UNIVERSITY OF ESWATINI
RE-SIT EXAMINATION PAPER 2018/2019

TITLE OF PAPER: BIOSTATISTICS

COURSE CODE: BIO301

TIME ALLOWED: THREE (3) HOURS

INSTRUCTIONS: 1.   QUESTION 1 IN SECTION A IS COMPULSORY AND IT CARRIES 50 MARKS

2.   ANSWER **ANY TWO** QUESTIONS IN SECTION B

2.   EACH QUESTION IN SECTION B CARRIES TWENTY FIVE (25) MARKS.

3.   USE CLEARLY LABELED DIAGRAMS WHERE APPROPRIATE.

4.   CLEARLY STATE YOUR NULL AND ALTERNATIVE HYPOTHESES AND YOUR CONCLUSIONS WHERE APPROPRIATE

5.   SHOW ALL CALCULATIONS WHERE APPLICABLE

SPECIAL REQUIREMENTS:

1.   CALCULATORS (CANDIDATES MUST BRING OWN).

2.   GRAPH PAPER WILL BE SUPPLIED

3.   STATISTICAL TABLES (TO BE SUPPLIED WITH THE EXAM PAPER).

THIS PAPER IS NOT TO BE OPENED UNTIL PERMISSION HAS BEEN GRANTED BY THE INVIGILATORS

SECTION A (Compulsory)
Question 1

(a) The following data were collected by a researcher regarding the time studied and scores obtained.

Test score (%)	Time studied (min)
88	120
80	105
76	106
83	108
55	98
62	97
67	99

(i)   Is there a significant correlation between the amount of time a student studied and their test score?

[15 marks]

(ii) Present these data in an appropriate graph.

[10 marks]

(b)   The scores for prospective UNESWA students who took the Mature Age Entry Exam (MAEE) in 2016 had a mean of 490 and a standard deviation of 100. The distribution of MAEE scores is normal.

(i)   What % of applicants scored between 390 and 590 in this MAEE test?
[5 Marks]

(ii)   One student scored 795 in this test. How did this student do compared to the rest of the scores?   [5 Marks]

(iii)   A rather strict Programme at UNESWA only admits students who are among the top 16% of the scores in this test. What score would a student need on this test to be qualified for admittance to this programme?
[5 Marks]

(c) An airport company is studying the noise levels of jets during take-off as they pass over a neighbourhood. They find that the mean noise level is 103 decibels (dB) and the standard deviation is 5.4 dB. The distribution of noise levels for all jets during take-off over this neighbourhood has a normal distribution.

(i) What proportion of these jets have a noise level of 95 dB or less when taking off?   [5 Marks]

(ii) What is the probability that one jet would have a noise level that is between 100 and 110 dB?   [5 Marks]

[Total MARKS = 50]

SECTION B (Answer any two questions in this section)

Question 2

(a)   If, in a binomial population, p = 0.22 and n = 5, what is the probability of X= 4?
[2 mark]

(b)   If, in a Poisson distribution, μ = 1.3, what is P(0)   [2 marks]

(c)   (i) When is it necessary to perform data transformation?   [4 marks]

         (ii) List any three data transformation methods and give the data types they use.   [6 marks]

(d)   What minimum conditions are required in order to perform an unbiased
        chi-square test?   [2 marks]

(d)   In an experiment to determine the mode of inheritance of the 'green bomber'
        mutant housefly, 146 wild type and 30 mutant offspring were obtained when
        F_1 generation houseflies were selfed. Test whether the data agrees with the
        hypothesis that the ratio of wild types to mutants is 3:1.   [9 marks]
[TOTAL MARKS: 25].

Question 3

Awande and Bongani studied the survival time of goldfish (in minutes) when placed
in colloidal silver suspensions. They used three different treatments, which differed in
the concentrations of silver and documented the fish survival times. Here's a list of
the survival times:

Observation	Survival times (minutes)		
	Treatment 1	Treatment 2	Treatment 3
1	210	150	330
2	180	180	300
3	240	180	300
4	210	240	420
5	210	240	120

Given that the variances of the three groups are not equal, investigate whether the
survival times are equal between the three groups.

[TOTAL MARKS: 25].

Question 4

It is hypothesized that students that use a statistical computer package, such as Minitab, do better in introductory statistics courses than those who don't. A random sample of 24 students uses a statistical computer package while taking statistics. Another random sample of 28 students taking the same course uses only hand-held calculators. The final average in the course is recorded for each of these students. The data are as shown below.

Is there sufficient evidence to conclude that students who do not use the computer have lower averages at 95% confidence level?

[TOTAL MARKS: 25]

Question 5

a) Discuss what constitutes a scientifically acceptable research question. [10 Marks]
b) Explain the five basic steps that need to be followed to achieve a scientifically correctly designed experiment. [15 Marks]

[TOTAL MARKS: 25]

END OF EXAM PAPER