AFRICA UNIVERSITY
(A United Methodist-Related Institution)

"Investing in Africa's Future"

FACULTY OF HEALTH SCIENCES

2015 FIRST SEMESTER EXAMINATIONS

COURSE CODE: SNS 401

COURSE TITLE: INTRODUCTION TO EPIDEMIOLOGY & BIOSTATISTICS

DATE: NOVEMBER-DECEMBER 2015

TIME: 3 HOURS

INSTRUCTIONS

Answer ALL Questions in Section A and ANY 3 questions from Section B

The mark allocation for each question is indicated at the end of the question

SECTION A

QUESTION 1

1a Define the following terms as used in Statistics

i. Ordinal and nominal scale [4]

ii. Ratio and Interval scale [4]

iii. Qualitative and quantitative data [4]

1b Distinguish between

i. Descriptive and Inferential statistics

ii. Parameter and Statistic

iii. Population and Sample

iv. Data and Variable

v. Standard deviation and Standard error

vi. type 1 and type 2 errors in hypothesis testing [12]

QUESTION 2

a). Define and describe the three essential characteristics that are examined to study the cause(s) for disease in analytic epidemiology. [4]

b). Define and describe the three essential characteristics of disease that we look for in descriptive epidemiology [4]

QUESTION 3

Define Epidemiology and state any 5 of its uses. [8]

SECTION B

QUESTION 4

A mammogram detects 250 positives for breast cancer, of which 180 are incorrect and 750 negatives, of which 30 are incorrect.

a. Construct a 2 x 2 table to measure the diagnostic performance of a mammogram for breast cancer [4]

TEST	CANCER	NO CANCER	TOTAL
+			
-			
TOTAL			

b. What is the sensitivity, specificity of the mammogram [4]

c. What is the false positive and false negative rate? [4]

d. What is the positive and negative predictive value? [4]

e. What is the accuracy of the mammogram? [4]

QUESTION 5

Define following terms and give the formulae for calculating each

i. Attack rate [3]

ii. Secondary attack rate [3]

iii. Epidemic [3]

iv. Endemic [3]

v. Pandemic [3]

In a community of 800 households with a population of 4799 health workers found 120 persons with scabies. A total of 480 persons lived in the 80 affected households. Assuming that each household had only one primary case, calculate the secondary attack rate [5]

QUESTION 6

Distinguish between a Cohort and Case-Control study design [6]

b). For the following situations, state the study design and the reason.

i. A study in which children are randomly assigned to receive either a newly formulated vaccine or the currently available vaccine, and are followed to monitor for side effects and effectiveness of each vaccine. [2]

ii. The Zimbabwe Women's Health Study, in which researchers enrolled 41,837 women in 1986 and collected exposure and lifestyle information to assess the relationship between these factors and subsequent occurrence of cancer [2]

iii. MoHCC investigators conducted a study to compare measles-mumps-rubella (MMR) vaccine history among 1,294 children with pervasive development disorder (e.g., autism and Asperger's syndrome) and 4,469 children without such disorders. (They found no association.) [2]

c). Define and describe the three essential characteristics that are examined to study the cause(s) for disease in analytic epidemiology. [4]

d). Define and describe the three essential characteristics of disease that we look for in descriptive epidemiology [4]

QUESTION 7

Suppose you have data on age and systolic blood pressure (SBP) from a random sample of 16 adult females. The data are presented as follows:

Subject	Age (years)	SBP (mmHg)
1	22	131
2	24	116
3	28	114
4	29	123
5	30	117
6	32	122
7	35	121
8	41	171
9	47	111
10	49	133
11	51	130
12	51	133

a). State the dependent and independent variables. [2]

b). Draw a scatter plot of age (years) against SBP (mmHg) [3]

c). Copy and complete the table below [3]

SBP	age			
y	x	yx	y2	x2
131	22			
116	24			
114	28			
123	29			
117	30			
122	32			
121	35			
171	41			
111	47			
133	49			
130	51			
133	51			

d). Calculate the correlation coefficient (r) and comment [4]

e). Compute b_0 and b_1 and hence write down the regression equation connecting Age and SPB [8]

QUESTION 8

a). You want to determine the mean blood pressure among government employees. In order to do this, you measure the blood pressure of 200 employees. Use the descriptive statistics below to determine a 95% Confidence Interval around the mean.

N = 300; $\bar{x}$ = 137mmHg; s = 15mmHg. [5]

b). Interpret the 95% CI you calculated in (a) above. [3]

c). You record gestational age at birth for live births in the past month at three primary health facilities in the region. The following statistics were obtained:

n = 250 $\bar{x}$ = 36.5 weeks s = 10.2

(i) Calculate the standard error of the mean. [3]

(ii) Find the 95% confidence interval [6]

(iii) State and Interpret the interval [3]