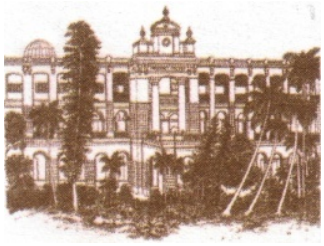
PRESIDENCY UNIVERSITY

DEPARTMENT OF MATHEMATICS

Syllabus for One Semester Ph.D. Course Work



Department of Mathematics
(Faculty of Natural and Mathematical Sciences)
Presidency University
Hindoo College (1817-1855), Presidency College (1855-2010)
86/1, College Street, Kolkata - 700 073

Detailed outline of the Ph.D. course work

Duration: One semester (6 months)

Course Code	Course Title	Course Type	Credit	Marks
MATHC1	Research Methodology	Taught	4	50
MATHC2	Research and Publication Ethics	Taught	2	50
MATHC3	Literature Review and Presentation	Sessional	2	50
MATHE4	Reading Project-I	Sessional	4	50
MATHE5	Reading Project-II	Sessional	4	50

The detailed syllabus is given below:

Paper-I (MATHC1): Research Methodology (Compulsory course, 4 credits)

Scientific Research and Literature Survey.

Formulation of a Research Problem.

Developing a Research Plan: Research objectives, information to be obtained and techniques to be adopted for solving the problem.

Research Writing and Presentation: Introduction to Latex and Beamer, Write-ups in latex and beamer/power point presentations.

Mathematical Software: Introduction to Mathematica/Matlab/Sage for solving numerical and computational problems.

Assessment:

Internal Assessment: 15 Marks
Final written examination at the end of the course: 35 Marks

References:

[1] C.R. Kothari & G. Garg (2014): *Research Methodology: Methods and Techniques*, 3rd Edition, New Age International Publishers, New Delhi.
[3] K. Prathapan (2014) : *Research Methodology for Scientific Research*, IK International, New Delhi.
[4] L. Lamport (1994) : *LaTeX, a Document Preparation System*, 2nd Edition, Addison-Wesley.
[5] Nicholas J. Higham (1998) : *Handbook of Writing for the Mathematical Sciences*, 2nd Edition, SIAM.
[6] Donald E. Knuth, Tracy L. Larrabee, and Paul M. Roberts (1989): *Mathematical Writing*, Mathematical Association of America.
[7] David F. Griffiths, Desmond J.Higham (1997): *Learning LATEX*, SIAM, Philadelphia.
[8] S.R. Otto and J.P.Denier (2005): *An Introduction to Programming and Numerical Methods in MATLAB*, Springer.
[9] C-K. Cheung, G. E. Keough, Robert H. Gross, Charles Landraitis (2009): *Getting Started with Mathematica*, Third Edition, John Wiley and Sons.
[12] SageMath – an open source mathematics software system: https://www.sagemath.org

Paper-II (MATHC2): Research and Publication Ethics (Compulsory course, 2 credits)

I: PHILOSOPHY AND ETHICS

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

II: SCIENTIFIC CONDUCT

1. Ethics with respect to science and research
2. Intellectual honest and research integrity
3. Scientific misconducts: falsification, fabrication, and plagiarism (FFP)
4. Redundant publications: duplicate and overlapping publications, salami slicing
5. Selective reporting and misrepresentation of data.

III: PUBLICATION ETHICS

1. Publication ethics: definition, introduction and importance
2. Best practices/standards setting initiatives and guidelines: COPE, WAME, etc.
3. Conflicts of interest
4. Publication misconduct: definition, concept, problems that lead to unethical behavior and vice verse, types
5. Violation of publication ethics, authorship and contributor ship
6. Identification of publication misconduct, complaints and appeals
7. Predatory publishers and journals

IV: OPEN ACCESS PUBLISHING

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

V: PUBLICATION MISCONDUCT

A. Group Discussions

1. Subject specific ethical issues, FFP, authorship
2. Conflicts of interest
3. Complaints and appeals: examples and fraud from India and abroad

B. Software tools: Use of plagiarism software like Turnitin, Urkund and other open source software tools.

VI: DATABASES AND RESEARCH METRICS

A. Databases

1. Indexing databases
2. Citation databases: Web of Science, Scopus, etc.

B. Research Metrics
1. Impact Factor of journal as per journal citation report, SNIP, SJR, IPP, Cite Score.
2. Metrics: h-index, g index, i10 index, altmetrics

Assessment:

Internal Assessment: 15 Marks
Final written examination at the end of the course: 35 Marks

References:
[1]. Alasdair MacIntyre (1966): *A Short History of Ethics*, Macmillan Publishers.
[2]. A. Bird (2006): *Philosophy of Science*, Routledge.
[3]. P. Chaddah (2018): *Ethics in Competitive Research: Do not get scooped; do not get plagiarized*, ISBN: 9789387480865.
[4]. National Academy of Sciences, National Academy of Engineering (US) and Institute of Medicine (US) Committee on Science, Engineering, and Public Policy (2009): *On Being a Scientist: A Guide to Responsible Conduct in Research*, Third Edition, National Academies Press.
[5]. Indian National Science Academy (INSA) (2019): *Ethics in Science Education, Research and Governance*, ISBN : 978-81-939482-1-7. https://www.insaindia.res.in/pdf/Ethics_Book.pdf
[6]. P. Oliver (2003): *The Student's Guide to Research Ethics*, Open University Press.
[7]. D.B. Resnik (2011): *What is Ethics in Research and Why is it Important?* National Institute of Environmental Health Sciences, 1-10.
https://www.niehs.nih.gov/research/resources/bioethics/whatis/index.cfm

Paper-III (MATHC3): Literature Review and Presentation

The research topic on which surveys are to be carried out depends on the supervisor.

Assessment:

A three-member committee (Supervisor, one member of the Departmental PhD Committee and one faculty member of the Department related to the subject) should be present in one-hour presentation followed by viva-voce.

Supervisor in consultation with the members of the committee will be submitting the marks.

Paper IV & V (MATHE4 & MATHE5): Reading Projects (4 credits each)

Two (02) Reading Projects are to be opted for with the supervisors of choice, after discussing with the departmental PhD committee.

Assessment:

The course content and assessment process is to be solely decided by the supervisors.