## DISCIPLINE SPECIFIC ELECTIVE COURSE –DSE-13

| Course title& Code | Credits | Credit distribution of the course | | | Eligibility criteria | Pre-requisite of the course (if any) |
|---|---|---|---|---|---|---|
| | | Lecture | Tutorial | Practical/ Practice | | |
| **Research methodology (BS-DSE-13)** | **4** | **2** | | **2** | Class XII pass with Biology | **NA** |

### Learning Objectives:

The main objective of this paper is to provide students with a general introduction to the methodological foundations and tools used in research for an understanding of the ways to identify problems, develop hypotheses and research questions and design research projects. The course will expose students to the range of designs used in research in laboratory, field experiments, surveys and content analysis. It will also provide an introduction to the concept of controls, statistical tools and computer applications used in research. In addition, the course will impart knowledge of scientific writing, oral presentation and the various associated ethical issues.

### Learning Outcomes:

Upon completion of the course, students will be able to:

- Define research, learn the importance of research and its link with theoretical knowledge
- Describe the research process and the principle activities, skills and ethics associated with the researchprocess
- Describe and compare the major quantitative and qualitative research methods
- Construct an effective research proposal
- Understand the importance of research ethics use the computer software for organization and analysisof data.
- Develop skills in the art of scientific writing and oral presentation

### Course Contents

**Theory**

Credits: 2 Total Hours: 30

**Unit 1: Introduction to Research** **No. of hours: 4**

Objectives and characteristics of research; significance of research, types of research methods-qualitative andquantitative; basic and applied; descriptive and analytical; various phases of research-problem identification, generation of hypothesis, experimental design, results and discussion. Writing a research proposal-schematic presentation.

**Unit 2: Basic principles of research design** **No. of hours: 8**

Review of literature using appropriate sources – reviews, patents, research papers, books and e-resources; Significance of controls in research, Types of research designs – exploratory, descriptive, experimental, surveyand case study.

**Unit 3: Statistical tools and Report writing** **No. of hours: 12**

Data collection, analysis and graphical presentation; Sample – types and characteristics; Basic Statistical Tools - Measures of central tendency, Arithmetic mean, Median, Mode, Standard deviation, Co-efficient of variation (Discrete serious and continuous serious), Correlation, Regression, Multiple Regression, hypothesis testing, P- value, data analysis and interpretation; Report writing, format of publications and presentations-oral and poster.

**Unit 4: Scientific conduct and ethics in Research** **No. of hours: 6**

Biosafety and Ethics - compliance and concerns; Plagiarism-Software tools and Creative Commons; Introduction to Intellectual Property Rights; Citation and acknowledgement, Impact factor, h-index, Indianand international funding agencies.

## 3.1 PRACTICALS

**CREDITS: 2** **TOTAL HOURS: 60**

1. Use of search engine tools for retrieving research papers
2. Preparation of bibliography in different formats
3. Use of Plagiarism tools
4. Design of a research survey on a specific problem
5. Writing a concept note / research proposal
6. Writing of a mini-review paper
7. Systematic review, meta data analysis and presentation
8. Poster/oral presentations

## 3.2 Essential readings


1. Cresswell, J. (2009) *Research Design : Qualitative and quantitative Approaches* Thousand Oaks CA, (3rd ed.), Sage Publications
2. Kothari, C.R. (2004) *Research Methodology: Methods and Techniques* (2nd ed.), New Age International Publishers.
3. Kumar, R. (2011) *Research Methodology: A Step-by-Step Guide for Beginners* (5th ed.), SAGE publisher
4. Walliman, N. (2017*) Research Methods: The Basics,* (2nd ed.), London ; New York : Routledge
5. *WHO (2001) Health Research Methodology – A Guide for Training in Research Methods.*


**Note: Examination scheme and mode shall be as prescribed by the ExaminationBranch, University of Delhi, from time to time.**