كلية الصيدلة

FACULTY OF PHARMACY

Department of Medicinal Chemistry

PMC101 General & Physical chemistry

3 Cr. Hrs. = (*2* LCT + *0* TUT + *2* LAB + *0* OTH) – SWL = *150* – ECTS = *5*

Prerequisite - - -

- Quantum theory and the electronic structure of atoms. - Periodic relationships among the elements. - Chemical bonding and molecular structure. - Calculations with chemical formulas and equations. - Thermochemistry. - Solutions and Gases. - Chemical kinetics. - Chemical and ionic equilibrium. - Qualitative analysis of anions and cations.

PMC102 Organic Chemistry I

3 Cr. Hrs. = (*2* LCT + *0* TUT + *2* LAB + *0* OTH) – SWL = *150* – ECTS = *5*

Prerequisite - - -

Introduction, type of chemical bonds, hybridization and their types. Representation of organic compounds, type of isomerism, electronic effects (inductive & mesomeric), and Steric effect. Alkanes, alkenes and alkynes (properties, nomenclature, preparations, and reactions). Alkyl halides (nomenclature, preparations, and properties), Nucleophilic substitution reactions mechanism, and reactions of organometallic compounds. Alcohols and ethers (properties, nomenclature, preparations, and reactions). Introduction on streochemistry, chirality and optical activity. - Conformational and geometrical isomerism. - Stereochemistry of cyclohexanes and stereochemistry in organic reactions. - Monosaccharides. - Reactions of carbohydrates. - Di- and polysaccharides.

PMC103 Organic Chemistry II

3 Cr. Hrs. = (*2* LCT + *0* TUT + *2* LAB + *0* OTH) – SWL = *150* – ECTS = *5*

Prerequisite PMC102O

Aromaticity and Nomenclature of benzenoid compounds. Reactions of benzene; electrophilic substitution and their Orientation. Alkyl benzene and Aryl halides. Aromatic nucleophilic substitutions. Aromatic Nitro Compounds. Amines and their diazonium salts. Phenols. sulphonic acids aldehydes and Ketones. Carboxylic acids and their derivatives. Polynuclear hydrocarbons. Heterocyclic chemistry. Spectroscopy and elucidation of chemical structures using different spectroscopic techniques (UV-Vis, IR, NMR and Mass spectroscopy).

PMC104 Analytical Chemistry I

3 Cr. Hrs. = (*2* LCT + *0* TUT + *2* LAB + *0* OTH) – SWL = *150* – ECTS = *5*

Prerequisite - - -

- Introduction to different types of volumetric analysis. - Acid-base (Aqueous titration). - Acid-base (Non-Aqueous titration). - Complex formation titration (Complexometry). - Precipitate formation titration (Precipitemetry), - Redox titration. - Gravimetric methods of analysis.

PMC205 Analytical Chemistry II

3 Cr. Hrs. = (*2* LCT + *0* TUT + *2* LAB + *0* OTH) – SWL = *150* – ECTS = *5*

Prerequisite **PMC104**

- Different electrochemical methods of analysis. - UV/Visible Absorption spectroscopy. - spectrofluorimetry. - Flame spectroscopy. - Chromatography.

PMC306 Medicinal Chemistry I

2 Cr. Hrs. = (*2* LCT + *0* TUT + *0* LAB + *0* OTH) – SWL = *90* – ECTS = *4*

Prerequisite **PMC103**

Antibiotics (β-Lactam antibiotics, Tetracyclines, aminoglycosides, chloramphenicol, macrolides). Sulfonamides and Dihydrofolate Reductase Inhibitors. Antineoplastic Drugs. Antimalarials. Antifungal Drugs. Antiviral Agents. Antiseptic Agents. Antiprotozoal Agents. Antimycobacterial Agents. Antileprotics. Diuretics. Oral Antidiabetic Drugs.

PMC307 Medicinal Chemistry II

4 Cr. Hrs. = (*2* LCT + *0* TUT + *2* LAB + *-2* OTH) – SWL = *150* – ECTS = *5*

Prerequisite **PMC306**

Vitamins. Steroidal Hormones. Thyroid Hormones & Anti thyroid drugs. Polypeptide Hormones. Opioid Analgesics. Non-Opioid Analgesics. Non-steroidal Anti- Inflammatory Drugs. Aging and Anti-Aging Therapies.

PMC408 Medicinal Chemistry III

3 Cr. Hrs. = (*2* LCT + *0* TUT + *2* LAB + *0* OTH) – SWL = *150* – ECTS = *5*

Prerequisite **PMC307**

Adrenergic agents, cardiovascular drugs, Antihyperlipidemic agents and anticoagulants. Central nervous system stimulants, analeptics, sympathomimetic agents and antidepressants. CNS depressants, general anesthetics and sedative-hypnotics. Anxiolytics, muscle relaxants, anticonvulsants and antipsychotics. Cholinergics and anticholinergics, Antiparkinsonism drugs. Local anesthetics. Antiallergenic and antiulcer drugs. Non-computational drug design. Computer aided drug design. Drug metabolism.

PMC509 Drug discovery and development

2 Cr. Hrs. = (*2* LCT + *0* TUT + *0* LAB + *0* OTH) – SWL = *90* – ECTS = *4*

Prerequisite **PMC 307 - PMC408**

Introduction to Drug Design and Development: Drug Discovery as a Process, Target Identification and Validation, Target Validation and Drug Validation Practical's. Drug targets: Targets: Membrane Proteins, Targets: DNA, Targets: RNA, Targets: Enzymes. Lead Identification and Modification: Biological Assays: Lead Identification and High Throughput Screening, Lead Identification and Modification Practical's, Sources of active compounds, Biologics. Computer-Aided Drug Design: Molecular Modelling, Ligand-based Drug Design, Structure Determination, Structure-based Drug Design, Molecular Modelling Practical, Molecular Modelling Practical: Visualization.

PMC510 Advanced Instrumental Analysis

2 Cr. Hrs. = (*2* LCT + *0* TUT + *0* LAB + *0* OTH) – SWL = *90* – ECTS = *4*

Prerequisite **PMC 205**

Introduction and Fundamentals of Spectrometry. Quantum Chemistry and Spectroscopy. Applications of Spectrophotometry. Spectrophotometers and Lasers. Introduction to Mass Spectrometry. Mass Spectrometry Instrumentation. Quadrupole and time-of-flight mass spectrometry. Ion Mobility-Mass Spectrometry. Quantum

Chemistry and Molecular Modeling. Exploring Chemistry with Electronic Structure Methods. Introduction to Analytical Separations. High Performance Liquid Chromatography. Chromatographic Methods. Advanced HPLC Methods.

Department of Pharmacognosy

PPC101 Botany & Medicinal plants

3 Cr. Hrs. = (*2* LCT + *0* TUT + *2* LAB + *0* OTH) – SWL = *150* – ECTS = *5*

Prerequisite *- - -*

The scope & practice of botany & medicinal plants. Ethnobotany and ethnopharmacy. General principles of botany: morphology and systematics. Plant nomenclature & classification of medicinal plants. Families yielding important phytopharmaceuticals. Plant Anatomy and Physiology. Plant structure& modifications of its tissues. Plant crude drugs and their different classifications. Importance of plants in modern pharmacy and medicines. Evolutionary Perspectives on the Role of Plant Secondary Metabolites.

PPC102 Pharmacognosy

3 Cr. Hrs. = (*2* LCT + *0* TUT + *2* LAB + *0* OTH) – SWL = *150* – ECTS = *5*

Prerequisite **PPC101**

Introduction of Pharmacognosy& its history. The scope of pharmacognosy & its role in modern medicines. Emerging Areas in Pharmacognosy. Medicinally important drug derived from different plant organs. Identification and authentication of genuine herbal drugs. Common herbal drugs in pharmacy market. Pharmacognostical features & Quality control of herbal products. Standardization & production of herbal products. What is make phytomedicines unique?

PPC303 Phytochemistry

3 Cr. Hrs. = (*2* LCT + *0* TUT + *2* LAB + *0* OTH) – SWL = *150* – ECTS = *5*

Prerequisite **PMC103O**

Introduction of phytochemistry. Definition of bioactive Plant Molecules. Natural products chemistry in drug discovery. Chemistry of different natural product classes. Methods in natural product chemistry. Isolation methods & bioassay guided isolation of natural products. Marines and chemistry of anticancer natural products. Toxicity of herbal constituents.

PPC404 Herbal and alternative Medicine

2 Cr. Hrs. = (*2* LCT + *0* TUT + *0* LAB + *0* OTH) – SWL = *90* – ECTS = *4*

Prerequisite **PPC102**

Traditional systems of herbal medicine. Introduction to Complementary & Alternative medicines. Homeopathic remedies. Aromatherapy & Medical Herbalism. WHO regulations for herbal medicine. Important natural products and phytomedicines used in the treatment of different body systems diseases. Bioactive plant molecules (sources and mechanism of Action). Miscellaneous supportive natural therapies for stress, ageing, cancer and debility.

PPC505 Biotechnological Production of herbal Drugs

2 Cr. Hrs. = (*2* LCT + *0* TUT + *0* LAB + *0* OTH) – SWL = *90* – ECTS = *4*

Prerequisite **PPC404**

- Introduction to Biotechnology. - Downstream Processes for Plant Cell

and Tissue Culture. - Biotechnology, Bioengineering, and Biomedical Engineering. - History of Biotechnology. - Blue Biotechnology (Marine). - Red Biotechnology (Medical). - Green Biotechnology (Agricultural). - Nucleic Acid Isolation. - Genetic Engineering Techniques. - Different pharmaceutical applications in biotechnology.

PPC506 Pharmaceutical Herbal Quality Control

2 Cr. Hrs. = (*2* LCT + *0* TUT + *0* LAB + *0* OTH) – SWL = *90* – ECTS = *4*

Prerequisite **PMC 205 - PMB 202 - PPH 306 - PPC 505**

Introduction about quality controls. Quality control and approval testing in accordance with pharmacopeial standards. Physico-chemical, spectroscopic and chromatographic testing. Microbiological controls. Bioanalytical methods. Method verification. Method validation. Integration of products specifications and SOP-system. The creation of SOPs and a testing plan. Documentation and raw data archiving conforms with GMP.

PPC507 Applied and forensic medicine

2 Cr. Hrs. = (*2* LCT + *0* TUT + *0* LAB + *0* OTH) – SWL = *90* – ECTS = *4*

Prerequisite **PPT 406 - PPT 407**

Introduction and different fields of toxicology and antidotal therapy. Forensic chemistry, Chemotherapy. CNS stimulants, Mercury poisoning, Lead poisoning, Cyanide poisoning, methaemoglobineamia, Carbon monoxide poisoning, Digoxin toxicity, Salicylate poisoning, Cocaine and herion.

Department of Pharmaceutics & Industrial Pharmacy

PPH101 Pharmacy Orientation & Medical Terminology

2 Cr. Hrs. = (*2* LCT + *0* TUT + *0* LAB + *0* OTH) – SWL = *90* – ECTS = *4*

Prerequisite *- - -*

Scope of pharmacy. Information resources. Prescription. Dosage forms. Ethics of pharmacy, self-care and self-medication. History of pharmacy.

PPH102 Physical Pharmacy

3 Cr. Hrs. = (*2* LCT + *0* TUT + *2* LAB + *0* OTH) – SWL = *150* – ECTS = *5*

Prerequisite *- - -*

State of matter. Phase equilibria. Solution and solubility. Colligative properties. Buffers in pharmacy. Surfactant and surface and activity. Rheology.

PPH203 Pharmaceutics I

3 Cr. Hrs. = (*2* LCT + *0* TUT + *2* LAB + *0* OTH) – SWL = *150* – ECTS = *5*

Prerequisite PPH102

•. Incompatibilities. •. Colloids. •. Solutions. •. Suspensions. •. Emulsions. •. Extracts.

PPH204 Pharmaceutics II

3 Cr. Hrs. = (*2* LCT + *0* TUT + *2* LAB + *0* OTH) – SWL = *150* – ECTS = *5*

Prerequisite PPH102

Ointments. Suppositories. Powders and granules. Capsules. Tablets and tablet coating. Microencapsulation.

PPH305 Pharmaceutics III

3 Cr. Hrs. = (*2* LCT + *0* TUT + *2* LAB + *0* OTH) – SWL = *150* – ECTS = *5*

Prerequisite PPH102

Reaction Kinetics. Parenteral products. Drug stability. Aerosols. Ophthalmic dosage forms.

PPH306 Pharmaceutics IV (Industrial pharmacy)

3 Cr. Hrs. = (*2* LCT + *0* TUT + *2* LAB + *0* OTH) – SWL = *150* – ECTS = *5*

Prerequisite PPH102

Size reduction and enlargement and size separation. Heat transfer, distillation and evaporation. Drying and industrial nanotechnology. Filtration, crystallization. Emulsification and extraction techniques.

PPH407 Biopharmaceutics & Basics of

Pharmacokinetics

2 Cr. Hrs. = (*2* LCT + *0* TUT + *0* LAB + *0* OTH) – SWL = *90* – ECTS = *4*

Prerequisite **PPH305**

Pharmacokinetics of drugs administered by IV route. Compartmental models. Pharmacokinetics of drug absorption. Renal and hepatic clearance. Non-compartmental pharmacokinetics. Biopharmaceutical considerations in drug product design. Bioavailability and bioequivalence.

PPH508 Introduction to pharmaceutical, biotechnology and device industries

2 Cr. Hrs. = (*2* LCT + *0* TUT + *0* LAB + *0* OTH) – SWL = *90* – ECTS = *4*

Prerequisite ***REGISTRATION, AFTER 3RD YEAR OF THE PROGRAM***

Introduction to Regulatory Affairs. FDA, EMA, TGA, and other regulatory authorities: Organization and Structure, Insight into the Agency Operations. Pharmaceuticals: Product Development Process and Regulations, Drug Classification & Generic Drugs; OTC Drugs, Post-Marketing Activities. Biologics Product Development and Regulatory policies. Medical Devices: Types of Submissions; Product Development Design Control, Overview of the Quality Systems Regulation, IVD Summary, Post Market Compliance for Medical Devices. Recalls and Field Corrective Actions.

PPH509 Current GMP

2 Cr. Hrs. = (*2* LCT + *0* TUT + *0* LAB + *0* OTH) – SWL = *90* – ECTS = *4*

Prerequisite **PPH 305**

The Current Good Manufacturing Practice (CGMP) Regulations. Complying with the Law and Your Responsibilities: A Scheme of Systems for Manufacture of Drugs/Drug Products. The regulatory authorities Responsibilities and Roles. The Consequences of Not Complying with the regulation and Law. Principles of cGMP. Implications and Need to Comply. • Product processing. • Manufacture. • Quality control. • Storage/warehousing. • Transportation. • Delivery. Production/Processes. •Satisfy regulatory accreditation. • Standard operating procedures (SOP). • Document control system. Documentation. Personnel. Premises and Equipment. Quality Assurance and Management. Regulatory Expectations.

PPH510 Cosmeceuticals

2 Cr. Hrs. = (*2* LCT + *0* TUT + *0* LAB + *0* OTH) – SWL = *90* – ECTS = *4*

Prerequisite **PPH 305**

This course consists of the introduction of the formulation and science aspects of cosmetic preparations such as skin, hair, colored cosmetics, deodorants and anti-perspirants, baby, and perfumes. Cosmeceuticals as products that have both cosmetic and therapeutic (medical or drug-like) effects, and are intended to have a beneficial effect on skin health and beauty. Classification of cosmetic and cosmeceutical products. Cosmetic excipients: Surfactants, rheology modifiers, humectants, emollients, preservatives. Principles of formulation and building blocks of skin care products: Face wash, Moisturizing cream, Cold Cream, Vanishing cream and their advantages and disadvantages. Application of these products in formulation of cosmeceuticals. Antiperspirants & deodorants- Actives & mechanism of action. Principles of formulation and building blocks of Hair care products: Conditioning shampoo, Hair conditioner, anti-dandruff shampoo, Hair oils. Chemistry and formulation of Para-phylenediamine based hair dye. Principles of formulation and building blocks of oral care products: Toothpaste for bleeding gums, sensitive teeth. Teeth whitening, Mouthwash. Sun protection, Classification of Sunscreens and SPF. Role of herbs in cosmetics: Skin

Care: Aloe and turmeric. Hair care: Henna and amla. Oral care: Neem and clove. Analytical cosmetics: BIS specification and analytical methods for shampoo, skin- cream and toothpaste. Principles of Cosmetic Evaluation: Principles of sebumeter, corneometer. Measurement of. TEWL, Skin Color, Hair tensile strength, Hair combing properties Soaps, andsyndet bars. Evolution and skin benefits. Oily and dry skin, causes leading to dry skin, skin moisturisation. Basic understanding of the terms Comedogenic, dermatitis. Cosmetic problems associated with Hair and scalp: Dandruff, Hair fall causes. Cosmetic problems associated with skin: blemishes, wrinkles, acne, prickly heat and body odor. Antiperspirants and Deodorants- Actives and mechanism of action.

PPH511 Radiopharmaceuticals

2 Cr. Hrs. = (***2*** LCT + ***0*** TUT + ***0*** LAB + ***0*** OTH) – SWL = ***90*** – ECTS = ***4***

Prerequisite **PPH 305**

Introduction to Radio-pharmacy: Basic principle of pharmacy and pharmaceuticals, Nuclear medicine physics, Radiation protection, safety and Regulation Practice, Instrumentation, measurement, calculation, dosimetry. Radiopharmacy and radiopharmaceutical chemistry: radioisotope production and radiopharmaceutical preparation - generators, cyclotron, reactors - small scale production for clinical use, labelling, dispensing - operational level 1a, 1b, 3a. Therapeutical Radiopharmacy: Radioisotope for therapy and radiopharmaceutical preparation. Regulatory aspects of radiopharmaceuticals: Qualification and validation in radiopharmaceutical manufacturing Quality, Safety and GMP in radiopharmaceutical practice Sterile Radiopharmaceuticals and Endotoxins.

PPH512 Application of nanotechnology in pharmacy

2 Cr. Hrs. = (***2*** LCT + ***0*** TUT + ***0*** LAB + ***0*** OTH) – SWL = ***90*** – ECTS = ***4***

Prerequisite ***REGISTRATION, AFTER 3RD YEAR OF THE PROGRAM***

Introduction to Nanotechnology and nanomaterials. Pharmaceutical Nanotechnology Based Systems. Nano-crystalline materials. Raw Nano-materials and their use in drug encapsulation, bone replacements, prostheses. Nano-devices, examples include biosensors and detectors to detect trace quantities of bacteria, airborne pathogens, biological hazards, and disease signatures and some intelligent machines like respirocytes. General Applications: Intracellular targeting, Treatment of chemotherapy, Avoidance of Multi-drug resistance, Treatment of leprosy, Ocular drug delivery, Brain drug delivery, DNA delivery, Lymph targeting. Nanotechnology enabled drug delivery system with optimized physical, chemical and biological properties can serve as effective delivery tools for currently available bioactives. Cancer treatment. Implantable delivery systems. Site specific drug delivery. Molecular Diagnostics. Biosensor and bio-labels. Drug discovery. Other miscellaneous Applications.

Department of Pharmacology & Toxicology

PPT304 Pharmacology I

3 Cr. Hrs. = (*2* LCT + *0* TUT + *2* LAB + *0* OTH) – SWL = *150* – ECTS = *5*

Prerequisite **BMS232**

- Pharmacokinetics. - Pharmacodynamics. - Muscarinic agonists and antagonists. - Adrenergic agonists and antagonists. - Histamine and serotonin. - Prostaglandins and eicosanoids. - Cytokines.

PPT305 Pharmacology II

3 Cr. Hrs. = (*2* LCT + *0* TUT + *2* LAB + *0* OTH) – SWL = *150* – ECTS = *5*

Prerequisite **PPT304**

Anti-hypertensive and anti – anginal drugs. Congestive heart failure and anti- arrhythmic drugs. Diuretic agents. Pharmacology of the blood. Lipid lowering drugs. Anxiolytic and hypnotic drugs. General anaesthetics. Narcotic analgesics. Anti-epileptic drugs. Neuroleptic drugs. Anti-depressant drugs. Anti-parkinsonian drugs. Analeptics.

PPT406 Pharmacology III & Biostatistic

2 Cr. Hrs. = (*2* LCT + *0* TUT + *0* LAB + *0* OTH) – SWL = *90* – ECTS = *4*

Prerequisite **PPT304**

Principles of chemotherapy. Antibiotics. Inhibitor of cell wall synthesis. Drugs affecting bacterial protein synthesis. Drugs affecting intermediary bacterial metabolism. Drugs affecting bacterial DNA synthesis. Urinary tract antiseptics. Chemotherapy of tuberculosis. Antifungal and antiviral agents. Chemotherapy of protozoal infections and helminthiasis. Cancer chemotherapy.

PPT407 Basic and Clinical Toxicology

2 Cr. Hrs. = (*2* LCT + *0* TUT + *0* LAB + *0* OTH) – SWL = *90* – ECTS = *4*

Prerequisite **PPT406**

General toxicology. Management of toxicity. Target organs. Toxic responses to the liver. Toxic responses to the kidney. Toxic responses to the respiratory system. Toxic effects to the eye. Heavy metals. Animals and plant toxins. Mutation and teratogenicity. Pesticides. Forensic Toxicology and pathology.

PPT408 Drug Nutrient interaction

3 Cr. Hrs. = (*2* LCT + *0* TUT + *3* LAB + *0* OTH) – SWL = *165* – ECTS = *6*

Prerequisite **- - -**

Identify the process of drug absorption and give an example of how food may impact absorption. State how grapefruit juice influences drug metabolism. Identify the most common food/nutrient-drug interactions. Review common herb-drug interactions. List available resources for identifying common drug-nutrient and drug-herb interactions. Effect of nutrition on the body's response to drugs; conversely, drugs can affect the body's nutrition. Foods can enhance, delay, or decrease drug absorption. Foods impair absorption of many antibiotics. They can alter metabolism of drugs; e.g., high-protein diets can accelerate metabolism of certain drugs by stimulating cytochrome P-. Effect of grapefruit on cytochrome P-450 34A, slowing metabolism of some drugs

(e.g., amiodarone, carbamazepine, cyclosporine, certain calcium channel blockers). Diets that alter the bacterial flora may markedly affect the overall metabolism of certain drugs. Some foods affect the body's response to drugs. For example, tyramine, a component of cheese and a potent vasoconstrictor, can cause hypertensive crisis in some patients who take monoamine oxidase inhibitors and eat cheese. Nutritional deficiencies can affect drug absorption and metabolism. Severe energy and protein deficiencies reduce enzyme tissue concentrations and may impair the response to drugs by reducing absorption or protein binding and causing liver dysfunction. Changes in the gastrointestinal tract can impair absorption and affect the response to a drug. Deficiency of calcium, magnesium, or zinc may impair drug metabolism. Vitamin C deficiency decreases activity of drug-metabolizing enzymes, especially in older people. Effect of drugs on appetite, food absorption, and tissue metabolism. Some drugs (e.g., metoclopramide) increase gastrointestinal motility, decreasing food absorption. Other drugs (e.g., opioids, anticholinergics) decrease gastrointestinal motility. Some drugs are better tolerated if taken with food.

PPT508 Drug abuse and misuse

2 Cr. Hrs. = (*2* LCT + *0* TUT + *0* LAB + *0* OTH) – SWL = *90* – ECTS = *4*

Prerequisite **PPT 406 - PPT 407**

Introduction and definitions. Epidemiology of drug misuse. Aetiology and maintenance of drug misuse. The course of drug misuse. The pharmacological effects of drug misuse. The public health impact of drug misuse. Identification and assessment of drug misuse. The aims of the treatment and management of drug misuse. Drug misuse and the family. Economic impact of drug misuse. Psychoactive substances. Workplace drug testing. Human sport drug testing. Drug and driving.

PPT509 Drug Interactions

2 Cr. Hrs. = (*2* LCT + *0* TUT + *0* LAB + *0* OTH) – SWL = *90* – ECTS = *4*

Prerequisite ***REGISTRATION***

Drug interactions with agents used to treat. gastrointestinal diseases. Cardiovascular diseases. CNS Disorders. Infectious diseases. Endocrine disorders. Drug-drug interactions for: Non-steroidal. Immunosuppressant and cancer chemotherapeutic agents. Vaccines.

PPT510 Pharmacogenomics

2 Cr. Hrs. = (*2* LCT + *0* TUT + *0* LAB + *0* OTH) – SWL = *90* – ECTS = *4*

Prerequisite ***REGISTRATION***

Principles of Pharmacogenomics: Pharmacokinetic, Pharmacodynamic, and Clinical Implications. Incorporating Pharmacogenomics in Drug Development: Industry and Regulatory Perspectives. Translating Pharmacogenomic Research to Therapeutic Potentials. Pharmacogenomics in Cancer Therapeutics. Pharmacogenomics in Cardiovascular Diseases. Pharmacogenomics in Psychiatry Disorders. Role of Pharmacogenomics in HIV Infection. Role of Pharmacogenomics in Diabetes.

Department of Microbiology & Immunology

PMB201 General Microbiology & Imunnology

3 Cr. Hrs. = (*2* LCT + *0* TUT + *2* LAB + *0* OTH) – SWL = *150* – ECTS = *5*

Prerequisite *REGISTRATION*

Overview on the course taught in General microbiology during the whole semester, history of microbiology. Study of Prokaryotes; classification of bacteria, Bacterial morphology, Structure of bacterial cells, biological requirements, growth, bacterial products, bacterial physiology, continuous culture, microbial genetics and mutation through different mutagenic agents. An introduction to virology including general characteristics, viral replication, classification as well as methods of cultivation of different viruses. Study the morphological and characters of different fungi; their nature; chemical composition of cell wall; fungal reproduction as well as classification of fungi. Immune system function and structure. Innate and adaptive immunity. Tissues, cells and soluble components of immune system. Complement, antibodies, antigens, MHC, immune reactions against grafts, cancer immunotherapy. Immune system aberration (hypersensitivity, autoimmune diseases, immune deficiencies). Serological reactions and their applications (precipitation, agglutination, complement fixation, ELIZA, immunofluorescence, radioimmunoassay).

PMB202 Pharmaceutical Microbiology

3 Cr. Hrs. = (*2* LCT + *0* TUT + *2* LAB + *0* OTH) – SWL = *150* – ECTS = *5*

Prerequisite **PMB201**

Classes of chemotherapeutic agents and antibiotics, their advantages and disadvantages of each class and bases of selection of the most appropriate chemotherapeutic agent for treatment in different diseases. Sterilization methods & their validations. Non- antibiotic antimicrobial agents: antiseptics, disinfectants and preservatives. Evaluation of different antimicrobial agents: Antibiotics & non-antibiotics. Microbiological Quality Control of pharmaceutical products.

PMB303 Medical Microbiology

3 Cr. Hrs. = (*2* LCT + *0* TUT + *2* LAB + *0* OTH) – SWL = *150* – ECTS = *5*

Prerequisite **PMB 201**

Introduction and taxonomy of microorganisms. Gram positive pathogens, pathogenesis, symptoms, laboratory diagnosis, prevention and treatment. Gram negative pathogens, pathogenesis, symptoms, laboratory diagnosis, prevention and treatment. Chlamydia and Rickettsiae, pathogenesis, symptoms, laboratory diagnosis, prevention and treatment. Spirochetes, pathogenesis, symptoms, laboratory diagnosis, prevention and treatment. Mycoplasma & other miscellaneous pathogens, pathogenesis, epidemiology symptoms, laboratory diagnosis, prevention, and treatment. Viral disease (mode of transmission, pathogenesis, symptoms, laboratory diagnosis, prevention and treatment). Fungal diseases (mode of transmission, pathogenesis, symptoms, laboratory diagnosis, prevention and treatment).

PMB404 Biotechnology

2 Cr. Hrs. = (*2* LCT + *0* TUT + *0* LAB + *0* OTH) – SWL = *90* – ECTS = *4*

Prerequisite **PMB202**

General introduction to biotechnology and fermentation. Microbial growth processes (mode of fermentation processes; design of a fermentor; achievement and maintenance of aseptic conditions in the fermentor. Major biotechnological products and bioconversion processes. Biodegradation, bioremediation biotransformation, biopolymers, bioinsecticides, bioleaching, biosensor, biosurfactants. Genetic engineering (applications; recombinant DNA; cloning, hybridizations and sequencing).

PMB505 Public Health

2 Cr. Hrs. = (*2* LCT + *0* TUT + *0* LAB + *0* OTH) – SWL = *90* – ECTS = *4*

Prerequisite **PMB303**

General introduction to public health and epidemiology. Communicable diseases: causes & control. Non-communicable diseases (e.g. heart, cancer, cerebrovascular, liver, diabetic, renal diseases, peptic ulcer, homicide, anemia; risk, prevention & control). Social; mental; environmental health. Occupational health, Food, water & milk microbiology (transmitted diseases; malnutrition; risk; prevention and control), Nosocomial infection, family health, bioterrorism & genetic pollution. Waste disposal (sewage treatment; disposal of waste water, dry refuse and radioactive materials). Disaster & public health (types of disasters; impact on public health; causes; characteristics; prevention and control).

PMB506 Antibiotics stewardships

2 Cr. Hrs. = (*2* LCT + *0* TUT + *0* LAB + *0* OTH) – SWL = *90* – ECTS = *4*

Prerequisite **PMB202**

Introduction. The Principles of Antimicrobial Prescribing. Antimicrobial resistance. Antibiotic allergies. Urinary tract infections. Community-acquired respiratory tract infections. Skin and soft tissue infections. Bloodstream infections. Antimicrobial Surgical Prophylaxis. Acute pharyngitis in adolescents and adults. Acute Infectious Diarrhea. Ventilator-associated pneumonia. Acute Otitis media.

PMB507 Biologicals and Biosimilar Standardization

2 Cr. Hrs. = (*2* LCT + *0* TUT + *0* LAB + *0* OTH) – SWL = *90* – ECTS = *4*

Prerequisite **PMB 504**

Developments in biologicals standardization. International recommendations, guidelines, and other matters related to the manufacture and quality control of biologicals. Antigens and related substances. Blood products and related substances. Cytokines, growth factors and endocrinological substances. Diagnostic reagents.

PMB508 Genomics and bioinformatics

2 Cr. Hrs. = (*2* LCT + *0* TUT + *0* LAB + *0* OTH) – SWL = *90* – ECTS = *4*

Prerequisite ***AFTER THE 3RD YEAR OF THE PROGRAM***

Teaching and Learning Methods.

PMB509 Infection control

2 Cr. Hrs. = (*2* LCT + *0* TUT + *0* LAB + *0* OTH) – SWL = *90* – ECTS = *4*

Prerequisite **PMB 303**

Basic microbiology & immunology. • Overview and principles of epidemiology. • Evidence-based infection control principles and

practices. • Emerging and re-emerging infections. • Prevention & control of common healthcare associated infections. • Components of an effective infection control program. • Role of Infection Control Committee, IC Professionals and IC Link Officers. • Multi Drug Resistant Organism (MDRO). • Sterilization and Disinfection.

Department of Biochemistry

PBC201 Biochemistry I

3 Cr. Hrs. = (*2* LCT + *0* TUT + *2* LAB + *0* OTH) – SWL = *150* – ECTS = *5*

Prerequisite **PMC103**

- introduction to the course: topics, objectives, grading and assessments. - Cell structure and biological membrane. - amino acids & protein chemistry: Structure, function, classification. Practical: - fragility test. - effect of different haemolytic agents. - Enzymes: Kinetic properties of enzymes. Practical: - Optimum conditions for salivary amylase activity. - Effect of Electrolytes on the activity of salivary amylase. - Effect of temperature on the activity of salivary amylase. - Effect of pH on the activity of salivary amylase. - Optimum conditions for peptic activity. - Comparative digestive power of pepsin with different acids. - Clotting and souring of milk. - Effect of time on catalase activity. - Effect of substrate concentration on catalase activity. - Identification of some enzymes as catalase, peroxidase, urease, amylase and sucrase in biological fluids. - Nucleic acids & protein synthesis. - Porphyrins: Specialized product of Amino acid. synthesis and degradation. Practical: - Determination of haemoglobin by acid hematin method (Sahli's method). - Minerals and Vitamins.

PBC202 Biochemistry II

3 Cr. Hrs. = (*2* LCT + *0* TUT + *2* LAB + *0* OTH) – SWL = *150* – ECTS = *5*

Prerequisite **PBC201**

- Introduction to the course, assessment, topics, objectives. - Biological oxidation. - Identification and classification of Carbohydrates. a) Carbohydrate chemistry, digestion and absorption. b) Metabolism. Practical: Determination of blood glucose level. - Identification of lipids and lipoproteins (Triglycerides). Practical: Determination of Plasma lipids and lipoproteins (Triglycerides). Determination of plasma total Cholesterol level. - Studying proteins and amino acids metabolism. - Describe inter-tissue metabolism of carbohydrates, lipids and proteins in the post absorptive state and in starvation.

PBC403 Clinical Biochemistry

3 Cr. Hrs. = (*2* LCT + *0* TUT + *2* LAB + *0* OTH) – SWL = *150* – ECTS = *5*

Prerequisite **PBC202**

Introduction to the course, assessment, topics, objectives. Disorders of carbohydrate metabolism: •. Hyperglycemia: •. Hypoglycemia. Practical: -Determination of serum glucose level and oral glucose tolerance test. Metabolism of lipoproteins - LDL receptor: Practical: - Determination of serum total cholesterol, TAG, HDL, LDL and VLDL-cholesterol. Identification of Aminoaciduria, Glycinuria, Hyperoxaluria, Cystinuria, Cystinosis, Homocystinuria, Phenylketonuria (Types-V). Investigation of Renal Function. Practical: - Determination of serum urea, uric acid and creatinine. Investigation of Liver Function. Practical: - Determination of serum total proteins and albumin. - Determination of (ALT), ALP and bilirubin. Investigation of Myocardial Infarction: Practical: - Determination of serum aspartate transaminase (AST). Investigation of Metabolic Disorders of Calcium & Phosphate. Practical: - Determination

of serum calcium and phosphate. Studying Endocrine Abnormalities. Practical: - Determination of serum cortisol level. - Determination of serum thyroxine level. introduction to molecular biology.

PBC504 Clinical Nutrition

3 Cr. Hrs. = (***2*** LCT + ***0*** TUT + ***2*** LAB + ***0*** OTH) – SWL = ***150*** – ECTS = ***5***

Prerequisite **- - -**

. Introduction to the course, assessment, topics, objectives. Nutritional Assessment: the systematic process of collecting and interpreting information in order to make decisions about the nature and cause of nutrition related health issues. Practical: - Students complete a series of Practitioner Observation Visits, where they spend time in a range of different clinical settings observing established practitioners, and in other nutrition-related settings. Nutrition in Obesity. Practical: Design effective individualized nutritional interventions, using functional medicine models. Nutrition in Malnutrition. Nutrition principles and their application to disease prevention and treatment in adults. Clinical diseases. -. Cardiovascular disease. -. Diabetes. -. Oncology. -. Nutrition support methods. -. Aids/HIV.

Department of Pharmacy Practice & Clinical Pharmacy

PPP201 Pharmacoeconomics

2 Cr. Hrs. = (*2* LCT + *0* TUT + *0* LAB + *0* OTH) – SWL = *90* – ECTS = *4*

Prerequisite **- - -**

The course provides the students with the basic concepts of health economics, learning basic terms of health economics and understand key principles. Topics cover the economic mechanisms of health care markets as market failures, and government intervention. The course covers the key components of health care financing, and some methods of how to contain health care expenditure. Alongside the major definitions in health technology assessment, students should have an overview about different types of economic evaluation, budget impact analysis and their uses. Moreover, students should get familiar with different methods of pricing among which value-based pricing.

PPP302 Integrated Case based Learning I

2 Cr. Hrs. = (*1* LCT + *0* TUT + *2* LAB + *0* OTH) – SWL = *105* – ECTS = *4*

Prerequisite **BMS232**

The course will introduce the student to implementing clinical pharmacy tools to real case scenarios, detect drug related problems, screen for anticipated drug interactions. The course will advance students skills in managing complicated cases of cardiovascular diseases & implementing evidence-based medicine using SOAP notes & appropriate clinical scores whenever required.

PPP303 Integrated Case based Learning II

2 Cr. Hrs. = (*1* LCT + *0* TUT + *2* LAB + *0* OTH) – SWL = *105* – ECTS = *4*

Prerequisite **BMS232**

The course will introduce the student to implementing clinical pharmacy tools to real case scenarios, detect drug related problems, screen for anticipated drug interactions. The course will advance students skills in managing complicated cases of infectious diseases & implementing evidence-based medicine using SOAP notes & appropriate clinical scores whenever required.

PPP304 Pharmacy Administration

2 Cr. Hrs. = (*2* LCT + *0* TUT + *0* LAB + *0* OTH) – SWL = *90* – ECTS = *4*

Prerequisite **- - -**

Understand the basic principles of management, financial and human resources, drug promotion sales and marketing, business administration and accounting as well as the field of social, behavioral and environmental sciences and health policy that are relevant to pharmacy. Develop an understanding of the law relating to pharmacy and medicines, regulatory affairs, ethics of health care and its impact on relationships with patients and other health care professionals. Understand the factors affecting the delivery of pharmacy services. Application of management in the various pharmacy practice settings; hospital, etc.

PPP405 Pharmacotherapy I

3 Cr. Hrs. = (*2* LCT + *0* TUT + *2* LAB + *0* OTH) – SWL = *150* – ECTS = *5*

Prerequisite **PPT305**

The course provides a study of the clinical presentation, diagnostic criteria, classification criteria and latest evidence-based management guidelines of the various and most common cardiovascular disorders. These disorders include hypertension, dyslipedemia, angina syndromes, acute coronary syndromes, venothromboembolic disorders, heart failure, stroke and arrhythmia. The course also gives on overview on the management of these disorders in special populations.

PPP406 Integrated Case based Learning III

2 Cr. Hrs. = (*1* LCT + *0* TUT + *2* LAB + *0* OTH) – SWL = *105* – ECTS = *4*

Prerequisite **PPT305**

The course will introduce the student to implementing clinical pharmacy tools to real case scenarios, detect drug related problems, screen for anticipated drug interactions. The course will advance students skills in managing complicated cases of neuropsychiatric diseases & implementing evidence based medicine using SOAP notes & appropriate clinical scores whenever required.

PPP407 Pharmacotherapy II

3 Cr. Hrs. = (*2* LCT + *0* TUT + *2* LAB + *0* OTH) – SWL = *150* – ECTS = *5*

Prerequisite **PPP406**

The course provides a study of the clinical presentation, diagnostic criteria, classification criteria and latest evidence-based management guidelines of the various and most common infectious diseases. These infectious diseases include upper and lower respiratory, urinary tract, sepsis, skin & soft tissue, tuberculosis, meningitis and various other infections. The course also gives on overview on the criteria required for the appropriate selection of antimicrobial regimens based on the nature of each infection and the patient related factors. The course also addresses the antibiotic stewardship programs.

PPP408 Hospital Pharmacy

3 Cr. Hrs. = (*2* LCT + *0* TUT + *2* LAB + *0* OTH) – SWL = *150* – ECTS = *5*

Prerequisite **PPH203 - PPH204 - PPH305 - PPH306**

The course provides an overview on the institutional patient care including; the organization of the hospital pharmacy, the drug distribution systems & hospital committees. The course introduces the students to the aseptic techniques and the regulatory guidelines governing preparation, formulation & storage of IV admixtures. The course acquaints students with the preparation, components & complications of specialized nutritional support (parenteral & enteral nutrition). The ambulatory care practice is also addressed.

PPP409 Principles of Drug Information

1 Cr. Hrs. = (*1* LCT + *0* TUT + *0* LAB + *0* OTH) – SWL = *45* – ECTS = *2*

Prerequisite **- - -**

The course will introduce the students to the term drug information & identify services offered by drug information centers. Describe the skills required to perform medication information functions & identify the major factors that hindered this. Describe methods of searching, analyzing & providing medication information to patients & other healthcare professionals. Describe the various drug information resources & their advantage & disadvantages.

PPP410 Pharmaceutical Care

2 Cr. Hrs. = (*2* LCT + *0* TUT + *0* LAB + *0* OTH) – SWL = *90* – ECTS = *4*

Prerequisite **PPP405**

The course provides an overview of the pharmaceutical care implementation in the various endocrine & pulmonary diseases. The course will acquaint the students with the clinical presentation, diagnostic criteria, classification criteria and latest evidence based management guidelines of the various endocrine & endocrine disorders. These disorders include pituitary, adrenal & thyroid gland disorders, diabetes mellitus, obesity, asthma, chronic obstructive pulmonary disorders and others.

PPP411 Integrated Case based Learning IV

2 Cr. Hrs. = (*1* LCT + *0* TUT + *2* LAB + *0* OTH) – SWL = *105* – ECTS = *4*

Prerequisite **PPP405**

The course will introduce the student to implementing clinical pharmacy tools to real case scenarios, detect drug related problems, screen for anticipated drug interactions. The course will advance students skills in managing complicated cases of oncologic & hematologic diseases & implementing evidence based medicine using SOAP notes & appropriate clinical scores whenever required.

PPP512 Pharmacotherapy III

3 Cr. Hrs. = (*2* LCT + *0* TUT + *2* LAB + *0* OTH) – SWL = *150* – ECTS = *5*

Prerequisite **PPP407**

The course provides a study of the clinical presentation, diagnostic criteria, classification criteria and latest evidence-based management guidelines of the various and most common neuropsychiatric disorders. These neuropsychiatric disorders include Parkinson's, Alzheimer's, epilepsy, Multiple sclerosis, schizophrenia, depression anxiety disorders and others. The course also gives on overview on the management of these disorders in special populations.

PPP513 Clinical Pharmacokinetics

2 Cr. Hrs. = (*2* LCT + *0* TUT + *0* LAB + *0* OTH) – SWL = *90* – ECTS = *4*

Prerequisite **PPH407**

The course will introduce the student to the changes in drugs absorption, distribution, metabolism and elimination with time following one compartment IV bolus, oral absorption, IV infusion and multiple IV dosing. The lectures will provide students with principle of the linear and non-linear pharmacokinetic models and their application. The course will address various drug monographs such as: antibiotics, digoxin, immunosuppressants, methotrexate, antidepressants, theophylline, lidocaine and phenytoin & their relevant pharmacokinetics aspects & dosage adjustments in the different clinical situations.

PPP514 Community Pharmacy

3 Cr. Hrs. = (*2* LCT + *0* TUT + *2* LAB + *0* OTH) – SWL = *150* – ECTS = *5*

Prerequisite **PPH203 - PPH204 - PPH305 - PPH306**

The course covers some social and business aspects of pharmacy practice. The communication skills & tools required in the community to assess a patients' problems. Overview of the various minor ailments & the required over the counter medications to treat them & the referral procedures. These minor ailments include; respiratoy system, ophthalmic & otic conditions, headaches, gastroenterology, dermatology, pediatrics & musculoskeletal disorders.

PPP515 Integrated Case based Learning V

2 Cr. Hrs. = (*1* LCT + *0* TUT + *2* LAB + *0* OTH) – SWL = *105* – ECTS = *4*

Prerequisite **PPP407**

The course will introduce the student to implementing clinical pharmacy tools to real case scenarios, detect drug related problems, screen for anticipated drug interactions. The course will advance students skills in managing complicated cases of gastrointestinal, hepatic & renal diseases & implementing evidence based medicine using SOAP notes & appropriate clinical scores whenever required.

PPP516 Pharmacy Seminars I

1 Cr. Hrs. = (*0* LCT + *0* TUT + *2* LAB + *0* OTH) – SWL = *30* – ECTS = *1*

Prerequisite **PPP409**

This will include the presentation of various patient cases & scenarios. The designing and presenting of effective presentations. Effective communication for patient interviewing. Basic elements of a well formatted CV & letter of intent.

PPP517 Pharmacotherapy IV

3 Cr. Hrs. = (*2* LCT + *0* TUT + *2* LAB + *0* OTH) – SWL = *150* – ECTS = *5*

Prerequisite **PPP512**

The course provides a study of the clinical presentation, diagnostic criteria, classification criteria and latest evidence based management guidelines of the various and most common oncologic & hematologic disorders. These disorders include anemias, breast cancer, malignant lymphoma, acute leukemia, oncologic emergencies and others. The course also gives on overview on the management of these disorders in special populations.

PPP518 Pharmacotherapy V

3 Cr. Hrs. = (*2* LCT + *0* TUT + *2* LAB + *0* OTH) – SWL = *150* – ECTS = *5*

Prerequisite **PPP512**

The course provides a study of the clinical presentation, diagnostic criteria, classification criteria and latest evidence based management guidelines of the various and most common gastrointestinal, hepatic and renal disorders. These disorders include acute & chronic kidney injury, different types of viral hepatitis, hepatic encephalopathy, inflammatory bowel disorders and others. The course also gives on overview on the management of these disorders in special populations.

PPP519 Pharmaceutical Ethics and Legislation

1 Cr. Hrs. = (*1* LCT + *0* TUT + *0* LAB + *0* OTH) – SWL = *45* – ECTS = *2*

Prerequisite **- - -**

The course provides a study of the Egyptian practice legal system in terms of the basis of pharmacy law & the Egyptian food, drug and cosmetics acts: Definitions (drug, device, cosmetic, label, etc.). It addresses the professional behavior for pharmacist. Sale and supply of medicines: Evaluation and management of risk and provision of advice. Basic illegal acts as Adulteration and misbranding are highlighted. Prescription exemption & guidance for submission of medicines are also overviewed. Comprehend the laws and ethics of practice of the profession used during the manufacturing process.

PPP520 Integrated Case based Learning VI

2 Cr. Hrs. = (*1* LCT + *0* TUT + *2* LAB + *0* OTH) – SWL = *105* – ECTS = *4*

Prerequisite **PPP512 PHARMACOTHERAPY III**

The course will introduce the student to implementing clinical pharmacy tools to real case scenarios, detect drug related problems, screen for

anticipated drug interactions. The course will advance students skills in managing complicated cases of multiple disease states & implementing evidence based medicine using SOAP notes & appropriate clinical scores whenever required.

PPP521 Pharmacy Seminars II

1 Cr. Hrs. = (*0* LCT + *0* TUT + *2* LAB + *0* OTH) – SWL = *30* – ECTS = *1*

Prerequisite **PPP409 PRINCIPLES OF DRUG INFORMATION**

This will include the presentation of various patient cases & scenarios. The designing and presenting of effective presentations. Effective communication for patient interviewing. Seminars will address illicit drug use, topics of debate in the healthcare system. The basics of interviewing. Allowing students to design teaching materials.

PPP522 Pharmacoepidemiology

2 Cr. Hrs. = (*2* LCT + *0* TUT + *0* LAB + *0* OTH) – SWL = *90* – ECTS = *4*

Prerequisite **- - -**

The course will introduce the student to epidemiology & descriptive study designs, cohort study design & randomized controlled studies. Overview of registries & writing protocol- study report, systematic review & meta-analysis. Evidence based medicine & its application in practice.

PPP523 Pharmacy skills and patient counseling

2 Cr. Hrs. = (*2* LCT + *0* TUT + *0* LAB + *0* OTH) – SWL = *90* – ECTS = *4*

Prerequisite **REGISTRATION**

The pharmacist-patient relationship. Regulations concerning patient counselling. Legal issues affecting patient counselling. Overview of communication skills. The counselling environment and design. The use of Pharmacy technicians in patient counselling. Patient medication profile development. The prescription label. Counselling the patient. Applying patient counselling to the practice setting.

PPP524 Patient safety and informatics

2 Cr. Hrs. = (*2* LCT + *0* TUT + *0* LAB + *0* OTH) – SWL = *90* – ECTS = *4*

Prerequisite **- - -**

Introduction to Pediatrics. Pediatric Pharmacokinetics. Introduction to Neonatology. Medication Safety. Communicating with Children and Their Caregivers. Pediatric Dermatology. Cardiovascular/Pulmonary. Gastrointestinal. Renal/Endocrinology. Neuro/Psychiatric. Infectious Diseases/Immunology. Hematology/Oncology.

PPP525 Pediatric Pharmacotherapy

2 Cr. Hrs. = (*2* LCT + *0* TUT + *0* LAB + *0* OTH) – SWL = *90* – ECTS = *4*

Prerequisite **REGISTRATION**

Introduction to Pediatrics. Pediatric Pharmacokinetics. Introduction to Neonatology. Medication Safety. Communicating with Children and Their Caregivers. Pediatric Dermatology. Cardiovascular/Pulmonary. Gastrointestinal. Renal/Endocrinology. Neuro/Psychiatric. Infectious Diseases/Immunology. Hematology/Oncology.

PPP526 Geriatric Pharmacotherapy

2 Cr. Hrs. = (*2* LCT + *0* TUT + *0* LAB + *0* OTH) – SWL = *90* – ECTS = *4*

Prerequisite **- - -**

Challenges in geriatric care. Geriatric assessment. Adverse drug events and medication management. Cardiovascular disorders. Respiratory disorders. Renal and urologic disorders. Endocrine disorders. Gastrointestinal disorders and nutrition. Infections and antimicrobial stewardship.

PPP527 Patient care & Biometric

2 Cr. Hrs. = (*2* LCT + *0* TUT + *0* LAB + *0* OTH) – SWL = *90* – ECTS = *4*

Prerequisite **PPT 406**

The course is designed to teach students to apply the elements of the pharmaceutical care cycle to case studies exploring the problem-solving skills needed to practice in pharmacotherapy, management, informatics, and missions. Emphasis on the generation, development, use, and integration of data, information, knowledge, technology, and automation in the medication use process. Emphasis on the provision of population-based care using evidence-based principles and culturally sensitive methods that applies across local, national, and international borders. Identify drug-therapy problems; Patient needs; Literature/landmark trials; Drug and disease knowledge. Overview resources to utilize to obtain rapidly changing information.

PPP528 Project management in clinical trials

2 Cr. Hrs. = (*2* LCT + *0* TUT + *0* LAB + *0* OTH) – SWL = *90* – ECTS = *4*

Prerequisite ***AFTER 3RD YEAR OF THE PROGRAM***

Overview Assignment of Course Project Introduction to the Drug Development Process. Introduction to FDA Regulatory Process. Good Clinical Practices (GCP). Clinical Trial Applications. Clinical Trial Protocol Development and Set-Up. Statistical Design of Clinical Trials and Data Management. FDA Regulations for clinical trials. Introduction to Project Management for Clinical Trial Professionals: Human Subject Protection (HSP) and Informed Consent for Clinical Trials: Adverse Event Management in Clinical Trials. Practical Issues with Clinical Project Management.

PPP529 Clinical trials & monitoring

2 Cr. Hrs. = (*2* LCT + *0* TUT + *0* LAB + *0* OTH) – SWL = *90* – ECTS = *4*

Prerequisite ***AFTER 3RD YEAR OF THE PROGRAM***

Introduction and Objectives. Regulation and human subject protection. Regulation and GCPs. ICH guidelines for good clinical practice. FDA Regulations for clinical trials. Good clinical practice (GCP). Roles and responsibilities in clinical trials. Institutional review board. Clinical investigator. Clinical trials. Protocol preparation. Informed consent. Basic element of informed consent. Monitoring informed consent. Study design and statistical issues. Study monitoring. Adverse events and safety monitoring.

PPP631 Advanced Community Pharmacy Practice

5 Cr. Hrs. = (*5* LCT + *0* TUT + *0* LAB + *0* OTH) – SWL = *225* – ECTS = *9*

Prerequisite **- - -**

Each of the clinical clerkship rotations provides five weeks' experience (5 weeks' x 5 days' x 8 hrs./day = 200 training hours for each rotation = 5 credit hours). In all rotations the students will be under the supervision of a clinical staff who provides patient–oriented pharmaceutical services. Common activities include dispensing medications, evaluating medical information, evaluating medication orders, preparing/updating pharmaceutical care plans, performing patient counseling, and taking/documenting medication histories.

PPP632 Advanced Institutional (hospital) Practice

5 Cr. Hrs. = (*5* LCT + *0* TUT + *0* LAB + *0* OTH) – SWL = *225* – ECTS = *9*

Prerequisite **- - -**

Common activities of this rotation include dispensing medications, evaluating medical information, evaluating medication orders,

preparing/updating pharmaceutical care plans, performing patient counseling, and taking/documenting medication histories.

PPP633 Acute medicine experiences (2 rotations)

10 Cr. Hrs. = (***10*** LCT + ***0*** TUT + ***0*** LAB + ***0*** OTH) – SWL = ***450*** – ECTS = ***19***

Prerequisite **- - -**

Acute medicine experiences have primary emphasis on caring for acutely ill hospitalized patients (i.e. not in associated long-term care facilities). Examples include: Internal Medicine, Surgery/Transplantation, Cardiology, Oncology, Neurology, Gastroenterology, Infectious Disease, Nutritional Support, Pharmacokinetics, Pediatrics/Neonatology, Women's Health, Critical Care, Emergency Medicine, Psychiatry, Family Medicine, and Geriatrics. In order to fulfill graduation requirements, at least two of these experiences (rotations) must be completed.

PPP634 Outpatient medicine experiences (2 rotations)

10 Cr. Hrs. = (***10*** LCT + ***0*** TUT + ***0*** LAB + ***0*** OTH) – SWL = ***450*** – ECTS = ***19***

Prerequisite **- - -**

Outpatient medicine experiences have primary emphasis on caring for patients in the community (i.e. not in hospitals). Examples include: Clinics (such as primary care, hematology, family medicine, infectious disease, oncology, transplantation, allergy/immunology, dental, geriatrics, and psychiatry), Geriatrics/Consulting, Home Health, Public Health, and Wellness. In order to fulfill graduation requirements, at least two of these experiences (rotations) must be completed.

PPP635 Elective experiences

10 Cr. Hrs. = (***10*** LCT + ***0*** TUT + ***0*** LAB + ***0*** OTH) – SWL = ***450*** – ECTS = ***19***

Prerequisite **- - -**

Electives can consist of an experience from any of the following categories: Advanced Community, Acute Medicine, Outpatient Medicine or Indirect/Non Patient Care Rotations. The only stipulation is that students cannot complete more than two experiences in either the Advanced Community or Indirect/Non Patient Care categories. Indirect or Non-Patient rotations are quite varied in content. Examples include: Drug Information, Toxicology, Managed Care, Research, Nuclear, Industry, Compounding, Administration, and Association Management. In order to fulfill graduation requirements, at least two of these experiences (rotations) must be completed.