

Central University of South Bihar
Department of Mathematics
Ph. D course work Syllabus

Course Code: MTH101DC00104

Course Name: Research Methodology

Total Credits: 4 Credits

Part- A **(2 Credits)**

Unit I: Research: A Conceptual Framework

- Research: meaning and concept
- Knowledge, facts, principles, theories and research as a source of knowledge
- Scientific method of inquiry and basic steps of research
- Types of research: Basic, Applied and Action Research
- Ethics in research
- Methods and methodology
- Intellectual and property rights

Unit II: Computer Applications

- Word processing, Data processing, Graphical Processing, Use of web tools for research, Use of multimedia tools.

Part- B **(2 Credits)**

1. Working knowledge of MathSciNet, JSTORE and other online journals, Conference proceedings, Review of research papers.
2. Latex Software

References:

1. Raman, V. Raja, Fundamental of Computers, Prentice Hall India, New Delhi
2. PC, Software windows made simple, Tasali, Tata McGraw Hill Publication.
3. Stefan Kottwitz, LATEX for Beginners, open sources

Course Code: MTH101DC00304

Course Name: Tools & Techniques of Research in Mathematics

Total Credits: 4 Credits

1. **History of Mathematics** (1 credit)
2. **Lecturer/Seminar** on different topics in Mathematics (1 credit)
(Different topic(s) will be given by an individual supervisor to his/her student for Lecture/seminar)
3. **Techniques involved in solving the problem:** Methods of solving research problems
(Different research area(s) undertaken by an individual Supervisor) (1 credit)
4. **Applications of Latex:** Research paper writing, plotting of graphs, Slide preparation for presentation. (1 credit)

References for Unit-1 and Unit-4

1. J. Stillwell, Mathematics and its History, Springer International Edition, 4th Indian Reprint, 2005.
2. R. C. Archibald, Outline of the history of mathematics; the 2nd Slaughter Memorial Paper, Math. Assoc. of America, 1949.
3. E. T. Bell, The development of mathematics; Dover, 1992 (orig. 1945).
4. W. P. Berlinghoff & F. Q. Gouvêa, Math through the ages: A general history for teachers and others, expanded ed.; Oton House Publ. and MAA, 2004.
5. Stefan Kottwitz, LATEX for Beginners, open sources.

References for Unit-2 and Unit-3 may be provided by an individual supervisor as per need during teaching session.

Course Code: MTH101DC0202

Course Name: Research and Publication Ethics

Total Credits: 2 Credits

Course Code		Credits	2
L + T + P	2+0+0	Course Duration	One Semester
Semester	I	Contact Hours	30 hrs.
Methods of Content Interaction	<i>Lecture, Group discussion, Seminar, Presentations by students.</i>		

Course Objectives:

- ❖ To make students aware with research ethics and publication misconducts.

Course Contents:

UNIT I: PHILOSOPHY AND ETHICS (3 hrs.)

Introduction to philosophy: definition, nature and scope, concept, branches. - Ethics: definition, moral philosophy, nature of moral judgments and reactions.

UNIT II: SCIENTIFIC CONDUCT (5 hrs.)

Ethics with respect to science and 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.

UNIT III: PUBLICATION ETHICS (7 hrs.)

Publication ethics: definition, introduction, and importance. - 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 publisher and journals.

UNIT IV: OPEN ACCESS PUBLISHING (4 hrs.)

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

UNIT V: PUBLICATION MISCONDUCT (4 hrs.)

Group Discussion: Subject specific ethical issues, FFP, authorship. - Conflicts of interest. -

Complaints and appeals: examples and fraud from India and abroad. - Software tools: Use of plagiarism software like Turnitin, Urkund, and other open source software tools.

UNIT VI: DATABASES AND RESEARCH METRICS (7 hrs.)

Databases: Indexing databases - Citation databases: Web of Science, Scopus, etc. - Research Metrics: Impact Factor of journal as per Journal Citations Report, SNIP, SJR, IPP, Cite Score

- Metrics: h-index, g index, i10 index, altmetrics.

References:

1. Bird, A (2006). Philosophy of Science, Routledge
2. MacIntyre, Alasdair (1967), A short History of Ethics, London
3. P. Chaddha (2018), Ethics in Competitive Research: Do not get scooped; do not get plagiarised, ISBN: 9789387480865
4. National Academy of Sciences, National Academy of Engineering and Institute of Medicine. (2009). On being a Scientist: A Guide to Responsible Conduct in Research: Third Edition, National Academic Press.
5. Resnik, D. B. (2011): What is ethics in research & why is it important. National Institute of Environmental Health Sciences, 1-10.
6. Beall, J. (2012), Predatory publishers are corrupting open access, Nature, 489(7415), 179-179.
7. Indian National Science Academy (INSA), Ethics in Science Education, Research and Governance (2019), ISBN 978-81-93948217

Course Code: MTH102DC00404

Course Name: Preparation and presentation of Research Proposal

Total Credits: 4 Credits

1. Literature Review and research preparation by the research scholars. (2 Credits)
2. Presentation on research proposal by the research scholars (2 Credits)
