



LEAD CITY UNIVERSITY
Faculty of Social and Management Sciences
Department of Economics

COURSE PARTICULARS

Course Code: ECO 214
Course Title: Applied Statistics II
Number of Units: 2
Status: Compulsory

LECTURERS DETAIL

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Area of Specialization:		Monetary Economics

COURSE DESCRIPTION

Index numbers; Analysis of time series data; introduction to correlation theory; simple/multiple regression, interpretation of its results; standard error, t-statistics; F-statistics, Adjusted R^2 ; matrices and its application; the use of Cramer's Rule; reliability and confidence levels and introduction to the analysis of variance (ANOVA)

COURSE OBJECTIVES

The students, at the end of the course should be able to:

- Have an understanding of analysis of time series
- Have knowledge about correlation and regression
- Understand different types of comparison methods

ASSESSMENT

Test 30 marks,
Exam 70 marks,
Total 100 marks

TEACHING PLAN

Week	Topic
Week 1	Index numbers Tutorials
Week 2-3	Analysis of time series data Tutorials
Week 4-5	Introduction to correlation theory Tutorials
Week 6-7	Simple regression and interpretation of its results Tutorials
Week 8	Matrices and its application Tutorials
Week 9	The use of Cramer's Rule Tutorials
Week 10	Multiple regression and interpretation of its results Tutorials
Week 11	Standard Errors, T-statistics, F-statistics and adjusted R^2 Tutorials
Week 12	Introduction to the analysis of variance (ANOVA) Tutorials

READING LISTS

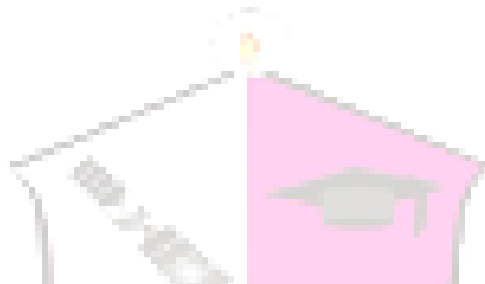
Murray R. Spiegel. (2008) Schaum's Outline of Theory and Problems of Statistics. Forth Edition in SI Units. McGRAW-HILL BOOK COMPANY

Laurence C.Hamilton (1995) Data Analysis for Social Scientists. A first course in Applied Statistics. An international Thomson publishing company

Mathematics for Economics and Business by IAN JACQUES fifth Edition

Bittinger M.L., Ellenbogen D. J. and Johnson. B. L. (2001). Elementary and Intermediate Algebra: Concepts and Applications, A combined Approach. Third edition.

Udofia (2011) Applied statistics with multivariate methods.First Edition.Immaculate Publications Limited.



TUTORIAL QUESTIONS

1) The data below represents advertising share(X) and marketing share(Y) for a particular brand of cigarettes during 10 randomly selected years.

X('000)	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0
Y('000)	1.0	1.5	1.8	2.2	2.6	3.0	3.3	3.8	4.0	4.4

- Calculate the equation of the estimated regression line and use it to obtain the predicted market share when advertising shares is 10,000.
- How would you interpret the data.

2a). Using Paasche formula, compute the price index for 2000 with 1996 as the base year from the following table

Commodity	Quantity		Price	
	1996	2000	1996	2000
A	100	150	500	900

B	80	100	320	500
C	60	72	150	360
D	30	33	360	297

(b) Using the same table as above, compute the price index for 2000 with 1996 as the base year, by

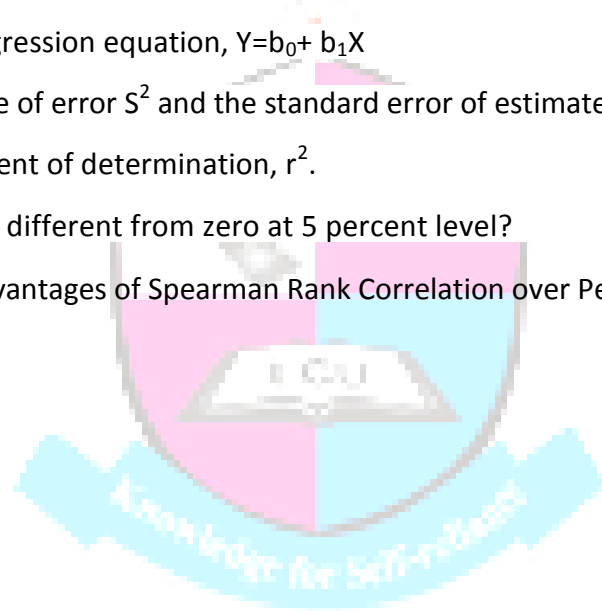
- (i) Marshall-Edgeworth's formula (ii) Fisher's formula

3. Consider the following observations on two variables X and Y:

Y	4	4	6	8	11	12	11	10	11	12
X	1	2	3	4	5	6	7	8	9	10

- i) Estimate the regression equation, $Y=b_0+ b_1X$
- ii) Find the variance of error S^2 and the standard error of estimate of b_0 and b_1 .
- iii) Find the coefficient of determination, r^2 .
- iv) Is b_1 statistically different from zero at 5 percent level?

4 a) What are the advantages of Spearman Rank Correlation over Pearson Correlation coefficient?



b) Ten competitors in a beauty contest are ranked are ranked by three Judges in the following order

Competitor	1	2	3	4	5	6	7	8	9	10
Judge 1	1	5	4	8	9	6	10	7	3	2
Judge 2	4	8	7	6	5	9	10	3	2	1
Judge 3	6	7	8	1	5	10	9	2	3	4

Use rank correlation coefficient to discuss which pair of judges has the approach to beauty .

5) The Table below shows the yield in litres per plot of unit area of a certain variety of wheat grown in a particular type of soil treated with chemicals, A, B, or C. Compare the 3 samples using one-way analysis of variance

A	18	19	20	19	14	12	11	15
B	17	19	18	23	10	11	15	18
C	19	21	20	22	12	21	19	11

6) Solve the following simultaneous linear equations with three variables using Cramer's rule:

a) $2x - y + 6z = 10$

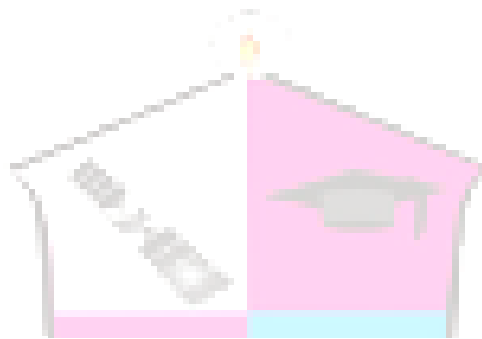
$$-3x + 4y - 5z = 11$$

$$8x - 7y - 9z = 12$$

b) $-b - 2c = -8$

$$a + 3c = 2$$

$$7a + b + c = 0$$



7a_i) Define time series.

a_{ii}) List and explain three major components of time series.

b) The figures of quarterly income of a municipal group in dollars for 3 years are given below

Year	Q1	Q2	Q3	Q4
2005	74	56	48	69
2006	83	52	49	81
2007	92	63	60	85

Using a four-quarterly centred moving average, estimate the trend values.

8) a_i. What is an index number?

a_{ii}) Identify and explain the types of index numbers you are familiar with.

b) The table below shows the average wholesale prices of egg at CHI farms in Ibadan for the years

2006-2013. Construct the price index for:

- i) the year 2012 with 2006 as base year
- ii) the year 2011 and 2013 with 2009 as base year.

Year	2006	2007	2008	2009	2010	2011	2012	2013
Average price of egg per dozen	60.3	66.2	62.8	69.0	66.8	72.7	78.6	63.4

9) A researcher wishing to make comparison obtained the following ratio scale data:

X_1	X_2	X_3
8	10	2
0	18	8
9	12	0
5	9	10
4	20	6
7	16	2
6	11	8

- a) Formulate the H_0
- b) Compute and draw the ANOVA table.

Should the H_0 be accepted at 0.05 level of significance?.

10) The table below gives the data for a random sample of 12 couples on the number of children they have (Y), the number of children they wanted at the time of marriage (X_1) and the years of education of the wife (X_2).

Y	4	3	0	4	4	3	0	4	3	1	3	13
X_1	3	3	0	2	2	3	0	3	2	1	3	2
X_2	12	14	18	10	10	14	18	12	15	16	14	15

- a) Derive a multiple linear regression equation and interpret it
- b) Find the coefficient of individual determination and interpret it
- c) Find the coefficient of multiple determination and interpret it.

11) From the table below, construct index numbers of price relatives using

- i) Fisher's method
- ii) Paasche's method.

Commodity	1980(Price)	1980(Quantity)	1990(Price)	1990(Quantity)
Yam	5	12	8	1
Melon	4	8	12	2
Garri	8	11	11	1

b) A researcher wishing to compare the annual yields of maize between two farms X and Y for a six years period obtained the following data: Table 11

X	Y
3	2
4	3
7	9
5	5
4	2
6	4

- i) Formulate the H_0
 - ii) What is the calculated T-value?
 - iii) Are the yields in X significantly different from those in Y at 0.05 level of significance.
- 12a) A population consists of the five numbers 6,8,10,12 and 14 consider all possible samples of size 2 that can be drawn with replacement from this population. Find
- i) the mean of the sampling distribution of mean and
 - ii) the standard deviation of the sampling distribution of mean (i.e, the standard error of mean).
- b) Illustrate graphically different types of correlations you know. State the relationship of X to Y in each cases.