Institute of Pharmaceutical Sciences, Kurukshetra University, Kurukshetra

Ph.D. Course work Syllabus: Paper-I
Paper Code : Pharm.-PhD-I
Paper Name: Research Methodology

Time: 3 hours   **M.M.:100**

1. **Scientific Research**: Definition, Characteristics, types, need of research, Identification of Problem, Assessing the status of Problem, Formulation of the objectives, Preparing design (experimental or otherwise), Actual investigation.

2. **Information Collection and Retrieval**: Review of published work in related field from printed/electronic resources, Keeping own record/reference cards etc., Retrieval of research manuscript, Writing of Review of Literature and bibliography. Methods and sources of literature review, Different methods of writing references.

3. **Drafting of Research Project/Proposal**: Background, information, Significance of Research problem (International, National or local level), Materials and Techniques to be employed, Expected Duration, Funding agencies (DST, DBT, ICMR, CSIR, AICTE and UGC).

    a) **Plan of Work:** Periodic Planning, Sequence of steps to be adopted, Sorting of Lab acquaintance with techniques and their limitation.

    b) **Execution**: Standardization of Research/Survey methods, Sequence of experimentation (Control, treatment and replicates), Reproducibility and precautions

4. **Writing of Research Manuscript**: Technique of preparation of research manuscript. Introduction, Review of literature, Materials and methods, Results, Discussion, Conclusion, Summary, Bibliography, Appendices, Figures, Tables, Plates (Ideal materials for photography and their use, magnification etc.) legends, format of typing proof reading (editing). Online submission of Research manuscript, Online checking of similarity/Plagiarism using available softwares.

5. **Data recording, Processing and Elementary biostatistics**: Data collection techniques, Honesty, Accuracy & Precision in recording observations and Results, Discussion, Mean, Mode, Median, Standard deviation (SD), Standard Error (SE), Parametric and Non-parametric tests, Chi-Square test, test of significance, Analysis of variance (ANNOVA), Correlation Co-efficient, Regression Co-efficient, *p*-value, Concept of sampling and Methods of estimation.

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Ph.D. Course work Syllabus: Paper-II (Subject Specific)
Paper Code : Pharm.-PhD-II
Paper Name: Pharmaceutical Sciences

Time: 3 hours **M.M.:100**

1. **Toxicity studies & OECD guidelines**: Acute, Subacute (Repeated dose), Subchronic and Chronic toxicity.

   In-vitro & In-vivo **models for Selected categories of drugs**: Analgesic and anti-inflammatory, Immunomodulatory, Anti-diabetic, Antiobesity, Hepatoprotectives, Anti-oxidant, anticonvulsant, Antiferility agents, Antianxiety and Antidepressants.

2. **Alternatives to Animal Experimentation:** a) Animal cell lines and their uses
   b) Radioligand binding assay c) Patch clamp and ELISA d) Stem cell research etc.

3. **Preformulation studies**, **Stability studies, Novel Drug Delivery System, Quality Control and Quality Assurance, Introduction to Validation**

4. **Drug Discovery & Development:** Search and Selection of Lead Compounds and its optimization; Target Identification and Validation, Computer Aided Drug Design.

5. **Introduction to Novel Methods of Extraction**: Solid Phase micro Extraction, Ultrasound Assisted Extraction, Supercritical Fluid Extraction, Microwave Assisted Extraction

6. **Spectroscopic interpretation and Structure elucidation of some natural and synthetic compounds using UV, IR, NMR & Mass techniques**.

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Ph.D. Course work Syllabus: Paper-III
Paper Code : Pharm.-PhD-III
Paper Name: Term Paper

M.M.:100

1. **Seminar in thrust area of research Work   - 50 Marks**

2. **Research Assignment/Literature Survey, etc. - 50 Mark**