

**Course Outcomes:** On successful completion of the course, students will be able to:

CO1: Plan and design experiments to obtain statistically significant data

CO2: Systematically analyze, provide meaningful interpretation, and present experimental data

CO3: Select a suitable journal for publication based on the research metrics and the field of study

CO4: Scientifically draft journal article, research reports, and thesis proposal

CO5: Understand the various stages involved in the publication of a journal article, conference proceedings, and patent filing.

CO6: Understand the various ways of protecting IPR

#### Unit I

Design and planning of Experiments: Aims and objectives, expected outcome, methodology to be adopted - importance of reproducibility of research work. Interpolation, Extrapolation, Types of errors, Error analysis and statistical principles. Objectives and basic principles of designs of experiments.

#### Unit II

Analysis and presentation data: using graphs, presenting data in tables, schemes and figures. Statistical tests, software for drawing, statistical analyses, bibliography using Mendeley and endnote. Software used in Science (LaTeX, Chemdraw, isis draw, Origin, statistical software (SPSS) etc. Familiarization of Spreadsheet Tools, Presentation Tools and Writing Tools. Presentation of Tables and Figures. Use and Format of Appendices, Indexing.

#### Unit III

Databases and Research Metrics: Databases – Indexing databases, Citation databases: Web of Science, Scopus, etc. Research Metrics, Impact factor of journal as per journal citation report, SNIP, SJR, IPP, Cite Score. Metrics: h-index, g-index, i10 index, altmetrics.

#### Unit IV

Communicating information: General aspects of scientific writing, reporting practical and project work, writing literature survey and reviews, organizing a poster display, oral presentation. Guidelines for writing the abstract, introduction, methodology, results and discussion, conclusion sections of a manuscript. References, Citation and listing system of documents. Developing a Research Proposal – Thesis proposal. Format of research proposal. Research Report: Format of the research report, style of writing the report, references and bibliography.

#### Unit V

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

IPR and cyber law: Patents, Patent laws, process of patenting a research findings, Intellectual property (IP), intellectual property right (IPR), copyright, trademarks, GI, cyber laws.

#### References:

1. Bordens, K. S. and Abbott, B. B. (2011) Research Design and Methods – A Process Approach. 8<sup>th</sup> Edition, McGraw-Hill.
2. Davis, M., Davis K.J, and Dunagan M. (2013) Scientific Papers and Presentations. 3<sup>rd</sup> Edition, Elsevier Inc.

3. Kothari C. R. (2004) Research Methodology – Methods and Techniques 2<sup>nd</sup> Edition. New Age International Publishers
4. Angelika H. Hofmann, (2010) Scientific Writing and Communication: Papers, Proposals, and Presentations, Oxford University Press
5. Michael P. M (2011) Research Methods for Science. Cambridge University Press.
6. George C. T (2015) Research Methodology and Scientific Writing. Springer Nature.

**Modes of Evaluation:**

<b>Components</b>	<b>Assignment</b>	<b>Presentation</b>	<b>End Semester Viva</b>
Weightage %	40	20	40