

SYLLABUS FOR MPhil PROGRAMME

(Effect from 2020-2022)



DEPARTMENT OF STATISTICS

THE UNIVERSITY OF BURDWAN, BURDWAN

Course Outline

Year	Semester	Course Code	Course Title	Credit Value	Marks Distribution
1 st (Course Work)	Sem-I	MPHIL101	Research Methodology	4	50
		MPHIL102	Research and Publication Ethics (RPE)	2	25
		MPHIL103	Statistical Computing	4	50
		MPHIL104	Term Paper	4	50
		Sub-Total		14	175
	Sem-II	MPHIL201	Statistical Techniques and Monte Carlo Methods	4	50
		MPHIL202	Statistical Methods	4	50
		MPHIL203	Term Paper	4	50
		Sub-Total		12	150
	2 nd	Sem-III & IV	MPHIL301	Dissertation	12
Presentation and Viva-Voce				4	50
Sub-Total				16	200
		Grand Total		42	525

Detailed Syllabus

Semester-I

MPHIL101

Research Methodology

50 Marks/ 4 Credits

1. Research Methods

25 Marks/ 2 Credits

- Meaning and Definition of Research, Types of Research, Research Process and Steps in it
- Search for existing literature, Review of literature on selected topic, writing up the review
- Review of research articles, Formulation of research problem, Presentation and Discussion of Research Problems
- Research Proposal and Report

References:

- CR Kothari (2004) : Research Mythology: Methods and Techniques, New Age International Publishers, ISBN (13): 978-81-224-2488-1
- Ranjit Kumar (2011) : Research Methodology a Step-by-Step Guide for Beginners, SAGE, ISBN : 978-1-84920-300-5

2. Brief History of Statistics

25 Marks/ 2 Credits

- PREHISTORY, BEGINNING OF HISTORY, AND THE TODDLING PERIOD
- NEW CONCEPTS AND METHODS—PRE-BAYESIAN ERA
- BEGINNING OF THE PRO-SUBJECTIVE APPROACH

References:

- Shoutir Kishore Chatterjee (2003): Statistical Thought: A Perspective and History, Oxford, DOI:10.1093/acprof:oso/9780198525318.001.0001
- Stephen Stigler (1986): The History of Statistics: The Measurement of Uncertainty Before 1900, Harvard University Press, ISBN: 9780674403413

MPHIL102

Research and Publication Ethics (RPE)

25 Marks/ 2 Credits

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

- Scientific Conducts:
 - 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.
- Publications Ethics:
 - Publications Ethics: definitions, introductions and importance. Best practices/standards setting initiatives and guidelines: COPE, WAME, etc. Conflicts of interest, Publications misconduct: definition, concept, problems that lead to unethical behavior and vice versa, types. Violations of publications ethics, authorship and contributorship; Identification of publication misconduct, complaints and appeals; Predatory publishers and journals.
- Open access publishing:
 - Open access publications and initiatives, SHERPA/RoMEO online resource to check publisher copyright and self-archiving policies, Software tool to identifying predatory publications developed by SPPU, Journal finder/ journal suggestion tools viz. JANE, Elsevier Journal Finder, Springer journal Suggester, etc.
- Publication Misconduct:
 - Group Discussions: 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.
- 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.

References:

- Bird, A. (2006). Philosophy of Science. Routledge.
- MacIntyre, Alasdair (1967) A Short History of Ethics, London.
- P. Chaddah, (2018) Ethics in Competitive Research: Do not get scooped; do not get plagiarized, ISBN: 978-9387480865.

- 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 Academies Press.
- Resnik, D.B. (2011). What is ethics in research and why is it important. National Institute of Environmental Health Sciences, 1-10, Retrieved from <https://www.niehs.nih.gov/research/resources/bioethics/whatis/index.cfm>
- Beall, J. (2012). Predatory publishers are corrupting open access. Nature, 489(7415), 179-179. <https://doi.org/10.1038/489179a>
- Indian National Science Academy (INSA), Ethics in Science Education, Research and Governance (2019), ISBN: 978-81-939482-1-7. http://www.insaindia.res.in/pdf/Ethics_Book.pdf.

MPHIL103

Statistical Computing

50 Marks/ 4 Credits

- R language and its applications in Statistics
- Python language and its applications in Statistics

References:

- Julian J. Faraway (2014): Linear Models with R , Chapman & Hall/CRC Texts in Statistical Science, ISBN (13): 978-1439887332
- Youngjo Lee, Lars Ronnegard, Maengseok Noh (2017): Data Analysis Using Hierarchical Generalized Linear Models with R, Chapman and Hall/CRC, ISBN (13): 978-1138627826
- Gareth M. James, Daniela Witten, Trevor Hastie, R J Tibshirani (2013): An Introduction to Statistical Learning: With Applications in R, Springer Texts in Statistics, ISBN (13): 978-1461471370

MPHIL104

50 Marks/ 4 Credits

Term Paper

25 Marks/ 2 Credits

- To write a review literature of a research paper.
- To discuss the result in that paper.
- Developing some results related to the paper.
- To discuss the merits and demerits of the paper.
- To discuss the conclusions according your views.

Presentation and Viva-Voce

25 Marks/ 2 Credits

Semester – II

MPHIL201

Statistical Techniques and Monte Carlo Methods

50 Marks/ 4 Credits

- Cluster Analysis, Linear and Quadratic Discriminant Analysis, Logistic Regression
- Bootstrap Methods for Estimating Bias and Standard Error.
- Classical Monte Carlo Integration, Importance Sampling and Acceleration Methods.
- Gradient Methods, Simulated Annealing, Monte Carlo Approximation, EM and MCEM Algorithm.

References:

- Myers RH, Montgomery, DC, Vining, GG(2010). Generalized Linear Models with Applications in Engineering and the Sciences, John Wiley & Sons, New York.
- B Efron. The Jackknife, the Bootstrap and other Sampling Plans.
- B. Efron & R. J. Tibshirani. An Introduction to Bootstrap.

MPHIL202

Statistical Methods

50 Marks/ 4 Credits

- Advanced Design of Experiments: General block design with uncorrelated and correlated error; Response surface design (first and second order) with uncorrelated and correlated errors; Industrial design of experiments.
- Regression Analysis: Basic regression analysis; Correlated regression analysis; Regression diagnostic.
- Survival Analysis: Basic survival analysis; Location-scale regression model; Extension of location-scale regression model.
- Demography: Mobility, migration-their environmental impact assessment; determinants and consequences of internal/ international migration; urbanization and migration in developed and developing countries; processes of sub-urbanization; rural urban continuum. Theory of migration, pull and push factors, Lee's theory of migration; Ravenstein's Law of migration. Peterson's typology; Stouffer's model of

Intervening opportunities and competing migrants; gravity models; Harris-Todaro Model of Migration.

References:

- Myers RH, Montgomery, DC, Vining, GG(2010). Generalized Linear Models with Applications in Engineering and the Sciences, John Wiley & Sons, New York.
- Khuri AI (2006). Response Surface Methodology and Related Topics, World Scientific Publishing Co, Ptc. Ltd.
- R.H. Myers and D.C. Montgomery, Response Surface Methodology, John Wiley and Sons, New York, 2002.
- J.F. Lawless, Statistical Models and Methods for Lifetime Data, John Wiley and Sons, New York, 2002.
- G.E.P. Box and R.N. Draper, Response Surface, mixtures and ridge analysis, 2nd ed., John Wiley and Sons, New York, 2007.
- D. J. Bartholomew: Statistics Model for Social Processes (3rd Edition).
- C. L. Chiang: Introduction to Stochastic Processes in Biostatistics
- H. S. Shryocket. al. :The Methods and Materials of Demography.
- P. R. Cox: Demography
- N. Keyfitz: Applied Mathematical Demography.

MPHIL 203 Term Paper(s) & Related Seminar Presentation(s)

MPHIL203

50 Marks/4 Credits

Term Paper

25 Marks/2 Credits

Presentation and Viva-Voce

25 Marks/2 Credits

Semester – III & IV

MPHIL301

200 Marks/16 Credits

Dissertation

150 Marks/12 Credits

Presentation and Viva-Voce

50 Marks/4 Credits