RAMA UNIVERSITY

KANPUR

UTTAR PRADESH

FACULTY OF PHARMACEUTICAL SCIENCES

Ph.D. SYLLABUS (PHARMACEUTICAL SCIENCES)

2024-25

Dean
Faculty of Pharmaceutical Sciences
Rama University

Rama University Uttar Pradesh Kanpur

Faculty of Pharmaceutical Sciences

Ph.D Evaluation Scheme

Sr. No	Course Code	Course Name	L	T	P	Total Credit	Total Marks
1	PDPH-101	Modern Trends in Pharmaceutical Sciences	3	1	0	4	100
2	PDRP-101	Research and Publication ethics (RPE)	2	0	0	2	100
3	PDRM-101	Research Methodology	3	1	0	4	100
4	PDLR-101	Literature Review	0	0	2	2	100

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BOARD OF STUDIES

A meeting of the board of studies of Faculty of Pharmaceutical Sciences was held on 19/06/2024 at 1:00 P.M. The following members were present:

1- **Convener-** Prof. (Dr.) S.P. Singh
2- **Member-** Dr Neelam Jain
3- **Member-** Dr Sharad Chandra Machrella
4- **External member-** Dr. Ramesh Gupta
5- **External member-** Dr. Ashish Parashar

The quorum of meeting was complete

Agenda of the meeting:

1- **Assessment criteria**
2- **Question paper format**
3- **Syllabus**
4- **Course work discussion**
5- **Synopsis format**

The meetings resolved unanimously that attached Assessment criteria, Question paper format, syllabus, course work pattern, format of synopsis are justified and approved. The board members has clarified that there is no change in the previous syllabus and it will be continued for the Ph.D Program 2024-25 Batch.

Convenor:

Signature:

Name: Prof. (Dr.) S.P. Singh

Internal Member:

Signature

Name: Dr Neelam Jain

Internal Member:

Signature

Name- Dr Sharad Chandra Machrella

External member- Dr. Ramesh Gupta

External member- Dr. Ashish Parashar

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MANDHANA KANPUR-209217

SYLLABUS FOR Ph.D. COURSE WORK

MODERN TRENDS IN PHARMACEUTICAL SCIENCES

Course Code: PDPH-101 **Credit Point: 04**

Course Objectives: This course enables the student to learn the knowledge, skills, and values necessary to meet the drug-related needs of patients in society. This primarily occurs in practice when the pharmacist delivers pharmaceutical care to a patient, thereby meeting an individual patient's drug-related needs. It also occurs at the professional level through education, research, and the development of policies and standards, and at the societal level through research, public education, and policy development, all directed toward the prevention of drug-related morbidity and mortality.

Course content

Unit-I: Solid state and molecular level properties of solid state for drug delivery

- Crystallinity and polymorphism, solubility, melting characteristics of particles. Particle size reduction to micron and nano size-nanocrystals, polymeric nanocrystalline solid dispersions, small molecule assisted nano-complexes.

- Crystallinity and polymorphism vs drug loading capacity and drug release, strategies to improve drug loading drug delivery systems.

Unit-II: Advancement in Lipid nanoparticulate drug delivery systems

A revolution in dosage from design and development, lipids, classification of solid and liquid lipids for delivery of bioactive compounds. Liposomes, Niosomes Solid lipid Nanoparticles (SLN), Nanostructured lipid carriers (NCL) etc.

Unit-III: Nanoparticulate toxicity and Assessment

Clinical and toxicological aspects of NPs, proposed mechanism of NP induced toxicity (oxidative stress) and brief study over toxicity assessment of different novel drug delivery systems.

Unit-IV: Gene delivery systems

Recent progress in viral and non-viral therapy. Gene therapy: Chronology, viral gene delivery systems, retroviral systems, lentiviral systems, non- viral gene delivery system: Physical methods: Gene gun; Chemical methods: polymers, electrostatic interaction, encapsulation, adsorption, vesicular and particulate systems.

Unit-V: Physico-Chemical approaches for drug targeting

Stimuli responsive: Magnetically, thermal and pH assisted drug delivery systems, Chemical drug delivery (prodrugs), Lipid-drug/Polymer drug conjugates.

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Unit–VI: Principles of drug targeting and molecular basis of targeted drug delivery

Receptor mediated endocytosis; Different levels of targeting-first order, second order and third order targeting; Different types of targeting-active and passive targeting.

Organ based targeting

Novel strategies for CNS, pulmonary, liver, and colon targeting.

Unit–VII: Emerging Carrier based approach for targeted drug delivery

Functionalized liposomes, polymeric and lipid nanoparticles, liquid crystalline nanoparticles, polymeric micelles, functionalized carbon nanotubes and inorganic nanoparticles.

Suggested Readings

1. Niazi S.K Hand book of Preformulation. Informa healthcare, New York.
2. Gibson M. Pharmaceutical Preformulation and formulation. LHS Health group, CRC press, New York.
3. Vyas S.P. and Khar RK Targeted and controlled drug delivery, CBS Publisher & Distributer, New Delhi.
4. Molema G and Meijer KF. Drug targeting organ-specific strategies, Wiley-VCH, Verlage GmbH.
5. Remington's Pharmaceutical Sciences.
6. Vogel H.G. "Drug Discovery and Evaluation, Pharmacological Assays," 2nd edition, Springer.
7. Gibson M. Pharmaceutical Preformulation and formulation. LHS Health group, CRC press, New York.
8. Controlled drug delivery: fundamentals and applications. by Robinson, Joseph R., 1939-; Lee, Vincent

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RESEARCH AND PUBLICATION ETHICS

Course Code: PDRP-101 **Credit Point: 02**

Course Objectives: The course is for awareness about publication ethics and publication misconducts. It is focusing on basics of philosophy of science and ethics, research integrity, publication ethics. Indexing and citation databases, open access publications, research metrics (citations, h-index, impact factor etc.) and plagiarism tools will be introduced in this course.

Course Content
Theory

Unit 1: Philosophy and ethics

Introduction to philosophy: definition, nature and scope, concept, branches
Ethics: definition, moral philosophy, nature of moral judgments and reactions

Unit 2: Scientific conduct

Ethics with respect to science and research
Intellectual honesty and research integrity
Scientific misconducts: Falsification, Fabrication and Plagiarism (FFP)
Redundant publications: duplicate and overlapping publications, salami slicing
Selective reporting and misrepresentation of data

Unit 3: Publication Ethics

Publication ethics: definition, introduction, and importance
Best practices/ standards setting initiatives and guidelines: COPE, WAME etc.
Conflict of interest
Publication misconduct: definition, concept, problem that leads to unethical behavior and vice versa, types
Violation of publication ethics, authorship and contributor-ship
Identification of publication misconduct, complaints and appeals
Predatory publishers and journals

Practice

Unit 4: Open access publishing

Open access publications and initiatives
SHERPA/RoMEO online resource to check publisher copyright & self-archiving policies
Software tool to identify predatory publications developed by SPPU
Journal finder/ journal suggestion tools viz. JANE, Elsevier Journal Finder, Springer Journal Suggester etc.

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Unit 5: Publication Misconduct

A. Group discussions
Subject specific ethical issues, FFP, authorship
Conflicts of interest
Complaints and appeals: examples and fraud from India and abroad

B. Software tools

Use of plagiarism software like Turnitin, Urkund and other open-source software tools

Unit 6: Database and research metrics

A. Databases
Indexing databases
Citation databases: Web of sciences, Scopus etc.

B. Research metrics
Impact factor of journal as per Journal citation report, SNIP, SJR, IPP, Cite score
Metrics: h-index, g-index, i10 index, Altmetrics

Reference Books

1. Robert G. Burgess, "The Ethics of Educational Research."
2. Nicholas Walliman, "Research Methods"- The Basics, Routledge Taylor & Francis Group, London, and New York.
3. David DeMatteo, Geoffrey Marczyk and David Festinger "Essentials of Research Design and Methodology", John Wiley & Sons, Inc.

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RESEARCH METHODOLOGY

Course Code: PDRM-101 **Credit Point: 04**

Course Objectives: The objectives of the course are to equip the students with the concept and methods of Pharmaceutical Research. The students will be able to plan, design and carry out pharmaceutical research using scientific methods and prepare research report(s) / paper(s).

Course content

Unit-1: Introduction to Research Methodology

Introduction to research methodology: Meaning of research, objectives of research, motivations in research, types of research, research approaches, significance of research, research process. Defining a research problem, selecting the problem, necessity of selecting the problem, techniques in defining the problem.

Unit-2: Research Design

Meaning and need of research design, features of good research design, types of research design, principle of experimental research design, development of a research plan.

Unit-3: Data Collection

Methods of primary and secondary data collection, selection of appropriate method of data collection. sampling methods, coding, editing and tabulation of data, graphical representation of data, charts and diagrams used in data analysis, bar and pie diagrams and their significance.

Unit-4: Statistical Analysis

Mean, Median and mode
Testing hypothesis: sampling of attributes, sampling of large and small variances with business applications (t-test).
Chi- square test, analysis of variance (ANOVA): Concepts, applications, and interpretation of results.

Unit-5: Report Writing

Meaning and significance of report writing, types of reports, steps in report writing, layout of the research report, referencing style, appendices, precautions in writing research report, writing of thesis report. Importance of publishing a research paper, writing of research paper and review article.

Reference Books

1. C. R. Kothari, "Research Methodology: Methods and techniques," New Delhi: Vishwa Prakashan.
2. B. Balaji Sathya Narayanan and D. Napolean, "Research Methodology: A Theoretical Approch," Laxmi Publications
3. Suresh K. Sharma, "Research Methodology & Biostatistics", Elsevier, 2017.

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LITERATURE REVIEW

Course Code: PDLR-101

Credit Point: 02

Course Objectives: Understand the basis philosophical assumptions underlying research literature reviews for different purposes, including what, why, when, for whom and how? Be able to manage to process of conducting a literature review, including reading, note-taking strategies, coding/reference management, synthesizing and writing literature results. Be able to write a quality literature review with variations in references. The candidate should gain sufficient practical knowledge for use of computer and computer software for use in research work.

Course Content

UNIT-I: Understanding and Organizing of literature: Relevance, Approach and Applications; Developing an outline for the literature review; Formulate key questions for review. Identify which literature base to search; developing the theoretical basis for the Research Question; Searching for, locating, and organizing relevant professional.

Unit-II: Conducting, Synthesizing and Writing the Review: Abstract relevant information from appropriate studies in a systematic manner; critically reviewing the literature; Rate the scientific quality of each study and the level of evidence for each question. Create evidence tables and summary tables; interpret the pattern of evidence in terms of strength and consistency; summarize the studies' findings. Writing a first draft; Writing references and citations; Obtaining, giving, and making productive use of feedback; the redrafting process; Professional formatting.

Unit-III: MS Word, MS Excel, and MS Power Point

Features and applications related to presentation of text in suitable format and saving the data for future applications. Practical knowledge of MS Word to type the script, insert tables, figures and graphs to prepare thesis and research papers in presentable format.
Construction of spreadsheets from the experimental data. Design and application of formulae for calculations and their applications to the experimental data. Use of statistical tools, preparation of graphs, histograms, charts, and diagrams.
Preparation of power point presentations based on the topic of research. Insertion of figures, graphs, charts in presentation. Preparation of scientific posters for presentations. Use of various presentation techniques

UNIT-IV: Using Internet for Research

The Internet: quick look, what is internet, Use of Internet, major internet services, electronic mail, www, downloading super tools for better computing Internet and the society, Use of E-Journals, Use of E-library, searching the keyword search engines, News and multimedia, governments, archives, and statistics. Exploring various websites and search engines for collecting quality literature and secondary data related to research work.

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UNIT-V: Introduction to Research related Software's

Definition, objectives and features, data analysis using SPSS: Data entry creating variables, switching to data labels, data analysis: Frequencies, recording into different variables, cross tabulations, and layers. Core calculation software, developing utility programs for research. Use of Computers in Quantitative analysis.

Reference Books

1. Diana Ridley, "The Literature Review: A Step-by-Step Guide", 2nd Edition, Sage Publications, 2012
2. Balagurusamy, "Fundamentals of Computer" 1e, Tata McGraw-Hill
3. Chandwani, Jain, Choudhari, "Computing & Informatics", Jain Brothers.

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