



MASENO UNIVERSITY  
FOUNTAIN OF EXCELLENCE

eLearning



University of  
Reading



STATISTICAL  
SERVICES CENTRE

**36%** LIVE ON LESS  
THAN ONE DOLLAR PER DAY

HEIGHT OF KILIMANJARO 19,340 FEET 

**14%** WORLD POPULATION **53 COUNTRIES**

**12 MILLION**  **31%** SECONDARY SCHOOL ENROLLMENT

**6** AVERAGE CHILDREN EACH WOMAN BEARS **44%** POPULATION IS UNDER FIFTEEN **ONE THOUSAND+ LANGUAGES**

**80%** MALARIA DEATHS UNDER 5 ARE CHILDREN

**114B. BARRELS** IN 2ND MOST POPULOUS CONTINENT **6%** OF WORLD'S SURFACE AREA **900** PEOPLE, 000,000 

NUMBER ONE CONTINENT

**26,828** SQUARE MILES IN LAKE VICTORIA

*Putting the learner first*

# Basic Statistics (eSTATS) eLearning Programme

SCHOOL OF MATHEMATICS, STATISTICS AND ACTUARIAL SCIENCE



ISO 9001:2008  
CERTIFIED

## Introduction

This eLearning module leads to a Certificate in Basic Statistics. It can also be taken as a prequalification for a Masters' level degree in Statistics and related studies. The participant will learn and practice the skills necessary for statistical data analysis. The module adapts a balanced approach, including a theoretical underpinning, analytical tools and practical application of the learning. It puts less emphasis on hand calculations in order to allow students more time to understand the key concepts and the computer outputs. The data used for practical sessions will be realistically sized data sets.

## Background

We live in times when intuition has minimal or no role in decision making in all sectors of society. Strengthening the evidence-base for decision making in developing countries is now more important than ever. The decision-makers often need statistics – a subject in which a number of people are not well grounded. This is exacerbated by the professionals not using their statistical knowledge regularly to gain the required confidence. This module provides the student the opportunity to put into use, recent developments in the subject including the use of statistical software for the analysis of data. The module intends to make the subject more accessible and relevant.

## Aim of the Module

The ultimate aim of the module is to provide participants with the ability to:

- manage data
- analyse data using statistical software
- interpret results of a statistical analysis objectively

## Module Outcome

At the end of the module, participants will be able to:

- use statistical software to describe, analyse and model statistical data
- produce a statistical report of the analysis of a data set
- interpret statistical information provided on published papers, journal articles, books and other sources

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## Admission Requirements

To be eligible for registration for the module, the student must provide evidence of an academic qualification of at least or equivalent to:

- a diploma of Maseno University
- at least grade C aggregate at KCSCE plus experience in a data handling environment.

The ultimate target groups are research students and any other person who is required to collect and analyze data and then interpret and report their findings.

## Duration and Structure of the Module

The module has 8 topics which run for 10 weeks. It is offered by the eCampus, Maseno University on their Learning Management System as an on-line course. Participants are expected to fulfil all prerequisites, including the 1-week Online Orientation to eLearning. The Orientation enables participants to navigate the eLearning portal with ease. During the Orientation, participants will be guided on installing a statistical package on their computers for the practical sessions. The Statistical Software may include but will not be limited to: Instat, Genstat 14th Edition and R.

## Assessment

On-line quizzes, assignments, on-line discussions in every Topic and the written statistical report constitute the assessment of the module. An aggregate mark above 40% constitutes a pass and will be certified.



# Module Content

## TOPIC 1: DESCRIBING DATA

Time required: 2 weeks

- role of Statistics in your study area
- variables, data types and measurement levels
- numerical and graphical summary of numerical data
- numerical and graphical summary of categorical data

## TOPIC 2: PROBABILITY DISTRIBUTIONS

Time required: 1 week

- sample data versus population level data
- sampling distribution versus underlying population distribution
- the histogram and the probability density
- shapes of distributions
- the normal distribution
- means, variability and the normal distribution

## TOPIC 3: SAMPLING DISTRIBUTION

Time required: 1 week

- sampling distribution of a sample mean
- variability in the sampling distribution
- standard deviation versus standard error
- standard error of mean
- confidence intervals for the population mean
- sampling distribution of a sample proportion
- standard error of a proportion
- confidence intervals for a proportion

## TOPIC 4: HYPOTHESIS TESTING

Time required: 1 week

- comparing two groups – the paired data situation
- the null and the alternative hypothesis
- relating confidence intervals with hypothesis testing
- p-values

## TOPIC 5: COMPARING MEANS AMONG TWO (OR MORE) INDEPENDENT POPULATIONS

Time required: 1 week

- confidence intervals for mean difference between two independent populations
- two sample t-Test
- small samples
- large samples
- non-parametric alternative
- mann whitney test
- comparing means amongst more than two independent populations: Analysis of Variance

## TOPIC 6: COMPARING PROPORTIONS BETWEEN TWO (OR MORE) INDEPENDENT POPULATIONS

Time required: 1 week

- using Confidence intervals for difference in proportions between two independent populations
- large sample methods for comparing proportions between two populations
- normal method
- chi-square test
- fisher's exact test
- measures of Association: risk difference, relative risk and the odds ratio
- sampling behaviour of relative risks/odds ratios

## TOPIC 7: STATISTICAL MODELLING

Time required: 1 week

- review of equation of a straight line
- independent and dependent variables
- scatter-diagram
- correlation coefficient
- estimating the regression equation
- accounting for uncertainty in the estimates – confidence intervals for regression coefficients
- hypothesis testing  $H_0 : \rho = 0$
- ANOVA and regression analysis

## TOPIC 8: PUTTING IT ALL TOGETHER

Time required: 1 week

- writing a statistical report

