

**Unit I**

Introduction to Philosophy: definition, nature and scope, concept, branches. Ethics: Definition, moral philosophy, nature of moral judgements and reactions

Ethics in science 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.

Publication Ethics: Best practices/standards setting initiatives and guidelines: COPE, WAME, etc. Conflicts of interest. Publication Misconduct: definition, concept, problems that lead 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

**Unit II**

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 III**

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 IV**

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.

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.

**Unit V**

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, and 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.

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. Bird, A. (2006) *Philosophy of Science*. Routledge.
2. Alasdair C MacIntyre (1998), *A short history of ethics: a history of moral philosophy from the Homeric Age to the twentieth century*. London
3. P. Chaddah, (2018) *Ethics in Competitive Research: Do not get scooped, do not get plagiarized*
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5. Resnik, D.B (2011). *What is ethics in Research & Why is it important?* National Institute of Environmental Health Sciences
6. Beall. J. (2012). *Predatory publishers are Corrupting Open access*. *Nature*, 489 (7415), 179
7. Indian National Science Academy (INSA), *Ethics in Science Education, Research and Governance* (2019)
8. Bordens, K. S. and Abbott, B. B. (2011) *Research Design and Methods – A Process Approach*. 8<sup>th</sup> Edition, McGraw-Hill.
9. Davis, M., Davis K.J, and Dunagan M. (2013) *Scientific Papers and Presentations*. 3<sup>rd</sup> Edition, Elsevier Inc.
10. Kothari C. R. (2004) *Research Methodology – Methods and Techniques* 2<sup>nd</sup> Edition. New Age International Publishers
11. Angelika H. Hofmann, (2010) *Scientific Writing and Communication: Papers, Proposals, and Presentations*, Oxford University Press
12. Michael P. M (2011) *Research Methods for Science*. Cambridge University Press.
13. George C. T (2015) *Research Methodology and Scientific Writing*. Springer Nature.