DOCTOR OF PHILOSOPHY

DOCTOR OF PHILOSOPHY in Pharmaceutical Analytical Chemistry

1. Duration of program	Minimum of two years
2. Language of study	English
3. *Academic Reference Standards*	*National Academic Reference Standards (NARS) Pharmacy* January 2009 *1st* Edition. *(National Authority for Quality Assurance and Accreditation of Education).*
4. Aims of the program(s)	• The Ph.D. Program in pharmaceutical Analytical Chemistry has been designed for students who need to develop research skills in Analytical Chemistry by carrying out a project in this area. The program is expected to: • Provide a sound knowledge and understanding of principles and recent advances in theory and practice of pharmaceutical analytical chemistry • Provide the ability to undertake a substantial piece of independent research to publication standard, drawing upon their own knowledge and initiative to determine the direction and progress of the work. • Yield the mastery to analyze and interpret data, design and conduct research in their field of expertise. • Effectively teach to communicate scientific information both orally and in writing to scientists and non scientists. • Apply analytical and critical thinking in reviewing literature. • Exhibit professionalism and the highest ethical standards.

Name of course	**Credit Hour**	Description
0907801 Advanced Chromatographic Methods of Analysis II	**Lectures: 3** **Seminars /Tutorial:** **Practical: ---** **Others:** **<u>Total:</u> 3**	This course aims to: -Display a sound knowledge and understanding of principles and recent advances in theory and practice of gas chromatography and capillary electrophoresis techniques and their applications in pharmaceutical analysis, environmental analysis and drug analysis in biological fluids. -Illustrate the ability to analyze and interpret data, design and conduct research in their field of expertise. -Effectively communicate scientific information both orally and in writing to scientists and non scientists. -Apply analytical and critical thinking in reviewing literature.
0907805 Chemometric and laboratory intelligence methods	**Lectures: 2** **Seminars /Tutorial:** **Practical: ---** **Others:** **<u>Total:</u> 2**	This course aims to: -Demonstrate competence in knowledge and understanding of principles in theory and practice of most common chemometric and laboratory intelligence methods. -Identify appropriate chemometric methods for certain condition. -Effectively introduce presentation and processing of knowledge in the computer for developing analytical expert systems. -Provide the skills required to understand the operation of multivariate methods of data analysis -Provide the skills required to understand artificial neural networks and their application for pattern recognition and modeling of analytical data. -Learn about the theory of fuzzy sets for handling vague and incomplete data. -Demonstrate the use of complex optimization problems. -Apply analytical and critical thinking in reviewing literature.

		-Exhibit professionalism and the highest ethical standards.
0906801 Advanced course in chromatography	**Theoretical: 3** **Practical: ---** **Total: 3**	This course will give an overview of the various modern instrumental chromatographic techniques used in the pharmaceutical research and industry through education of graduate students with: -Advancements in chromatographic techniques: droplet counter current chromatography (DCCC); Centrifugal counter current chromatography CCCC, HPLC; chiral separation of racemates; immunoaffinity chromatography; supercritical fluid chromatography; hyphenated techniques GC-MS and HPLC-MS. -The course is designed to provide analysts with theoretical foundation of and practical experience with modern chromatographic techniques. Students will learn to use state-of-the-art instrumentation to develop, optimize, validate and apply methods for qualitative and quantitative determinations. -Furthermore the students will be able to apply this knowledge efficiently in choosing the suitable instrument professionally in analytical problems.
0901701 Advanced physical pharmacy	**Lectures: 3** **Seminars /Tutorial:** **Practical: ---** **Others:** **Total: 3**	This course aims to: -Provide the students with advanced knowledge in physical pharmacy that forms the basis for the formulation and development of stable pharmaceutical products.Targeted physical pharmacy areas include rheology, polymer science and stability and considerations in pharmaceutical raw materials and finished products.
0906608 Biotechnology in drug production	**Theoretical:** 3 hours **Practical:** ----- **Total:** 3 credit hours	The objective of the course is to get the student aware with the basic organization and facilities for initiating *in vitro* cultures, various sterilization protocols of equipment and plant material utilized for initiating cultures and adequate practice on dealing with sterile

		transfer area for aseptic manipulation of various tissues. The course shed some light on the nutritional requirements, media composition and different classes of plant tissue culture technology as well as different types of cultures and characteristic cell behavior for each type. The course covers the basic principles of some biotechnological applications used for the production of bioactive secondary metabolites as well as some biotransformation reactions and its advantages over organic synthesis.
0904805 Microbiological Quality Control	**Theoretical:** 3 hours **Practical:** ----- **Total:** 3 credit hours	This course will provide the PhD candidate with profound knowledge of the microbiological quality control techniques and the instrumentations used in the pharmaceutical manufacturing process. Updated and in-depth aspects of quality assurance will be taught in this course with emphasis on immunological and biotechnology pharmaceutical products.
0903805 Pharmaceutical quality control	**Lectures: 3** **Seminars /Tutorial:** **Practical: ---** **Others:** **Total: 3**	The course aims to developing and enriching student's knowledge and skills concerning various pharmaceutical quality control processes. Students should be able to perform, analyze and conclude different pharmaceutical product quality control testing. In addition, students will be capable of identifying and performing various quality assurance elements.
0906604 Quality assessment of natural products and phytopharmaceuticals .	**Theoretical:** 3 hours **Practical:** ----- **Total:** 3 credit hours	To enhance the pharmacist's capabilities and understanding the methodologies of the quality control of botanicals and herb-derived products.
0906703 Quality control of crude drugs and	**Lectures: 31** **Seminars/Tutorial: 8**	To enhance the students capabilities and basic understanding of the principles and methodologies of the quality control of botanicals and herb-derived products.

phytopharmaceuticals	**Practical: ---** **Others:** **Total: 39**	
0906702 Spectral and chemical characterization of natural products	**Lectures: 3** **Seminars /Tutorial:** **Practical: ---** **Others:** **Total: 3**	The course Introduce different spectroscopic techniques to students, expose the student to theoretical backgrounds for each analytical technique, explain how each technique can contribute to the process of structure elucidation. Also it explain how all these techniques can comprehensively used to elucidate the structure of natural products and expose the student to real problems in structural elucidation
0907802 Functional group analysis	**Lectures: 2** **Seminars /Tutorial:** **Practical: ---** **Others:** **Total: 2**	This course aims to: -Demonstrate competence in knowledge and understanding of principles in theory of certain functional groups widely encountered in medicinal drugs. -Identify appropriate reactions suitable for the analysis of common functional groups. -Design experiments for the optimization of the chosen reactions. -Apply analytical and critical thinking in reviewing literature. -Exhibit professionalism and the highest ethical standards.
0907803 Seminar I	**Lectures: 3** **Seminars /Tutorial:** **Practical: ---** **Others:** **Total: 3**	The course aims to: -Display a sound knowledge and understanding of principles and recent advances of pharmaceutical analytical chemistry in the areas related to the topics discussed in the PhD pharmaceutical analytical chemistry -Use up-to-date tools in retrieving information from proper sourses of scientific information -Know how to access relevant full articles

		-Gain skills of preparing a referenced scientific report -Present information compiled in a clear and comprehensive way for an audience of teaching staff in the department and answer their inquiries.
0907806 Seminar II	**Lectures: 3** **Seminars /Tutorial:** **Practical: ---** **Others:** **<u>Total:</u> 3**	The course aims to: -Display a sound knowledge and understanding of principles and recent advances of pharmaceutical analytical chemistry in the areas related to the topics discussed in the PhD pharmaceutical analytical chemistry -Use up-to-date tools in retrieving information from proper sources of scientific information Know how to access relevant full articles -Gain skills of preparing a referenced scientific report -Present information compiled in a clear and comprehensive way for an audience of teaching staff in the department and answer their inquiries.
0907804 Stability indicating methods of pharmaceutical analysis	**Lectures: 3** **Seminars /Tutorial:** **Practical: ---** **Others:** **<u>Total:</u> 3**	This course aims to: -Display a sound knowledge and understanding of principles and recent advances in theory and practice of stability indicating analytical methods for the determination of drugs and pharmaceutical products in presence of their degradation products -Illustrate the ability to analyze and interpret data, design and conduct research in their field of expertise. -Effectively communicate scientific information both orally and in writing to scientists and non scientists. -Apply analytical and critical thinking in reviewing literature.