Ph.D. Course Work Syllabus in Pharmaceutical Sciences (2016-17)
One Semester

Paper I Advanced Research Methodology
Paper II Review of Literature, Advanced Research Tools & Seminar

Paper I: Advanced Research Methodology			
1	**RESEARCH**		
	Definition of research, Applications of research and types, Research process and steps.	6L	10
	Literature review: Importance of literature review, methods and sources of literature review, Review the literature selected, Development of a theoretical and conceptual framework, writing up the review.		
2	**RESEARCH DESIGN**		
	Design of Experiments: Objectives, strategies, Experimental design, Simple Comparative Experiments-Basic statistical concepts, sample mean and variance, random variable, correlation and regression, standard normal distribution, statistical hypothesis, degrees of freedom, Two sample *t*-test, *F*-test, *Chi-square* test, *P*-value, Confidence Intervals, Paired *t*-test.	12L	20
	Single Factor Experiment: Analysis of Variance (ANOVA) for fixed effect model; ANOVA for Randomized complete block design to control effects of nuisance factors.		
	Two Factor Factorial Design: Basic definitions and principles, main effect and interaction, response surface and contour plots, General arrangement for a two-factor factorial design; Models-Effects, means and regression.		
3	**RESEARCH PROPOSAL**		
	An Introduction: Preamble, problem, objectives, hypothesis to be tested, design of study, measurement procedures, analysis of data, organization of report, Displaying data tables, graphs and charts	12L	20
	Writing a research report: General consideration, Prewriting considerations, Thesis writing, Formats of report writing, Formats of publications in Research journals		
4	**DRUG REGULATORY AFFAIRS**		
	Indian Patent Act 1970, its amendments, concepts of IPR, criteria for granting patents and filing a Indian patent, Introduction to Patent Search.	12L	20
	. ICH guidelines, GMP, GLP, USFDA, CTD, ISO 9000, TQM, OECD guidelines		
	WHO guidelines for standardization of raw material and finished products including herbal products.		
5	**PHARMACEUTICAL ANALYSIS**		
	Principles and applications of the following: Absorption spectroscopy (UV, visible and IR). Principles of NMR, ESR, Mass spectroscopy, X-ray diffraction analysis, malditof and different chromatographic techniques and methods, Thermal Techniques. Microscopy Techniques.	12L	20
6	**COMPUTATIONAL ANALYSIS**		
	Introduction to the creation and advancement of databases, algorithms, computational and statistical techniques for data analysis.	6L	10
	Applications of Microsoft excel for quantitative and statistical data analysis, Power point, Introduction to Internet database surfing.		
	Advanced Research Tools– Exposure to SPSS, Design expert, Systat, SigmaPlot, WinNonlin, Kinetica and Pk analyst software.		

Note: Lecture – 1 Hour (preferably through ICT)

Approved in meeting of Board of Studies in Faculty of Technology, Sub: Pharmacy Dt. June 07, 2016

7/6/2016 7/6/16 7/6/16

Paper II	Review of Literature, Advanced Research Tools & Seminar		
1.	Review of Literature – Writing review of literature in the area of the proposed Ph.D. program	**24 L**	**40**
2.	Advanced Research Tools- Exposure to design expert, Systat, Sigma Plot and Kinetica	**12 L**	**20**
3.	Seminar – Based on the review of literature;	**24 L**	**40**

Note: The candidate must obtain 50% or more marks to qualify in the course work.