MASTER OF SCIENCE
PHARMACEUTICAL SCIENCES

INTRODUCTION

The Faculty of Pharmacy, Kuwait University offers a Master of Science Degree in **Pharmaceutical Sciences** in the area of pharmaceutical chemistry or pharmaceutics or pharmacology and therapeutics. The program is designed to provide in depth knowledge in biopharmaceutics and pharmacokinetics, pharmaceutical chemistry, drug discovery and development, advanced drug delivery systems and advanced techniques in pharmaceutical and pharmacological research. Research thesis will be focused on drug design, medicinal plants chemistry, biopharmaceutical analysis, pharmacokinetics and drug-drug interactions, formulation studies of modern dosage forms, CNS pharmacology, applied pharmacokinetics and therapeutic drug monitoring.

According to the University Council decision dated 4/2/2007, Thesis students admitted with effect from September 2007 are exempted from the comprehensive examination.

PROGRAM REQUIREMENTS

The program requirements are:

33 TOTAL COURSE CREDITS

21 COMPULSORY (Credits in parenthesis)

0510-501	Biostatistics and Computer in Medicine	(2)
0550-505	Molecular Pharmacology	(2)
1100-520	Advanced Pharmaceutical Chemistry	(3)
1100-521	Techniques in Pharmaceutical and Pharmacological Research	(3)
1100-525	Advanced Biopharmaceutics and Pharmacokinetics	(3)
1100-540	Drug Discovery and Development	(3)
2000-501	Scientific Writing and Communication Skills	(3)
2000-503	Ethics & Professionalism	(2)

3 ELECTIVES (3 credits each)

1100-522 Evidence-based Phytotherapy
1100-527 Advanced Drug Delivery Systems
1100-541 Central Neuropharmacology

The student should select only ONE course from the list of elective courses. However, upon approval by the program director, he/she may select additional elective courses from the list of electives given in the MSc program at the Faculty or from other MSc graduate program (s) within the Health Sciences Center or Kuwait University.

9 COMPULSORY (Thesis)

1100-597	(0)
1100-598	(0)
2000-599	(9)

COURSE DESCRIPTION

1100-520: ADVANCED PHARMACEUTICAL CHEMISTRY
CR: 3

This course will provide the students with an updated chemistry knowledge of important synthetic and natural medicinal compounds. The organic chemistry methodologies for the chemical synthesis of compounds of pharmaceutical interests will be reviewed. The physicochemical properties, metabolic pathways, structure-activity relationships (SARs) and therapeutic and toxicological aspects will be discussed. Important medicinal classes such as psychoactive compounds, antibiotics, anticancer agents, immunosuppressive agents, steroids will be demonstrated and discussed in details. Instrumental techniques for structural elucidation and for biopharmaceutical analysis of drugs, metabolites and biomolecules in biological media will be studied.

1100-521: TECHNIQUES IN PARMACEUTICAL & PHARMACOLOGICAL RESEARCH
CR: 3

This course will provide the students with important techniques and skills necessary for analytical and pharmaceutical research. Laboratory sessions related to the isolation and structural elucidation of compounds from natural and synthetic sources will be given. Laboratory sessions dealing with application of the "Design of Experimental Programs" in R&D, drug dissolution and stability studies will be conducted. Laboratory problems related to the biopharmaceutical analysis of drugs in biological media will be addressed. The course will also provide the training experience on important pharmacological techniques in the areas of neuropharmacology, respiratory pharmacology, therapeutic drug monitoring pain, ocular, and inflammation pharmacology.

1100-522: EVIDENCE-BASED PHYTOTHERAPY
CR: 3

This course will provide the basis of evidenced-based evaluation of phytotherapy and Complementary and Alternative Medicine (CAM) modalities. Students will explore the utilization of herbal dietary supplements and CAM therapies. Claims, regulations and standardization of herbal medicines will be highlighted. Classes of natural products: Carbohydrates, Alkaloids, Glycosides, Flavonoids, Tannins, Bitter Principles, Vitamins and constituents from toxic plants; will be discussed with respect to sources, chemical structures, biological roles, and medicinal products.

1100-525: ADVANCED BIOPHARMACEUTICS AND PHARMACOKINETICS
CR: 3

This course will describe the molecular, physiological and pathological factors affecting drug absorption and how these factors can be modified to optimize the absorption process. The different experimental models that can be used to study drug pharmacokinetics in humans will be discussed. Important issues including drug-drug interactions, bioavailability-bioequivalence, pharmacokinetic and pharmacodynamic correlations will be discussed in details. A survey of the various techniques pertinent to clinical pharmacokinetics and dosage adjustments will be overviewed. The fundamentals of therapeutic drug monitoring (TDM) for dosing patients more rationally and safely will be discussed.

1100-527: ADVANCED DRUG DELIVERY SYSTEMS
CR: 3

This course will discuss the biochemical and physiological barriers that hinder the drug delivery to various body organs. The strategies of overcoming these barriers and approaches used to design drug delivery systems for specific

therapeutic use will be surveyed. *In vivo* and *in vitro* evaluations of the designed delivery systems will be discussed. This course will also focus on the fundamental concepts of specialized modern dosage forms such as sustained-release formulations, melting and fast disintegrating tablets, depot injections and inhalation products. The expected outcomes of administration of these drug formulations such as patient compliance and reduction of the caring costs will be overviewed.

1100-540: DRUG DISCOVERY AND DEVELOPMENT
CR: 3

This course will provide an understanding of the interrelated activities throughout the drug development cycle. The course will discuss all steps involved in developing a drug from discovery to commercialization. The student will have the opportunity to learn about latest innovations in drug discovery, issues of drug pharmacokinetics in drug discovery, issues of ethical and governance requirements of research including Good Clinical Practice (GLC). The student will be also familiar with the chemical and biochemical approaches to drug design and the role of the functional groups in drug-receptor interactions.

1100-541: CENTRAL NEUROPHARMACOLOGY
CR: 3

This course provides a comprehensive coverage of the molecular composition, physiology, function and pharmacology of neurons and the pathological changes that lead to CNS disorders. The different neurotransmitter systems and their roles in the physiology and pathology of CNS disorders will be covered. Pharmacological agents in current medical use as well as the future therapeutic agents will be discussed

1100-597: THESIS
CR: 0

1100- 598: THESIS
CR: 0

2000-599: THESIS
CR: 9