



MASENO UNIVERSITY

UNIVERSITY EXAMINATIONS 2013/2014

**THIRD YEAR FIRST SEMESTER EXAMINATIONS FOR THE DEGREE
OF BACHELOR OF SCIENCE IN ENVIRONMENTAL SCIENCE WITH
INFORMATION TECHNOLOGY**

(MAIN CAMPUS)

NES 303: ENVIRONMENTAL STATISTICS I

Date: 4th April, 2014

Time: 11.15 - 1.30pm

INSTRUCTIONS:

- Answer QUESTION ONE and any other TWO questions.
- Illustrate your answers with suitable examples, diagrams and figures whenever appropriate.



1. (a) An environmentalist is interested on establishing the relationship between income levels of people and frequency of dumping of solid waste in the skips placed within Migosi estate in Kisumu City. The table below shows the monthly income levels of respondents in Kenya shillings and frequencies.

Monthly income levels('000)	Frequencies
90 – 100	5
81 – 90	7
71 – 80	10
61 – 70	15
51 – 60	16
41 – 50	20
31 – 40	12
21 – 30	8
11 – 20	6
1 – 10	2
Total	101

- (i) Construct a histogram and frequency polygon. [12 marks]
- (ii) Give the advantages of frequency polygon and histogram in environmental data analyses. [3 marks]
- (b) The table below shows the heights of the tree seedlings and age of the seedlings in months. In order to make statistical inference, the data must be normally distributed and hence the normality must be tested.

Height (inches)	Age (months)	Frequency
59.5– 62.5	61	5
63.5– 65.5	64	18
66.5– 68.5	67	42
69.5– 71.5	70	27
72.5– 74.5	73	8

Calculate the skewness and kurtosis, and interpret the results. [15 marks]

2. Estimated populations of birds in 25 counties in Kenya are given below.

547, 495, 562, 631, 548, 543, 557, 512, 566, 582, 545, 535, 542, 601, 576,
562, 531, 531, 529, 564, 612, 573, 584, 503

- (a) Make a back-to-back stem and leaf plot of populations. [8 marks]
- (b) Explain the distribution of the data and the application of stem and leaf plot in environmental data analyses. [4 marks]
- (c) Calculate the measures of central tendency and explain their advantages and limitations. [8 marks]
3. The data below show the distribution of the body weight (g) of fish species caught in various fish ponds containing pollutants.

54.7, 49.5, 56.2, 63.1, 54.8, 54.3, 55.7, 51.2, 56.6, 58.2, 54.5, 53.5, 54.2, 60.1,
59.7, 57.6, 56.2, 53.1, 53.1, 52.9, 56.4, 61.2, 57.3, 58.4, 50.3, 37.5, 45.6, 39.4,
46.7, 42.8, 43.6, 48.2, 44.5, 49.0, 50.6, 41.6, 38.8, 39.7, 41.6, 42.1, 44.3, 43.2,
48.9, 37.1, 45.3, 46.4, 47.1, 44.3, 43.7, 40.4

Demonstrate methods of exploring the data and measuring variability of the data. [20 marks]

4. The following table shows the frequency of occurrence of Sitatunga (*Tragelaphus spekii*) in 7 Counties in Kenya

County	Frequency
Nandi	150
Kericho	40
Trans Nzoia	30
Narok	100
Kajiado	50
Samburu	70
Baringo	20
	10

- (a) Draw appropriate graphic representation of a frequency distribution. [10 marks]
- (b) Elucidate the importance of normal distributions in statistics. [2 marks]

- (c) The concentration of the pollutant cadmium in five streams has a mean of 10ppm and standard deviation of 2ppm. Using the 68%- 95%- 99.7% rule for normal distributions, calculate and illustrate the lowest and highest concentrations. [8 marks]

5. (a) The table below shows data relating human activities to environmental pollution.

	Agricultural pesticides	Industrial emissions
Water pollution	900	200
Air pollution	100	800

Use appropriate measure to calculate statistical association between human activities and environmental pollution. Explain the implications of the associations. [7 marks]

- (b) The table below shows data relating air pollution to industrialisation.

Air Pollution	Less industrialised	Middle industrialized	Highly industrialized
High	200	400	700
Medium	500	900	400
Low	800	300	100

Use appropriate measure to calculate statistical association between air pollution to industrialisation. Explain the implications of the associations. [13 marks]