and interpret information needed in pharmacy practice.
- Apply and utilize the knowledge of physiology, pharmacology, pharmacovigilance and toxicology in the proper selection and use of drug in various disease conditions, and in predicting the side effects of drug classes and toxic agents.
- Interpret the clinical laboratory data and their critical evaluation in term of their significance and their theoretical basis.
- Participate in self-learning activities and in mentorship activities.

c. Interpersonal Skills and Responsibility:

- Carry out duties in accordance with legal, ethical, social, economic, and professional guidelines.
- Work constructively in a group, cooperating with their leaders and seniors.
- Show professional responsibility and respect the compliance to work through systems.

- Demonstrate critical thinking, problem- solving and decision-making abilities.
- Demonstrate creativity and time management abilities.
- Demonstrate active listening skills.

d. Communication, Information Technology and Numerical Skills:

- Communicate in a facilitative, effective, efficient, and educational manner with patients, their families and their relatives.
- Interact and/or communicate orally and in writing with other health care professionals in their own specialized language and also express complex issues in terms that lay people can understand.
- Interact and/or communicate orally and in writing with other health care professionals in their own specialized language and also express complex issues in terms that lay people can understand.
- Work in a team during clinical cases study and discussion sessions.
- Use the language of medicine in communication with other health team members.
- Maintain a suitable image in manner, dress, speech and relationships that is consistent with the medical profession.
- Use modes of modern IT communication.
- Perform library search and retrieval of information**.**

e. Psychomotor Skills:

- Take a complete history for a given patient.
- Advise patients by properly informing and effectively influencing decisions.
- Design the development of health care through reflective practice, innovation and the interpretation.
- Recommend the rational use of drugs and prevent drug misuse or abuse.
- Design of patient-centered, culturally relevant treatment plans.

- Assess and monitor the patient's drug therapy. - Choose the best drug, dose, frequency and duration. - Diagnose and treat the patients based on scientific and reasonable rationale. - Calibrate cost effective pharmacotherapeutic regimen to achieve desired therapeutic outcomes. - Implement the concept of quality management in clinical pharmacy daily practice. - Perform in a level meet and consistent with the international standards.
Contents: Basis of pathophysiology and pharmacology in the treatment of male reproductive disorders (erectile dysfunction, prostatic diseases); diseases of blood (anemias , drug-induced hematologic disorders, immunization therapy); infectious diseases (as pneumonia, tuberculosis, urinary tract, intrabdominal and gastrointestinal tract infections, infective endocarditis, central nervous system infections, bone and joint infections, sexually transmitted diseases, acquired immunodeficiency syndrome (AIDS), mycotic infections, pancreatic infections, infection in immunosuppressed patients, bacteremia and sepsis, skin and soft tissue infections); immunologic disorders (function and evaluation of immune system, systemic Lupus Erythematosus and other collagen-vascular diseases, allergic and pseudo-allergic drug reactions, solid-organ transplantation); bone and joint disorders (osteoporosis and other metabolic bone diseases, rheumatoid arthritis, osteoarthritis, osteomalacia, gout and hyperuricemia), pediatric, neonatal therapy and critical care. **Practical**: Clinical cases study and discussion sessions.
Minimum Course Requirements: 75 (5 x 15) Unit lectures and 45 practical hours (3 x 15) per level.

Teaching and Learning Methods:

1- Lectures

2- Class discussions.

3- Practical sessions.

Evaluation Methods:

- Quizzes 10%
- Assignments 10%
- Midterm examination 20%
- Practical examinations 20%
- Final examination (written) 40%

Principal Text (Latest Edition):

1- Pharmacotherapy: A Pathophysiologic Approach, Joseph T. Dipiro, Robert L. Talbert, and Michael Posey, Appleton and Lange: Norwalk, Connecticut. McGraw-Hill Medical Publisher.

Supplementary Texts (Latest Edition):

1-Pharmacotherapy Principles and Practice, Marie Chisholm-Burns, Terry Schwinghammer, Barbara Wells, and Patrick Malone, McGraw-Hill Medical.

2- Pharmacotherapy Principles and Practice Study Guide, Michael Katz, Marie Chisholm-Burns, and Kathryn R. Matthias, McGraw-Hill Medical.

Pharmaceutics-3

Course Identification and General Information:	
Title: Pharmaceutics-3.	
Course Number: 20010511.	**Year:** Fifth.
Credit Units: 3+ 0 Units (3 contact hours) per week.	
Pre-requisite: 20010421.	**Level**: Ninth.
Co-requisite: None.	
Aims: To provide general knowledge on sterile dosage forms, study of cosmetics, aerosols and sprays. This course will also handle the radiopharmacy as an area of specialty of pharmacy practice.	
Description: This course covers the principles and techniques involved in the formulation, preparation and evaluation of sterile dosage forms, parenteral admixture and incompatibility, ophthalmic preparations. Methods of sterilization and applications of aseptic techniques. Cosmetics, aerosols and sprays, also will discussed. In addition to, fundamentals of radiopharmacy and radio-pharmaceuticals.	
Learning Outcomes: Upon successful completion of this course the student should be able to: **a- Knowledge and Understanding:** - Describe the different sterile products, cosmetics, their formulations, preparations and evaluations. - Outline the formulation additives in these dosage forms. - List the methods of sterilization and validation of aseptic processes. - Mention the basic principles related to preparation, dispensing and administration of different dosage forms.	

- Identify the appropriate packaging for different dosage forms.
- Gain knowledge about the sourcing, handling, storage, use and disposal of radio-pharmaceuticals.
- Recognize the role of the clinical pharmacist in the production, dispensing and application of radiopharmaceuticals.
- Demonstrate knowledge of the components of a prescription.

b- Cognitive Skills:

- Explain the concepts of design of different dosage forms.
- Evaluate and predict the relationship between the methods of preparation and the formulation additives and the drug product effectiveness.
- Correlate the relationship between the physicochemical characteristics of the drug product and its in-vivo performance.
- Investigate the quality measures for the different formulations.

c. Interpersonal Skills and Responsibility:

- Carry out duties in accordance with legal, ethical, social, economic, and professional guidelines
- Demonstrate professionalism in personal conduct and appearance.
- Maintain competence in a dynamic profession through self-initiated learning.
- Employ the attitudes, skills and behaviors associated with life-long learning.
- Comprehend the sensitivity to issues regarding cultural diversity, employing appropriate attitudes, behaviors, and skills.

d. Communication, Information Technology and Numerical Skills:

- Collaborate with other health care practitioners, patients, and family members to effectively develop interpersonal and interprofessional relationships.
- Read, write, speak, listen, and use multimedia technology to communicate effectively.

- Work in a team during laboratory demonstration.
- Use modes of modern IT communication.
- Retrieve and evaluate information from different sources to improve professional competencies.

e-Psychomotor Skills:

- Perform in Level consistent and meet the international standards.
- Employ the advanced pharmaceutical systems such as liposomes and other vesicles in cosmetic preparations.
- Select and dispense the best pharmaceutical form for a given ingredients and /or medication.
- Design and prepare the different formulations.
- Calibrate the results of the in-vitro quality control tests of different products.
- Manipulate carefully the radiopharmaceuticals and recommend the appropriate dose.
- Perform for proper treatment under stressful circumstances.

Contents: Sterile dosage forms and fundamental concepts to their preparation, parenterals, ophthalmic preparations, nutritional solutions, sterilization, validation methods to quality control, cosmetic (face and body preparations and make-up, hair products, shampoo, creams, lotions, lipsticks, conditioners ..etc), pharmaceutical aerosols, sprays and radio-pharmaceuticals and radiopharmacy.

Minimum course requirements: 45 (3 x 15) Unit lectures (45 contact hour) per level.

Teaching and Learning Methods:

1- Lectures using overhead projector.

2-Class discussions.

Evaluation Methods:

- Quizzes	30%
- Midterm examination	30%
- Final examination (written)	40%

Principal Text (latest edition):

1- Ansel's Pharmaceutical Dosage Forms and Drug Delivery Systems, Loyd V. Allen, Nicholas G Popovich, and Howard C. Ansel, Lippincott Williams & Wilkins.

Supplementary Texts (latest editions):

1-Pharmaceutical Dosage Forms: Parenteral Medications, Facility Design, Steilization and Processing, Sandeep Nema and John D. Ludwig, Informa HealthCare.

2-Pharmaceutical Preformulation and Formulation: A Practical Guide from Candidate Drug Selection to Commercial Dosage Form, (Drugs and the Pharmaceutical Sciences) by Mark Gibson, Informa Healthcare.

Clinical Pharmacokinetics

Course Identification and General Information:	
Title: Clinical Pharmacokinetics.	
Course Number: 20020512.	**Year:** Fifth.
Credit Units: 2+ 0 Units (2 contact hours) per week.	
Pre-requisite: 20010321.	**Level**: Ninth.
Co-requisite: None.	
Aims: It provides the students with the principles for dosing patients more rationally and safely and understands how various disease states alter the pharmacokinetic parameters.	
Description: This course is designed to provide the students with exposure to the application of pharmacokinetic and pharmacodynamic principles of a variety of drug classes to clinical situations. It provides them with review of clinical pharmacokinetic principles to develop an approach to therapeutic drug monitoring. It also deals with more specifically, most common drug classes where therapeutic drug monitoring is applied in clinical practice.	
Learning Outcomes: Upon successful completion of this course the student should be able to: **a-Knowledge and Understanding:** - Identify the drug dosing and drug monitoring. - Initiate drug dosing regimens individualized to specific patient demographics and organ function. - Recognize the sources of individual pharmacokinetic variability due to physiological and disease factors. - Define the application and role of pharmacokinetic information generated for	

selected drugs and drug classes.

- Demonstrate the standardized techniques and approaches to patient-specific dosing and new information on recent pharmacokinetically monitored drugs.
- Outline the therapeutic management, case studies and drug monitoring for hospital patients

b- Cognitive Skills:

- Participate in self-learning activities and in mentorship activities.
- Apply the pharmacokinetic principles to specific drug-related problems commonly encountered in practice setting.
- Discuss clinical pharmacokinetic parameters, serum plasma levels, equations which influence the pharmacokinetics of selected drugs and their significance.
- Evaluate and individualize dosage regimens in clinical situations, using pharmacokinetic and biopharmaceutic parameters.
- Evaluate unusual responses to drug therapy for possible pharmacokinetic and pharmacological explanations.
- Interpret sources of individual pharmacokinetic variability due to physiological and disease factors.
- Evaluate quality assurance programs which document improved therapeutic benefits, decreased toxicity, and economic benefits resulting from clinical pharmacokinetic services.

c. Interpersonal Skills and Responsibility:

- Carry out duties in accordance with legal, ethical, social, economic, and professional guidelines.
- Demonstrate professionalism in personal conduct and appearance
- Work constructively in a group, cooperating with their leaders and seniors.
- Show professional responsibility and respect the compliance to work through

systems.

- Demonstrate critical thinking, problem- solving and decision-making abilities.
- Demonstrate creativity and time management abilities.

d. Communication, Information Technology and Numerical Skills:

- Communicate in a facilitative, effective, efficient, and educational manner with patients, their families and their relatives.
- Communicate clearly and succinctly to colleagues and other members of the health care team.
- Communicate information on patient-specific drug therapy to physicians, nurses, and other clinical practitioners.
- Counsel the patients and their families about different management strategies.
- Use numeric and computation methods such as natural logarithms, exponential and mathematical functions including differentiation and integration.
- Demonstrate written and oral communication skills.
- Use the language of medicine in communication with other health team members.
- Maintain a suitable image in manner, dress, speech and relationships that is consistent with the medical profession.
- Use pharmacokinetic software to develop and assess dosage regimens in patients.
- Retrieve and evaluate clinical applied pharmacokinetic information from different sources to improve professional competencies.

e- Psychomotor Skills:

-Take a complete history for a given patient.

- Utilize pharmacokinetic data generated from individual patients to develop appropriate therapeutic dosing regimens.
- Design the individualize dosage regimens in clinical situations, using pharmacokinetic and biopharmaceutics parameters.

- Calculate appropriate dosing regimens utilizing derived pharmacokinetic parameters. - Assess the individual pharmacokinetic parameters. - Calibrate and review patient medication regimens and make appropriate suggestions concerning drug therapy. - Perform for proper treatment under stressful circumstances. - Perform in a level meet and consistent the international standards.
Contents: Clinical pharmacokinetic and pharmacodynamic concepts and applications, pharmacokinetics of drugs under disease states that modify body functions, dietary influences on absorption, distribution, metabolism, and excretion, clinical pharmacokinetic equations and calculations, application of pharmacokinetic principles for the purpose of optimizing drug therapy, clinical pharmacokinetics of commonly used and low-therapeutic-index drugs, the pharmacokinetic-pharmacodynamic interface, therapeutic drug monitoring with the emphasis on pharmacokinetics of drugs (such as: aminoglycosides antibiotics, carbamazepine, cyclosporine, vancomycin, digoxin, ethosuximide, lidocaine, lithium, methotrexate, phenpbarbital, phenytoin, procainamide/ N-acetyl procainamide, quinidine, salicylates, theophylline, tricyclic antidepressants, valproic acid, vancomycin and tacrolimus).
Minimum Course Requirements: 30 (2 x 15) Unit lectures (30 contact hours) per level.
Teaching and Learning Methods: 1-lectures 2-Class discussions.
Evaluation Methods:

- Quizzes	30%
- Midterm examination	30%
- Final examination (written)	40%

Principal Text (Latest Edition):

1- Applied Clinical Pharmacokinetics, Larry A. Bauer, McGraw-Hill Medical.

Supplementary Texts (Latest Edition):

1-Clinical Pharmacokinetics, John E. Murphy, American Society of Health-System Pharmacists.

2-Concepts in Clinical Pharmacokinetics, Joseph T. Dipiro, William J. Spruill, William E. Wade, and Robert A. Blouin, American Society of Health-System Pharmacists.

Patient Assessment

Course Identification and General Information:	
Title: Patient Assessment.	
Course Number: 20020513.	**Year:** Fifth.
Credit Units: 0 + 1 Units (3 contact hours) per week.	**Level**: Ninth.
Pre-requisite: 20020423 and 20040411.	
Co-requisite: None.	
Aims: To provide general knowledge on physical examination techniques, application of clinical assessment and physical parameters to normal conditions and to various disease states.	
Description: This course covers basis of patient physical assessment, cultural considerations in patient assessment, health and medication history. It includes, general assessment and vital signs (as blood pressure, heart rate, ECG, heart and respiratory sounds, skin rashes, changes in nails, hair, eyes, ears, head, neck, functions of liver and kidney). The use of equipments, techniques necessary to conduct physical examination were also included.	
Learning Outcomes: Upon successful completion of the course, the student should be able to: **a-Knowledge and Understanding:** - Recognize the comprehensive patient history. - Identify the basic assessment techniques (inspection, palpation, percussion, and auscultation), terminology, and the modifications caused by common disease states and drug therapy. - Gain knowledge of therapeutic drug concentrations and their interpretation - List basis for common clinical laboratory values and diagnostic tests and the	

influences of common disease states

- Recognize the Over-the-counter OTC point-of-care testing devices (e.g., glucometers, pregnancy tests, home testing for HbA1c, drug screening).
- Identify the principles of electrocardiography and common ECG abnormalities.
- Know the advanced cardiac life support

b- Cognitive skills:

- Evaluate patient problems and triage patients to other health professionals as appropriate.
- Participate in self-learning activities and in mentorship activities.
- Correlate signs and symptoms of possible diseases.
- Apply the relevant knowledge to health care either by direct instructions or advice to patients or by properly informing and effectively influencing decisions and actions of other health and social care professionals.
- Interpret laboratory test.
- Differentiate between the false positive and false negative results.
- Participate in self-learning activities and in mentorship activities.

c. Interpersonal Skills and Responsibility:

- Use effectively the interpersonal communication skills.
- Demonstrate professionalism in personal conduct and appearance.
- Present effectively the ideas in writing.
- Demonstrate effective basic counseling skills
- Apply appropriate interaction behavior and assertiveness in communications with health care professionals.
- Carry out duties in accordance with legal, ethical, social, economic, and professional guidelines.

- Comprehend the sensitivity to issues regarding cultural diversity, employing appropriate attitudes, behaviors, and skills.

-Use listening skills consistently when performing professional functions.

d. Communication, Information Technology and Numerical Skills:

- Apply communication skills in interpersonal relationships to improve the clinical, economical, and humanistic outcomes of patients.

- Work in a team during laboratory demonstration.

- Counsel the patients and their families about different management strategies.

- Use the language of medicine in communication with other health team members.

- Retrieve, analyze, and interpret the professional, lay, and scientific literature to provide drug information to patients, their families, and other involved health care providers.

-Dress professionally when engaging patients, health-care professionals, colleagues, and care givers.

e- Psychomotor Skills:

- Take a complete history for a given patient.

- Perform in a level meet the international standards.

- Perform a medication history and reviewing patient systems and charts.

- Assess medical, physical, psychosocial, behavioral, and economic status.

- Assess patient's health status by using appropriate interviewing.

- Examine pertinent data to determine a patient's health care needs related to the presenting problem(s).

- Assess patient compliance and develop strategies to improve.

- Report the laboratory tests.

- Manage the signs and symptoms of the diseases.

Contents:

Practical: Various concepts and methods and techniques of physical assessment and tools used in therapeutic drug monitoring, clinical laboratory tests, comprehensive patient history, influences of disease states; diagnostic imaging; diagnostic tests, routine; medical history taking; patient assessment: history, physical, and laboratory evaluation. General physical examination techniques; tools used in assessment in normal and abnormal findings; assessment of individual organs including photos and diagrams. Details of physical examinations associated with selected organs; OTC point-of-care testing devices (e.g., glucometers, pregnancy tests ….etc), principles of electrocardiography and common ECG abnormalities

Minimum Course Requirements: (3 x 15) 45 contact hours per level.

Teaching and Learning Methods:

1-Class discussions.

2-Practical sessions.

Evaluation Methods:

- Quizzes	30%
- Midterm examination	30%
- Final examination (written)	40%

Principal Text (Latest Edition):

1- Patient Assessment in Pharmacy Practice, Rhonda M. Jones and Raylene M Rospond, Lippincott Williams & Wilkins**.**

Supplementary Texts (Latest Edition):

1-Health Assessment and Physical Examination, Delmar, Lippincott Williams & Wilkins**.**

2- Principles of Patient Assessment in EMS, Bob Elling and Kirsten M. Elling, Delmar Cengage Learning.

First Aid

Course Identification and General Information:	
Title: First Aid.	
Course Number: 20020514.	**Year**: Fifth.
Credit Units: 0 + 1 Units (3 contact hours) per week.	
Pre-requisite: 20040411.	**Level**: Ninth.
Co-requisite: 20020513.	
Aims: Also to introduce the student to general, medical and surgical emergencies of all ages and their management and to understand signs and symptoms and first aid care for commonly encountered life-threatening, emergencies.	
Description: This course is designed to provide the immediate and temporary proper aid to a sick or injured person until medical treatment can be provided. Also to apply patient assessment skills to the pharmacy practice settings. It deals also with signs and symptoms and general rules of first aid care for commonly encountered life-threatening, emergencies.	
Learning Outcomes: Upon successful completion of the course, the student should be able to: **a-Knowledge and Understanding:** - Define the principles of first aid, including wound, fractures, dehydration and poison management, prior to the arrival of emergency medical intervention. - Recognize the role and responsibilities of an emergency first aider. - Know how to assess an incident. - Demonstrate the signs and symptoms and first aid care for commonly encountered life-threatening situations and emergencies.	

b- Cognitive skills:

- Apply the relevant knowledge to health care either by direct instructions or advice to patients or by properly informing and effectively influencing decisions and actions of other health and social care professionals.
- Investigate the signs and symptoms and first aid care.
- Participate in self-learning activities and in mentorship activities.

c. Interpersonal Skills and Responsibility:

- Adopt ethical, legal and safety guidelines, plan and implement efficient and effective working environment in different settings contributing to organization and management of time.
- Display professional attitudes when engaging patients, health-care professionals, colleagues, and care-givers.
- Act and communicate in a self-assured, confident manner.
- Demonstrate active listening skills.

d. Communication, Information Technology and Numerical Skills:

- Use the language of medicine in communication with other health team members.
- Work in a team during laboratory demonstration and management of the injured or shocked patient.
- Adhere to professional attire.
- Retrieve, analyze, and interpret the professional, lay, and scientific literature to provide drug information to patients.
- Give indications to patients in a professional way.
- Counsel the patients and their families about different management strategies

e- Psychomotor Skills:

- Perform in a level meet the international standards.

-Take a complete history for a given patient.

- Perform professionally the immediate and temporary proper aid to a sick or injured person until medical treatment can be provided.

- Perform the aids to minimize the consequences of injury or sudden illness until medical help arrives.

- Perform laboratory techniques safely and accurately.

Contents:

Practical: Introduction to first aid for all ages and all systems of the body, aims and priorities of first aid, management of the injured patient and shock, maintenance of airway passages and intravenous line, cardiovascular resuscitation, bleeding and hemorrhage, burns and wound care, fractures, epilepsy, coma and semicoma, sunstroke, animal bites, high grade fever, burns, strain and sprain, poisoning, drowning, head injuries and emergency procedures at home, work or leisure.

Minimum Course Requirements: (3 x 15) 45 contact hours per level

Teaching and Learning Methods:

1-Class discussions.

2-Practical sessions.

Evaluation Methods:

- Quizzes	30%
- Midterm examination	30%
- Final examination (written)	40%

Principal Texts (Latest Edition):

1- American Medical Association Handbook of First Aid and Emergency Care, American Medical Association, Random House Reference.

Supplementary Texts (Latest Edition):

1-First Aid for the USMLE, Tao Le, Vikas Bhushan, and Neil Vasan, McGraw-Hill Medical.

2-First Aid for the Basic Sciences, Organ Systems (First Aid Series) , Tao Le and Kendall Krause, McGraw-Hill Medical.

Pharmaceutical Biotechnology

Course Identification and General Information:	
Title: Pharmaceutical Biotechnology.	
Course Number: 20030511.	**Year**: Fifth.
Credit Units: 2+ 0 Units (2 contact hours) per week.	**Level**: Ninth.
Pre-requisite: 20030321.	
Co-requisite: None.	
Aims: To understand the recent trends and aspect concerning biotechnology, its applications, and the importance in the production of medicinal and pharmaceutical products.	
Description: This course is designed to understand the various techniques in biotechnology and their applications in the manufacturing of biopharmaceuticals and biomedical research and gain knowledge in some of the physicochemical properties, pharmacology and the formulation of commonly used biopharmaceuticals. Also, to understand the principles of the mechanism of some biotechnologically derived diagnostic aids/tests.	
Learning Outcomes: Upon successful completion of the course the student should be able to: **a- Knowledge and Understanding:** - Illustrate different biotechnological processes efficiently. - Define the concepts related to the production of biotechnological products & developing processes, so that the finished product will be suitable for its purpose. - Identify the therapeutic and diagnostic purposes and applications of molecular biotechnology in the treatment and diagnosis of diseases. - Recognize the recombinant DNA technology, recombinant proteins and nucleic	

acid technology.

- List the therapeutic use of biotechnological products, gene therapy, macromolecular drug delivery, and anti-sense technology.

- Demonstrate knowledge and understanding of currently topical and newly emerging aspects of pharmaceutical biotechnology

B- Cognitive skills:

- Estimate and interpret how the genetically modified organisms are produced.

- Discuss different criteria of the major biotechnological recombinant products in the market

- Explain techniques of cellular and molecular biology of microorganisms and their application in production of biotechnological and recombinant products.

- Interpret and assess information of different fermentation systems reliably.

- Apply the knowledge of genetics and biotechnological related subjects in practice settings.

- Integrate analytical techniques applied to the process of drug discovery.

- Cultivate the habit of continuous self learning that will enable them to meet the challenges of future development in pharmaceutical biotechnology.

c. Interpersonal Skills and Responsibility:

- Carry out duties in accordance with legal, ethical, social, economic, and professional guidelines.

- Work constructively in a group, cooperating with their leaders and seniors.

- Recognize the pharmacist professional limitations and the patient rights.

- Demonstrate professionalism in personal conduct and appearance.

-Demonstrate effective medication history interviewing skills.

- Demonstrate critical thinking, problem- solving and decision-making abilities.

- Exhibit creativity and time management abilities.

d. Communication, Information Technology and Numerical Skills:

- Work constructively in a group, cooperating with their leaders and seniors.
- Show professional responsibility and respect the compliance to work through systems
- Disseminate experimental results and write technical and scientific reports in English.
-Transmit the knowledge and professional expertise to non specialists.
- Retrieve, evaluate and rationalize information from different sources to improve professional competencies.
- Counsel the patients and their families about different management strategies.
- Use the language of medicine in communication with other health team members.
- Maintain a suitable image in manner, dress, speech and relationships that is consistent with the pharmacy profession.
- Use modes of modern IT communication.

e-Psychomotor Skills:

- Design and plan various process development for many valuable biotechnological products.
- Follow the legal aspects involved in progress of a new drug to market in biotechnological area.
- Design protocols on the application of experimental as a part of a group.
- Prepare oral presentations on specific topics in biotechnology.
- Verify the validity of biotechnological processes.
- Perform in a level meet the international standards.

Contents: General introduction to biotechnology, major biotechnological products and bioconversion processes**,** biodegradation and bioremediation,

nanobiotechnology, drug development biotechnology, biopharmaceuticals, gene therapy, the regulatory requirements of biotechnology drug products to receive approval to market, the challenges and approaches for overcoming an undesired immune response to protein therapeutics, addresses the discovery and clinical development of the new biotechnology-produced drugs.
Minimum Course Requirements: 30 (2 x 15) Unit lectures (30 contact hours) per level.
Teaching and Learning Methods: 1-Lectures. 2-Class discussions.
Evaluation Methods: - Quizzes 30% - Midterm examination 30% - Final examination (written) 40%
Principal Text (Latest Edition): 1- Pharmaceutical Biotechnology: Fundamentals and Applications, Daan J. A. Crommelin, Robert D. Sindelar, and Bernd Meibohm, Informa Healthcare.
Supplementary Texts (Latest Edition): 1-Pharmaceutical Biotechnology: Concepts and Applications, Gary Walsh, Wiley. 2-Pharmaceutical Biotechnology: Drug Discovery and Clinical Applications, Oliver Kayser and Rainer H. Müller, Wiley-VCH.

Drug Information

Course Identification and General Information:	
Title: Drug Information.	
Course Number: 20020515.	**Year:** Fifth.
Credit Units: 2 + 0 Units (2 contact hours) per week.	**Level**: Ninth.
Pre-requisite: 20020423 and 20040411**.**	
Co-requisite: None.	
Aims: To integrate information management principals and utilize, retrieve, relate, interpret and disseminate valuable drug information in daily practice. In addition, students will learn how to critically analyze and evaluate medical literatures.	
Description: This course explores the concept, fundamental aspects of drug information services, fundamentals of the practice, application of drug information skills for delivery of pharmaceutical care, technology of drug information retrieval for quality assurance, and the ability to judge the reliability of various sources of information. The course also includes literature evaluation, principles of evaluation of the primary literature and practical implications of the primary literature.	
Learning Outcomes: Upon successful completion of this course the student should be able to: **A-Knowledge and Understanding:** - Illustrate the fundamental aspects of drug and poison information services. - Define different sources of information (primary, secondary and tertiary). - Identify and use appropriate drug information resources. - Describe the strengths and weaknesses of information gleaned from the internet and from conventional primary, secondary and tertiary sources. - Identify the basis of poison control including diagnosis, first aid/home	

management.

- Illustrate the basis of advanced poisoning treatment and life support.
- Mention the concepts of drug and poison information centers, information about medication errors, evidence-based medicine and drug monographs.
- Demonstrate the ability to appropriately comprehend and utilize the literature to answer a variety of drug information questions.

b- Cognitive Skills:

- Distinguish various types of electronic medical information databases.
- Evaluate of drug literature as an integral component of pharmaceutical care.
- Analyze and interpret information needed in pharmacy practice.
- Interpret, and combine information from multiple sources into concise written and verbal presentation.
- Indicate an efficient strategy to locate the drug information necessary to answer questions related to identification, usual dose, adjustment the dose safety of drug a and drug interactions.
- Participate in self-learning activities and in mentorship activities.

c. Interpersonal Skills and Responsibility:

- Demonstrate a professional caring attitude.
- Demonstrate behavior which fulfills personal responsibilities and duties.
- Demonstrate organization and time management skills.
- Exhibit initiative, enthusiasm, and reliability in performing clinical tasks.
- Demonstrate common sense and practical judgments in interactions.
- Use effectively the interpersonal communication skills to apply and develop the drug and poison information.
- Demonstrate accountability for actions and decisions.

d- Communication, Information Technology and Numerical Skills:

- Provide drug information to health care professionals.
- Interact and/or communicate orally and in writing with other health care professionals in their own specialized language and also express complex issues in terms that lay people can understand.
- Use the language of medicine in communication with other health team members.
-Effectively present group presentations using appropriate media aids to peers and health care professionals.
- Effectively communicate information in writing.
- Apply appropriate interaction behavior and assertiveness in communications with health care professionals.
- Use modes of modern IT communication.
- Retrieve and evaluate information from different sources to improve professional competencies.

e. Psychomotor Skills:

- Provide drug and poison information to the patients and society.
- Advise and inform the patients and society about the aid in different conditions (e.g burning, anaphylaxis, convulsion….etc).
- Design a strategy to search and manage drug information from different sources.
- Present drug and poison information as presentations to members of the healthcare team.
- Rationalize the use of medicine while giving the information.
- Write a report using a variety of information sources, primary literature.
- Use appropriate drug information to patient care situations.
- Manage OTC prescribing.
- Implement the concept of quality management in drug information and clinical Pharmacy.

- Perform in a level meet and consistent the international standards.

Contents: Concept of drug information, fundamentals of the practice of drug information process of providing drug information resources, primary literature documents, literature evaluation, clinical application of statistical analysis, professional writing, drug information services, poison centers, investigational drugs, adverse drug reactions, drug use evaluations, 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, judge the reliability and application of drug information skills for delivery of pharmaceutical care. Primary, secondary and tertiary drug information resources including standard reference texts, computer systems, periodicals and technology of drug information retrieval for quality assurance.

Minimum Course Requirements: 30 (2 x 15) Unit lectures (30 contact hours) per level.

Teaching and Learning Methods:

1-Lectures.

2-Class discussions.

Evaluation Methods:

- Quizzes	30%
- Midterm examination	30%
- Final examination (written)	40%

Principal Text (Latest Edition):

1- Drug Information Handbook: A Comprehensive Resource for All Clinicians and Healthcare Professionals (Lexi-Comp's Drug Reference Handbooks), Charles F. Lacy, Lora L. Armstrong, Morton P. Goldman, and Leonard L. Lance, Lexi-Comp.

Supplementary Texts (Latest Edition):

1-Drug Information: A Guide for Pharmacists , John E. Stanovich, McGraw Hill Text.

2-Drug Information: A Guide for Pharmacists (Malone, Drug Information), Patrick Malone, Karen Kier, and John Stanovich, McGraw-Hill Medical.

Pharmacotherapeutics-4

Course Identification and General Information:	
Title: Pharmacotherapeutics-4	
Course Number: 20020521.	**Year**: Fifth.
Credit Units: 5 + 1 Units (8 contact hours) per week.	**Level**: Tenth.
Pre-requisite: 20020511**.**	
Co-requisite: None.	
Aims: To provide knowledge and therapy of common diseases of ophthalmic and otolaryngological, dermatologic and oncologic disorders	
Description: A course series in clinical pharmacology and advanced therapeutics which includes major disease problems and use of therapeutic interventions in (ophthalmic, otolaryngological, dermatologic disorders hematologic, infectious diseases and neoplastic diseases). Course material typically includes disease symptomology, current concepts regarding appropriate drug treatment, patient monitoring, drug mechanism/effects/pharmacokinetics, and drug interactions. Literature review and case studies are included.	
Learning Outcomes: Upon successful completion of the course, the student should be able: **a-Knowledge and Understanding:** - Recognize the normal laboratory values. - List the pharmacotherapeutic modalities. - Identify the drug therapy, pharmacotherapeutic duplications and interactions. - Describe the mechanism of action, remedy adverse reactions and iatrogenic or drug-induced illness of drugs and avoid drug misuse and abuse. - Recognize the rationale use of drugs.	

- List indications, contraindications, warnings, and precautions associated with a drug product's active and inactive ingredients
- Identify drug products by their generic, trade and/or common name.

b-Cognitive Skills:

- Integrate core scientific and systems-based knowledge in patient care decisions
- Predict the prognosis.
- Suggest therapy protocol.
- Interpret and apply pharmacokinetic principles to calculate and determine appropriate drug dosage regimens.
- Analyze and interpret information needed in pharmacy practice.
- Apply and utilize the knowledge of physiology, pharmacology, pharmacovigilance and toxicology in the proper selection and use of drug in various disease conditions, and in predicting the side effects of drug classes and toxic agents.
- Interpret the clinical laboratory data and their critical evaluation in term of their significance and their theoretical basis.
- Participate in self-learning activities and in mentorship activities.

c. Interpersonal Skills and Responsibility:

- Carry out duties in accordance with legal, ethical, social, economic, and professional guidelines.
- Work constructively in a group, cooperating with their leaders and seniors.
- Show professional responsibility and respect the compliance to work through systems.
- Demonstrate critical thinking, problem- solving and decision-making abilities.
- Demonstrate creativity and time management abilities.

- Demonstrate active listening skills.

d. Communication, Information Technology and Numerical Skills:

- Communicate in a facilitative, effective, efficient, and educational manner with patients, their families and their relatives.
- Interact and/or communicate orally and in writing with other health care professionals in their own specialized language and also express complex issues in terms that lay people can understand.
- Interact and/or communicate orally and in writing with other health care professionals in their own specialized language and also express complex issues in terms that lay people can understand.
- Work in a team during clinical cases study and discussion sessions.
- Use the language of medicine in communication with other health team members.
- Maintain a suitable image in manner, dress, speech and relationships that is consistent with the medical profession.
- Use modes of modern IT communication.
- Perform library search and retrieval of information**.**

e. Psychomotor Skills:

-Take a complete history for a given patient.
- Advise patients by properly informing and effectively influencing decisions.
- Design the development of health care through reflective practice, innovation and the interpretation.
- Recommend the rational use of drugs and prevent drug misuse or abuse.
- Design of patient-centered, culturally relevant treatment plans.
- Assess and monitor the patient's drug therapy.
- Choose the best drug, dose, frequency and duration.
- Diagnose and treat the patients based on scientific and reasonable rationale.

- Calibrate cost effective pharmacotherapeutic regimen to achieve desired therapeutic outcomes.
- Implement the concept of quality management in clinical pharmacy daily practice.
- Perform in a level meet and consistent with the international standards.

Contents: allergic and drug induced skin disease, common skin disorders, burns, Concepts of pathophysiology, pharmacology and pharmacokinetics in the treatment of ophthalmic and otolaryngological disorders (glaucoma, common eye, ear, nose and throat diseases); dermatologic disorders (Acne vulgaris, psoriasis, atopic dermatitis, coagulation disorders, allergy, other skin disorders, burns); oncologic disorders (leukemias, lymphomas, breast cancer, liver tumors, GIT, lung and prostate cancers, pediatric solid tumors, gynecologic cancers, skin cancers and melanomas) and transplantation.

Practical: Clinical cases study and discussion sessions.

Minimum Course Requirements: 75 (5 x 15) Unit lectures and 45 practical hours (3 x 15) per level.

Teaching and Learning Methods:

1-Lectures

2-Class discussions.

3-Practical sessions.

Evaluation Methods:

- Quizzes 10%
- Assignments 10%
- Midterm examination 20%

- Practical examinations 20% - Final examination (written) 40%
Principal Text (Latest Edition): 1-Pharmacotherapy: A Pathophysiologic Approach, Joseph T. Dipiro, Robert L. Talbert, and Michael Posey, Appleton and Lange: Norwalk, Connecticut. McGraw-Hill Medical Publisher.
Supplementary Texts (Latest Edition): 1-Pharmacotherapy Principles and Practice, Marie Chisholm-Burns, Terry Schwinghammer, Barbara Wells, and Patrick Malone, McGraw-Hill Medical. 2- Pharmacotherapy Principles and Practice Study Guide, Michael Katz, Marie Chisholm-Burns, and Kathryn R. Matthias, McGraw-Hill Medical.

Pharm. D. Seminar

<table>
<tr><td colspan="2">Course Identification and General Information:</td></tr>
<tr><td colspan="2">Title: Pharm. D. Seminar.</td></tr>
<tr><td>Course number: 20020522.</td><td>Year: Fifth.</td></tr>
<tr><td>Credit Units: 0 + 1 Units (3 contact hours) per week.
Pre-requisite: 20020511.</td><td>Level: tenth.</td></tr>
<tr><td colspan="2">Co-requisite: None.</td></tr>
<tr><td colspan="2">Aims: To provide the student with the proper methods of presentation and discussion of relevant topics and develop skills needed for the effective presentation of pharmacy-oriented material and in literature evaluation and encourage them to think critically about contemporary pharmacy issues.</td></tr>
<tr><td colspan="2">Description: This course has been designed to provide students with basics of scientific presentation and discussions of current issues in the profession of clinical pharmacy to develop and refine professional speaking skills. Students will also gain experience conducting Medline searches, analyzing the medical literature, and developing audio-visual materials to enhance their presentations. Emphasis will be on use of multimedia, slides, overheads, handouts and other visual aids as well as methods of answering questions from the audience. The course deals with some of the current clinical and non clinical issues affecting health care.</td></tr>
</table>

Learning Outcomes:

Upon successful completion of the course, the student should be able to:

a-Knowledge and Understanding

- Gain knowledge for their presentations.
- Maintain professional competence by identifying and analyzing emerging issues.
- Explore mechanisms that would allow for more students to actively present as part of the micro-teach experience.

b-Cognitive Skills

- Apply advanced statistical analysis to evaluate the data.
- Apply their acquired knowledge in coding, recoding and analyzing collected data to formulate, write, and present the results.
- Evaluate and integrate information from multiple sources based on a course topic.
- Incorporate peer evaluation of teaching into the micro-teach experience.
- Participate in self-learning activities and in mentorship activities.

c. Interpersonal Skills and Responsibility

- Develop the ability and confidence in attitude.
- Develop and refine professional speaking skills.
- Exhibit awareness in the listening skills and great respect to the audience.
- Demonstrate awareness of ethical debates pertaining to the seminar topics.
- Demonstrate awareness of ethical considerations of academic life.
- Encourage the student to think critically about contemporary pharmacy issues.
- Develop and improve oral presentation skills and interactive dialogue.
- Develop clinical thinking skills required of a clinical pharmacist.
- Demonstrate creativity and time management abilities.

d. Communication, Information Technology and Numerical Skills

- Use the numerical skills as statistical analysis to evaluate the data.
- Improve oral and written communication skills.
-Use multimedia technology to communicate effectively.
- Collaborate with other health care practitioners, patients, and family members to effectively develop interpersonal and interprofessional relationships.
- Maintain a suitable image in manner, dress, speech and relationships that is consistent with the pharmacy profession.
- Retrieve, analyze, and interpret the professional, lay, and scientific literature to provide drug information to patients, their families, and other involved health care providers.
- Effectively present group presentations using appropriate media aids to peers and health care professionals.

e- Psychomotor Skills

- Assess changes in attitudes and behaviors as a result of the course.
- Design of a seminar, in terms of providing lectures and arranging for guest speakers as needed
- Use of multimedia, power point, slides, overheads, handouts and other visual aids as well as methods of answering questions from the audience.
- Prepare the scientific content of the presentation and handle questions following the presentations.
- Implement and evaluate an innovative approach to a pharmacy seminar course intended to develop students' presentation skills.
- Perform in a level meet and consistent the international standards.

Contents: Presentation and discussions of current issues in the profession of clinical pharmacy. Emphasis will be on evaluation of drug literature, articles for proper research, design and data interpretation including use of multimedia, slides,

overheads, handouts and other visual aids as well as methods of answering questions from the audience. Each seminar topic is directed by a faculty preceptor and includes a question and answer period and discussion questions
Minimum Course Requirements: (3 x 15) 45 contact hours per level.
Teaching and Learning Methods: 1-Class discussions. 2- Presentation. 3-Practical sessions.
Evaluation Methods: - Attendance and participation 20% - Presentation 80%
Principal Text (latest edition): 1-How to Run Seminars & Workshops: Presentation Skills for Consultants, Trainers and Teachers, Robert L. Jolles, Wiley.
Supplementary Text (latest editions): 1-How to Create and Market a Successful Seminar or Workshop, Howard L. Shenson, Bermont Books. 2-How to Develop and Promote Successful Seminars and Workshops, Howard L. Shenson, John Wiley & Sons, Inc.

Pharmacy Management

Course Identification and General Information:	
Title: Pharmacy Management.	
Course Number: 20020523.	**Year:** Fifth.
Credit Units: 2 + 0 Units (2 contact hours) per week.	**Level**: tenth.
Pre-requisite: None.	
Co-requisite: None.	
Aims: This course aims to provide students with knowledge of concepts and principles of management within the economic and professional pharmacy environment.	
Description: This course is to familiarize students with the basic principles, terms, and functions of pharmacy marketing and management that must be undertaken in every pharmacy practice setting. Topics include evaluating the financial performance of a pharmacy, strategic planning and marketing management, material management, developing a marketing plan to provide innovative pharmaceutical care services, drug supply and accounting.	
Learning Outcomes: Upon successful completion of this course, the student should be able to: **a-Knowledge and Understanding:** - Identify the basic concepts and principles of management. - Describe the methods of management, decision making, leadership pharmacy practice and how maximize the benefits. - Define the role of the pharmacist in the management and administration of pharmacies and hospital and retail establishments.	

- Recognize the ideal design and modernization of pharmacies.
- List the principles of purchase systems, turn-over and inventory control, pricing and fee concepts, control of costs cash and credits, financial analysis and evaluation.
- Identify components of a job description..

b-Cognitive Skills:

- Apply the management principles, processes and activities in pharmacy practice**.**
- Discuss marketing principles in pharmacy and pharmaceutical care service.
- Explain the significance of financial and human resources management in pharmaceutical business.
- Improve the relationship with customers.
- Appraise and determine market needs.
- Explain the role and functions of a pharmacist in the community Pharmacy.
- Evaluate a pharmacy layout.

c. Interpersonal Skills and Responsibility:

- Show awareness of the legal, ethical, economic, and professional guidelines of setting up a pharmaceutical business.
- Demonstrate behavior that fulfills the personal responsibilities and duties owed to the patient in the provision of pharmacy management.
- Display a respect and sensitivity for patient and family attitudes, behaviors and lifestyles.
- Communicate and collaborate with prescribers, policy makers, members of the community and other involved health care providers and administrative and supportive personnel to develop public policy.
- Maintain professional competence by identifying and analyzing emerging issues, products, and services.

d. Communication, Information Technology and Numerical Skills:

- Develop good relationships with the customers.
- Identify one's strengths and weaknesses in communications and devise and implement strategies to improve skills.
- Communicate in a facilitative, effective, efficient, and educational manner with patients, their families and their relatives.
- Carry out duties in accordance with legal, ethical, social, economic, and professional guidelines.
- Communicate clearly and succinctly to colleagues and other members of the health care team.
- Use modes of modern IT communication.
- Retrieve and evaluate information from different sources to improve professional competencies.

e. Psychomotor Skills:

- Perform feasibility study for a pharmacy ownership or management using principles of financial management and business indicators**.**
- Design community medical information service.
- Analyze location and evaluate of various types of pharmacies.
- Manage pharmacy operations, personnel, medication distribution and control systems.
- Draw up adequate plans for the sustained growth of any concern, given relevant data.
- Implement and manage the formulary system.
- Calibrate the legal aspects of setting up a pharmaceutical business.
- Manage staffing and selection of personnel and co-operation.

- Manage human, physical, medical, informational and technological resources to effectively administer and develop the medication use and services. - Access the quality of health and disease prevention services.
Contents: Management principles (planning, organizing, directing, and controlling resources) applied to various pharmacy practice settings and patient outcomes. Management of staff, pharmacists, technicians, and other supportive personnel. Personal time management and organizational skills, management of medication, use safety systems, strategies to improve continuity of patient care as patients move between health care settings. Managing risks in pharmacy practice, management applications in specific practice settings; independent community pharmacy, chain community pharmacy and hospital pharmacy. Concepts, tools, techniques and application of marketing in pharmacy, fundamentals financial accounting, project management, managing and improving the medication-use process, administration and managed care systems, health care improvement mechanisms at the micro- and macro-system levels.
Minimum Course Requirements: 15(1 x 15) Unit lectures (15 contact hours) per level.
Teaching and Learning Methods: 1-Lectures. 2-Class discussions.
Evaluation Methods: - Quizzes 30% - Midterm examination 30% - Final examination (written) 40%

Principal Text (Latest Edition): 1- Pharmacy Management: Essentials for All Practice Settings, Shane Desselle and David Zgarrick, McGraw-Hill Medical.
Supplementary Texts (Latest Edition): 1- Pharmacy Management, Leadership, Marketing and Finance, Marie A. Chisholm-Burns, Allison M. Vaillancourt, and Marv Shepherd, Jones & Bartlett Publishers. 2- Pharmacy Management, Shane P. Zgarrick, David P. Desselle, McGraw-Hill Medical.

Toxicology

Course Identification and General Information:	
Title: Toxicology.	
Course Number: 20040521.	**Year:** Fifth.
Credit Units: 2 + 0 Units (2 contact hours) per week.	**Level**: tenth.
Pre-requisite: 20040411.	
Co-requisite: None.	
Aims: To provide general knowledge on toxicology, detection and isolation of poisons and their treatment, instrumentation procedures, biological assays and clinical toxicology.	
Description: This course is concerned with the general principles of management of poisoning with drugs, chemicals and heavy metals. It also deals with the general mechanisms through which toxic substances exert their effects at the molecular and cellular level. It focuses on the poisonings following drug allergies and those that result from interaction of chemicals with proteins, enzyme, receptors or the genome and the role of free radicals in induction of diseases. Furthermore, the student will be enlightened about those intoxications resulting from exposure to environmental pollutants, heavy metals, drug-drug interactions and drug-food interactions. The course also covers the mechanisms of teratogenicity, mutagenicity and carcinogenicity	
Learning Outcomes: Upon successful completion of the course, the student should be able to: **a-Knowledge and Understanding:** - Recognize the basic principles of basic and clinical toxicology.	

- Identify the major classes of toxins, their mechanism of toxicity and toxicokinetics.
- Illustrate the basic principles in management of poisoning.
- Describe the mechanisms of mutagenesis, carcinogenesis and teratogenesis.
- Define toxicity of various drugs, gases, heavy metals and poisons of plant and animal origin, including (sources, identification, handling, symptoms, management and treatment).
- Outline the basic and applications of clinical toxicology.
- Illustrate clinical features of diseases and appropriate medical intervention in emergency situations, with stress on some genetic abnormalities and toxicology of addiction.
- Define drug and substance misuse and abuse from a toxicological perspective.
- Identify the functions of drug and poison control centers.

B- Cognitive Skills:

- Interpret the drug screens.
- Apply the knowledge of patient stabilization and antidotes in management of toxicity cases.
- Evaluate the toxic effects of poisons on different organs.
- Predict the precise mechanisms through which the different toxicants may produce their hazardous effects.
- Apply and utilize the knowledge of physiology and toxicology in predicting the side effects of toxic agents.
- Distinguish minor illnesses from toxicity cases requiring prompt medical intervention.
- Analyze, evaluate and interpret clinical cases of toxicity.
- Criticize different methods for the management of poisoning in individual cases

of toxicity.

- Participate in self-learning activities and in mentorship activities.

c. Interpersonal Skills and Responsibility:

- Achieve cultural competence and social awareness.
- Assume professional responsibility for patients and respect the compliance to work through systems.
- Comprehend the sensitivity to issues regarding cultural diversity, employing appropriate attitudes, behaviors, and skills.
- Demonstrate behavior that fulfills the personal responsibilities and duties owed to the patient.
- Act and communicate in a self-assured, confident manner.
- Demonstrate active listening skills.
- Work constructively in a group, cooperating with their leaders and seniors.
- Demonstrate critical thinking, problem- solving and decision-making abilities.

d. Communication, Information Technology and Numerical Skills:

- Co-operate with the team in emergency management of poisoned patients.
- Demonstrating effective communication skills and using informatics.
- Communicate in a facilitative, effective, efficient, and educational manner with patients, their families and their relatives.
- Communicate clearly and succinctly to colleagues and other members of the health care team.
- Use modes of modern IT communication.
- Retrieve information.
- Use the language of medicine in communication with other health team members.

e- Psychomotor Skills:

-Take a complete history for a given patient.

- Perform in a level meet and consistent the international standards.

-Implement the concept of quality management in basic and clinical toxicology. Pharmacy.

- Minimize toxicity outcomes and protect from further intoxication.
- Design antidotes approaches to toxic exposures.
- Assess accurately the potential toxicity of the most commonly ingested substances involved in accidental poisonings.
- Evaluate the health effects of chemicals.
- Set the minimum exposure limits for different toxic agents.

-Implement efficient and effective modes of working to manage patient toxicity through group discussions and participation in laboratory sessions.

- Report adverse reactions to medicines and assess toxicity profile.
- Advise patients on the safe and effective use of drugs while managing the toxicity condition.
- Manage poisoned cases protect the environment from the hazardous effects of the pollutants.
- Estimate the risk of different toxicities including heavy metals, gases, animals and plant toxins.
- Calibrate the acute and chronic toxic effect of xenobiotics on the body, including drug or chemical overdose and toxic signs of drugs of abuse.
- Calculate a dose metric in humans following exposure to chemical using physiological-based pharmacokinetic models.

Contents: Principles, mechanism of toxicity and toxicokinetics, signs, symptoms and management of toxicity, systemic toxicology, toxic agents, teratogens,

carcinogens, radiations, acute and chronic toxic effect of xenobiotics on the body, including drug or chemical overdose and toxic signs of drugs of abuse, environmental toxicity, drug abuse, over dosage of drugs; antidotes and approaches to toxic exposures , functions of poison control centers , detection and isolation of poisons and their treatment, analytical instrumentation and procedures, biological assays, clinical toxicology, forensic toxicology and industrial toxicology. Adverse drug interactions and generic components in clinical practice.
Minimum Course Requirements: 30 (2 x 15) Unit lectures (30 contact hours) per level.
Teaching and Learning Methods: 1-Lectures using overhead projector. 2-Class discussions.
Evaluation Methods: - Quizzes 30% - Midterm examination 30% - Final examination (written) 40%
Principal Text (Latest Edition): 1-Principles of Toxicology, Karen Stine and Thomas M. Brown, Informa Healthcare**.**
Supplementary Texts (Latest Edition): 1-Clinical Toxicology: Principles and Mechanisms, Frank A. Barile, Informa Healthcare. 2-A Textbook of Modern Toxicology , Ernest Hodgson, Wiley-Interscience.

Pharmacoepidemology and Pharmacoeconomics

Course Identification and General Information:	
Title: Pharmacoepidemology and Pharmacoeconomics.	
Course Number: 20020524.	**Year:** Fifth.
Credit Units: 3 + 0 Units (3 contact hours) per week.	**Level**: tenth.
Pre-requisite: None.	
Co-requisite: None.	
Aims: To provide general knowledge on strategies, measures, and applications of Pharmacoeconomics in daily pharmacy practice. Also to provide detailed knowledge for evaluating the safety and effectiveness of medicines and illustrate pharmacoepidemiology and toxicoepidemiology in real clinical setting	
Description: This course is designed to give the student an overview of basic principles of pharmacoeconomics and drug utilization evaluation. It includes topics as prices and profit in the industry, productivity, costs, economies of scale, innovation, economic effects of regulation, and cost benefit and cost effectiveness analysis of pharmaceuticals. The basic concepts, terminology, methods and assumptions necessary for pharmacoeconomics analysis, introduction to of pharmacoepidemiology that uses quantitative research methods to evaluate benefit/risk ratio with regard to the use of marketed medications. Useful techniques to medical and health researchers who wish to assess the utilization, effectiveness and safety of marketed drug therapies. In addition to applications of pharmacoeconomics and pharmacoepidemiology in pharmacy practice.	
Upon successful completion of the course, the student should be able to: **a-Knowledge and Understanding:** - Identify the main definitions of principles, methods and applications of	

pharmacoeconomics and pharmacoepidemiology..

- Recognize the concepts of pharmacoeconomics in relation to patient care and pharmacoepidemiological data.
- State the applications of economic theories and health-related quality-of-life concepts to improve allocation of limited health care resources.
- Describe the direct and non-direct medical costs.
- Mention the intangible costs, opportunity costs and incremental costs.
- Define cost-effectiveness analysis and discuss the appropriate application of this method for drug therapy evaluations.
- Outline the components of a "full" economic evaluation.
- Describe toxicoepidemiology of drugs (human health risk assessment.
- Identify the prices and profit in the industry, productivity, economies of scale, economic effects of regulation, and cost benefit and cost effectiveness analysis of pharmaceuticals.

b- Cognitive Skills:

- Apply the full and partial economic evaluation methods.
- Discuss the challenges and the future of pharmacoepidemiology.
- Explain the cost of illness evaluation, cost minimization analysis and statistical methods used in pharmacoepidemiologic study.
- Appraise the economic, clinical and humanistic consequences.
- Discuss how cost-benefit analysis can be used to quantify the value of clinical pharmacy services.
- Investigate the quality of life studies as an application of pharmacoepidemiology.
- Evaluate the cost benefit analysis, cost effective analysis and cost consequence analysis.
- Correlate the economic principles in relation to pharmacoeconomic analysis .

- Participate in self-learning activities and in mentorship activities.

c. Interpersonal Skills and Responsibility:

- Carry out duties in accordance with legal, ethical, moral, and pharmacoeconomic principles to quality of pharmacy issues.
- Demonstrate ethical and legal decision making to the development, promotion, sale and use of drugs.
- Demonstrate professionalism in personal conduct and appearance.
- Exhibit organization and time management skills.
- Demonstrate critical thinking, problem- solving and decision-making abilities.
- Demonstrate creativity and time management abilities.
- Use listening skills consistently when performing professional functions.
- Work constructively in a group, cooperating with their leaders and seniors.
- Show professional responsibility and respect the compliance to work through systems.

d. Communication, Information Technology and Numerical Skills:

- Use and present numerical skills in pharmacoeconomic study results.
- Effectively present ideas in writing.
- Use the numerical skills to apply in pharmacoepidemiologic studies
- Identify barriers to communication and devise and implement strategies to overcome these barriers.
- Use modes of modern IT communication.
- Retrieve, analyze, and interpret the professional, lay, and pharmacoeconomic literature to provide health care providers.
- Calculate professionally the pharmacoepidemiologic parameters.
- Communicate in a facilitative, effective, efficient, and educational manner with patients, their families and their relatives.

- Communicate clearly and succinctly to colleagues and other members of the health care team.

e- Psychomotor Skills:

- Perform in a level meet and consistent the international standards.
- Implement the concept of quality management in pharmacoeconomics and pharmacoepidemiologic parameters.
- Assess professionally pharmacoeconomics and pharmacoepidemiologic problems.
- Perform a sensitivity or incremental cost analysis and costs discount.
- Calibrate the patient, provider, payer and societal perspectives.
- Design in depth studies in prices and profit in the industry, productivity, cost benefit , cost effectiveness analysis of pharmaceuticals**,** continual monitoring for unwanted effects and other safety-related aspects of drugs
- Estimate of the probability of beneficial effects in populations, or the probability of adverse effects in populations, and other parameters relating to drug use benefit.
- Write reports on the application of principles of epidemiology to the study of drug use and outcomes in large populations.

Contents: Principles for evaluating and conducting pharmacoeconomic studies, economic principles in relation to pharmacoeconomic analysis, concepts of pharmacoeconomics in relation to patient care, applications of economic theories and health-related quality-of-life concepts to improve allocation of limited health care resources. Cost-effectiveness analysis, cost-minimization analysis, cost-benefit analysis, burden-of-illness analysis, cost utility analysis, decision analysis and verification of quality and efficiency in the services. Pharmacoepidemiology, medical surveillance and outbreaks of disease, application of principles of epidemiology to the study of drug use and outcomes in large populations, studies

that provide an estimate of the probability of beneficial effects in populations, or the probability of adverse effects in populations, and other parameters relating to drug use, benefit and methods for continual monitoring for unwanted effects and other safety-related aspects of drugs and data systems for pharmacoepidemiologic studies. Post-marketing surveillance, recall and withdrawal of drugs from the market.
Minimum Course Requirements: 45 (3 x 15) Unit lectures (45 contact hours) per level.
Teaching and Learning Methods: 1-Lectures. 2-Class discussions.
Evaluation Methods: - Quizzes 30% - Midterm examination 30% - Final examination (written) 40%
Principal Text (latest edition): 1-Reference Guide for Pharmacy Management & Pharmacoeconomics, Manan H. Shroff, Krishna Publications Inc.
Supplementary Texts (latest editions): 1-1-Textbook of Pharmacoepidemiology, Brian L Strom and Stephen E Kimmel**,** Wiley. 2- Essentials of Pharmacoeconomics, Karen L. Rascati, Lippincott Williams and Wilkins.

Social and Behavioral Sciences

<table>
<tr><td colspan="2">Course Identification and General Information:</td></tr>
<tr><td colspan="2">Title: Social and Behavioral Sciences.</td></tr>
<tr><td>Course Number: 20020525.</td><td>Year: Fifth.</td></tr>
<tr><td>Credit Units: 1+ 0 Units (1 contact hours) per week.</td><td rowspan="2">Level: Tenth.</td></tr>
<tr><td>Pre-requisite: None.</td></tr>
<tr><td colspan="2">Co-requisite: None.</td></tr>
<tr><td colspan="2">Aims: To provide general knowledge on general sociology, social problems, general psychology and scientific interpretations of behavior to improve communication skills in work and life situations. Also to acquire self control and self adjustment skills and to applications in pharmacy.</td></tr>
<tr><td colspan="2">Description: The course will survey the major fields of psychology (cognition, personality, development, social interaction, and abnormal behavior). It will explore current approaches to psychology, demonstration of the biological, cognitive, and socio-cultural approaches to psychology. Social interactions and relationships that provide a comprehensive view of human behavior.</td></tr>
<tr><td colspan="2">Learning Outcomes:
At the end of the course, the student should be able to:
a-Knowledge and Understanding:
- Identify the principles and applications of sociology and psychology in the pharmacy practice.
- Recognize the role of the pharmacist and his balanced and positive interactions with the patients.
- Illustrate and articulate the major psychological and sociological theories and its impacts in the clinical pharmacy setting.</td></tr>
</table>

- Elaborate the pharmacist's role in identifying patient's noncompliant behavior and managing drug-related problems.
- Show understanding of cross-cultural differences and cultural diversity the importance of cultural context and its impact in the patient behavior.
- Recognize the individual and interpersonal models of health and illness behavior.
- Identify the variations of patient's memory and intelligence.

b-Cognitive Skills:

- Develop the student in the cognitive, moral, gender and psycho-social domains, theories of cognition, learning and motivation.
- Discuss the socio-psychological problems
- Plan to find solutions for such problems.
- Appraise how to improve the memory and concentration.
- Participate in self-learning activities and in mentorship activities.
- Interpret the models and frameworks for health and illness behaviors.

c. Interpersonal Skills and Responsibility:

- Exhibit development of professional, ethical, moral, and culturally competent behavior to optimize patient care and collaboration with other health care providers.
- Demonstrate critical thinking skills necessary to critically assess real world issues and the various perspectives on them.
- Demonstrate understanding of the diverse assumptions and values that shape our experiences and/or attitudes of the world.
- Develop the leadership, supervision and decision making skills.
- Exhibit behavior modification according to the patient.

- Demonstrate the necessary skills to understand the patients.
- Provide organized educational programs to facilitate continuous professional development.
- Recognize the pharmacist professional limitations and the patient rights.
- Carry out duties in accordance with legal, ethical, social, economic, and professional guidelines.
- Act and communicate in a self-assured, confident manner.
- Demonstrate active listening skills.
- Demonstrate professionalism in personal conduct and appearance.
- Work constructively in a group, cooperating with their leaders and seniors.
- Show professional responsibility and respect the compliance to work through systems.

d. Communication, Information Technology and Numerical Skills:

- Communicate in a facilitative, effective, efficient, and educational manner with patients, their families and their relatives.
- Communicate clearly and succinctly to colleagues and other members of the health care team.
- Use modes of modern IT communication.
- Retrieve information.

e- Psychomotor Skills:

- Assess properly the patient behavior.
- Solve problems and know how to deal with others.
- Manage problem and conflicts.
- Design and apply a special professional dealing with children and elderly medicines.

- Perform and show an advanced care for individuals with mental illness. - Design a model for the public images of pharmacists and pharmacies. - Perform in a level meet and consistent the international standards.
Contents: Introduction to scientific thinking, definition and fields of psychology, biology of behavior, the psychology of sensation, attention and perception, consciousness, learning and memory, human intelligence, thinking and problem solving, interaction with other health care motivation, emotion and emotional states, stress and personality. Scope of sociology, fundamental concepts, basic social institutions and the fundamental processes of group interaction. Social interactions and relationships
Minimum Course Requirements: 15 (1 x 15) Unit lectures (15 contact hours) per level.
Teaching and Learning Methods: 1-Lectures. 2-Class discussions.
Evaluation Methods: - Quizzes 30% - Midterm examination 30% - Final examination (written) 40%
Principal Text (Latest Edition): 1-Social and Behavioral Aspects of Pharmaceutical Care, Nathaniel M. Rickles, Albert I. Wertheimer, and Mickey C. Smith, Jones & Bartlett Publishers.
Supplementary Texts (Latest Edition): 1-Psychotherapeutic Techniques in Medicine (International Behavioral and

Social Sciences, Classics from the Tavistock Press), Michael Balint, Routledge; Reprint edition.

2-Pharmacy Practice: Social and Behavioral Aspects, Albert I. Wertheimer and Mickey C. Smith, Williams & Wilkins.

Industrial Pharmacy

Course Identification and General Information:	
Title: Industrial Pharmacy.	
Course Number: 20010521.	**Year:** Fifth.
Credit Units: 3 + 0 Units (3 contact hours) per week.	**Level**: tenth.
Pre-requisite: 20010511.	
Co-requisite: None.	
Aims: To outline the design and mechanism of action of the instruments in pharmaceutical industry, principles of filtration, size reduction, size enlargement ,size separation, and their application in pharmaceutical processes.	
Description: This course explains the principles of industrial pharmacy through studying the unit operations such as evaporation, distillation, drying, mixing, humidification, extraction, filtration, centrifugation, crystallization, refrigeration, dehumidification and air conditioning. In addition to, pharmaceutical operations methods of particle size reduction enlargement, separation and analysis. Also, the student studies the applications of such knowledge through studying principles of production of dosage forms with its different types including solids, liquids and semisolids.	
Learning Outcomes: Upon successful completion of the course, the student should be able to: **a-Knowledge and Understanding:** - Define the physical principles of each operation unit in industrial pharmacy. - Describe the equipment used in pharmaceutical industry. - Identify the concepts of pharmaceutical operations. - Recognize the influence of different factors on the application of certain	

equipment in certain operation.

- Enumerate the factors affecting different unit operations and different manufacturing problems.
- Identify the rationale use of the equipment for a specific application in pharmaceutical industry.
- List the whole production process of different pharmaceutical products starting from raw materials ending with the finished product brought into the market.
- Describe the concepts of good practice in pharmaceutical manufacture to obtain a good quality final pharmaceutical product.
- Outline the role of quality assurance and quality control in pharmaceutical industry.

B-Cognitive Skills:

- Evaluate the different dosage forms by different pharmacopoeial methods.
- Predict the relationship between equipment design and product characteristics.
- Explain and discuss the use of different equipment to achieve certain operation in pharmaceutical industry.
- Plan the most suitable equipment used for each of the various unit operations.
- Estimate and solve problems emerging during technical operations with respect to machine capacity and product quality.
- Estimate and solve problems emerging during technical operations with respect to machine capacity and product quality.
- Predict the relationship between the methods used, the selected equipment and the mechanism of action on the characteristics of the operation product.
- Evaluate the advantages and disadvantages of each equipment in each unit operation.
- Participate in self-learning activities and in mentorship activities.

c. Interpersonal Skills and Responsibility:

- Adopt ethical, legal and safety guidelines, plan and implement efficient and effective working environment in different settings contributing to organization and management of time.
- Demonstrate critical thinking, decision making, synthesis and interpretation of pharmaceutical information and data, production of pharmacy-specific scientific documentation, and presentation of pharmaceutical information.
- Demonstrate creativity and time management abilities.
- Work constructively in a group, cooperating with their leaders and seniors.
- Show professional responsibility and respect the compliance to work through systems.

d. Communication, Information Technology and Numerical Skills:

- Collaborate with the patient and other health care professionals in the drug use decision making process.
- Communicate effectively the information in writing.
- Perform online computer search to develop information technology skills and know how to retrieve information from a variety of sources.
- Use modes of modern IT communication.
- Communicate with instructors, tutors, staff, and patients.
- Use the language of medicine in communication with other health team members.

e-Psychomotor Skills:

- Use the appropriate machines safely and effectively.
- Conduct standard industrial procedures and instrumentation professionally.
- Design of different pharmaceutical equipment for different operations in

pharmaceutical industry.

- Design diagrams for the studied equipments for each operation.
- Design the application of the concepts of GMP to get ideal product.
- Design flow chart for different dosage form outlining the required in-process control tests.
- Use appropriate units, dimensions and scientific notation.
- Select the suitable equipment used for the different pharmaceutical unit operations.
- Solve problems encountered with the manufacture of different dosage forms.

Contents: This course introduces students to industrial practice, size reduction, size separation, particle size analysis, particle size enlargement, air purification, sterile area, centrifugation, heat flow, evaporation, tablet manufacture and its quality control, drying, mixing, homogenization, size analysis, filtration, extraction, crystallization and emulsification. Quality assurance, ISO-systems and quality control of raw materials and finished products and fundamental considerations of good manufacturing practice (GMP).

Minimum Course Requirements: 45 (3 x 15) Unit lectures (45 contact hours) per level.

Teaching and Learning Methods:

1-Lectures

2- Class discussions.

3-visits

Evaluation Methods:

- Quizzes 30%

- Midterm examination	30%
- Final examination (written)	40%

Principal Text (Latest Edition):

1-Pharmaceutical Manufacturing Handbook: Production and Processes (Pharmaceutical Development Series), Shayne Cox Gad, Wiley-Interscience.

Supplementary Texts (Latest Edition):

1-Modern Pharmaceutical Industry: A Primer, Thomas M. Jacobsen and Albert I. Wertheimer, Jones & Bartlett Publishers.

2-Good Manufacturing Practices for Pharmaceuticals, (Drugs and the Pharmaceutical Sciences), Graham Bunn and Joseph D. Nally, Informa Healthcare.

Pharmacy Practice

Course Identification and General Information:	
Title: Pharmacy Practice.	
Course Number: 20020526.	**Year:** Fifth.
Credit Units: 3+ 0 Units (1 contact hours) per week.	**Level**: Tenth.
Pre-requisite: 20020511.	
Co-requisite: None.	
Aims: To provide an overview of the pharmacy profession, issues of contemporary practice and role of pharmacist in patient care.	
Description: This course provides the student with the aspects of contemporary pharmaceutical services, the planning, development, organizational structuring and administration of pharmaceutical services. It also includes the principles of pharmacist-managed, patient-centered pharmacy services, evidence-based practice and decisions and problem identification.	

Learning Outcomes:

Upon successful completion of the course, the student should be able to:

a-Knowledge and Understanding:

- Identify the mission of the pharmacy profession to society.
- Recognize how to optimize physical and technological resources required for fulfilling the practice mission.
- Discuss the pharmacists' roles and responsibilities in clinical trials.
- Identify and prioritize patient’s problems, delineate monitoring parameters, and educational information (e.g. nutrition, lifestyle) intended to promote general health and prevent or minimize disease progression.
- Describe the appropriate structure, process, and outcome measures to evaluate the

quality of pharmaceutical care.

- List drug interactions which may be imbedded in a series of prescriptions or in the patient's profile.
- Mention the different status of drugs (Rx vs OTC drugs).
- Describe new perspectives in pharmacy practice, pharmaceutical care and evidence-based pharmacy on the job situations.
- Outline the quality assurance of pharmaceutical practice services.
- Identify how maintain and improve professional performance.

b-Cognitive Skills:

- Apply in practice settings the knowledge of pharmaceutical sciences and pharmacy related subjects.
- Improve health outcomes and delivery and to increase safety and effectiveness.
- Develop pharmaceutical care plans that maximize the patient's response to drug therapy.
- Develop and execute plans to emphasize patient safety.
- Apply elements of continuous quality improvement to pharmaceutical care in the pharmacy practice.
- Interpret, evaluate and accurately the prescriptions and medication orders.
- Evaluate and interpret relevant data (drug information/literature).
- Integrate pharmacy with healthcare systems, to improve health outcomes and delivery to increase safety and effectiveness.
- Participate in self-learning activities and in mentorship activities.

c. Interpersonal Skills and Responsibility:

- Achieve cultural competence and social awareness.
- Carry out duties in accordance with legal, ethical, social, economic, and

professional guidelines, taking into consideration personal values, and caring.

- Maintain professional competence by identifying and analyzing emerging issues, products, and services that may impact patient-specific therapeutic outcomes (continuous professional development).
- Practice self-assessment by recognizing one's limitation and implementing a self-learning plan.
- Work constructively in a group, cooperating with their leaders and seniors.
- Demonstrate behavior which fulfills personal responsibilities and duties.
- Demonstrate organization and time management skills.
-Demonstrate initiative, enthusiasm, and reliability in performing clinical tasks.

d. Communication, Information Technology and Numerical Skills:

- Develop a traditional pharmacist-patient relationship.
- Participate as part of a multidisciplinary team in the pharmaceutical care system's process for conducting medication use evaluations.
- Communicate and collaborate professionally with prescribers, patients, care givers, and other involved health care providers to engender a team approach to patient care.
- Use informatics to support communication.
- Retrieve, analyze, and interpret the professional, lay, and scientific literature to provide drug information to patients, their families, and other involved health care providers.
- Utilize systems to document drug misadventuring, enhance patient safety, and maintain quality assurance by identifying, preventing and/or resolving medication related problems.
- Provide drug information to health care professionals.

- Dress professionally when engaging patients, health-care professionals, colleagues, and care givers.

e. Psychomotor Skills:

- Design, implement, monitor, evaluate, and adjust patient care plans that are patient-specific and evidence-based.
- Determine appropriate therapeutic courses of action by identifying, preventing, and/or resolving medication-related problems.
- Manage and administer prescriptions and /or medication orders.
- Manage and use resources of the health care system.
- Resolve and prevent medication related problems.
- Document the implementation of and assess the outcomes related to the care plan.
- Implement development in the pharmacy practice and health-care delivery.
- Recommend patient use of prescription and non-prescription medications, as well as non-drug therapy, when appropriate.
- Assess and monitor the daily pharmacy practice.
- Monitor, modify and implement therapeutic approaches (including dispensing & supplying OTC medicines).

Contents: Overview of the pharmacy profession, issues of contemporary practice, hospital pharmacy, emerging and unique roles for the pharmacist on the health care team, concepts of pharmacist-provided patient care and medication therapy management services. It includes principles of pharmacist-managed, patient-centered pharmacy services, methods of outcome monitoring and assessment techniques, problem identification (e.g., duplication, dosage, drug interactions, adverse drug reactions and interactions, frequency, dosage form, indication mismatches) and resolution. In addition to, role of pharmacy care plans in patient care, monitoring for positive and negative drug therapy outcomes, evidence-based

practice and decisions, principles of clinical management of drug toxicity and over dosage and home diagnostic devices. Pharmacist-provided care for special populations (e.g., pediatric, geriatric, pregnant, cystic fibrosis, sickle cell anemia, celiac disease, genetic disorders, and others). Problem-solving to meet special therapy and patient needs and challenges face the pharmacy practice and the impact of automation in hospital and community pharmacies.

Minimum Course Requirements: 45 (3 x 15) Unit lectures (45 contact hours) per level.

Teaching and Learning Methods:

1-Lectures

2-Class discussions.

Evaluation Methods:

- Quizzes	30%
- Midterm examination	30%
- Final examination (written)	40%

Principal Text (Latest Edition):

1-A Practical Guide to Contemporary Pharmacy Practice, Judith E. Thompson and Lawrence Davidow, Lippincott Williams and Wilkins.

Supplementary Texts (Latest Edition):

1- Pharmacy Practice, Geoffrey Harding, Taylor and Francis.

2- Mosby's Pharmacy Technician: Principles and Practice, Teresa Hopper, Saunder.

Advanced Pharmacy Practice Experiences
(Clerkships)

Advanced Pharmacy Practice Experiences (35 Units). The student must pass all the previous courses and take summer pharmacy internships before starting the clerkships.

The mandatory rotations include the eight of following sections:

1- Internal Medicine.

2- Ambulatory Care.

3- Cardiology.

4- Pulmonary.

5- Surgery and Nutritional Support.

6- Emergency Services.

7- Endocrinology.

8- Nephrology.

9- Infectious Diseases.

10- Hematology and Oncology.

11- Neurology.

12- Pharmaceutical Industry.

Each of the clinical clerkship rotations provides one-calendar-month experience. In all rotations the students will be under close supervision of his preceptors. The preceptor show the student how to apply knowledge learned in the classroom to daily practice provides patient–oriented pharmaceutical services, assess the student's progress, and contribute to the student's overall evaluation. Each rotation will stress outcome oriented decision making in clinical situations

regarding drug therapy in specific disciplines. Student will attend physician rounds/ interdisciplinary team meetings attend conferences and discussions, monitor and present assigned patients, and interact with patients and health care professionals. Student will learn to develop recommendations and participate in decisions about drug therapy considering factors involving efficacy, toxicity, drug interactions and unique methods of delivery.

Electives:

One of the most intriguing aspects of our program is our diversity and in the opportunities that exist in our clerkship. Electives make up 35% of our training, which allows students to mature professionally and focus on their specific areas of individual interests.

Pharmaceutical industry clerkship is designed to offer students experience in a variety of practice settings solid dosage forms (tablets and capsules), syrups, ointments, creams, parenterals, pharmaceutical biotechnology, quality control and good manufacturing practice (GMP) principles. The pharmaceutical industry offers career opportunities in sales and marketing, drug research and development, quality assurance, and professional services.

Clerkship-1

Title: Clerkship-1.
Clerkship Number: 20020531.
Year: Fifth year.
Level: Summer level.
Credit Units: 0 + 5 Units (15 contact hours) per week.
Prerequisites: The student must pass all the previous courses and take pharmacy internships.
Co-requisites: None.
Aims: Introduce and involve the students in the provision of advanced clinical pharmacy services and provide experience in various medical sub-specialty environments.
Description: This training will help the students to gain the knowledge, skills and attitudes to precisely identify and apply the different ways to evaluate the drug therapy either fully engagement in an advanced hospital setting or an advanced community practice experience. The students will interact with health care consumers and pharmacists, and will be permitted, under appropriate supervision and practice regulations, to assume direct patient care responsibilities. As part of the above training the ethical, moral issues will be well taught.
Learning Outcomes: Upon successful completion of the training the student should be able to: **a-Knowledge and Understanding:** - Demonstrate independent judgment and the integration of fundamental knowledge with clinical application.

- Recognize the dispensing new/refill medication orders.

b-Cognitive Skills:

- Apply the educational programs within the scope of pharmacy practice.
- Evaluate the effectiveness of their educational interventions.
- Demonstrate commitment to lifelong learning with the ability to apply knowledge**.**
- Participate in purchasing activities.
- Participate in the pharmacy's quality improvement program.
- Participate in the pharmacy's planning process.

c. Interpersonal Skills and Responsibility:

- Carry out duties in accordance with legal, ethical, social, economic, and professional guidelines.
- Manage the interpersonal relationships in pharmacy practice.
- Apply organizational and time management skills in the practice of pharmacy.
- Demonstrate active listening skills.
- Act and communicate in a self-assured, confident manner.
- Work constructively in a group, cooperating with their leaders and seniors.
- Engage in inquiry, critical analysis, and logical thinking in professional activities.
- Engage with various pharmacy personnel to learn all aspects of institutional pharmacy practice.

d. Communication, Information Technology and Numerical Skills:

- Analyze information and effectively and appropriately communicate with the public and other healthcare professionals in written and spoken English**.**
- Retrieve, analyze, and interpret the professional, lay, and scientific literature to provide drug information to patients, their families, and other involved health

care providers. - Demonstrate professionalism in personal conduct and appearance. - Demonstrate effective counseling skills. - Adhere to professional attire. - Use the language of medicine in communication with other health team members. **e. Psychomotor Skills:** - Perform calculations required to compound, dispense, and administer medications. - Manage the use of investigational drug products. - Prepare pharmaceutical products. - Provide primary health care. - Provide medicines and health information and education**.** - Perform in a level meet the international standards. - Recommend the rationale use of drugs, drug abuse and misuse. - Manage systems for storage, preparation, and dispensing of medications.
Contents: This course introduces the student to experiences in patient care setting, involves the student in the provision of advanced clinical pharmacy services and provides experience in various medical sub-specialty environments. It enhances the development of independent judgment and the integration of fundamental knowledge with clinical applications. This clerkship includes community and institutional pharmacy.
Evaluation methods:
- Clinical supervisors' evaluations.
Principal Text (Latest Edition):

1-Applied Therapeutics: The Clinical Use of Drugs, Mary Anne Koda-Kimble, Lloyd Yee Young, Wayne A Kradjan, and B. Joseph Guglielmo, Lippincott Williams & Wilkins.
Supplementary Texts (Latest Edition):
1-Pharmacotherapy Handbook, Barbara Wells, Joseph DiPiro, Terry Schwinghammer, and Cecily DiPiro, McGraw-Hill Medical. 2- Textbook of Therapeutics: Drug and Disease Management (Helms, Textbook of Therapeutics) by Richard A Helms and David J Quan, Lippincott Williams & Wilkins.

Clerkship-2

Title: Clerkship-2.
Clerkship Number: 20020611.
Year: Sixth.
Level : Eleventh
Credit Units: 0 + 15 Units (45 contact hours) per week.
Prerequisites: 15020531**.**
Co-requisites: None.
Aims: To provide practical experience in different patient care settings as a vital component of the doctor of pharmacy program.
Description: This training will help the students to gain the knowledge, skills and attitudes to precisely identify and apply the different ways to evaluate the drug therapy either fully engagement in different hospital rotations as an advanced pharmacy practice experience. The students will interact with health real patients and the health care team. The students will be permitted, under appropriate supervision and practice regulations, to assume direct patient care responsibilities. As part of the above training the ethical, moral issues will be well taught**.**
Learning Outcomes Upon successful completion of the rotations the student should be able to: **a-Knowledge and Understanding:** - Demonstrate experience in different clinical areas and be able to develop independent judgment and integration of fundamental knowledge with clinical application. - Demonstrate understanding of pathophysiology and pharmacotherapy of most

common acute and chronic disease states encountered the inpatient setting.

- Identify the appropriateness of the patient's specific pharmacotherapeutic agents, dosing regimens, dosage forms, routes of administration, and delivery systems.
- Recognize and report medication errors and adverse drug reactions.
- Describe the professional role of the pharmacist in hospital.
- Identify issues in pharmacy practice and drug utilization.
- Identify and prioritize drug related problems including adverse drug events, drug interactions, and/or suboptimal treatment.

b-Cognitive Skills:

- Participate critical thinking, problem- solving and decision-making abilities.
- Apply the mentorship activities.
- Interpret mechanism of action, indications, contraindications, adverse effects, and drug interactions when reviewing a patient's medication list.
- Appraise the treatment goals and appropriate follow up plan for patients.
- Interpret lab data.
- Discuss inpatient disease states encounter on the rotation with his preceptor.

c. Interpersonal Skills and Responsibility:

- Carry out duties in accordance with legal, ethical, social, economic, and professional guidelines.
- Demonstrate leadership skills that will enable them to mentor other students and supervise pharmacy staff.
- Demonstrate respect for patients and other healthcare personnel.
- Utilize time efficiently and is punctual.
- Demonstrate accountability for actions and decisions.

d. Communication, Information Technology and Numerical Skills:

- Counsel patients on medications

- Consult with patients regarding self-care products**.**
- Identify one's strengths and weaknesses in communications and devise and implement strategies to improve skills.
- Use informatics to support communication.
- Work in a team during daily rotations.
- Use multimedia technology to communicate effectively.
- Apply communication skills in interpersonal relationships to improve the clinical, economical, and humanistic outcomes of patients.
- Dress professionally when engaging patients, health-care professionals, colleagues, and care givers.

e. Psychomotor Skills:

- Recommend prescription and nonprescription medications, dietary supplements, diet, nutrition, traditional nondrug therapies, and complementary and alternative therapies.
- Administer medications where practical and consistent with the practice environment and where legally permitted.
- Educate the patients the rationale use of drugs, drug abuse and drug misuse.
- Manage the drug regimen through monitoring and assessing patient information.
- Deliver patient care to a diverse patient population.
- Manage the drug regimen through monitoring and assessing patient information.
- Perform of proper treatment under stressful circumstances.
- Assess through preceptor and student patient case discussions, medical team rounds, and student case presentation.
- Perform in a level meet the international standards.

Contents: This course introduces the student to responsibilities of patient care, clinical communication and organizational skills in preparation for future clerkships and professional practice through rotations in different departments in the hospital. It also provides experience in medical sub-specialty areas, problem solving skills to interpret and understand medical information in patient charts as related to specific disease processes. The student must select four rotations from the above list.
Evaluation methods:
- Clinical supervisor's evaluations.
Principal Text (Latest Edition):
1-Applied Therapeutics: The Clinical Use of Drugs, Mary Anne Koda-Kimble, Lloyd Yee Young, Wayne A Kradjan, and B. Joseph Guglielmo, Lippincott Williams & Wilkins.
Supplementary Texts (Latest Edition):
1-Pharmacotherapy Handbook, Barbara Wells, Joseph DiPiro, Terry Schwinghammer, and Cecily DiPiro, McGraw-Hill Medical. 2- Textbook of Therapeutics: Drug and Disease Management (Helms, Textbook of Therapeutics) by Richard A Helms and David J Quan, Lippincott Williams & Wilkins.

Clerkship-3

Title: Clerkship-3.
Clerkship Number: 20020621.
Year: Sixth year.
Level: Twelfth**.**
Credit Units: 0 + 15 (45 contact hours) per week.
Prerequisites: 20020611.
Co-requisites: None.
Aims: To provide the student with information on evaluation of drug therapy.
Description: This clerkship training will help the students to gain additional knowledge skills, attitudes, professional communications to apply the different ways to evaluate the drug therapy either fully engagement in different hospital rotations as an advanced pharmacy practice experience. The students will interact with health real patients and the health care team and acquire more confidence. The students will be permitted, under appropriate supervision and practice regulations, to assume direct patient care responsibilities. As part of the above training the ethical, moral issues will be well taught**.**
Learning Outcomes: Upon successful completion of the rotations the student should be able to: **a-Knowledge and Understanding:** - Demonstrate experience in different clinical areas and be able to develop independent judgment and integration of fundamental knowledge with clinical application. - Demonstrate and understand the pathophysiology and pharmacotherapy of most common acute and chronic disease states encountered the inpatient setting.

-Identify the rationale use of drugs.

- Recognize the medication errors and adverse drug reactions.

- Describe the professional role of the pharmacist in hospital.

- Mention the broad issues of pharmacy practice and drug utilization.

- Identify and prioritize drug related problems including adverse drug events, drug interactions, and/or suboptimal treatment.

- Outline the appropriate monitoring parameter and therapeutic endpoints for safe and effective use of prescribed medications.

b-Cognitive Skills:

- Evaluate by observing the student's interaction with patients.

- Interpret laboratory data.

- Develop and support the implementation of a therapeutic plan.

- Discuss at least three inpatient disease states encounter on your rotation with his preceptor.

- Evaluate and design how medication errors are reported and handled.

- Participate critical thinking, problem- solving and decision-making abilities.

-Apply the mentorship activities.

- Interpret mechanism of action, indications, contraindications, adverse effects, and drug interactions when reviewing a patient's medication list.

- Appraise the treatment goals and appropriate follow up plan for patients.

c. Interpersonal Skills and Responsibility:

- Carry out duties in accordance with legal, ethical, social, economic, and professional guidelines.

- Demonstrate leadership skills that will enable them to mentor other students and supervise pharmacy staff.

- Use listening skills consistently when performing professional functions.

- Demonstrate respect for patients and other healthcare personnel.
- Utilize time efficiently and is punctual.
- Demonstrate accountability for actions and decisions.
- Interact and communicate with health care professionals.
- Identify and act upon learning opportunities proactively and independent from instructor prompting.
- Demonstrate a commitment to independent and lifelong learning.

d. Communication, Information Technology and Numerical Skills:

- Counsel patients on medications
- Consult with patients regarding self-care products**.**
- Identify one's strengths and weaknesses in communications and devise and implement strategies to improve skills.
- Use informatics to support communication.
- Work in a team during daily rotations.
- Use multimedia technology to communicate effectively.
- Apply communication skills in interpersonal relationships to improve the clinical, economical, and humanistic outcomes of patients.
-Adhere to professional attire.
- Use the language of medicine in communication with other health team members.

e. Psychomotor Skills:

- Recommend prescription and nonprescription medications**.**
- Administer medications where practical and consistent with the practice environment and where legally permitted.
- Educate the patients the rationale use of drugs, drug abuse and drug misuse.
- Manage the drug regimen through monitoring and assessing patient

information. - Manage the drug regimen through monitoring and assessing patient information. - Assess through preceptor and student patient case discussions, medical team rounds, and student case presentation. - Perform in a level meet the international standards. - Advise the patient sharply about the rationale use of drugs, drug abuse and drug misuse.
Contents: On-site/ classroom evaluation of drug therapy, with emphasis on development of verbal communication skills between pharmacists and patients in the utilization of drug resources in order to make the right decisions. The student must select another four rotations from the list of rotations that should take during this semester:
Evaluation methods:
- Clinical supervisor's evaluations.
Principal Text (Latest Edition):
1-Applied Therapeutics: The Clinical Use of Drugs, Mary Anne Koda-Kimble, Lloyd Yee Young, Wayne A Kradjan, and B. Joseph Guglielmo, Lippincott Williams & Wilkins.
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