

DISCIPLINE SPECIFIC ELECTIVE COURSE (DSE-08): revised RESEARCH METHODOLOGY to be followed from 2025-26 academic year

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

| Course title & Code | Credits | Credit distribution of the course | | | Eligibility criteria | Pre-requisite of the course (if any) |
|--------------------------------|---------|-----------------------------------|----------|---------------------|----------------------|--------------------------------------|
| | | Lecture | Tutorial | Practical/ Practice | | |
| RESEARCH METHODOLOGY DSE-08 | 4 | 2 | 0 | 2 | Semester V | Nil |

Learning Objectives:

- To introduce fundamental principles of research, including types, designs, and approaches used in biological sciences.
- To provide hands-on experience in data collection, analysis, interpretation, and scientific communication.
- To develop critical skills for framing research questions, hypotheses, and experimental designs.
- To equip students with tools for conducting literature reviews using digital and print resources.
- To train students in scientific writing, referencing, plagiarism checking, and intellectual property rights.
- To encourage ethical practices and promote problem-solving through scientific investigation aimed at societal benefit.

Learning Outcomes:

After successful completion of the course, students will be able to:

- Describe the key concepts, types, and methodologies of research in biological sciences.
- Formulate research questions and hypotheses, and design appropriate experimental or survey-based studies.
- Conduct comprehensive literature reviews, identify research gaps, and synthesize existing knowledge.
- Collect, analyze, and interpret qualitative and quantitative data using appropriate statistical or software tools.
- Write scientific reports, proposals, reviews, and thesis documents using correct referencing and citation styles.
- Demonstrate ethical research conduct, understand plagiarism, and appreciate the basics of intellectual property rights.

Theory: **30 hours**

Unit 1: Basic Concepts of Research **4 hours**

Objectives, Research Methods vs Methodology, Types of Research-Quantitative vs Qualitative, Analytical vs Descriptive, Basic vs Applied, Field Research, Search engines, Literature-review and its consolidation

Unit 2: Research Design, Data Collection and Analysis **12 hours**

Conceptualization a research problem, Developing a research model, Validation of the proposed model with standard procedures and attributes, Experimental design, and implementation, Observation and Data acquisition, Methods of data collection, Data quality check, Processing and Analysis Strategies; Data presentation (Tables and Figures), Interpretation

Unit 3: Ethical Issues **04 hours**

Intellectual Property Rights, Copy Right, Plagiarism, Commercialization and Royalty

Unit 4: Report Writing **10 hours**

Technical Research writing (Dissertation/ Reports/Research/Review papers), Citations, Acknowledgements, Research Grants/ Fellowships, Bibliography

PRACTICALS: **60 hours**

1. Search engines, Literature survey, identification of gap areas
2. Presentation of collated literature
3. Experimental layout, execution, observation
4. Data analysis, using softwares, tables and figures
5. Writing a report/research paper/dissertation/summary
6. Preparation of bibliography in different formats as per journal's requirements
7. Usage of software tools for checking plagiarism

Suggested Readings:

1. Coley, S.M. and Scheinberg, C.A. (1990). "Proposal writing". Stage Publications.
2. Stapleton, P., Yondeowei, A., Mukanyange, J., Houten, H. (1995). Scientific writing for agricultural research scientists – a training reference manual. West Africa Rice Development Association, Hong Kong.
3. Wadhera, B.L. (2002). Law Relating to Patents, Trade Marks, Copyright Designs and Geographical Indications, Universal Law publishing.
4. Dawson, C. (2002). Practical research methods. UBS Publishers, New Delhi.
5. Anthony, M, Graziano, A.M. and Raulin, M.L. (2009). Research Methods: A Process of Inquiry, Allyn and Bacon.
6. Kothari, C.R. (2014). Research Methodology: Methods and Techniques, 2nd edition, New Age International (P) Ltd.,

7. Walliman, N. (2011). *Research Methods- The Basics*. Taylor and Francis, London, New York, USA.
8. Cresswell, J.W. (2014). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches* (4th edition). SAGE Publications Inc.
9. Rao, G.N. (2018). *Biostatistics & Research Methodology*. Pharmamed Press.
10. Gary J. Burkholder, G.J., Cox, K.A., Crawford, L.M. Hitchcock, J.H. (2019). *Research Design and Methods: An Applied Guide for the Scholar-Practitioner*. SAGE Publications, Inc.
11. Mukherjee, S.P. (2019). *A Guide to Research Methodology: An Overview of Research Problems, Tasks and Methods*. CRC Press
12. Flick, U. (2020). *Introducing Research Methodology: Thinking Your Way Through Your Research Project*. SAGE Publications Ltd.