(Chapter seven)
Doctor of Philosophy program
(Pharmaceutical technology)

Exam marks					course title	Code	
Total	Oral	Practical	Theo.	Credit hours			
100	20	80	2	(0+2)	Dosage form Design 2	4101	First semester
100	20	80	2	(0+2)	Advanced Biopharmaceutics and Pharmacokinetics	4102	
100				(0+2)	Selected topics in pharmaceutical technology	4103	
100	20	80	2	(0+2)	Good Manufacturing practice and Quality Assurance	4104	Second semester
100	20	80	2	(0+2)	Radiopharmaceuticals.	4105	
100				(0+2)	Selected topics in pharmaceutical technology	4106	
					12	Total	

Content of PhD courses in Pharmacy
(Pharmaceutical technology)

Course title and description	Code
Dosage Form Design2 Drug targeting to brain, colon and prostate. Pharmaceutical dosage forms depending on biotechnology and nanotechnology. Transdermal drug delivery.	**4101** **(0+2)**
Advanced Biopharmaceutics and Pharmacokinetics Factors affecting drug absorption. dissolution tests for pharmacopial and non pharmacopial drugs. pharmacokinetics of single dose intravenous injection or oral administration. compartmental and non compartmental models of Pharmacokinetic .non linear pharmacokinetic. Bioavailability and Bioequivalence.	**4102** **(0+2)**
Seminars on selected topics in pharmaceutical technology	**4103** **(0+2)**
Good Manufacturing practice and Quality Assurance Good manufacturing practice, individuals, buildings, equipments, production steps, packaging control and double checking all steps. essential requirements for quality managing. quality costs, managing manufacturing quality. improving quality through monitoring manufacturing techniques.	**4104** **(0+2)**
Radiopharmaceuticals Using radioactive materials in diagnosis and treatment. how to calculate the dose of radiation .types of radiopharmaceuticals .protection from radiation.	**4105** **(0+2)**
Seminars on selected topics in pharmaceutical technology	**4106** **(0+2)**

Doctorate degree in pharmacy

(The pharmacognosy)

Exam marks			Exam duration	Credit hours	Course title	Code	semesters Oral
Total	Oral	Theo.					
100	20	80	2	{0+2)	Aromatherapy and its chemical structure.	4201	First semester
100	20	80	2	{0+2)	Biotechnology for production of drugs of natural origin	4202	
100				{0+2)	Seminar	4203	
100	20	80	2	{0+2)	Marine natural products	4204	The second semester
100	20	80	2	{0+2)	New Approaches in natural products	4205	
100				{0+2)	Seminar	4206	
				12	Total		

Content of PhD courses in pharmacy

(The pharmacognosy)

Course title and description	Code
Aromatherapy and its chemical structure. This course will discuss the modern use of aromatherapy in complementary medicine , their biological activity, their application and structure elucidation of these compounds.	4201 (0+2)
Biotechnology for production of drugs of natural origin This course includes an introductory course in biotechnology which will discuss the use of different enzymes in reactions to produce usefull pharmaceutical compounds also it'll shed the light on Monoclonal antibodies and their therapeutic applications	4202 (0+2)
Seminar	4203 (0+2)
Marine natural products This course will discuss the environmental, and climatic factors affecting marine plants and their production of natural products, alsoexamples of Marine natural products, their biological and therapeutic activity will be studied	4204 (0+2)
New Approaches in natural products The course includes methods for production of active natural products from untapped resources such as marine compounds products, endophytes, and Human microbiome also the application of synthetic biology in design of novel natural products will be addressed	4205 (0+2)
Seminar	4206 (0+2)

Doctorate degree in pharmacy

(Pharmacology and Toxicology)

Exam marks			Exam duration	Credit hours	Course title	Code	semester
Total	Oral	Theo.					
100	20	80	2	(0+2)	Advanced Pharmacology 2	4301	First semester
100	20	80	2	(0+2)	Advanced applied and environmental toxicology.	4302	
100				(0+2)	Seminars	4303	
100	20	80	2	(0+2)	Molecular pharmacology	4304	The second semester
100	20	80	2	(0+2)	Agents and Teratogenicity.	4305	
100				(0+2)	Seminars	4306	
				12	Total		

Content of PhD courses in pharmacy

(Pharmacology and Toxicology)

Course title and description	Code
Advanced Pharmacology 2: The course aims to cover the new strategies and guidelines used in the treatment of diseases related to the following systems: central nervous system, endocrine system, GIT. In addition the course will cover the following topics: new trends in cancer treatment, antibiotics, and analgesics.	**4301** **(0+2)**
Advanced applied and environmental toxicology The couse mainly focuses on the study of the toxicological effects and mechanisms of reactive oxygen species, chemicals and pollutants on and inflammatory disorders and their complications.	**4302** **(0+2)**
Seminars Discussion of recent topics in the field of pharmacology and toxicology	**4303** **(0+2)**
Molecular Pharmacology The course topics deal with different types of drug receptors, their function, qualitative and quantitative identification and their application in drug discovery.	**4304** **(0+2)**

Agents and Teratogenicity. The course focus on teratogenicity, drug induced teratogenicity and mutagenicity.	**4305** **(0+2)**
Seminars Discussion of recent topics in the field of therapeutics	**4306** **(0+2)**

Doctorate degree in pharmacy

(Microbiology and Immunology)

Exam marks			Exam duration Theo.	Credit hours	Course title	Code Total	semesters Oral
Total	Oral	Practical					
100	20	80	2	(0+2)	Immunology and immunological methods	4401	First semester
100	20	80	2	(0+2)	Diagnostic Microbiology.	4402	
100	20	80	2	(0+2)	Advanced techniques in Microbiologyand Biotechnology	4403	
100				(0+2)	Seminars	4404	
100	20	80	2	(0+2)	Advanced virology	4405	The second semester
100	20	80	2	(0+2)	Microbial Resistance	4406	
100	20	80	2	(0+2)	Advanced techniques in Microbiology and Biotechnology	4407	
100				(0+2)	Seminars	4408	
				12	Total		

Content of PhD courses in pharmacy

(Microbiology and Immunology)

Course title and description	Code
Immunology and Immunological methods The course content includes different immunological methods regarding antigen, immunogen, hapten, antigen antibody interaction, immunological reagents, principles of immunological laboratory tests, vaccine preparation and quality assurance of immunological products.	4401 (0+2)
Diagnostic microbiology The content of the course includes the study of different types of microbial diseases, diagnosis of different microbial diseases and study of different laboratory techniques used in diagnosis of microbial diseases.	4402 (0+2)
Advanced techniques in Microbiology and Biotechnology The content of the course includes different types of techniques used in Microbiology and Biotechnology produced drug and other pharmaceutical products.	4403 (0+2)
Seminars Discussion of recent topics in the field of Microbiology and Immunology	4404 (0+2)

Advanced virology The content of the course includes the study of recent viral diseases and novel techniques which are currently used for identification and diagnosis as well as treatment of such diseases.	4405 (0+2)
Microbial resistance The content of the course includes different mechanisms of resistance to antimicrobial agents, methods of resistance transfer and how to overcome microbial drug resistance.	4406 (0+2)
Advanced techniques in Microbiology and Biotechnology The content of the course includes different types of techniques used in Microbiology and Biotechnology produced drug and other pharmaceutical products.	4407 (0+2)
Seminars Discussion of recent topics in the field of Microbiology and Immunology	4408 (0+2)

Doctor of Philosophy degree in Pharmacy

(Pharmaceutical chemistry)

Exam marks			Exam duration	Credit hours	Course title	Code Total	Semesters Oral
Total	Oral	Theo.					
100	20	80	2	{0+2)	Advanced pharmaceutical Organic Chemistry II.	4501	First semester
100	20	80	2	{0+3)	Advanced Medicinal Chemistry II.	4502	
100				{0+1)	Selected Topics in Pharmaceutical Chemistry	4503	
100	20	80	2	{0+2)	Stereochemical Aspects of Drug Action	4504	Second semester
100	20	80	2	{0+2)	Recent Advances in Drug Design	4505	
100				{0+2)	Selected Topics in Pharmaceutical Chemistry	4506	
				12	Total		

Content of the degree of Doctor of Philosophy in Pharmacy

(Pharmaceutical chemistry)

Course title and description	Code
Advanced pharmaceutical Organic Chemistry II. Advanced course in organic chemistry with the main goal of study of different types of organic reactions which divided into the polar reactions, radical reactions and pericyclic reactions followed by deep study for each subtypes of each one in the previous reactions.Also,this course includes a deep study for the basics of the stereochemistry in addition to the chemistry of the heterocyclic compounds.	**4501** **(0+2)**
Advanced Medicinal Chemistry II. This course introduce the latest developments and insights in the field of medicinal chemistry and focuses on applications of different aspects of medicinal chemistry as pharmaceutical properties of drugs, principals of pharmacokinetics and pharmacodynamics to optimize drug design and discovery	**4502** **(0+3)**
Selected Topics in Pharmaceutical Chemistry	**4503** **(0+1)**

Stereochemical Aspects of Drug Action This course is designed to provide an opportunity for students to study the stereochemistry of a number of chemical reactions of drugs with biological enzymes and receptors . Also it is examined various ways and means used in the study of the relationship between stereochemistry and biological effect . In addition to the study of the modern applications in the stereochemistry of the compounds of pharmaceutical and biologically active molecules	**4504** **(0+2)**
Recent Advances in Drug Design This course includes the study of all uses and applications of the means and methods used in drug design research. Where the study includes the quantity theory , molecular law of motion , and the study of the relationship between the chemical composition and effectiveness by quantitative three-dimensional means. It will also include the study of characteristics of bioavailablity and how they impact on drug design . Among the general objectives of this content is that all matters relating to the design of enzymes, and the well-known effective compounds.	**4505** **(0+2)**
Selected Topics in Pharmaceutical Chemistry	**4506** **(0+2)**

Doctor of Philosophy degree in Pharmacy

(Pharmaceutical analytical chemistry)

Exam marks					Course title	Code	Semesters
Total	Oral	Practical	Theo.	Exam duration	Total	Oral	Practical
100	20	80	2	(0+2)	Advanced Analytical chemistry II	4601	First semester
100	20	80	2	(0+2)	Quality Control (chemical view)	4602	
100				(0+2)	Seminar I	4603	
100				(0+2)	Seminar II	4604	second
100	20	80	2	(0+2)	Advanced separation techniques	4605	
100	20	80	2	(0+2)	Environmental Analysis.	4606	
					12	Total	

Content of the degree of Doctor of Philosophy in Pharmacy

(Pharmaceutical analytical chemistry)

Course title and description	Code
Advanced Analytical chemistry II **-**This course covers modern methods for determination of pharmaceuticals using chemometric methods. -Includes study of the stereochemistry of the pharmaceutical compounds and development of new methods of analysis for enantioseprartion of chiral compounds. -It also contains the study of nanomaterials and to develop new methods for the analysis of pharmaceuticals dependent on nanotechnology**.**	**4601** **(0+2)**
Quality Control (chemical view): This course covers an extensive study on the quality control activity in the laboratory of pharmaceutical companies. This includes the terms of good laboratory practice, equipment, documentation and different methods of analysis needed to work.	**4602** **(0+2)**
Seminar I Choose topics according to the student's research project.This is governed by the supervisor of the research.	**4603** **(0+2)**
Seminar II Choose topics according to the student's research project.This is governed by the supervisor of the research.	**4604** **(0+2)**

Advanced separation techniques: The course includes an advanced study in chromatographic separation techniques such as gas chromatography, size exclusion chromatography and supercritical fluid chromatography. The course includes the study of other separation techniques such as capillary electrophoresis and its applications such as the determination of pharmaceutical raw materials and pharmaceutical dosage forms, as well as in biological fluids, focusing on stability indicating methods of analysis.	**4605** **(0+2)**
Environmental Analysis Air pollution: air pollutants - Sampling - follow up and analysis of (nitrogen oxides - sulfur oxides - carbon monoxide - suspended impurities - metal ions.) Water pollution: determination of factor affecting water pollutants such as water quality (TDS - suspended solids - dissolved oxygen - vital oxygen required - pH - Temperature - sediment - water hardness - oil and grease - Methods of water treatment) soil analysis.	**4606** **(0+2)**

Doctorate degree in pharmacy

(Biochemistry)

Exam Marks			Exam duration	Credit hours	Course title	Code Total	Semesters Oral
Total	Oral	Theo.					
100	20	80	2	(0+2)	Advanced cell biology	4701	First semester
100	20	80	2	(0+2)	Diagnostic value of molecular and clinical markers	4702	
100				(0+2)	Seminars	4703	
100	20	80	2	(0+2)	Epigenetics and RNA structure and function	4704	Second semester
100	20	80	2	(0+2)	Cancer Biology	4705	
100				(0+2)	Seminars	4706	
				12	Total		

Content of the degree of Doctor of Philosophy in Pharmacy

(Biochemistry)

Course title and description	Code
Advanced cell biology The course content includes genetic engineering, disease mediators on the cell membrane and smaal circulating RNAs, genomic and proteomic diagnosis and therapeutic targets	4701 (0+2)
Diagnostic value of molecular and clinical markers The content of the course includes the study of different clinical and molecular markers and their diagnostic value.	4702 (0+2)
Seminars specialized in biochemistry and molecular biology. Discussion of recent topics in the field of Biochemistry and molecular biology	4703 (0+2)
Epigenetics and RNA structure and function The content of the course includes protein post-translation modifications and DNA/RNA processing. Chemical and structural biology of RNA molecules including ribozymes, siRNA with attention to biological functions	4704 (0+2)
Cancer biology The content of the course includes mechanisms of cellular proliferation and differentiation, cancer stem cells, anticancer therapy.	4705 (0+2)
Seminars specialized in biochemistry	4706 (0+2)

Doctor of Philosophy degree in Pharmacy

(Clinical pharmacy)

Exam Marks			Exam duration	Credit hours	Course title	Code	Semesters
Total	Oral	Theo.					
100	20	80	2	(0+2)	Advanced Clinical pharmacy I	4801	First semester
100	20	80	2	(0+2)	Advanced Clinical pharmacy II	4802	
100				(0+2)	Seminars	4803	
100	20	80	2	(0+2)	Advanced Clinical pharmacy III	4804	Second semester
100	20	80	2	(0+2)	Advanced Clinical pharmacy IV	4805	
100				(2)	Seminars	4806	
				12	Total		

Content of the degree of Doctor of Philosophy in Pharmacy
(Clinical pharmacy)

Course title and description	Code
Advanced Clinical pharmacy I This course discusses the advaces in the role of clinical pharmacy in cardiovascular Disorders and Urology with discussion to recent guidelines of treatment plan.	**4801** **(0+2)**
Advanced Clinical pharmacy II This course discusses the advaces in the role of clinical pharmacy in Diabetes,Hepatitis, oncology and GIT Disorders with discussion to recent guidelines of treatment plan.	**4802** **(0+2)**
Seminars and round discussion including recent top publications in disease management	**4803** **(0+2)**
Advanced Clinical pharmacy III This course discusses the advaces in the role of clinical pharmacy in Neuropsychatry, Bone Disorders, Antibiotic Therapy with discussion to recent guidelines of treatment plan.	**4804** **(0+2)**
Advanced Clinical pharmacy IV This course discusses the advaces in the role of clinical pharmacy in Dermatology Gynecology Thyroid with discussion to recent guidelines of treatment plan.	**4805** **(0+2)**
Seminars and round discussion including recent top publications in pharmacy practice	**4806** **(0+2)**