Title: Research Methodology (JEE613)

Number of credits: 3

Semester: 1/2025

Level of study: Masters and PhD

Course instructor: Prof. Dr. Shabbir H. Gheewala

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1. 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 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.

To equip students with foundational knowledge and skills in research methodology, the course emphasizes systematic approaches to designing, conducting, and analyzing research. Key topics include defining research problems, literature review, research design, data collection techniques, and data analysis methods. The course is designed to develop critical thinking and analytical skills, enabling students to apply research methods to real-world problems in their respective fields.

2. Target Knowledge, Skills, and Abilities (KSA)

This course provides students with:

- Knowledge of the principles and practices of research methodology.
- Skills in developing research proposals and conducting empirical research.
- The ability to critically evaluate research studies and apply appropriate methodologies to specific problems.

3. Target Group of Students

The course is open to Master's and PhD students from various disciplines, including energy and environment. It is also suitable for non-degree students from academia, industry, and government sectors who are interested in acquiring research skills.

4. Pre-requisites

This is an introductory course; hence, there are no formal prerequisites. However, a basic understanding of academic writing and statistics is beneficial.

5. Course Learning Outcomes (CLOs)

CLO 1: Apply critical thinking when conducting research.
CLO 2: Formulate clear and concise research questions and hypotheses.
CLO 3: Design appropriate research strategies and methodologies for specific research problems.
CLO 4: Analyze and interpret qualitative and quantitative data.
CLO 5: Demonstrate ethical considerations in research.

6. Method of Teaching and Learning

The course will be delivered in a hybrid format, combining online and on-site lectures, workshops, and presentations. On-site sessions are recommended for students, especially for interactive workshops and group discussions. Online options will be available, if needed for students outside Thailand.

7. Course Outline and Organization

This course is offered every semester. For the Semester 2/2024, the course will take place every Tuesday morning, 9:00 AM – 12:00 PM, starting from [28 January 2025].

8. Evaluation Methods

- Midterm exam: 20%
- Final exam: 20%
- Assignments: 60%
- Total: 100%

Subject Outline

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

9. Guided References/Resources

Textbooks

- Bueno de Mesquita, E. & Fowler, A. (2021). *Thinking Clearly with Data. A Guide to Quantitative Analysis and Reasoning*. Princeton University Press.
- Kumar, R. (2019). *Research Methodology: A Step-by-Step Guide for Beginners*. Sage Publications.
- Agresti, A., & Franklin, C. (2007). *The art and science of learning from data.* Upper Saddle River, New Jersey, 88.
- Creswell, J.W. (2018). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. Sage Publications.
- Bryman, A. (2015). *Social Research Methods*. Oxford University Press.

Internet Resources

- Research Methods Knowledge Base: https://conjointly.com/kb/
- Sage Research Methods: https://methods.sagepub.com/
- Ethics in Research: https://www.apa.org/ethics/code/index