

Research Methods/Tools/ Writing (RTW) Course 3b: Tools for Research

Structure 3: PG Curricular Structure with Research only

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Prerequisite of the course (if any)
		Lecture (15 Hours)	Tutorial (00 Hours)	Practical (30 Hours)		
RTW 3b: Tools for Research	2	1	0	1	NIL	NIL

Course Objectives:

- To develop practical skills for conducting statistical research using modern computational tools.
- Familiarise students document preparation, data analysis, and visualisation tools.
- To equip students for applying programming and numerical methods to data-based analytics.

Course Learning Outcomes:

After successful completion of this course, the students will be able to:

- Perform advanced data analysis using SPSS, Excel, and Minitab/Stata.
- Handle the data from various well known platforms.
- Apply simulation, MCMC, and bootstrap methods in statistical computations.
- Solve algebraic, transcendental, and matrix problems using numerical methods.

Unit I (7 hours)

Use of Statistical spreadsheets for data management and analysis: SPSS, Excel/ Minitab/STATA.

Unit II (7 hours)

Data handling through analytic platforms, Eviews/ITSM.

Unit III (8 hours)

Methodology of Inverse Transformation method and Acceptance-Rejection algorithm for simulating data from some selected statistical distributions.

Unit IV (8 hours)

Algorithms for solving algebraic and transcendental equations, Numerical integration, Matrix operations and applications in Statistics by using R/ Python.

Essential Readings:

1. Bass, I. (2007). *Six Sigma Statistics with Excel and Minitab (Vol. 7, p. 386)*, New York, McGraw-Hill.
2. Bryman, A. & Cramer, D. (2012). *Quantitative Data Analysis with IBM SPSS 17, 18 & 19: A Guide for Social Scientists*, Routledge.
3. McKinney, W. (2022). *Python for Data Analysis: Data Wrangling with pandas, NumPy, and Jupyter*, O'Reilly Media.
4. Pannerselvam, R. (2006). *Research Methodology*, Prentice-Hall of India Pvt.
5. Rizzo, M.L. (2019). *Statistical Computing with R*, Chapman & Hall/CRC Press.

Suggested Readings:

1. Press, W.H., Teukolsky, S.A., Vetterling, W.T. and Flannery, B.P (2007). *Numerical Recipes: The Art of Scientific Computing*, Cambridge university press.
2. Rasch, D., Pilz, J., Verdooren, L.R. and Gebhardt, A. (2019). *Exploratory Data Analysis in Business and Economics: An Introduction Using SPSS, Stata, and Exce*, Springer Cham.
3. Robert, C.P. and Casella, G. (2004). *Monte Carlo Statistical Methods*, Springer Science, Springer.

Practical:

- Exploring use of statistical tools and techniques using software taught in class.