SCHOOL OF PURE AND APPLIED SCIENCES

COURSE OUTLINE

DEPARTMENT: PURE AND APPLIED SCIENCES

PROGRAMME: PhD PURE MATHEMATICS

YEAR: 1   **SEMESTER:** II

UNIT CODE: SPM 4106   **UNIT TITLE: COMPUTATIONAL MATHEMATICS**

CONTACT HOURS: 45 HOURS   **CREDIT HOURS**: 45 HOURS

LECTURER:: Dr. Kilai Mutua

LECTURER CONTACTS: Email: kmutua@kyu.ac.ke   **Mobile No:** 0719 749 965

Pre-Requisite: None

Course Purpose

Equip the learner with the skills necessary to carry out research for decision making and for solving practical management problems in a dynamic business world.

Course Outcomes

By the end of the course the learner should be able to:

1. Explain basic research concepts

2. Discuss relevant tools and skills in conducting research

3. Explain common types of data applied in business research

4. Write a research proposal.

5. Collect and analyze data

6. Write a Research Report

Course Description

Types of Research; Application Perspective, Objective perspective, Mode of enquiry perspective. Paradigms of research, Research process; an eight- step model-deciding what to research, planning what to research, conducting a research study. Formulating a Research Problem; Reviewing the literature, formulating a research problem in qualitative approach, sources of research problem, the study population, establishing operational definitions. Identifying variables; difference between a concept and a variable, converting concepts into variables, types of variables, types of measurement scales.

Processing and Displaying Data; Data processing in quantitative studies, developing a frame of analysis, analysing quantitative data manually, data processing in qualitative studies, role of statistics and computers in research. Displaying data; methods of communicating and displaying data:-text, tables, graphs, statistical measures, Writing research report: developing a draft outline, writing about variables, referencing, writing a Bibliography. Mathematical Writing in LaTeX document processing system: cross referencing, diagram inclusion, sectioning, document classes, LaTeX packages, mathematics computation and analysis using softwares such as R, Matlab, SAGE, GAP, Mathematica, python.

Work Plan

Week	Topic/Sub-Topic	Course Content
1	Types of Research	- Application perspective - Objective perspective - Mode of Enquiry Perspective
2	Paradigms of Research	- Research process - An eight-step model deciding what to research - Planning what to research - Conducting a research study
3	Formulating a Research Problem	- Reviewing the literature - Formulating a research problem - Sources of research problem - Study population - Establishing operational definitions
4	Identifying variables	- Difference between a concept and a variable - Converting concepts into variables - Types of Variables and measurement levels - Constructing hypothesis - Types of hypothesis methods
5	**CAT 1**	
6	Conceptualizing a study design	- The research design - Selecting a research design - Study designs in qualitative research
7	Constructing an Instrument for Data Collection	- Selecting a method for data collection - Methods of data collection - Collecting data using attitudinal scales
8	Validity and Reliability of Research Instrument	- Sample size selection
9	Writing a research proposal	- Collecting and displaying data
10	Displaying data	- Methods of communicating data - Writing reports
11	**CAT 2**	
12	Mathematical Writing in LaTeX	- Cross referencing - Diagram inclusion
13	LaTeX Writing	- Sectioning - Document classes - LaTeX packages
14	LaTeX Writing	- Mathematics computation - Analysis using softwares - R, Python and Matlab

Teaching Methods

The course will be delivered using lectures, case studies, videos, group discussions, presentations, role playing and invited guest speakers.

Instruction Material/Equipment

Computers/internet, Overhead projector and LCD, whiteboard, flipcharts.

Course Assessment

Continuous Assessment Tests:	40%
End of Semester Examination:	60%
Total:	**100%**