مقررات درجة دكتور الفلسفة (الصيدلانيات)(PTP- 300)
Ph.D. Courses (Pharmaceutics) (PTP- 300)

First Semester — **الفصل الدراسي الأول**

Code No	Course Title	Credit Hours	Exam. Hours	Exam. Marks	
			Written	Written	Oral
PTP-301	Polymers البوليمرات	2 + 0	3	90	10
PTP-302	Granulation and Compaction التحبيب والكبس	2 + 0	3	90	10
	Total	4	6	180	20

Second Semester — **الفصل الدراسي الثاني**

Code No	Course Title	Credit Hours	Exam. Hours	Exam. Marks	
			Written	Written	Oral
PTP-303	Diffusion الأنتشار	2 + 0	3	90	10
PTP-3EC	Elective course مقرر اختياري	2 + 0	3	90	10
	Total	4	6	180	20

Elective course (PTP-3EC) — **المقررات الاختيارية**

Code No	Course Title	Credit Hours	Exam. Hours	Exam. Marks	
			Written	Written	Oral
PTP-304	Good Laboratory Practice الممارسة المعملية الجيدة	2 + 0	3	90	10
PTP-305	Radiopharmaceuticals العناصر المشعة	2 + 0	3	90	10
	Total	2	3	90	10

توصيف مقررات درجة دكتور الفلسفة (الصيدلانيات)(PTP- 300)
Ph.D. Courses (Pharmaceutics) (PTP- 300)

First Semester			الفصل الدراسي الأول
PTP-301	**Polymers**	البوليمرات	**Credit Hours (2 + 0)**
Definition, uses in pharmaceutical field, types (natural, synthetics), different properties of polymers, polymer characterization and polymer degradation			
PTP-302	**Granulation and Compaction**	التحبيب والكبس	**Credit Hours (2 + 0)**
types of granulations and compaction, significance in drug delivery systems, different properties of granules. Theory of granulation and compaction, Pharmaceutical application			
Second Semester			**الفصل الدراسي الثاني**
PTP-303	**Diffusion**	الأنتشار	**Credit Hours (2 + 0)**
Definition, different theories of diffusion, diffusion in pharmaceutical field.			
PTP-304	**Good Laboratory Practice**	الممارسة المعملية الجيدة	**Credit Hours (2 + 0)**
Introduction: GMP, GAP, GLP, GVP & GCP, technology associated with abbreviation and definitions, GAP and quality control management-laboratory performance, self inspection, documentation, reporting and recording of analytical data, laboratory accreditation; collaborative work, data processing, information system. Microbiological quality control and pharmacological quality control.			
PTP-305	**Radiopharmaceuticals**	العناصر المشعة	**Credit Hours (2 + 0)**
Introduction about radiation and radiopharmaceuticals. Types of radioactivity, radioactive decay, generators, kits, preparation and quality control of radiopharmaceuticals. Basic principles involving the application of radiation and radioactive compounds in medical diagnosis, therapy and industry. Official examples of radiopharmaceuticals.			

مقررات درجة دكتور الفلسفة (عقاقير)(PGP- 300)
Ph.D. Courses (Pharmacognosy) (PGP- 300)

First Semester — **الفصل الدراسي الأول**

Code No	Course Title	Credit Hours	Exam. Hours	Exam. Marks	
			Written	Written	Oral
PGP-301	Biotechnology and Genetic Engineering in Pharmacognosy-I التقنية الحيوية و الهندسة الوراثية فى العقاقير-I	2 + 0	3	90	10
PGP-302	Applications on structural Elucidation of Natural Products تطبيقات علي إستنباط التركيب البنائي للنواتج الطبيعية	2 + 0	3	90	10
	Total	4	6	180	20

Second Semester — **الفصل الدراسي الثاني**

Code No	Course Title	Credit Hours	Exam. Hours	Exam. Marks	
			Written	Written	Oral
PGP-303	Biotechnology and Genetic Engineering in Pharmacognosy-II التقنية الحيوية و الهندسة الوراثية فى العقاقير-I I	2 + 0	3	90	10
PGP-3EC	Elective course مقرر اختياري	2 + 0	3	90	10
	Total	4	6	180	20

Elective course (PGP-3EC) — **المقررات الاختيارية**

Code No	Course Title	Credit Hours	Exam. Hours	Exam. Marks	
			Written	Written	Oral
PGP-304	Natural Toxins السموم الطبيعية	2 + 0	3	90	10
PGP-305	Natural Product Based Drug Design and Discovery اكتشاف و تصميم الأدوية من المنتجات الطبيعية	2 + 0	3	90	10
	Total	2	3	90	10

توصيف مقررات درجة دكتور الفلسفة (عقاقير)(PGP- 300)
Ph.D. Courses (Pharmacognosy) (PGP- 300)

First Semester — الفصل الدراسي الأول

PGP-301	**Biotechnology and Genetic Engineering (I)**	**التقنية الحيوية و الهندسة الوراثية (١)**	**Credit Hours (2 + 0)**

The course comprises an introduction to biotechnology, biocatalysis in natural products chemistry, types of biocatalysts, biocatalysis systems, microbial models of mammalian metabolism, biotechnology in drugs **and** therapeutics, genetics and biotechnology e.g. monoclonal antibodies, gene therapy, mammalian culture for production of pharmaceuticals.

PGP-302	**Applications on structural Elucidation of Natural Products**	**تطبيقات علي استنباط التركيب البنائي للنواتج الطبيعية**	**Credit Hours (2 + 0)**

Application of combined spectroscopic techniques e.g. UV, IR, ^{1}H-NMR, ^{13}C-NMR, TOCSY, MS, DEPT, APT, HMQC , HMBC, NOESY…etc in the identification of representatives from different classes of naturally occurring compounds.

Second Semester — الفصل الدراسي الثاني

PGP-303	**Biotechnology and Genetic Engineering (II)**	**التقنية الحيوية و الهندسة الوراثية (٢)**	**Credit Hours (2 + 0)**

Plant tissue culture

The candidate is introduced to the basic techniques of plant tissue culture including (history, overview, general methodology, basal salt media, hormones, vitamins, ……etc., different techniques for *in-vitro* micropropagation and their objectives, protoplast technology, somaclonal variant selection, synthetic (artificial) seeds and cryopreservation, screening and selection of cultured cells, transgenic plants: methods of transformation including Agarobacterium-based transformation, particle bombardment and the use of viral vectors) as well as uses and applications including (production of therapeutic proteins; edible vaccines and secondary metabolites, biotransformation using plant cell and organ cultures, large scale cultivation and techniques for crop improvement).

Mammalian cell culture

The course discusses an introduction to mammalian cell culture including (history, purpose for growing animal cells in culture, advantages, disadvantages and risks, characteristics of cells in culture, lab. design and basic equipments, primary culture, transformed cells and hybridoma cells) as well as uses and applications including (cell culture for tissue engineering (scaffolding) , stem cell assays and cloning)

PGP-304	**Natural Toxins**	**السموم الطبيعية**	**Credit Hours (2 + 0)**

The course discusses the classification of toxins, toxins as drugs, toxins with intracellular targets, cytolytic natural toxins (phospholipases & toxins which affect ion gradients), mycotoxins and mycotoxicoses, (aflatoxins, sterigmatocystins, ochratoxins, trichothecenes, miscellaneous toxins, rubratoxins and fumonisins).

PGP-305	**Natural Product Based Drug Design and Discovery**	**اكتشاف و تصميم الأدوية من المنتجات الطبيعية**	**Credit Hours (2 + 0)**

The course includes: introduction, cheminformatic analysis of natural products (advantage of structure diversity), stages in the development of a new drug, natural product drug discovery (optimization and screening), molecular modeling in natural drug design and successful examples.

مقررات درجة دكتور الفلسفة (الأدوية و السموم)(PHP- 300)
Ph.D. Courses (Pharmacology) (PHP- 300)

First Semester — **الفصل الدراسي الأول**

Code No	Course Title	Credit Hours	Exam. Hours	Exam. Marks	
			Written	Written	Oral
PHP-301	Immunopharmacology المناعة الدوائية	2 + 0	3	90	10
PHP-302	Pharmacotheraputics II العلاج الدوائى ٢	2 + 0	3	90	10
	Total	4	6	180	20

Second Semester — **الفصل الدراسي الثاني**

Code No	Course Title	Credit Hours	Exam. Hours	Exam. Marks	
			Written	Written	Oral
PHP-303	New Trends in Pharmacology إتجاهات حديثة فى علم الأدوية	2 + 0	3	90	10
PHP-3EC	Elective course مقرر اختياري	2 + 0	3	90	10
	Total	4	6	180	20

Elective course (PHP-3EC) — **المقررات الاختيارية**

Code No	Course Title	Credit Hours	Exam. Hours	Exam. Marks	
			Written	Written	Oral
PHP-304	Genotoxicity التسمم الجينى	2 + 0	3	90	10
PHP-305	Iatrogenic Diseases أمراض المحدثة بالأدوية	2 + 0	3	90	10
	Total	2	3	90	10

توصيف مقررات درجة دكتور الفلسفة (الأدوية و السموم)(PHP- 300)
Ph.D. Courses (Pharmacology) (PHP- 300)

First Semester — الفصل الدراسي الأول

PHP-301 Immunopharmacology — **Credit Hours (2 + 0)**

This course provides information about basic immune mechanisms and immunotherapeutic drugs used to treat inflammation and disorders of the immune system including autoimmune diseases, asthma, allergy, transplant rejection and cancer.

PHP-302 Pharmacotherapeutics II — **Credit Hours (2 + 0)**

This course provides information about therapeutic recommendations for drug selection, dosing, and monitoring of patients having renal, urologic, gynecologic and obstetric, dermatologic, psychiatric, neurologic or oncologic diseases.

Second Semester — الفصل الدراسي الثاني

PHP-303 New Trends in Pharmacology — **Credit Hours (2 + 0)**

This course is intended for advanced-level pharmacology students to explore, in depth, a particular area of pharmacology. Under the guidance of a faculty member, students read the recent and up-to-date scientific literature in a pharmacological field.

PHP-304 Genotoxicity — **Credit Hours (2 + 0)**

This course describes the ability of drugs or other chemicals to damage the genetic information within a cell causing mutations, which may lead to cancer. It also involves in vitro and in vivo genotoxicity tests designed to detect compounds which induce genetic damage by various mechanisms.

PHP-305 Iatrogenic diseases — **Credit Hours (2 + 0)**

This course covers diseases caused by medical treatment which may be due to adverse drug effects, drug interactions, unexpected drug effects and teratogenic, mutagenic or carcinogenic effects of drugs.

مقررات درجة دكتور الفلسفة (الميكروبيولوجيا والمناعة)(PMP-300)
Ph.D. Courses (Microbiology and Immunology) (PMP-300)

First Semester — **الفصل الدراسي الأول**

Code No	Course Title	Credit Hours	Exam. Hours	Exam. Marks	
			Written	Written	Oral
PMP-301	Advanced Biotechnology I التكنولوجيا الحيوية التقدمة ١	2 + 0	3	90	10
PMP-302	Advanced immunology and Immunopathology المناعة والمناعة الباثولوجية المتقدمة	2 + 0	3	90	10
	Total	4	6	180	20

Second Semester — **الفصل الدراسي الثاني**

Code No	Course Title	Credit Hours	Exam. Hours	Exam. Marks	
			Written	Written	Oral
PMP-303	Clinical microbiology الميكروبيولوجيا الاكلينكية	2 + 0	3	90	10
PMP-3EC	Elective course مقرر اختياري	2 + 0	3	90	10
	Total	4	6	180	20

Elective course (PMP-3EC) — **المقررات الاختيارية**

Code No	Course Title	Credit Hours	Exam. Hours	Exam. Marks	
			Written	Written	Oral
PMP-304	Microbiological quality control الرقابة الميكروبيولوجية للجودة	2 + 0	3	90	10
PMP-305	Advanced Biotechnology II التكنولوجيا الحيوية التقدمة ٢	2 + 0	3	90	10
	Total	2	3	90	10

توصيف مقررات درجة دكتور الفلسفة (الميكروبيولوجيا و المناعة)(PMP-300)
Ph.D. Courses (Microbiologyand Immunology) (PMP-300)

First Semester — الفصل الدراسي الأول

PMP -301 Advanced Biotechnology I — التكنولوجيا الحيوية التقدمة — **Credit Hours (2 + 0)**

Industrially relevant microbiology, fermentation, downstream processing, application of biotechnology for production of pharmaceutically relevant products and recovery of microbial products. The course includes: Structure and function of macromolecules. Biosynthesis and function of macromolecules (DNA, RNA and proteins). Isolation of DNA and RNA. Chromatography and electrophoresis of nucleic acids. Hybridization of nucleic acids. Use of enzymes in the modification of nucleic acids. Polymerase chain reaction. DNA sequencing. Cloning procedures. Expression of recombinant protein. Microscopic techniques. Laser applications.

PMP -302 Advanced immunology and Immunopathology — المناعة والمناعة الباثولوجية المتقدمة — **Credit Hours (2 + 0)**

Major features of the evolutionary development of innate and adaptive immune systems. The course will integrate molecular, cellular and biochemical events involved in the ontogeny of the lymphoid system and its activation in the immune response. The course will provide an up-to-date understanding of a rapidly moving field.

Second Semester — الفصل الدراسي الثاني

PMP -303 Clinical microbiology — الميكروبيولوجيا الاكلينكية — **Credit Hours (2 + 0)**

Current and emerging microbial deseases in all body system, Principles of hospital acquired infections, integration and managements of the host-parasite relationship in terms of transmission, population dynamics, environmental management, immune responses, and safe medical waste disposal to control nosocomial infections.
Emerging of microbial infections.

PMP -304 Microbiological quality control — الرقابة الميكروبيولوجية للجودة — **Credit Hours (2 + 0)**

Study of microbiological quality control techniques and instrumentation especially in relation to pharmaceutical manufacturing with emphasis on the requirements of total assurance of safe pharmaceutical products. The course includes sterile and non sterile preparation and ISO specifications requirements.

PMP -305 Environmental microbiology — الميكروبيولوجيا البيئية — **Credit Hours (2 + 0)**

Industrially relevant microbiology, fermentation, downstream processing, application of biotechnology for production of pharmaceutically relevant products and recovery of microbial products. The course includes: Genomics and functional genomics. Bioinformatics. Molecular diagnostics in medicine. Recombinant antibodies and phage display. Transgenic and gene- Targeted mice and their impact in medical research. Gene therapy: strategies and vectors RNA interference, Modified DNA, Peptide nucleic acid and application in medicine and biotechnology. Industrial application: biotech industry, markets and opportunities. Patents in the molecular biotechnology industry: legal and ethical issues. Emergence of biotechnology industry. Marketing.

مقررات درجة دكتور الفلسفة (الكيمياء العضوية الصيدلية)(POP-300)
Ph.D. Courses (Pharmaceutical Organic Chemistry) (POP-300)

First Semester — **الفصل الدراسي الأول**

Code No	Course Title	Credit Hours	Exam. Hours	Exam. Marks	
			Written	Written	Oral
POP-301	Organometallic Chemistry كيمياء العضوية المعدنية	2 + 0	3	90	10
POP-302	Bioorganic Chemistry الكيمياء الحيوية	2 + 0	3	90	10
	Total	4	6	180	20

Second Semester — **الفصل الدراسي الثاني**

Code No	Course Title	Credit Hours	Exam. Hours	Exam. Marks	
			Written	Written	Oral
POP-303	New Trends in Drug Synthesis NanooChemistry, Biotechnology, Green Chemistry	2 + 0	3	90	10
POP-3EC	Elective course مقرر اختياري	2 + 0	3	90	10
	Total	4	6	180	20

Elective course (POP-3EC) — **المقررات الاختيارية**

Code No	Course Title	Credit Hours	Exam. Hours	Exam. Marks	
			Written	Written	Oral
POP-304	Advanced Heterocyclic Chemistry الكيمياء الحلقية الغير متجانسة	2 + 0	3	90	10
POP-305	Total Synthesis of Natural Products تشييد المركبات الطبيعية	2 + 0	3	90	10
	Total	2	3	90	10

توصيف مقررات درجة دكتور الفلسفة (الكيمياء العضوية الصيدلية)(POP-300)
Ph.D. Courses (Pharmaceutical Organic Chemistry) (POP-300)

First Semester — الفصل الدراسي الأول

POP-301 Organometallic Chemistry — **Credit Hours (2 + 0)**

Organometallic compounds, Coordination compounds with organic ligand, Structure and properties, Applications, Concepts and techniques: oxidative addition and reductive elimination, transmetalation, carbometalation, Hydrometalation, electron transfer, beta-hydride elimination, organometallic substitution reaction, carbon-hydrogen bond activation, cyclometalation, Migratory insertion, Organometallics

POP -302 Bioorganic Chemistry — **Credit Hours (2 + 0)**

Carbohydrates

Classification of Carbohydrates, Fischer Projection for depicting Carbohydrate, Furanose and pyranose forms, Hemiacetal formation and cyclic structures of monosaccharides, Stereochemistry of monosaccharides, Mutarotation. Disaccharides and polysaccharides, Oxidation and reduction of carbohydrates, Chain extension and reduction, Other important carbohydrates, Carbohydrates on cell surface.

Amino Acids

Classification of amino acids, Structure of amino acids, Dipolar structure, Isoelectric point, Synthesis of amino acids, Resolution of R,S amino acids, Covalent bonding in peptides, Reactions of amino acids, Peptide synthesis.

Second Semester — الفصل الدراسي الثاني

POP -303 New Trends in Drug Synthesis — **Credit Hours (2 + 0)**

Nanochemistry

The course covers an in-depth knowledge of the chemistry of Fundamental concepts, Current research , Bottom-up approaches, Top-down approaches, Functional approaches, Biomimetic approaches, Speculative, Tools and techniques, Applications, Implications.

Combinatorial Chemistry

The course focuses on the in-depth studies of Principle of combinatorial chemistry, Combinatorial synthesis on solid-phase, Synthesis of a combinatorial library, Determination of product structure, Range and evolution of solid-phase chemistry, Combinatorial synthesis in solution (carbamates library), Techniques for solution-phase synthesis, Solution Phase Synthesis: Scavenger Resins (ureas & sulfonamides synthesis), Solution Phase Synthesis: Fluorous technology

Green Chemistry

The course focuses on the in-depth studies of Principles, Presidential Green Chemistry Challenge Awards, Other awards, Trends, Laws, Examples, Supramolecular chemistry, Natural Product Synthesis, Reducing market barriers, Education, Laboratory chemicals, Organometallic chemicals, Scientific uncertainty

POP -304 Advanced Heterocyclic Chemistry — **Credit Hours (2 + 0)**

The course covers an in-depth knowledge of the chemistry of heterocyclic compounds with particular emphasis on the synthesis, reactions, and stereochemistry of different three, four, five and six member heterocycles.

POP -305 Total Synthesis of Natural Products — **Credit Hours (2 + 0)**

The course covers an in-depth knowledge of the chemistry of Natural Products with particular emphasis on Target selection, Retrosynthesis, Strategic bonds in rings, Asymmetric Synthesis, Multi-step Synthesis, Selected synthetic strategies.

مقررات درجة دكتور الفلسفة (الكيمياء التحليلية الصيدلية)(PAP- 300)
Ph.D. Courses (Pharmaceutical Analytical Chemistry) (PAP- 300)

First Semester — **الفصل الدراسي الأول**

Code No	Course Title	Credit Hours	Exam. Hours	Exam. Marks	
			Written	Written	Oral
PAP-301	Automated Methods of Analysis طرق التحليل الأوتوماتيكية	2 + 0	3	80	20
PAP-302	Advanced Separation Techniques تقنيات الفصل المتقدمة	2 + 0	3	80	20
	Total	4	6	160	40

Second Semester — **الفصل الدراسي الثاني**

Code No	Course Title	Credit Hours	Exam. Hours	Exam. Marks	
			Written	Written	Oral
PAP-303	Advanced Electroanalytical Chemistry الكيمياء التحليلية الكهربية المتقدمة	2 + 0	3	80	20
PAP-3EC	Elective course مقرر اختياري	2 + 0	3	80	20
	Total	4	6	160	40

Elective course (PAP-3EC) — **المقررات الاختيارية**

Code No	Course Title	Credit Hours	Exam. Hours	Exam. Marks	
			Written	Written	Oral
PAP-304	Biological Analysis التحليل الحيوي	2 + 0	3	80	20
PAP-305	Environmental Analysis التحليل البيئي	2 + 0	3	80	20
	Total				

توصيف مقررات درجة دكتور الفلسفة (الكيمياء التحليلية الصيدلية)(PAP- 300)
Ph.D. Courses (Pharmaceutical Analytical Chemistry) (PAP- 300)

First Semester — الفصل الدراسي الأول

PAP-301 Automated Methods of Analysis طرق التحليل الأوتوماتيكية **Credit Hours (2 + 0)**

Special topics in highly automated methods of analysis such as flow injection analysis (FIA), sequential injection analysis (SIA) and laboratory robotic systems. In addition, a special focus is given to miniaturization of analytical systems including microfluidic systems (Lab-on-a-Chip).

PAP-302 Advanced Separation Techniques تقنيات الفصل المتقدمة **Credit Hours (2 + 0)**

The course covers modern techniques for analytical separations. The course focuses primarily on the theory of separations, analytical gas chromatography (especially high resolution capillary GC), modern liquid chromatography (Hydrophilic Interaction Liquid Chromatography or HILIC and Ultra Performance Liquid Chromatography or UPLC) and modern capillary electrophoretic methods. Moreover, interfacing separation techniques to highly sensitive detectors like mass spectrometric detectors will also be included.

Second Semester — الفصل الدراسي الثاني

PAP-303 Advanced Electroanalytical Chemistry الكيمياء التحليلية الكهربية المتقدمة **Credit Hours (2 + 0)**

Principles and applications of modern electroanalytical methods such as molecularly-imprinted electrodes and nanoparticles-based electrodes. Electrode kinetics and mass transfer are discussed in detail.

PAP-304 Biological Analysis التحليل الحيوي **Credit Hours (2 + 0)**

Collection and preservation of samples, Biological analysis, blood gas analyzer and trace elements in the body

PAP-305 Environmental Analysis التحليل البيئي **Credit Hours (2 + 0)**

Transport of pollution, The atmosphere, source, disposal, reconcentration and degradation of neutral organic compounds, metal ions, water analysis for major constituents, trace pollutants, atmospheric analysis for gases and particulates, Ultrasonic analysis

مقررات درجة دكتور الفلسفة (الكيمياء الدوائية)(PDP- 300)
Ph.D. Courses (Medicinal Chemistry) (PDP- 300)

First Semester — **الفصل الدراسي الأول**

Code No	Course Title	Credit Hours	Exam. Hours	Exam. Marks	
			Written	Written	Oral
PDP-301	Drug Pharmacodynamics	2 + 0	3	90	10
PDP-302	Advanced Trends in Medicinal Chemistry	2 + 0	3	90	10
	Total	4	6	180	20

Second Semester — **الفصل الدراسي الثاني**

Code No	Course Title	Credit Hours	Exam. Hours	Exam. Marks	
			Written	Written	Oral
PDP-303	Therapeutic Drug Monitoring	2 + 0	3	90	10
PDP-3EC	Elective course مقرر اختياري	2 + 0	3	90	10
	Total	4	6	180	20

Elective course (PDP-3EC) — **المقررات الاختيارية**

Code No	Course Title	Credit Hours	Exam. Hours	Exam. Marks	
			Written	Written	Oral
PDP-304	Molecular Modeling	2 + 0	3	90	10
PDP-305	Sample Preparation	2 + 0	3	90	10
	Total	2	3	90	10

توصيف مقررات درجة دكتور الفلسفة (الكيمياء الدوائية)(PDP- 300)
Ph.D. Courses (Medicinal Chemistry) (PDP- 300)

First Semester — الفصل الدراسي الأول

PDP-301 Drug Pharmacodynamics — **Credit Hours (2 + 0)**

The course concerns with the study of the basic principles of the chemical aspects of drug metabolism, as well as the role of drug metabolism in the design of prodrugs, drug delivery systems and soft drug formulations.
The course focuses on the in-depth studies of the chemical aspects of drug metabolism, in addition to components and structure of microsomal drug metabolizing systems. The student will be exposed to the mechanistic studies and stereoslectivity in drugs metabolism.

PDP-302 Advanced Trends in Medicinal Chemistry — **Credit Hours (2 + 0)**

This course covers, in depth, the chemical and biological considerations applied in the design of specific and selected drugs of versatile pharmacological activity.

Second Semester — الفصل الدراسي الثاني

PDP-303 Therapeutic Drug Monitoring — **Credit Hours (2 + 0)**

The course discuss the different analytical techniques used in today's practice of therapeutic drug monitoring and drugs of abuse with relevant theory, mechanism, and in-depth scientific discussion on each topic. The course includes structured monographs on different drug entities, illustrating different analytical methods and a description of method validation.

PDP-304 Molecular Modeling — **Credit Hours (2 + 0)**

The course covers the concepts of molecular modeling and simulation; and provides an overview of computational chemistry techniques, ranging from the fundamental theoretical basis of modeling techniques to their application.

PDP-305 Sample Preparation — **Credit Hours (2 + 0)**

This course focuses on the techniques of preparing analytical sample in a suitable form prior its introduction into the HPLC instrument using any of the applicable techniques, such as Liquid handling and Dialysis.

مقررات درجة دكتور الفلسفة (الكيمياء الحيوية الاكلينيكية)(PBP- 300)
Ph.D. Courses (Clinical Biochemistry) (PBP- 300)

First Semester — **الفصل الدراسي الأول**

Code No	Course Title	Credit Hours	Exam. Hours	Exam. Marks	
			Written	Written	Oral
PBP-301	Metabolism of Individual Tissues أيض الأنسجة المختلفة	2 + 0	3	90	10
PBP-302	Clinical Endocrinology الغدد الصماء الإكلينيكية	2 + 0	3	90	10
	Total	4	6	180	20

Second Semester — **الفصل الدراسي الثاني**

Code No	Course Title	Credit Hours	Exam. Hours	Exam. Marks	
			Written	Written	Oral
PBP-303	Biochemical Bases of Diseases الأساس الكيميائي الحيوي للمرض	2 + 0	3	90	10
PBP-3EC	Elective course مقرر اختياري	2 + 0	3	90	10
	Total	4	6	180	20

Elective course (PB-3EC) — **المقررات الاختيارية**

Code No	Course Title	Credit Hours	Exam. Hours	Exam. Marks	
			Written	Written	Oral
PBP-304	Applied Biochemistry الكيمياء الحيوية التطبيقية	2 + 0	3	90	10
PBP-305	Gene Therapy العلاج الجيني	2 + 0	3	90	10
	Total	2	3	90	10

توصيف مقررات درجة دكتور الفلسفة (الكيمياء الحيوية الاكلينيكية)(PBP- 300)
Ph.D. Courses (Clinical Biochemistry) (PBP- 300)

First Semester — الفصل الدراسي الأول

PBP-301 Metabolism of Individual Tissues — أيض الأنسجة المختلفة — **Credit Hours (2 + 0)**

Introduction to different metabolic pathways in some tissues. Clinical correlations. Regulation and integration of Metabolism. Muscular dystrophy. Low serum potassium. Essential fructosuria. Diabetic ketoacidosis. Neonatal hyaline membrane disease (HMD). Hemolytic anemia. Disorders of platelet.Vessel wall interaction. Hemorrhagic disease. Fasting cycles. Synthesis of different compounds. Heat production.

PBP -302 Clinical Endocrinology — الغدد الصماء الإكلينيكية — **Credit Hours (2 + 0)**

Pituitary Disease and Neuroendocrinology. Diabetes Mellitus and Carbohydrate Metabolism. Endocrinology of Male Reproductive system Endocrinology of Female Reproductive system. Thyroid Disease. Adrenal Disease and Function. Diseases of Bone and Mineral Metabolism. Diffuse Hormonal Systems and Endocrine Tumor Syndromes. Pediatric Endocrinology. Obesity, Endocrine Disease and Pregnancy, Endocrine Testing Protocols, Endocrinology of Aging

Second Semester — الفصل الدراسي الثاني

PBP-303 Biochemical Bases of Diseases — الأساس الكيميائي الحيوي للمرض — **Credit Hours (2 + 0)**

The genetics of simple and complex traits. Analysis and positional cloning. Genetic diagnosis. The Roles of oncogenes and tumor suppressors in tumor initiation, progression, and treatment. The interaction between genetics and environment. Animal models of human disease. Infectious diseases including bacterial, viral and eukaryotic pathogens. Cancer. Metabolic diseases like diabetes: bases, biochemical diagnosis and treatment. Liver disease: bases, biochemical diagnosis and treatment

PBP -304 Applied Biochemistry — الكيمياء الحيوية التطبيقية — **Credit Hours (2 + 0)**

Transgenic animals: genetic basis, disease models and clinical application. Monoclonal antibodies. Isoenzymes: Biochemistry, Expression, Distribution, Affinities and Role in health and disease. Cytokines and their receptors: Signaling, Receptors and ligands. Transporters. Clearance of signaling molecules. Receptors and ligands. Transporters. Clearance of signaling molecules. Biotechnological preparations and Role in disease management. Inherited human diseases: Molecular basis and Ways of therapeutic interventions

PBP -305 Gene Therapy — العلاج الجيني — **Credit Hours (2 + 0)**

History of gene therapy. Gene transfer in vitro and in vivo. Therapeutic genes and marker genes. Vectors: Plasmid vectors: construction and application and Viral vectors (retroviral, adenoviral, adeno-associated viral vectors, helper-dependent vectors). Inhibition of gene expression by nucleic acids: antisense oligonucleotides, DNA decoys, ribozymes, RNA interference. Gene therapy of immunodeficiency diseases. Gene therapy of other monogenic diseases (cystic fibrosis, Duchenne muscular dystrophy, hemophilia A and B). Gene therapy of cardiovascular diseases: atherosclerosis, hypertension, myocardial infarction, stroke. Pro-angiogenic gene therapy. Gene therapy of cancer: immune gene therapy, suicide gene therapy, anti-angiogenic gene therapy. Cell-based gene therapy: therapeutic potentials of stem cells. Gene therapy and cloning. Ethical aspects of gene therapy (Ethical and political issues related to stem cell research).

رابعاً : مقررات (درجة دكتورالصيدلة فى الصيدلة الإكلينيكية)(PP-PDP-200)

Pharm D Courses (PP-PDP-200)

First Semester — **الفصل الدراسي الأول**

Code No	Course Title	Credit Hours	Exam. Hours		Exam. Marks		
			Written	Practical	Written	Practical	Oral
PP –PDP-201	Adv. Pharmacotherapeutics I العلاج الدوائى المتقدم ١	5 + 0	3	-	90	-	10
PP –PDP-202	Infectious Diseases and Immunology الأمراض المعدية والمناعة	2+1	2	2	70	20	10
PP –PDP-203	Adv. Pharmacy Administration الإدارة الصيدلية المتقدمة	1 + 0	2	-	90	-	10
PP –PDP-204	Applied Clinical Pharmacokinetics حركية الدواء الاكلينيكية التطبيقية	2 + 1	2	2	70	20	10
Elective course							**المقررات الاختيارية**
PP –PDP-205	Clinical Skills Development تطوير المهارات الإكلينيكية	2 + 0	2	-	90	-	10
PP –PDP-206	Bioinformatics المعلوماتية الحيوية	2 + 0	2	-	90	-	10
PP –PDP-207	Advanced and Targeted action Pharmaceutical dosage forms	2 + 0	2		90	-	10
	Total	14	11	4	410	40	50

Second Semester **الفصل الدراسي الثاني**

Code No	Course Title	Credit Hours	Exam. Hours		Exam. Marks		
			Written	Practical	Written	Practical	Oral
PP –PDP-208	Adv. Pharmacotherapeutics II العلاج الدوائى المتقدم ٢	4 + 0	3	-	90	-	10
PP –PDP-209	Pharmacy practice ممارسة صيدلية	2+1	2	2	70	20	10
PP –PDP-210	Clinical Nutrition التغذية الاكلينيكية	1 + 0	2	-	90	-	10
PP –PDP-211	Clinical Toxicology السموم الاكلينيكية	2 + 0	2	-	90	-	10
PP-PDP-212	Clinical laboratory investigation فحص معملى اكلينيكى	1+1	2	2	70	20	10
Elective course							**المقررات الاختيارية**
PP –PDP-213	Drug literature Evaluation and Biostatistics تقييم ابحاث الدواء و الاحصاء الحيوي	2 + 0	2	-	90	-	10
PP –PDP-214	Patient Assessment and Disease Outcome Evaluation تقييم المريض وتقييم المردود المرضي	2 + 0	2	-	90	-	10
PP –PDP-215	Optimization of the technological aspects of pharmaceutical dosage forms	2 + 0	2	-	90		10
	Total	14	13	4	500	40	60

Third Semester — الفصل الدراسي الثالث

Mandatory Clinical Rotation

تدريبات اكلينيكية إجبارية

Courses					Exams/Marks		
level	No.	Core courses	Total credit hours	Code No	Practical/tutorial	Oral	Total
الفصل الدراسي الثالث	1	Clinical rotation cardiovascular (CV) التدريب الإكلينيكي (أمراض القلب)	3	PP-PDP- 216	90	10	100
	2	Clinical rotation (Endocrinology) التدريب الإكلينيكي (الغدد الصماء)	3	PP-PDP- 217	90	10	100
	3	Clinical rotation (GIT) التدريب الإكلينيكي (أمراض الجهاز الهضمي)	3	PP-PDP- 218	90	10	100
	4	Clinical rotation (Hepatology) التدريب الإكلينيكي (أمراض الكبد)	3	PP-PDP- 219	90	10	100
إجمالى عدد الساعات المعتمدة			12	--	--	--	--

Fourth Semester **الفصل الدراسي الرابع**

Elective Clinical Rotations: (Select 2 rotations only)

تدريبات إكلينيكية اختيارية (يتم اختيار دورتين فقط من السبعة) + مشروع التخرج

Courses					Exams/Marks		
level	No.	Core courses	Total credit hours	Code No	Practical/tutorial	Oral	Total
الفصل الدراسي الرابع	1	Clinical rotation (Oncology) التدريب الإكلينيكي (علم الأورام)	3	PP-PDP- 220	90	10	100
	2	Clinical rotation (Neurology and Psychology.) التدريب الإكلينيكي (الأمراض النفسية والعصبية)	3	PP-PDP- 221	90	10	100
	3	Clinical rotation (Drug information.) التدريب الإكلينيكي (معلومات دوائية)	3	PP-PDP- 222	90	10	100
	4	Clinical rotation (Pediatric/Nephrology.) التدريب الإكلينيكي (الأطفال وأمراض الكلى)	3	PP-PDP- 223	90	10	100
	5	Rational use of antibiotics الاستعمال الرشيد للمضادات الحيوية	3	PP-PDP- 224	90	10	100
	6	Enteral & total parentral nutrition التغذية بالمحاليل بالفم والتغذية الكاملة بمحاليل الحقن	3	PP-PDP- 225	90	10	100
	7	Critical care pharmacy صيدلة العناية الحرجة	3	PP-PDP- 226	90	10	100
		Graduation project مشروع التخرج	4	PP-PDP- 227	90	10	100
عدد الساعات المعتمدة فى هذا الفصل			10	--	--	--	--

توصيف مقررات (درجة دكتور الصيدلة الإكلينيكية)(PP-PDP-200)

Courses Description (Clinical Pharm D) (PP-PDP-200)

First Semester — **الفصل الدراسي الأول**

PP-PDP-201	**Adv. Pharmacotherapeutics I**	العلاج الدوائى المتقدم ١	**Credit Hours (5 + 0)**

It involves pharmacotherapeutic management of selected cardiovascular, respiratory, endocrine and gastrointestinal disorders. Emphasis on selection, designing and monitoring pharmacotherapies tailored to patients needs to ensure optimal therapeutic outcome.

PP-PDP-202	**Infectious Diseases and Immunology**	الأمراض المعدية و المناعة	**Credit Hours (2 +1)**

This course covers the study of biolological and immunological aspects of host-parasite interactions, pathogenicity, epidemiology and molecular aspects of major infectious agents. Emphasis on advanced methods for prevention, diagnosis and treatment of diseases caused by bacteria, virus, fungi and parasites.

PP-PDP-203	**Advanced Pharmacy Administration**	الإدارة الصيدلية المتقدمة	**Credit Hours (1 +0)**

The purpose is to describe and analyse the consequence and costs of pharmaceutical products and services, and impact on individual, healthcare system and society. . Factors affecting the planning, implementation and control of pharmacy services in hospitals.

PP-PDP-204	**Applied. Clinical Pharmacokinetics**	حركية الدواء الاكلينيكية التطبيقية	**Credit Hours (2 +1)**

Models of linear and dose-dependent systems in pharmacokinetics. Pharmacokinetic applications in therapeutic drug monitoring and patient care; specific drugs and disease states, effects of age and concomitant drug administration.

PP-PDP-205	**Clinical Skills Development**	تطوير المهارات الإكلينيكية	**Credit Hours (2+0)**

This course is intended to provide a forum for students to prepare and orally present current therapeutic and research material and discuss issues pertinent to clinical pharmacy practice. Critical literature evaluation skills are taught.

PP-PDP-206	**Bioinformatics**	المعلوماتية الحيوية	**Credit Hours (2+0)**

The course covers an in-depth knowledge of the bioinformatics with particular emphasis on database, Information Retrieval from Biological Databases**,** Protein Family Databases**,** Protein Structure Basics, Determination of Protein Three-Dimensional Structure Genome Mapping, Assembly, and Comparison, Microarray-Based Approach.

PP-PDP-207	**Advanced and Targeted action Pharmaceutical dosage forms**	**Credit Hours (2+0)**

Formulation of recent dosage forms, formulation of targeted action dosage forms. Evaluation and stability of advanced and targeted dosage forms

Second Semester	الفصل الدراسي الثاني

PP-PDP-208 **Adv. Pharmacotherapeutics II** العلاج الدوائى المتقدم ٢ **Credit Hours (4 +0)**

It involves pharmacotherapeutic management of selected renal, central nervous system and rheumatic disorders, in addition to infectious diseases and cancer . Emphasis on selection, designing and monitoring pharmacotherapies tailored to patients needs to ensure optimal therapeutic outcome

PP-PDP-209 **Pharmacy practice** ممارسة صيدلية **Credit Hours (2+1)**

This course provides instruction in the technical procedures for preparing and dispensing drugs in the hospital and retail settings under supervision of a registered pharmacist. Topics include drug packaging and labeling, out-patient dispensing, hospital dispensing procedures, controlled substance procedures, inventory control, and non-sterile compounding. Upon completion, students should be able to perform basic supervised dispensing techniques in a variety of pharmacy settings.

PP-PDP-210 **Clinical Nutrition** التغذية الاكلينيكية **Credit Hours (1+0)**

This course evaluates the use of nutrition therapy to address cases of gastro-intestinal disorders, endocrine gland dysfunction and neurological disorders and inflammation, pain, and autoimmune disorders. The physiology and biochemistry of the systems are explored in detail and related to specific disease states. This course provides the functional foundations of digestion, endocrine glands, inflammation that will be related to in the clinical nutrition courses. Practical nutritional applications and current available evidence will be reviewed and case studies will be developed by the students.

Clinical Training

At the completion of training , the student should be able to :

1- Collect and organize data in timely fashion .
2-Complete patient database was and prepare student was for patient discussions .
3-Formulate an appropriate patient -specific problem list .
4- Assess potential drug therapy problems and develop an appropriate intervention and monitoring plan .
5- Implement successfully the plan .
6- Identify and minimize potential errors in blood sample collection for TDM .
7- Determine appropriate drug dosing equations to use for the patient.
8- Perform calculation accurately and in a timely fashion .
9- Integrate clinical pharmacology and pharmacokinetic literature into patient-specific drug problems .
10-Express ideas clearly during rounds with the medical team .
11- Communicate effectively with medical and nursing staff .
12- Provides accurate , clear , succinct , and legible written documentation in the patient's chart .
13- Develop a positive professional relationship with medical and nursing staff .
14- Demonstrate good judgment and assertiveness if he / she believes an error has been made .
15- Admits readily to what he / she does not know but is able to find the required information in a timely fashion .