

Dr. B. R. Ambedkar Center for Biomedical Research

SEMESTER-II

DSE-vii **RESEARCH METHODOLOGY** 4 credits

Duration: 45 Hours + 15 Hours (Tutorial)

Course title and Code	Total Credits	Credit distribution of the course			Eligibility Criteria	Prerequisite of the Course (if any)
		Lecture	Tutorial	Practical		
Research Methodology (DSE-vii)	4	3	1	0	Graduation	NIL

LEARNING OBJECTIVES:

The goal of this paper is to make students:

- Understand the fundamental concepts and principles of research methodology
- Identify and apply different research designs and methods
- Develop skills in critically evaluating research literature and identifying research gaps
- Learn to formulate research questions, objectives, and hypotheses
- Understand the importance of ethics in research and apply ethical principles

LEARNING OUTCOMES:

It will help students to:

- Define research methodology and its significance in research
- Identify and explain different types of research designs and methods
- Recognize the importance of ethics in research and identify potential ethical issues
- Formulate research questions, objectives, and hypotheses.
- Appreciate the importance of research methodology in advancing knowledgeUnit 1.

Unit I: Research Methodology**(11 Hours)**

Introduction, Objectives and motivation in research, Approaches to scientific research- Experimental vs Theoretical; Descriptive vs Analytical; Fundamental vs Applied; Quantitative vs Qualitative; Conceptual vs Empirical; Survey vs Experimental. Pilot studies, Inter and Multidisciplinary Research, Clinical Research

Essential Reading

1. Swarooprani. K, An Study of Research Methodology, International Journal of Scientific Research in Science, Engineering and Technology (IJSRSET), Volume 9, Issue 3, pp.537-543, May-June-2022. Doi : <https://doi.org/10.32628/IJSRSET2293175>.

Unit II: Research Design (12 Hours)

Identifying gaps in knowledge through literature mining, identifying area of societal need like health/technology/anticipated crisis such as epidemic, energy, water. Elements for outlining a research problem. Developing an approach strategy, feasibility testing. Selection of research topic and its national and international scenario. Techniques involved in research plan using an illustration, Sampling and Sampling Techniques, data analysis and Interpretation.

Essential Reading

1. Khanday and Khanam, The Research Design, Journal of Critical Reviews, Volume 06, Issue 03, 2019.

Unit III: Intellectual Property: Patent, trademarks, copyright, trade secrets (10 Hours)

Introduction to IP, Types of IP, IP laws in India, Patent law, trademark law, copyright law and trade secrets (Protection, Requirements, Key benefits), Importance of academia-industry interaction, Marketing of research outcome.

Essential Reading:

1. *Patents Act, 1970 India; Trademarks Act, 1999 India; Copyright Act, 1957 India; WIPO Guide to Intellectual Property; Indian patent Office website (ipindia.gov.in)*

Unit IV. Scientific Documentation (12 Hours)

Introduction to Scientific Documentation (Background and context), Importance of Scientific Documentation (Transparency and reproducibility, Validity and credibility, Collaboration, Knowledge transfer, Error prevention, Ethical and legal compliance), Types of Scientific Documentation (Primary and Secondary Sources), Writing Scientific documents (IMRAD), Scientific Reports and Thesis, Abstracts and Presentations, Citations and Referencing, Plagiarism and Ethics, Editing and Proofreading.

Essential Reading:

1. Delving E, Pillay TS, Newman A. How to Write a Scientific Paper: Practical Guidelines. EJIFCC. 2014 Oct 24;25(3):259-68. PMID: 27683473; PMCID: PMC4975199.

Tutorial: (15 Hours)

- Seminars by students on recent papers/trends published in relevant journals.
- Quizzes and Debates.
- Revision of Specific topics; reinforcement of key concepts.
- Case studies, where applicable.
- Group Discussion.
- Theoretical critiques and hypotheses development.

SUGGESTED READINGS:

1. Research in Education (2005) 10th ed., Best, J.W. and Kahn, J.V., Prentice Hall of India Pvt. Ltd. (ISBN-13: 978-0205458400)
2. At the Bench: A Laboratory Navigator (2005) Barker, K., Cold Spring Harbor Laboratory Press (New York). ISBN: 978-087969708-2.
3. Research Methodology - Methods and Techniques (2004) 2nd ed., Kothari C.R., New Age International Publishers. (ISBN-13 / EAN: 9788122415223)
4. Research Methodology: A Step by Step Guide for Beginners (2010) 3rd ed., Kumar R., Pearson Education. (ISBN-13: 978-1849203012)
5. The Craft of Research (Guides to writing, editing and publishing) (2008), Booth, W.C., Colomb, G.G., Williams, J.M., University of Chicago Press, 2008. (ISBN-13: 978-0226065663)