

STADY PLAN

PhD in Pharmaceutical Sciences

Plan Number	\124	06	2010
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I. GENERAL RULES CONDITIONS:

1. This plan conforms to the regulations of the general frame of the programs of graduate studies.
2. Areas of specialty of admission in this program:
Holders of the Master's Degree in any field of Pharmacy, providing -
that the first degree is in Pharmacy .

II. SPECIAL CONDITIONS: None.

III. THE STUDY PLAN : Studying (54) Credit Hours as follows:

IV.

1. Obligatory courses: (21) Credit Hours:

Course No.	Course Title	Credit hrs.	Theory	Prac.	Pre-request
1201901	Pharmaceutical Organic Chemistry	3	3	-	-
1201902	Selected Topics in Drug Discovery (1)	2	2	-	-
1201904	Spectroscopy	3	3	-	-
1203905	Pharmacology Laboratory and Bioassay	2	-	6	-
1201907	Biotechnology and Drug Discovery	2	2	-	-
1201908	Medicinal Natural Products	3	3	-	-
1201925	Advanced Pharmaceutical Statistics	3	3	-	-
1201926	Research Methodologies and Tools in Pharmacy	3	3	-	-

Elective Courses: Studying (15) Credit hours from the following: .۲

Course No.	Course Title	Credit hrs.	Theory	Prac.	Pre-request
1201910	Selected Topics in Drug Discovery (2)	3	3	-	-
911\120	Proteomics and Drug Discovery	3	3	-	-
1201912	Quantification of Legand-Macromolecular Binding	3	3	-	-
1201914	Medicinal Chemistry of Anticancer Agents	3	3	-	-
1201915	Medicinal Chemistry of CNS Agents	2	2	-	-
1201916	Medicinal Chemistry of Respiratory and GIT Agents	2	2	-	-
1201917	Medicinal Chemistry of Anti-Inflammatories and Anti-Allergics	2	2	-	-
1201918	Medicinal Chemistry of Endocrine System Agents	2	2	-	-
1201919	Medicinal Chemistry of The Cardiovascular System Agents	2	2	-	-
1201927	Advanced Spectroscopy	3	3	-	-
1201928	Advanced Chromatographic Analysis	3	3	-	-
1201929	Quality Control and Standardization of Natural Products	2	2	-	-
1201930	Physicochemical Properties as a Tool in Drug Research	2	2	-	-
1201931	New Trends in Natural Products Drug Discovery	2	2		
1201932	Seminar in Natural Products	1	1	-	-
1201933	Seminar in Medicinal Chemistry	1	1	-	-

Pass the qualifying Exam: (1201998) 3 .

Dissertation: (18) Credit hours (1201999) 4.

1203905

Pharmacology Laboratory and Bioassay:

(2cr.)

Measurement of the effects of drugs on isolated tissues and cells and their use in the study of drug / receptor interactions and drug toxicity, and analytical techniques in the measurement of drug absorption and metabolism. Conducting simple experiments on *in vitro* preparations and present their findings in a written account, which includes details of the background of the experiment (introduction), methods, results and discussion.

911\120 Proteomics and Drug Discovery: (3cr.)

Study of organism proteins and their role in organism's structure, growth, health, disease (and/or the organism's resistance to disease, etc.). Those roles are predominantly due to each protein molecule's tertiary structure/conformation, therefore, the effect of drugs on 3D structure will be discussed as part of Drug Discovery Sciences. Some methods utilized to determine which impact results from which protein, such as: *chemical genetics*, to compare two same-species organisms, *gene expression analysis*, to determine the protein(s) produced when a given gene is "switched on", by measuring fluorescence of individual messenger RNA (mRNA) molecules when that mRNA hybridizes. Gene expression analysis, to determine impact when a given gene is "knocked out"/"turned off" and *protein interaction analysis*, to determine if a newly-discovered protein molecule interacts with a protein molecule whose function is already known. In silico biology (modeling), to compare computer-predicted events with actual or *in vitro* outcomes will be covered .

1201912 Quantification of Legend-Macromolecular Binding: (3cr.)

Theoretical aspects of various methods used in the quantitative determination of ligand-receptor affinities (traditional methods such as radio-immuno assay, and more recent methodologies such as Capillary Electrophoresis, Enzyme-linked immuno-sorbent assay (ELISA), and Plasmon Surface Resonance techniques (PSR) . Future plans include hands-on experience on the respective instruments, however, upon their acquisition.

1201914 Medicinal Chemistry of Anticancer Agents: (3cr.)

Detailed discussions of the recent developments in carcinogenesis and anticancer chemotherapy. The involvement of various cell signaling routes. Such as receptor and non-receptor tyrosine kinases, ras-raf system, MAPK and phosphoinositol 3 kinase, etc...,the involvement of other cellular targets in the carcinogenesis, such as topoisomerases, tubulin polymerization, telomerases, MDR factors, and the involvement of extracellular factors in carcinogenesis, such angiogenic factors, cytokines and related others. Examples on the development of recently introduced anticancer agents may be discussed.

1201915 Medicinal Chemistry of CNS Agents: (2cr.)

Discussion regarding the recent advances in psychotropic, stimulants, depressants, analgesics, analeptics, and psychedelics, as well as , some recently identified characterized receptor macromolecules involved in the normal and abnormal functioning of the central nervous system, such as, opiate receptors, histamine receptors, serotonin receptors, serotonin reuptake receptors, adrenergic receptors and reuptake mechanisms and dopamine receptors. Other recently introduced relevant subjects will be adequately discussed.

1201916 Medicinal Chemistry of the Respiratory and GIT Agents: (2cr.)

Discussions related to recent advances in broncho-modulators, such as broncho-smooth muscle contractors and relaxants, anti-asthmatic drugs, related inflammatory endogenous compounds (bradykinines, prostaglandines). Furthermore, medicinal compounds related to the management of peptic and duodenal ulcers including histamine receptor (Peptic acid secretion) inhibitors. Other topics related to spasmolytics, anticholinergic agents, locally acting dopamine antagonists. Recently isolated and characterized receptors and endogenous mediators related to the GIT and respiratory tract will be also discussed.

1201917 Medicinal Chemistry of Anti-Inflammatories, Ant-Allergenic: (2cr.)

Recent advances in the areas of steroidal and non-steroidal anti inflammatory agents, including issues such as selective cox2 inhibition, eicosanoids, prostaglandins, thromboxans, cytokines, and leukotrienes and their respective inhibitors. Furthermore, focus will be also directed towards steroidal anti-inflammatories including their intriguing SAR properties. Moreover, recent advances in antiallergenic anti-histamines and various histamine receptors will also be covered.

1201918 Medicinal Chemistry of Endocrine System Agents: (2cr.)

It deals with recent advances in sex hormones, gonadotropins, thyroid hormones, hormones involved in calcium balance, growth hormones, contraceptive hormones and hormonal analogues. Hormones involved in sugar balance. Particular interest is to be given the involvement of some hormones in the development of certain cancers.

1201919 Medicinal Chemistry of The Cardiovascular System Agent: (2cr.)

Discussions covering recent advances in the areas of antianginal agents, vasodilators, mediators involved in hypertension and antihypertensive agents. Furthermore, this course also covers antihyperlipidemics, anticoagulants, and diuretics. Particular interest will be directed towards recent developments concerning various ion-channels and ion-pumps and their relation to cardiac arrhythmias, such as K-channels, Na-channels, Na-channels, Cl-channels, Na/K pumps, etc.....

1201927 Advanced Spectroscopy (3cr)

The course is intended to cover the structural elucidation by using 1D NMR spectroscopy, namely H^1 NMR, C^{13} NMR, J-mod. The modern two dimensional techniques will also be discussed through the application on real NMR cases. These techniques include COSY, HMBC, HMQC, INADEQUATE, 1D NOE, NOSEY and TOCSY. Furthermore, single X-ray crystallography will be discussed as a tool of structure elucidation, particularly for the large molecules such as proteins.

1201928 Advanced Chromatographic Analysis (3cr)

This course provides an in-depth examination of techniques used to separate and analyze mixtures and presents a variety of advanced applications in chromatographic analysis. Topics to be covered include preparative column chromatography (CC), analytical and preparative liquid chromatography (HPLC), gas chromatography (GC), solid-phase extraction (SPE), capillary electrophoresis (CE) and electrochromatography (EC). In addition to provide a comprehensive knowledge of the instrumentation and operation of chromatographic equipments, the course also discusses the essential sample preparation requirements for trace analytes in complex matrices prior to chromatographic analysis.

1201929 Quality Control and Standardization of Natural Products (2cr)

This course will cover various topics related the standardization of natural products (crude drugs, extracts, and finished products), which will emphasize a better understanding of the subject. This will include definitions and implications, current techniques and methodologies, and validation protocols.

1201930 Physicochemical properties as a tool in drug research (2cr)

Development of advanced instruments explored new horizons in drug research and made it possible to obtain better and accurate results in shorter time in both diagnostic and therapeutic research areas.

During this course, the students will be introduced to some of the new trends in drug research like the application of advanced light sources (Synchrotrons) in the characterization of the physicochemical properties of different pharmaceutical dosage forms like microemulsions, liquid crystals and nanoparticles. Also the students will be introduced to some medical applications of advanced light source like tracing drug diffusion and delivery based on the interaction properties with light source components like the infrared light.

The knowledge of the relation between nature of the research tool and the physicochemical properties of the drug (interaction with light, magnetic properties, ..) and the formula (size, surface properties,..) are the key factors for optimum utilization of these advanced techniques.

During the course, it will be discussed with the students the importance of the physicochemical properties of drug molecules and their formulations in the choice and efficiency of the analytical methodology. The student will be introduced to the concept of the physical property of interest and the available experimental methods used in the determination of this property. After this stage, selected newly published articles will be discussed with the students illustrating the pharmaceutical or medical importance of the knowledge of the physicochemical properties and the new technologies.

