

Semester:	5		
Course Code:	ENCM 41702		
Course Name:	Research Methodology		
Credit Value:	2		
Status:	Compulsory for BSc Honours in ENCM degree		
Pre-requisite:	ENCM 22802		
Co-requisite:	None		
Hourly breakdown:	Theory	Practical	Independent Learning
	24	18	58

Intended Learning Outcomes:

After completion of this course unit, the student will be able to:

1. describe the sequential steps in a research process,
2. explain research methods used in scientific investigations and discuss their applicability in environmental management research,
3. demonstrate competencies in experimental designing with different sampling strategies in scientific investigations,
4. develop a research proposal for solving an identified research problem,
5. identify the stipulated requirements for scientific writing of a dissertation, research papers, abstracts/extended abstracts for research conferences,
6. demonstrate competencies in writing a scientific document with appropriate citing and listing of references,
7. identify ethical considerations in the context of scientific research, and
8. demonstrate competencies in presenting research proposals and research posters.

Course Content:

Introduction to scientific research: Inductive and deductive approaches to research, research philosophy and scientific method and sequential steps in the research process. Locating scientific literature using library and online databases: Google scholar, Web of Science, PubMed, ScienceDirect, Scopus and ResearchGate, Mendeley with e-library. Reviewing literature, writing a review, identification of knowledge gaps, formulating a research problem, postulating hypotheses, formulating main and specific objectives. Reference styles and reference generator: EndNote, BibMe, EasyBib, Mendeley with e-library, Word plugin. Research methods in pure and applied sciences: descriptive studies, comparative studies, experiments (manipulative methods), modeling, surveys (mensurative methods) and case studies and meta-analysis. Factors to be considered at the planning stage of a research. Experimental designs: Completely Randomized Design (CRD), Randomized Complete Block Design (RCBD), Matched Pairs Design, Latin Square design. Research data: data types and data collection methods. Introduction to sampling: populations, samples, sampling unit, and sample size. Probability sampling techniques: Judgmental sampling, Simple random sampling, Stratified sampling, Transect sampling, Systematic sampling, and Cluster sampling. Results presentation techniques: tables, graphs, charts, flow charts, kite diagrams, and preparing appropriate captions for the above. Compiling a research proposal for solving the identified research problem: brief literature review, identification of research problem, postulate hypotheses, formulation of objectives, justification of the research, proposed research design and data analytical methods, expected research outputs and outcomes,

budgeting, the time frame (Gantt charts), references. Effective academic writing methods: guidelines for writing a dissertation, manuscripts for a peer-reviewed journal, abstracts and extended abstracts at research conferences/symposia. Disseminating research findings: poster and oral presentations. Research ethics: role and responsibilities of being a researcher, honesty and integrity, ethical concerns related to research process, research publication. Requirements for ethical clearance. Plagiarism checking software.

Practical sessions on: Determination of sample size. Probability sampling techniques; simple random sampling, stratified sampling, transect sampling, systematic sampling and cluster sampling. Developing research proposals for identified research problems. Presentations on research proposals. Designing effective research posters.

Teaching/ Learning Methods:

A combination of lectures, assignments, and student seminars.

Assessment Strategy:

Continuous assessment and end of semester examination. Percentage given for each sub-component indicates the percent contribution to the final marks.

Continuous Assessment 40 %		Final Assessment 60 %		
Details:		Theory	Practical	Other
Assignments	20	60	-	-
Practical reports	10			
Oral presentation	10			

Recommended Readings:

1. Creswell, J. W. (2009). Research Design. Sage Publications Inc. California.
2. Hofmann, A. H. (2009). Scientific writing and communication: Papers, proposals and presentations, Oxford University Press.
3. Kumar, R. (2005). Research Methodology, Pearson Education, Australia.
4. Comstock, G. (2013). Research Ethics (A Philosophical Guide to the Responsible Conduct of Research). Cambridge University Press. Cambridge.
5. Peer reviewed scholarly literature on environmental management research.