Faculty of Pharmacy

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2011-2012
FACULTY OF PHARMACY

HISTORY
Faculty of Pharmacy at Beirut Arab University was established in 1986, in Beirut, the capital of Lebanon. The undergraduate program at the Faculty of Pharmacy started and progressed to include seven academic departments:
1. Analytical Chemistry and Drug Quality Control
2. Pharmaceutical Chemistry
3. Pharmacognosy and Medicinal Plants
4. Pharmaceutics and Pharmaceutical Technology
5. Pharmacology
6. Pharmaceutical Microbiology
7. Clinical Pharmacy
The faculty has observed considerable growth in number of its students that increased from a total number of 115 in 1986 to a total of 408 in academic year 2009/2010. Since 2002, the faculty has been expanding its curriculum to incorporate postgraduate programs including: Master and PhD Degrees, in addition to a Diploma in Clinical Pharmacy and Doctor in Pharmacy (Pharm.D.) programs. Since its establishment, the faculty has adopted the extended academic year system, then in 1999, it moved to the two academic terms scheme. In 2002, the faculty updated its programs and adopted the “Credit Hour System”. The curriculum of this new system prepares students for careers in different domains of Pharmacy and promotes interaction between pharmacists and other health professionals. Currently, a thorough inspection of the current curriculum is on-going for improvement to meet the national and international needs. Moreover, the faculty established a "Pharmaceutical Continuing Education Program" which includes short courses, seminars and presentations in the various Pharmaceutical fields that offer graduates and the community a venue for maintaining up-to-date knowledge.

VISION
To be recognized as a premier academic institution in pharmacy education, academic research and community involvement.

MISSION
Faculty of Pharmacy, at BAU, is an academic institution founded in 1986 to provide high quality pharmacy education and scientific research. The faculty educational program was designed and developed to prepare competent pharmacists able to effectively participate in the advancement of pharmacy profession, nationally and internationally. The faculty supports the role of its graduates as health care providers in the frame of professional ethics. The faculty seeks to establish a well-built relation with peer institutions and the surrounding society. To accomplish its mission, the faculty relies on qualified staff members, laboratory facilities and educational tools.
POSTGRADUATE PROGRAMS

OFFERED DEGREES
The Faculty of Pharmacy offers the following postgraduate degrees:
1. Diplomas in: Biochemical Analysis, Hospital Pharmacy and Clinical Pharmacy.
2. Doctor in Pharmacy (Pharm.D.).
4. Doctor of Philosophy in Pharmaceutical Sciences (PhD).

Both the Master and PhD Degrees are offered in the following specialization:
1. Analytical Chemistry and Quality Control
2. Pharmaceutical Chemistry
3. Pharmacognosy and Medicinal Plants
4. Pharmaceutics and Industrial Pharmacy
5. Pharmacology, Toxicology and Biochemistry
6. Pharmaceutical Microbiology

PROGRAM DESCRIPTION

Diploma in Biochemical Analysis and Hospital Pharmacy
The degree requirements consist of a total of 30 credit hours taken as follows:
- Mandatory Courses: 18 Credit Hours
- Faculty Elective Courses: 6 Credit Hours
- Research Project: 6 Credit Hours

Diploma in Clinical Pharmacy
The degree requirements consist of a total of 30 credit hours taken as follows:
- Mandatory Courses: 30 Credit Hours

Doctor in Pharmacy (Pharm.D.): (Duration: One Academic Year)
The Doctor in Pharmacy Degree consists of a total of 30 credit hours divided as follows:
- Mandatory Courses: 15 Credit Hours
- Elective Courses: 9 Credit Hours
- Thesis: 6 Credit Hours

The first and second semesters involve clinical training in accredited hospitals.

Doctor in Pharmacy (Pharm.D.2): (Duration: Two Academic Years)
The Doctor in Pharmacy Degree consists of a total of 38 Cr. divided as follows:
- Mandatory Courses: 32 Credit Hours
- Thesis: 6 Credit Hours

The first and second semesters involve course work and the third and forth involve clinical training in accredited hospitals.
Master Degree in Pharmaceutical Sciences:
The Master Degree Program consists of a total of 36 Credit Hours divided as follows:

- Mandatory Courses: 16 Credit Hours
- Specialized Elective Courses: 14 Credit Hours
- Thesis: 6 Credit Hours

All specialized Elective Courses are selected in accordance to the field of specialization. Thesis registration starts at the beginning of the third semester.

Doctor of Philosophy in Pharmaceutical Sciences (PhD):
The PhD Program consists of a total of 40 Credit Hours divided as follows:

- Specialized Elective Courses: 18 Credit Hours
- Thesis: 22 Credit Hours

All specialized Elective Courses are selected in accordance to the field of specialization.
# CURRICULA

## I- Diplomas

### 1- Diploma in Biochemical Analysis

*(Curriculum: 30 Credits Hours)*

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Credit</th>
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<tbody>
<tr>
<td>PHAR 601</td>
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<td>PHAR 603</td>
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<td>PHAR 701</td>
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<td>Elective ¹</td>
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<td>PHAR 604</td>
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<tr>
<td>Elective ¹</td>
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¹ Selected from the following courses: MATH 665, CMPS 312, PHAR 702, PHAR 703, PHAR 704, PHAR 707
## 2- Diploma in Hospital Pharmacy

(Curriculum: 30 Credits Hours)

<table>
<thead>
<tr>
<th>First Semester</th>
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<tbody>
<tr>
<td>PHAR 605 Pharmaceutical Dosage Forms</td>
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<tr>
<td>PHAR 607 Parenterals</td>
<td>2</td>
</tr>
<tr>
<td>PHAR 609 Advanced Microbiology</td>
<td>3</td>
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<tr>
<td>PHAR 611 Sera and Vaccines</td>
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<tr>
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<table>
<thead>
<tr>
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<tbody>
<tr>
<td>PHAR 606 Pharmaceutical Laws</td>
<td>2</td>
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<tr>
<td>PHAR 608 Hospital Food Analysis</td>
<td>2</td>
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<td>PHAR 610 Advanced Applied Microbiology</td>
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\(^2\) Selected from the following courses: PHAR 738, MATH 665, CMPS 312, PHAR 704, PHAR 706, PHAR 737
### 3- Diploma in Clinical Pharmacy

(Curriculum: 30 Credits Hours)

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<tbody>
<tr>
<td>PHAR 743 Pharmacotherapeutics I</td>
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<tr>
<td>PHAR 745 Basic Clinical Pharmacy</td>
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<tr>
<td>PHAR 747 Clinical Lab Investigations</td>
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</tr>
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<td>PHAR 749 Biopharmaceutics</td>
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<td>PHAR 751 Clinical Pharmacokinetics I</td>
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<td>PHAR 753 Pharmacotherapeutics II</td>
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<table>
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<tbody>
<tr>
<td>PHAR 748 Pharmaco Epidemiology</td>
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<td>PHAR 750 Drug Monitoring and Hospital Training</td>
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<td>PHAR 752 Clinical Pharmacokinetics II</td>
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<td>PHAR 754 Pharmacotherapeutics III</td>
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<td>PHAR 756 Pharmacotherapeutics IV</td>
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II- Master Degree in Pharmaceutical Sciences

(Curriculum: 36 Credits Hours)

Courses

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<tr>
<td>PHAR 701 Absorption and Emission Spectroscopy</td>
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<td>CHEM 618 Advanced Physical Chemistry for Pharmacists</td>
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<td>CMPS 312 Data Base Systems for Pharmacists</td>
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<td>PHAR 702 Topics in Chromatographic Techniques</td>
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<td>MATH 665 Biostatistics for Pharmacists</td>
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<tr>
<td>PHAR 704 Scientific Writing and Research Skills</td>
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<td>PHAR 706 Drug Library and Literature Searching</td>
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\(^1\)Specialized Elective Courses are selected according to the field of specialization and upon the recommendation of the academic supervisor from the following list:

## III- Doctor in Pharmacy (Pharm.D.)

### 1- Doctor in Pharmacy (Pharm.D.)

(A one-year program Curriculum: 30 credit Hours)

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<tbody>
<tr>
<td>PHAR 760-763</td>
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<tr>
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### Research Thesis:

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Curriculum 2011-2012 | 9
# 2- Doctor in Pharmacy (Pharm.D.2)

(A two-years program Curriculum: 38 Credits Hours)

## Courses

### First Semester

<table>
<thead>
<tr>
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<tr>
<td>PHAR 743</td>
<td>Pharmacotherapeutics I</td>
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</tr>
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<td>PHAR 745</td>
<td>Basic Clinical Pharmacy</td>
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<tr>
<td>PHAR 747</td>
<td>Clinical Lab Investigations</td>
<td>3</td>
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<tr>
<td>PHAR 749</td>
<td>Biopharmaceutics</td>
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<td>PHAR 751</td>
<td>Clinical Pharmacokinetics I</td>
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<tr>
<td>PHAR 753</td>
<td>Pharmacotherapeutics II</td>
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16

### Second Semester

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<td>PHAR 748</td>
<td>Pharmaco Epidemiology</td>
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<td>PHAR 750</td>
<td>Drug Monitoring and Hospital Training</td>
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<tr>
<td>PHAR 752</td>
<td>Clinical Pharmacokinetics II</td>
<td>3</td>
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<td>PHAR 754</td>
<td>Pharmacotherapeutics III</td>
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<tr>
<td>PHAR 756</td>
<td>Pharmacotherapeutics IV</td>
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### Research Thesis

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<td>PHAR 799</td>
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6
### IV- Doctor of Philosophy in Pharmaceutical Sciences (PhD)

(Curriculum: 40 Credits Hours)

<table>
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<th>Courses</th>
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<tbody>
<tr>
<td>PHAR 899 Thesis</td>
<td>22</td>
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</tbody>
</table>

\(^1\)Specialized Elective Courses are selected upon the recommendation of the academic supervisor according to the field of specialization from the following lists:

POSTGRADUATE COURSE DESCRIPTIONS

Mandatory and Elective Courses are grouped together due to their interchangeability in the P/G program.

PHAR 601 – APPLIED BIOCHEMISTRY I (3Cr: 2Lec, 2Lab)
This is an application course of human biochemistry, which is designed to provide an insight to the normal healthy metabolic processes and on the other hand focusing on the disorders and congenital diseases that result from abnormal defects of these metabolic processes and pathways.

PHAR 602 – APPLIED BIOCHEMISTRY II (3Cr: 2Lec, 2Lab)
This is an application course of human biochemistry, which is designed to provide an insight to the normal healthy metabolic processes and on the other hand focusing on the disorders and congenital diseases that result from abnormal defects of these metabolic processes and pathways.

PHAR 603 – CHEMICAL PATHOLOGY I (3Cr: 2Lec, 2Lab)
General laboratory, Quality Control in Chemical Pathology, Evaluation of Reliability Criteria, Sampling & Storing of different biological samples.

PHAR 604 – CHEMICAL PATHOLOGY II (3Cr: 2Lec, 2Lab)
Organ function tests, Carbohydrates, Lipids, Proteins, Enzymes, Electrolytes, and Hormones. Acid-Base Balance, Tumor Markers, Stones, Biological Fluids, Role of Lab investigation of some important diseases, Miscellaneous and Updating.

PHAR 605 – PHARMACEUTICAL DOSAGE FORMS (4Cr: 3Lec, 2Lab)
Dosage forms preparation, quality control, storage, stability tests and expiration.

PHAR 606 – PHARMACEUTICAL LAWS (2Cr: 2Lec)
Laws controlling drugs, drugs lists, toxic and narcotic drugs, handling dangerous materials, storage methods and sampling techniques.

PHAR 607 – PARENTERALS (2Cr: 2Lec)
Injectable solutions, methods of preparation, packaging, physical, chemical and microbiological quality control, test of containers of parenterals and storage.

PHAR 608 – HOSPITAL FOOD ANALYSIS (2Cr: 2Lec)
Food classes, Sources, sampling, Carbohydrate analysis, Protein analysis, Fat Analysis, Vitamins and mineral analysis.

PHAR 609 – ADVANCED MICROBIOLOGY (3Cr: 3Lec)
Microbial cell structure of function, microbial physiology, pathogenesis, antibiotic resistance and bacterial toxins.

PHAR 610 – ADVANCED APPLIED MICROBIOLOGY (3Cr: 3Lec)
General aspect of me viable cell, Regulation of gene expression, Modern method of genetic engineering and industrial application of genetic engineering.

PHAR 611 – SERA AND VACCINES (2Cr: 2Lec)
Immunological principals, Humoral and cell-mediated immunity, Conventional vaccines, Modern vaccine technologies, Pharmaceutical considerations.
PHAR 701 – ABSORPTION AND EMISSION SPECTROSCOPY (3Cr: 2Lec, 2Lab)
Topics include theory, instrumentation, fundamental laws, deviation and applications of ultraviolet and visible spectrophotometry, Molecular fluorescence spectroscopy theory, instrumentation, laws, and applications.

PHAR 702 – TOPICS IN CHROMATOGRAPHIC TECHNIQUES (3Cr: 2Lec, 2Lab)
High pressure liquid chromatography, gas chromatography, high performance thin layer chromatography, electrophoresis, theory, instrumentation and applications for qualitative and quantitative analysis.

PHAR 703 – ADVANCED COURSE IN DRUG ANALYSIS (3Cr: 2Lec, 2Lab)
Advanced methods in pharmaceutical Analysis. Analysis of dosage forms in the presence of different matrices, multicomponent-mixture analysis using different methods, data assessment and presentation.

PHAR 704 – SCIENTIFIC WRITING AND RESEARCH SKILLS (2Cr: 2Lec)
Topics include: how to write a paper, title, abstract, experimental, results & discussion, references, how to write a thesis, and to make a seminar.

PHAR 705 – DRUG QUALITY CONTROL (3Cr: 2Lec, 2Lab)
Sampling and probability, control chart technique, quality improved management, inter-and intra-Lab control. Establishment and uses of reference values, methods of selection and evaluation, seminars on different pharmacopoeial methods.

PHAR 706 – DRUG LIBRARY AND LITERATURE SEARCHING (2Cr: 2Lec)
Types, information resources, literature evaluation, establishment of DIPC, sources, computerized drug information retrieval system, internet, references, medical letters and professional literature.

PHAR 707 – MODERN TOPICS IN ELECTROCHEMISTRY (2Cr: 2Lec)
Theory of potentiometry, types of electrodes, applications, conductometry, Voltammetry, polarography and differential pulse polarography.

PHAR 708 – CHEMOMETRIC METHODS OF ANALYSIS (2Cr: 2Lec)
Definition, two-component equation, derivatives technique, orthogonal function, least squares method, partial least squares and application to drug analysis.

PHAR 709 – MODERN TECHNIQUES IN BIOLOGICAL ANALYSIS (2Cr: 2Lec)
Sample preparations, storage, methods of analysis of drugs in presence of interferences from biological solutions.

PHAR 710 – ADVANCED ORGANIC PHARMACEUTICAL CHEMISTRY I (3Cr: 2Lec, 2Lab)
Advanced organic and heterocyclic compounds, advanced mechanistic study of organic reactions, Special topics in organic chemistry.

PHAR 711 – ADVANCED ORGANIC PHARMACEUTICAL CHEMISTRY II (3Cr: 2Lec, 2Lab)
Molecular rearrangements, organic functional group preparations and reactions, organic name reactions, and solid phase organic synthesis.

PHAR 712 – ADVANCED MEDICINAL CHEMISTRY I (3Cr: 3Lec)
Cancer chemotherapy, antibiotics, drug used in neurodegenerative diseases, In all cases the following aspects will be discussed: historical resume, synthetic approaches, SAR–studies and mode of actions.

PHAR 713 – DRUG DESIGN I (3Cr: 2Lec, 2Lab)
This course includes manipulation of structurally specific agents which comprises receptor sites and mode of biological-action of the concerned molecules. It also includes molecular modeling, computer aided drug design and QSAR studies.
PHAR 714 – ADVANCED TOPICS IN IR, NMR AND MASS SPECTROMETRY (3Cr: 2Lec, 2Lab)
Theory of IR, applications for qualitative and quantitative analysis, NMR applications and mass spectrometry.

PHAR 715 – ISOLATION AND CHROMATOGRAPHIC TECHNIQUES (4Cr: 3Lec, 2Lab)
Isolation of chemical constituents from crude drugs, extraction methods, bioactivity-guided fractionation schemes, art, approaches and methods of crystallization; advancements in extraction methodologies and in chromatographic techniques.

PHAR 716 – QUALITY CONTROL OF CRUDE DRUGS AND PHYTOPHARMACEUTICALS (3Cr: 2Lec, 2Lab)
The course is designed to enhance the student’s basic knowledge of the principles and methodologies of the quality control of crude drugs. The course improves the student’s capabilities and problem solving skills in assuring reliability of drugs of natural origin as well as product of DNA technology. Evaluation of recent herbal monographs and establishment of fundamental approaches to design new one.

PHAR 717 – SPECTRAL AND CHEMICAL CHARACTERIZATION OF NATURAL PRODUCTS (4Cr: 3Lec, 1Lab)
Techniques used in characterization, identification, and structure elucidation of different classes of natural products with emphasis on integrated interpretation of these different techniques.

PHAR 718 – SELECTED TOPICS IN NATURAL PRODUCTS (3Cr: 3Lec)
Genetically engineered natural products, cytotoxic/anticancer agents of plant origin, natural products as anti-inflammatory drugs; as a source of anti-thrombotic drugs; allergic plants; semisynthetic drugs derived from natural products, poisonous plants and fungi; natural products as a renewable source of medicinal agents.

PHAR 719- ADVANCED PHYSICAL PHARMACY (3Cr: 2Lec, 2Lab)
Characterization of macromolecules used as pharmaceutical excipients; compendial specifications for excipients; standardization of excipients for quality and safety, drug-excipient interactions, and prodrugs in pharmaceutical formulations.

PHAR 720 – DRUG DELIVERY SYSTEMS (3Cr: 2Lec, 2Lab)
Controlled-release drug delivery systems, Targeted delivery systems (nanoparticles–liposomes), novel delivery systems (bioadhesvise–intelligent polymers–block copolymers micelles) and self regulated delivery systems.

PHAR 721 – ADVANCED BIOPHARMACY AND PHARMACOKINETICS (3Cr: 2Lec, 2Lab)
Bioequivalence testing; methodology guidelines, assay validation methods, and statistical analysis of bioequivalence data. Evaluation and predication of drug permeation.

PHAR 722 – SELECTED TOPICS IN PHARMACEUTICS (3Cr: 2Lec, 2Lab)
Biotechnology pharmaceuticals and gene therapy.

PHAR 723 – PHARMACEUTICAL TECHNOLOGY I
PHAR 724 – PHARMACEUTICAL TECHNOLOGY II (3Cr: 2Lec, 2Lab)
Heat transfer and its applications, fluid mechanics, mass transfer and its applications, operations involving particulate solids, size reduction and mechanical separation.

PHAR 725 – PHARMACEUTICAL UNIT OPERATION I
PHAR 726 – PHARMACEUTICAL UNIT OPERATION II (2Cr: 2Lec)
Advanced courses in: flow and transport of fluid, size reduction, size enlargement, size separation, filtration, mixing, emulsification, crystallization, heat generation and transfer, distillation, liquid-liquid extraction, leaching, humidification and air conditioning, evaporation and drying.
PHAR 727 - Molecular Pharmacology (3Cr: 3Lec)
The course is specifically concerned with the effect of drugs on cells at the molecular level; as it studies the effect of drugs on enzymes, proteins, amino acids, nucleic acids, chromosomes and genes. This course is considered to be the base for drug use in treatment of diseases, disclosing its side effects, drug interactions and restrictions to its use.

PHAR 728 – Selected Topics In Toxicology (3Cr: 3Lec)
This course is concerned with studying the effect of toxic chemical agents and overdoses of drugs in living organisms (humans, animals and microorganisms), placing in the spotlight on toxicokinetics, toxicodynamic and target organ toxicity. It also include studies on addiction and smoking.

PHAR 729 – SPECIAL TOPICS IN BIOCHEMISTRY (3Cr: 2Lec, 2Lab)

PHAR 730 – Experimental Pharmacology (2Cr: 1Lec, 1Lab)
This course is considered as a base for the study and research on drugs as it focuses on testing the drug on laboratory animals with the goal of demonstrating the drug’s effectiveness on whole animals, isolated organs, tissues or single cells. This course also handle different experimental techniques both in vitro and in vivo.

PHAR 731 – ADVANCED COURSE IN PHARMACEUTICAL BIOCHEMISTRY: PART I (3Cr: 2Lec, 2Lab)

PHAR 732 – ADVANCED COURSE IN PHARMACEUTICAL BIOCHEMISTRY: PART II (3Cr: 2Lec, 2Lab)
Nucleotide metabolism, Recombinant technology, Medical biotechnology.

PHAR 733 – ADVANCED GENERAL MICROBIOLOGY (3Cr: 2Lec, 2Lab)
The course includes lectures covering microbial cell structure and function, microbial physiology, general principles of microbial pathogenesis, adhesion and invasion strategies, antibiotic resistance, bacterial toxins, intracellular survival strategies, and biofilms. The course includes also a series of discussion groups in specialized areas of modern microbiology. In addition, all students in this course are required to present 3 seminars concerning advanced topics in microbiology.

PHAR 734 – MICROBIOLOGY QUALITY CONTROL (2Cr: 2Lec)
Quality control techniques and instrumentation. Application of methods (including requirements of QC department, product testing), medical gases, hospital-based practice which include: quality assurance, quality control, pharmaceutical microbiology, statistics, and audit.

PHAR 735 – PHARMACEUTICAL MICROBIOLOGY (3Cr: 2Lec, 2Lab)
Significance of microorganisms, Morphology and characteristics of microorganisms, Staining methods, Requirements of microbial growth, Cultivation of microorganisms, Reproduction of microorganisms, Measurement of microbial growth, Identification of microorganisms, Control of microbial growth, Requirements, classification and applications of disinfectants, Modes of action of disinfectants, Factors affecting activity of disinfectants, Evaluation of disinfectant activity and pathogenic microorganisms.

PHAR 736 – MOLECULAR TECHNIQUES (3Cr: 2Lec, 2Lab)
The course covers the main area of contemporary molecular biology, including DNA preparation, amplification of DNA using polymerase chain reaction (PCR) techniques e.g. multiplex PCR and inverse PCR, DNA sequencing, analysis of data using different approaches e.g. agarose gel electrophoresis, identification of bacteria and fungi by using molecular methods e.g. 168 rRNA sequencing, DNA hybridization technique, methods of transfer of genetic materials e.g. transformation, transduction, conjugation and electroporation, different methods of in-vitro mutation e.g. site directed mutagenesis, knock out mutation.
PHAR 737 – ANTIBIOTICS AND CHEMOTHERAPY (2Cr: 2Lec)
B-lactams, tetracyclines, rifampicins, aminoglycosides, aminocyclotols, macrolides, polypeptides, glycopeptides, miscellaneous antibiotics (chloramphenicol, fucidic acid, etc.) and antifungal antibiotics. Synthetic antimicrobial agents and antiviral drugs.

PHAR 738 – FUNDAMENTALS OF IMMUNOLOGY (2Cr: 2Lec)
Basic concepts in immunity, hypersensitivity both cellular and humoral, tumor and cancer immunology, transplant immunology, autoimmune diseases, serologic procedures.

PHAR 739 – MEDICAL BACTERIOLOGY (1Cr: 1Lec)
Most of bacterial infectious diseases including those diseases produced by Gram-positive and Gram-negative bacteria, Acid-fast bacteria, Rickettsiae, Chlamydia, Actinomycetes and Mycoplasma species.

PHAR 740 and PHAR 741 – Seminar (2Cr)

PHAR 742 – Neuropharmacology (3Cr: 3Lec)
The course aims to study the effect of drugs on the CNS and peripheral neurons with special emphasis on stimulatory and inhibitory drugs, in addition to drugs that create an imbalance in this system. The course include developments in neuro-psychopharmacology studies of anxiety disorders, affective disorders, psychotic disorders, degenerative disorders and eating and sleep behavior.

PHAR 744 – Immunopharmacology (3Cr: 3Lec)
This course is concerned with the study of the immunological changes resulting from drug use such as changes that lead to drug sensitization and its treatment using other drugs. It also focuses on the study of the effects of drugs used to suppress the immune system for its application in autoimmune diseases and in organ transplantation.

PHAR 745 – BASIC CLINICAL PHARMACY (2Cr: 2Lec)
Health policy, drug policy regulation, hospital pharmacy management and regulations. Pharmaceutical services.

PHAR 746 – PHARMACOECONOMICS (2Cr: 1Lec)
Health economics, application in hospitals and cost effectiveness of pharmaceutical interventions.

PHAR 747 – CLINICAL LABORATORY INVESTIGATIONS (3Cr: 2Lec, 3Lab)
Preparation of patients, sampling and factors affecting laboratory results. Principles of methods and interpretation of laboratory medicine.

PHAR 748 – PHARMACOEPIDEMIOLOGY (2Cr: 2Lec)
Drug utilization studies, clinical trials, post marketing surveillance, rational and irrational drug use.

PHAR 749 – BIOPHARMACEUTICS (2Cr: 2Lec)
Different types of drug interactions. Drug delivery system and product selection by the pharmacist.

PHAR 750 – DRUG MONITORING AND HOSPITAL TRAINING (3Cr: 1Lec, 6 Lab)
Monitoring and assessment of drug-drug interaction, drug-food interaction, Antibiotics and other antimicrobial agents spread and resistance in the hospital. Assessments of drug use in different situations and drug adverse effects.

PHAR 751 – CLINICAL PHARMACOKINETICS I
PHAR 752 – CLINICAL PHARMACOKINETICS II (3Cr: 2Lec)
Drug pharmacokinetics in special populations, approach to drug dosing, therapeutic monitoring and applications in drug toxicity.
PHAR 743 – PHARMACOTHERAPEUTICS I,  
PHAR 753 – PHARMACOTHERAPEUTICS II,  
PHAR 754 – PHARMACOTHERAPEUTICS III,  
PHAR 756 – PHARMACOTHERAPEUTICS IV,  
PHAR 755 – Pharmacogenetics And Pharmacogenomics (3Cr: 3Lec)  
This course is concerned with influence of genetics and polymorphism on drug pharmacokinetic and pharmacodynamic Parameters. The course include genetic influence on certain disease conditions. This course also deals with the basis of gene therapy, and application of genomic technologies to new drug discovery. It focuses on the use of genetic engineering to create drugs and apply them in treatment of certain diseases such as cancer, diabetes, heart problems and atherosclerosis.  
PHAR 757 – Experimental Toxicology (2Cr: 1Lec, 1Lab)  
The Course aims to Experience different experimental techniques both acute and chronic to test the toxic effects of drugs and preliminary determination of therapeutic, toxic and lethal doses to animals as well as the study of drug effects on animal embryos and lactating animals. It also demonstrates the possibility of occurrence of genetic mutations or malignancies following drug intake.  
PHAR 760-763 – Advanced Professional Pharmacy Practice (3Cr: 1 month clinical rotation)  
These are four required clinical rotations (each 3 credits) in the following departments:  
Internal Medicine (PHAR 760), Intensive Care Unit (PHAR 761), Pediatrics (PHAR 762), and Community Pharmacy (PHAR 763).  
PHAR 764-783 – ADVANCED PROFESSIONAL PHARMACY PRACTICE (3cr: 1 month clinical rotation)  
These are three optional clinical rotations (each 3 credits) to be conducted in three selected departments from the following: Emergency Medicine(PHAR 764), Psychiatry (PHAR 765), Dermatology (PHAR 766), Nephrology (PHAR 767), Cardiology (PHAR 768), Internal Medicine Elective (PHAR 769), Oncology (PHAR 770), Infectious Diseases (PHAR 771), Nutrition (PHAR 772), Neonatal Intensive Care (PHAR 773), Obstetrics/Gynecology (PHAR 774), Gastroenterology (PHAR 775), Drug and Poison Center (PHAR 776), Orthopedics (PHAR 777), Endocrinology (PHAR 778), Neurology (PHAR 779), Family Medicine (PHAR 780), Pulmonary Medicine (PHAR 781), Pediatric Oncology (PHAR 782), Ambulatory Care (PHAR 783).  
PHAR 784 – Advanced Clinical Pharmacokinetics (3cr: 2lec, 2Tut)  
Drug pharmacokinetics in special populations, approach to drug dosing, therapeutic monitoring and application in drug toxicity.  
PHAR 799 – Research Thesis (6 Cr)  
PHAR 801 – RESEARCH PROJECT (3Cr: 3Lec)  
This course takes advantage of efficient and high-quality instruction methodologies to ensure that students are able to complete the requirements for the doctoral degree within a certain set amount of time.  
PHAR 802 – MODERN THEORIES IN DRUG ANALYSIS (3Cr: 3Lec)  
Advanced techniques including chiral separation of drugs, use of enzymes in clinical analysis, stability studies and kinetic determination of drugs.  
PHAR 803 – NEW AUTOMATION SYSTEMS USED IN ANALYSIS (3Cr: 3Lec)  
Introduction of automation system in drug analysis, application of automation system in different techniques, use of pre-and post column derivatization techniques in automation system.
PHAR 804 – ADVANCED ANALYTICAL TECHNIQUES (2Cr: 2Lec)
Application of inclusion complexes in drug analysis using spectrophotometry and spectrofluorometry, micellar electro kinetic capillary chromatography in drug analysis.

PHAR 805 – NEW METHODS FOR PARAMEDICAL ANALYSIS (2Cr: 2Lec)
Analysis for preservatives, antioxidants and coloring agents using different techniques. Cosmetics and nutropharamceutical analysis.

PHAR 806 – MODERN CONCEPTS ON PHARMACEUTICAL ANALYSIS AND COMPUTER SCIENCES (3Cr: 3Lec)
Non-parametric linear regression of spectrophotometric and chromatographic peak responses in non-ideal conditions, H-point standard addition method, comparison of graphical and numerical methods in multi-component analysis.

PHAR 807 – TOTAL AND RETROSYNTHESIS OF PHARMACEUTICAL COMPOUNDS (2Cr: 2Lec)
Classical and retro-synthetic routes are widely used for preparation of some medicinally useful drugs.

PHAR 808 – Advanced Stereochemistry (2Cr: 2Lec)
It is the branch of chemistry concerned with the three dimensional aspects of molecules. It is the chemical studies that take into account the spatial aspects of molecules.

PHAR 809 – PERICYCLIC AND CYCLO-ADDITION REACTIONS (2Cr: 2Lec)
Pericyclic reactions represent an important class of concerted (single step) processes involving \( \pi \)-system. Cycloaddition reaction, particularly the Diels- Alder reaction, are introduced as a versatile synthetic method.

PHAR 810 – ADVANCED HETEROCYCLIC CHEMISTRY (2Cr: 2Lec)
The principle aim of this course is the study of fundamentals of heterocyclic reactivity and synthesis in a way which is standable by undergraduate and postgraduate students.

PHAR 811 – SYNTHETIC AND NATURAL PHARMACEUTICAL POLYMERS (2Cr: 2Lec)
Polymers have multitude of uses, from the foam coffee cup to the life saving artificial heart valve. Some important pharmaceutical polymers will be discussed.

PHAR 812 – SYNTHESIS OF PEPTIDES, NUCLEOTIDES AND RELATED DRUGS (2Cr: 2Lec)
This section is concerned with the study of the properties and synthesis of some selected important peptides and nucleotides.

PHAR 813 – MODERN THEORIES IN DRUG DESIGN (2Cr: 2Lec)
It is the theoretical aspects of the drug design process. Drug design requires certain knowledge of biological systems and how they are modulated and an appreciation of the physicochemical properties and structure of molecules.

PHAR 814 – SELECTED TOPICS IN MOLECULAR GENETICS (2Cr: 2Lec)
This course consists of lectures and discussions about recent advances in molecular genetics. These topics include, with emphasis on genetic aspects, the following: sporulation and differentiation, bacterial pathogenicity, recombination, cell growth and division, DNA replication and site specific mutagenesis.

PHAR 815 – MODERN THEORIES IN BIO-DETERIORATION AND BIO-DEGRADATION (3Cr: 3Lec)
This course dealing with the role of microorganisms in the bio-deterioration and biodegradation of polymers and waste products (Pollutants).

PHAR 816 – Advanced Applications Of Biotechnology (3Cr: 3Lec)
The course deals with the application of biotechnology for industrial purposes, including the manufacturing, alternative energy (Bio-energy), and biomaterials. It includes the practice of using cells or compounds of cells like enzymes to generate industrially useful products.
PHAR 817 – New Researches In Virology (2Cr: 2Lec)
Detailed description of the molecular virology research, special issues in advances in pathogenic viruses (hepatitis B and C, etc), Virology and biotechnology.

PHAR 818 – ADVANCED BIOPHARMACEUTICS AND PHARMACOKINETICS (2Cr: 2Lec)
Advanced Biopharmaceutics and pharmacokinetics concentrates on advanced drug delivery systems and advanced mathematics of biopharmaceutics and pharmacokinetics.

PHAR 819 – MOLECULAR PHARMACEUTICS (2Cr: 2Lec)
Molecular pharmaceutics deals with the integration of application of high quality, mechanisms including biosensors and application of cell molecular biology.

PHAR 820 – Pharmaceutical Biotechnology (2Cr: 2Lec)
Pharmaceutical Biotechnology deals with the production of rare or even unattainable pharmaceuticals in useful quantities by harnessing the power of molecular biology. Products can be produced from raw materials with the aid of organisms.

PHAR 821 – Tissue Engineering (2Cr: 2Lec)
Tissue engineering focuses on the development of substitutes for damaged tissues and organs. It combines the principles of engineering and biology to aid in the formation of new tissues or in the implantation of functional cells.

PHAR 822 – BIOINFORMATICS FROM A PHARMACEUTICAL PROSPECTIVE (2Cr: 2Lec)
It covers major databases and software programs for genomic data analysis with an emphasis on the theoretical basis and practical applications of computational tools.

PHAR 823 – SELECTED TOPICS IN INDUSTRIAL PHARMACY (3Cr: 3Lec)
Selected topics in industrial pharmacy deals with special topics in selected areas of industrial and physical pharmacy and pharmaceutical radioisotopes.

PHAR 824 – A MECHANISTIC BIOSYNTHETIC AND ECOLOGICAL APPROACH TO NATURAL PRODUCTS CHEMISTRY (3Cr: 3Lec)
Principal reactions and pathways of biosynthesis concerning chemical ecology and basic reaction mechanisms in biological chemistry of natural products such as redox, elimination and carbonium ion rearrangements.

PHAR 825 – ADVANCED TECHNIQUES IN DRUG TECHNOLOGY (3Cr: 3Lec)
Technology platform that combines artificial intelligence, advanced computational methods and chemical diversity techniques to discover new drugs, drug delivery techniques often requires multifunctional capabilities, biocompatible, developed and advanced biomedical polymers for healthcare applications, radiation sterilization of advanced drug device, new drug delivery good for alder drugs.

PHAR 826 – BIOTRANSFORMATION OF NATURAL PRODUCTS (3Cr: 3Lec)
Application, both actual and potential, of biological catalysts for the synthesis, inter-conversion or degradation of chemical species of natural products.

PHAR 827 – PHARMACOBIOTECHNOLOGY OF NATURAL PRODUCTS (3Cr: 3Lec)
Technological applications using biological systems, living organisms, or derivatives thereof, to make or modify natural products for specific uses.

PHAR 828 – ADVANCED BIOCHEMISTRY (3Cr: 3Lec)
Advanced topics in biochemistry, including enzyme action, metabolic disorders, membrane transport, nerve and muscle functions, and photosynthesis.
PHAR 829 – ADVANCED SELECTED TOPICS RELATED TO THE POINT OF RESEARCH (3Cr: 3Lec)

PHAR 830 – CELL SIGNALING (2Cr: 2Lec)
The course describes cells' communication through discrete signaling pathways to influence one another's differentiation, proliferation, secretion, and apoptosis. Recent studies of cell signaling mechanisms have led to a greater understanding of many diseases and to new therapeutic strategies.

PHAR 831 – ADVANCED TOPICS IN NEUROPHARMACOLOGY (3Cr: 3Lec)
Selected topics in the field of neuro-pharmacology. These Topics are carefully selected to be in line with the latest technological and scientific advancements worldwide.

PHAR 832 – PROTEIN STRUCTURE AND FUNCTION (3Cr: 3Lec)
An advanced study of the chemistry of proteins and protein-containing supra-molecular structures. The topics include isolation and purification of proteins, structure of proteins and relation of structure to biological function.

PHAR 833 – PHYSIOLOGICAL AND BIOCHEMICAL BASES OF HUMAN NUTRITION (3Cr: 3Lec)
Examines the biochemical and physiological bases of human nutritional requirements. Uses an integrated approach to cover the digestion and metabolism of nutrients (carbohydrates, proteins, lipids, vitamins, and minerals). Metabolic and chronic diseases related to nutrition are discussed throughout the semester.

PHAR 834 – DEPARTMENTAL SEMINAR AND JOURNAL (1Cr: 1Lec)
Discussion of recent topics in pharmacology and toxicology by faculty or invited outside speakers. Students research reports.

PHAR 835 – STEROID HORMONES (2Cr: 2Lec)
Structure of steroid hormones, synthesis, function, and diseases related to steroid hormones.

PHAR 836 – ADVANCED BIOCHEMICAL TECHNIQUES (3Cr: 3Lec)
The techniques of molecular biology are applied to address questions in pharmacology. Molecular cloning and gene expression technology are applied both to cells in culture as well as to intact organisms to identify new drug targets and understand the molecular mechanism of action of drugs.

PHAR 837 – DNA/PROTEIN INTERACTION (2Cr: 2Lec)
Study of proteins and peptides that target specific motifs in proteins, to define the domains of amino acids critical for such interactions, and to score specific drug-mediated disruption of protein–protein interaction. It also involves a study of the interactions between DNA and proteins, RNA and proteins, and between small molecules/drugs and proteins.

PHAR 838 – CURRENT TOPICS IN MOLECULAR BIOLOGY (1Cr: 1Lec)
Comprehensive overview of the cellular and molecular mechanisms of drug and chemical actions on the major organ systems of humans and other mammals.

PHAR 839 – VACCINE TECHNOLOGIES (3Cr: 3Lec)
Vaccine technology is based on the use of modern immunology to develop recombinant DNA vaccines for improved disease control against lethal diseases.

PHAR 840 – MOLECULAR IMMUNOLOGY (3Cr: 3Lec)
This course deals with molecular mechanisms underlying immune response in diseased including autoimmune diseases.

PHAR 841 – MICROBIAL CONTAMINATION CONTROL IN THE PHARMACEUTICAL INDUSTRY (3Cr: 3Lec)
This course discusses major issues regarding testing and quality control in pharmaceutical manufacturing, which will ensures product and process integrity.
PHAR 842 – BIOTECHNOLOGY OF ANTIBIOTICS (3Cr: 3Lec)
Use of molecular biology and recombinant DNA technology to influence specific biological processes largely related to meeting human needs.

PHAR 843 – ADVANCED TOPICS IN EXPERIMENTAL PHARMACOLOGY (3Cr: 2Lec, 1Lab)
Selected studies on new experimental techniques in selected areas of pharmacology relevant to the candidate study specialty.

PHAR 844 – ADVANCED TOPICS IN MOLECULAR PHARMACOLOGY (3Cr: 3Lec)
The department selects a diversity of Topics in the field of molecular pharmacology. These Topics are carefully selected to be in line with the latest technological and scientific progress worldwide.

PHAR 845 – ADVANCED TOPICS IN IMMUNOPHARMACOLOGY (3Cr: 3Lec)
The department selects a diversity of Topics in the field of immunopharmacology. These Topics are carefully selected to be in line with the latest technological and scientific advancements worldwide.

PHAR 846 – ADVANCED TOPICS IN PHARMACOGENETICS and PHARMACOGENOMICS (3Cr: 3Lec)
The course deals with selected topics of latest advances in the field of pharmacogenetics and pharmacogenomics.

PHAR 847 – RESEARCH TOPICS IN CARDIOVASCULAR AND RENAL PHARMACOLOGY (3Cr: 3Lec)
Selected studies on research articles relevant to the specialty in cardiovascular and renal pharmacology, with continuous follow up to the latest work in this field.

PHAR 848 – RESEARCH TOPICS IN NEUROMUSCULAR PHARMACOLOGY (3Cr: 3Lec, 0Lab, 0Tut)
Selected studies on research articles relevant to the specialty in neuromuscular transmission in different types of smooth and skeletal muscles with continuous follow up to the latest work in this field.

PHAR 849 – RESEARCH TOPICS IN CNS PHARMACOLOGY (3Cr: 3Lec)
Selected studies on research articles relevant to the specialty in CNS with continuous follow up to the latest work in this field.

PHAR 850 – RESEARCH TOPICS IN GIT PHARMACOLOGY (3Cr: 3Lec)
Selected studies on research articles relevant to the specialty in GIT, liver and relevant new insights in disease management, with continuous follow up to the latest work in this field.

PHAR 851 – ADVANCED PHYTOTHERAPY (3Cr: 3Lec)
Recent phytochemical and biological researches in the field of newly discovered global medicinal plants and possible use of their extracts and bioactive products as new sources of medicinal drugs.

PHAR 899 – THESIS