Title: Research Methodology (JEE613)

Number of credits: 3

Semester: 2/2025

Level of study: Masters and PhD

Course instructor: Prof. Dr. Shabbir H. Gheewala (assisted by Dr. Awais Mahmood, Dr. Ahsan Farooq, and Dr. Haseeb Akbar)

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Course description: This is an introductory course of research methods for postgraduate students preparing them to learn advanced research methods in their respective fields. It is designed to understand the general techniques for conducting research independently in various fields. As publishing your research articles in reputed journals is an important part of the research, therefore, the course emphasis on learning to write and publish scientific journals. By the end of this course, the students should be able to design, conduct, and communicate their research and critically evaluate the research of others.

Evaluation criteria:

Component	**Marks**
Midterm exam	15
Final exam	15
Assignments	70
Total	100

Learning Outcomes

Students will be able to

1. Apply critical thinking when reading research papers or other articles
2. Make reasonable assumptions and estimates of data
3. Understand the relevance of basic statistics techniques for research
4. Communicate research results in a scientific manner
5. Understand the ethics of research and publications

Week	Course contents (tentative)
1	Course introduction ➢ Course structure ➢ Requirements of the course Introduction to research ➢ Purpose of research ➢ Types of research ➢ Role of prior knowledge in conducting research
2	Ethics and Good Practice in Research ➢ Transparency/ authenticity/ honesty ➢ Plagiarism ➢ Submission Reading skills ➢ Skimming, scanning, summarization, and speed
3	Scientific writing skills ➢ Rephrasing and summarization ➢ Practice in writing a good, unified, and coherent paragraph ➢ Precise and comprehensive writing Presentation skills ➢ Personality development (emphasis on content, style, and pronunciation)
4	Systematic literature reviews ➢ Database, search engines ➢ Collecting/ selecting the relevant articles ➢ Identifying the objectives, novelty, scope, and findings ➢ Critical analysis and evaluation ➢ Writing the literature review
5	Defining your research question ➢ Research hypothesis, gaps, problems, and questions Research proposal writing technique ➢ Feasibility ➢ Proposed methodology ➢ Time schedule ➢ Expected results
6	Designing your research Data collection methods Numerical measurements
7	Data sampling ➢ The logic of sampling, concepts and terminologies, population and sampling frames, types of sampling design Data Collection Techniques Quantitative and qualitative data, Experimental research, Case studies, Surveys, Interviews, Questionnaire
	Midterm exam
9	Introduction to basic statistics-Part1 ➢ Central tendency ➢ Variability
10	Introduction to basic statistics-Part2 ➢ Charts, tables and graphs ➢ Probability, the normal curve, and z-score

11	Introduction to basic statistics-Part3 ➢ Hypothesis testing ➢ Correlation
12	Introduction to basic statistics-Part4 ➢ Regression analysis ➢ Missing data handling
13	Reporting results Interpreting the results ➢ Qualitative data ➢ Quantitative data
14	Scientific writing skills-Part 1 Types of papers Contents of research papers ➢ Title, name, authors contribution, affiliation, abstract, graphical abstract, keywords, introduction, methodology, results and discussion, conclusion and recommendations, acknowledgement, references
15	Scientific writing skills-Part 2 Scientific language and presentation Objectives, novelty, and application of your work Publishing your work ➢ Choosing the right journal ➢ Formatting ➢ Databases of journals
	Final exam

Textbooks

Will be announced later