Tutorial letter 101/3/2015

Econometrics

ECS3706

Semesters 1 & 2

Department of Economics

IMPORTANT INFORMATION:

This tutorial letter contains important information about your module.

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CONTENTS

1 INTRODUCTION

Dear Student

We are pleased to welcome you to this Econometrics module and hope that you will find it both interesting and rewarding. We shall do our best to make your study of this module successful. You will be well on your way to success if you start studying early in the semester and resolve to do the assignments properly.

You will receive a number of tutorial letters during the semester. A tutorial letter is our way of communicating with you about teaching, learning and assessment. Some of this study material may not have been available when you registered. Study material that was not available when you registered will be posted to you as soon as possible, but is also available on myUnisa.

2 PURPOSE OF AND OUTCOMES FOR THE MODULE

2.1 Purpose

This course deals with the problem of specifying and estimating the coefficients of a regression equation (of which the simplest form is: $Y=a+bX$). Everything in this course is aimed at doing this in the most efficient way. Our goal is to find the most accurate estimates of the coefficients of the regression equation, whatever the difficulties which arise.

Three inputs are required to estimate the coefficients of a regression equation.

- The first is economic theory. Economic theory is used to specify the nature of the regression equation. Must we use, for example, the form $Y=a+bX_1+cX_2$ or should we use $\log(Y) =a+bX_1+cX_2+dX_3$? To specify the regression equation correctly requires common sense and a good grasp of economic theory.

- The second input is economic data. In the case of the regression equation $Y = a+bX_1+cX_2$ we need data for variables Y, X_1 and X_2. Some familiarity of working with economic data and some data analysis skills are important. Econometrics also requires extensive calculations.

- The third input is statistics. Statistics not only provides us with formulas to estimate the coefficients of the regression equation, but more than this. The sample estimates of a regression equation are not fully accurate, but are subject to random variation. Statistics is used to evaluate the statistical significance of coefficient estimates, that is, to determine whether the coefficient estimates are sufficiently different from zero in the presence of random variation.

Based on these inputs, this module requires a diverse number of skills.

- Econometrics uses mathematic notation. A mathematical formula is simply the most direct and unambiguous way to describe mathematical processes. You must know mathematical notation.

- You must also have a good grasp of statistics. Econometric techniques are based on statistical concepts.

- Thirdly, because econometrics requires extensive computations, you must also know how to use a personal computer (a PC spreadsheet – MS Excel). The use of a PC is compulsory to perform the assignments. Doing calculations manually is not an option. If you have not used MS Excel before, then you must invest time and effort to learn the basics of MS Excel. You will never regret learning to use MS Excel.

Although this is an introductory module which only deals with a single equation model, it can nevertheless be quite demanding depending on your background. Although the module makes generous use of mathematics and statistics, it still has a practical orientation. Its focus is not, for example, on the theoretical (statistical) derivation of the properties of estimators but rather on their practical meaning, relevance and use.

Econometrics is very useful in economic research. In general, employers highly value the quantitative skills learned in econometrics. We trust that you will find the module both interesting and beneficial to your studies, even beyond your direct academic pursuits.

2.2 Outcomes

Once you have completed this module you should have a thorough understanding of
- how to specify a regression equation
- how to apply regression analysis to estimate an equation
- how to perform hypotheses testing
- how to identify and remedy some of the problems which occur in econometrics.

3 LECTURERS AND CONTACT DETAILS

3.1 Lecturers

We, the lecturers who are responsible for this module, are available to assist you with any enquiries concerning the prescribed content. You may contact us as follows:

LECTURER'S NAME	BUILDING & OFFICE NUMBER	TELEPHONE NUMBER	Email ADDRESS
Khumalo, J. Mr	Club 1 Room 2-29	012 433-4605	khumamj@unisa.ac.za

You will find more contact detail such as telephone numbers, building and office numbers of the lecturers in Tutorial Letter 302. You can also contact us by e-mail via *my*Unisa.

All queries that are not of a purely administrative nature but **are about the content of this module** should be directed to us. Please have your study material with you when you contact us.

3.2 Department

The Department of Economics is located in Hazelwood. The physical address is Club 1 Building, Corner of Dely Road and Pinaster Avenue, Hazelwood, Pretoria.

You will find the department's contact details in Tutorial 301. You can also contact the department's coordinator, Mr Themba Mzangwa at 012 433-4661.

3.3 University

If you need to contact the university about matters not related to the content of this module, please consult the publication: *my Studies@ Unisa* which you received with your study material or visit Unisa website at http://www.unisa.ac.za. This brochure and the website contain information on how to contact the university (e.g. to whom you can write for different queries, important telephone and fax numbers, addresses and details of the times certain facilities are open).

Always have your student number at hand when you contact the university.

4   MODULE-RELATED RESOURCES

4.1   Prescribed books

The only compulsory prescribed textbook for this course is:

> Studenmund, AH. 2014. Using econometrics: A practical guide. 6th edition, Pearson New International edition. London: Pearson Education.

This new edition is more similar to Studenmund, AH. 2010. Using econometrics: a practical guide. 6th edition. Boston: Pearson Education, except that it does not have chapters on heteroskedasticity and experimental and panel data.

- Chapters 1 to 9 remain the same and chapter 10 on heteroskedasticity has been excluded and the new chapter 10 is simply chapter 11 from the old edition. In addition to this change, the chapter on experimental and panel data has also been excluded in the new international edition.
- Since the chapter on heteroskedasticity is part of the content for this module, such chapter will be added on the module site (ECS3706-15-S1 and ECS3706-15-S2)
- Numbering of tables has also changed and Table 2.1 on "The calculation of estimated regression coefficients for the weight/height example" that appears on page 39 of the old edition is now Table 1 in new international edition.

Please consult the list of official booksellers and their addresses in *my Studies @ Unisa* brochure. Prescribed books can be obtained from the University's official booksellers. If you have any difficulty obtaining books from these booksellers, please contact the Prescribed Book Section at 012 429 4152 or email address vospresc@unisa.ac.za .

4.2 Recommended books

For the benefit of students who wish to consult other sources:
- You may use formally recommended books (which are not prescribed). The recommended books can be obtained from the library. A list of recommended titles appears below.
- Each title has been allocated a book number which you should supply on the request card when requesting books from the Library.

- Gujarati, D. 2004. Basic Econometrics. 4th Edition. New York. McGraw-Hill.
- Stock, J.H. and Watson, M.W. 2015. Introduction to Econometrics. 3rd Edition. Pearson Education.

4.3 Electronic Reserves (e-Reserves)

The following e-Reserves will be made available on module site on *my*Unisa:

- Excel file ECS3706_A1_S1_15, required for answering Assignment 01 in first semester and

- Excel file ECS3706_A1_S2_15, required for answering Assignment 01 in second semester.

- Heteroskedasticity chapter

5 STUDENT SUPPORT SERVICES FOR THE MODULE

For information on the various student support systems and services available at Unisa (e.g. student counselling, tutorial support programme and classes, language support), please consult the publication *my Studies @ Unisa* that you received with your study material.

5.1 Contact with fellow students – study groups

It is advisable to have contact with fellow students. One way to do this is to form study groups. You can get the names of other students in your area for the same modules by contacting the Department of Student Admission and Registration. For further information, please consult the *Studies @ Unisa* brochure.

5.2   myUnisa

If you have access to a computer that is linked to the internet, you can quickly access resources and information at the university. The *my*Unisa learning management system is Unisa's online campus that will help you to communicate with your lecturers, with other students and with the administrative departments of Unisa – all through the computer and the internet.

To go to the *my*Unisa website, start at the main Unisa website, http://www.unisa.ac.za, and then click on the "Login to *my*Unisa" link on the right-hand side of the screen. This should take you to the *my*Unisa website. You can also go there directly by typing in http://my.unisa.ac.za.

Please consult my *Studies @ Unisa* brochure.

5.3   Tutorial Support Programme

Unisa offers tutor services for students as additional academic support at the various Unisa regional learning centres throughout the country. A tutorial is an organised session where students and tutor(s) meet regularly at a common venue and at scheduled times to discuss course material. The main purpose of the tutorial services is to facilitate student learning by developing the student's independent learning skills and assisting students to become motivated and independent learners. Tutorials help the students to develop and enhance their learning experience and academic performance through interaction with the tutor and fellow students. Tutorials are not compulsory and willing students receive tutorial support at a nominal fee. **Interested students are advised to consult a learning centre closest to them to enrol for tutorials**. For further information on learning centres and tutorials consult the brochure *my Studies @ Unisa*.

Note that tutors are not necessarily available for all modules and/or at all learning centres. The Department of Economics has no means of providing you with any tutorial support if you did not follow the abovementioned steps.

6   MODULE-SPECIFIC STUDY PLAN

Some guidance regarding the studying of this module and preparation for the examination is provided below:

- You cannot pass this module by memorising and merely reproducing this module's content, you must understand the underlying principles. The examinations test your ability to apply principles. In the examination you will have to interpret results and to solve problem situations which you may have never seen before.
- If you have not previously completed statistics courses/modules, you must face the additional workload of understanding the basic statistical concepts. This matter is dealt with in chapters 15, 4 and 5 of the textbook / study guide.

- This module makes use of mathematical notation which offers a shorthand way of referring to complex concepts. You must understand the different functional forms (the nature of an equation, logarithms, power functions etc). The module also requires you to understand a number of simple proofs which require basic algebra.
- Although the examination does not require a PC, we at least expect you to be familiar with a spreadsheet (MS Excel) when completing the assignments. Basic spreadsheet skills, for example, entering formulas and using copy & paste, are not dealt with in the study guide. If you have never used a spreadsheet before, then this is the time to familiarise yourself with one of the most powerful calculation tools ever devised. It will change your life. Your lecturer can provide help if all else fails.

Experience has shown repeatedly that working diligently and continuously throughout the semester markedly improves students' chance of success in this module. You cannot cram for this module — you simply have to allow sufficient time to develop your understanding of the issues. There are no shortcuts to success!

To help you to work on this module regularly and systematically, we provide a proposed study programme below and three assignments (see section 9). The due dates for the assignments to be submitted to Unisa are indicated in the proposed study programme. The assignments are provided in section 8.

PROPOSED STUDY PROGRAMME: FIRST SEMESTER

STUDY WEEK	WEEK STARTING	STUDY UNIT or study instruction
1	2 February	1 and 2
2	9 February	3
3	16 February	4
4	23 February	Complete compulsory Assignment 01
5	2 March	5
6	9 March	5
		Remember to submit compulsory Assignment 01: Closing date: 16 March 2015
7	16 March	6
8	23 March	7
9	30 March	7
10	7 April	**Complete and submit Assignment 02: Closing date: 13 April 2015**
11	13 April	8
12	20 April	9
13	28 April	10 **Complete self assessment Assignment 03**
14+	4 May	Prepare for examination

PROPOSED STUDY PROGRAMME: SECOND SEMESTER

STUDY WEEK	WEEK STARTING	STUDY UNIT or study instruction
1	20 July	1 and 2
2	27 July	3
3	3 August	4
4	11 August	**Complete and submit compulsory Assignment 01: Closing date: 11 August 2015.**
5	17 August	5
6	24 August	5
7	31 August	6
8	7 September	7
9	14 September	7 **Complete and submit Assignment 02: Closing date: 14 September 2015.**
10	21 September	8 and 9
11	28 September	10 **Complete self assessment Assignment 03**
12	5 October	Prepare for examination
13	12 October	Prepare for examination
14+	19 October	Prepare for examination

7   MODULE PRACTICAL WORK AND WORK-INTEGRATED LEARNING

There are no practicals for this module.

8   ASSESSMENT

8.1   Assessment plan

Assessment will be done by the module leader and, where applicable, the module team and/or the examiner(s). The name(s) of examiner(s) will also be indicated on examination question papers.
Assessment criteria used for the assignments will done as follows: the multiple-choice questions in Assignment 01 will be marked electronically in accordance with mark-reading 'masters' provided to the Assignment section by the module leader. One mark will be awarded for each correct answer. No marks will be deducted for incorrect answers. Assignment 02 is a written assignment.

Note that assignment 01 is compulsory. The first assignment will contribute 40% to the semester mark and the second assignment 60%. The second assignment is not compulsory, but will still contribute 60% towards your semester mark.

Please note: Although students may work together when preparing assignments, each student must write and submit his or her own individual assignment. In other words, you must submit your own ideas in your own words, sometimes interspersing relevant short quotations that are properly referenced. It is unacceptable for students to submit identical assignments on the basis that they worked together. That is copying (a form of plagiarism) and none of these assignments will be marked. Furthermore, you may be penalised or subjected to disciplinary proceedings by the university.

For general information and requirements as far as examinations are concerned, see the brochure *my Studies @ Unisa* which you received with your study material.

Please note that the applications for, and the administration of re-marks of examination scripts are handled solely by the Examinations department and not academic departments.

8.2   General assignment numbers

Assignments are numbered consecutively per module, starting from 01. In this module there are three assignments per semester, namely 01, 02 and 03.

8.2.1 Unique assignment numbers

In addition to the general assignment number (eg 01 or 02), each assignment (multiple-choice questions and written assignments) has its own unique assignment number (eg 102717). In this module assignment 01 consists of only multiple-choice questions and therefore must be completed on a marking-reading sheet with an own unique assignment number. Assignment 02 is a written assignment and has its own unique assignment number as well. Please fill in this unique assignment number on the cover page of the assignment in the space provided for it.

8.2.2 Due dates for assignments

Please note that the due dates for the submission of assignments to Unisa are indicated in the proposed study programme as well.

The first ten questions of Assignment 01 are designed to obtain information required for the compilation of a student profile for this module. Your kind cooperation is requested, as this information assists the department in its ongoing efforts to ensure quality tuition. Your marks for this assignment will be based on your answers to questions 11 to 25.

SEMESTER 1:   ASSIGNMENTS SUBMISSION DATES

Assignment number	Unique number	Closing date	Contents of assignments	Type of assignment
01	575965	16 March 2015	Study units 1 to 3	Multiple-choice
02	575987	13 April 2015	Study units 4 to 7	Written
03	-	-	Study units 8 to 9	Self assessment

SEMESTER 2:   ASSIGNMENTS SUBMISSION DATES

Assignment number	Unique number	Closing date	Contents of assignments	Type of assignment
01	575988	11 August 2015	Study units 1 to 3	Multiple-choice
02	575999	14 September 2015	Study units 4 to 7	Written
03	-	-	Study units 8 to 9	Self assessment

8.3 Submission of assignments

You may submit written assignments and assignments completed on mark-reading sheets either by post or electronically via *my*Unisa. **Assignments may not be submitted by fax or e-mail**.

For detailed information on assignments, please refer to *my Studies @ Unisa* brochure which you received with your study package.

To submit an assignment via *my*Unisa:

- Go to *my*Unisa.
- Log in with your student number and password.
- Select the module.
- Click on "Assignments" in the menu on the left-hand side of the screen.
- Click on the assignment number you wish to submit.
- Follow the instructions.

8.4   Assignments

FIRST SEMESTER ASSIGNMENTS

You must fill in your answers on an assignment mark reading sheet. Please make sure that you also complete the following sections on the assignment mark reading sheet
- your name and address and **student number**
- the code of the study unit
- the **unique assignment** number as indicated in the table above. Note that there are different unique numbers for the first and second semesters.

Questions on student profile

1.1   Which ONE of the following is most true regarding your current registration.

- [1]   This is my first registration.
- [2]   I have been registered for this module before but have never written the examination.
- [3]   I have written the examination for this module once before.
- [4]   I have written the examination for this module twice before.
- [5]   I have written the examination for this module three or more times before.

1.2   In my matric results (students who do not have a South African matric please select the option you think is the most relevant.)

- [1]   I passed Mathematics (higher grade) or equivalent with a C-symbol or higher.
- [2]   I passed Mathematics (higher grade) or equivalent with a D-symbol or lower.
- [3]   I passed Mathematics (standard grade) or equivalent with a C-symbol or higher.
- [4]   I passed Mathematics (standard grade) or equivalent with a D-symbol or lower.
- [5]   I did not do take Mathematics for matric or I failed it.

1.3 In my matric results (students who do not have a South African matric please choose the option you think is the most relevant.)

[1] I passed English (higher grade) or equivalent with a C-symbol or higher.
[2] I passed English (higher grade) or equivalent with a D-symbol or lower.
[3] I passed English (standard grade) or equivalent with a C-symbol or higher.
[4] I passed English (standard grade) or equivalent with a D-symbol or lower.
[5] I did not do take English for matric or I failed it.

1.4 Which ONE of the following describes your situation best?

[1] I am a full-time student who does not work at all.
[2] I am a full-time student who works part-time for extra pocket money (not to pay for my studies).
[3] I am a full-time student who works part-time to pay for my studies.
[4] I work full-time and study only after hours, and the work that I do is not related to my degree at all.
[5] I work full-time and study only after hours, and the work that I do is related to my degree.

Questions on administrative matters

1.5 Regarding service delivery by the Economics Department:

[1] I have never tried to contact the Economics department.
[2] I have contacted the department but they were not helpful.
[3] I have tried to contact the department telephonically but was not successful.
[4] I have tried to contact the department by e-mail but never received a reply.
[5] I have contacted the department and was satisfied with the service.

Questions on study material and study programme

1.6 The section(s) of the study guide that I had to study to complete this assignment

[1] helped me to work through the textbook systematically.
[2] did not help me to understand the study material in the textbook better.
[3] was totally irrelevant to the assignment questions.
[4] I did not use the study guide at all although I have one.
[5] I have not received a study guide.

1.7 Do you plan to attend tutorial classes for this module?

    [1]   Yes.
    [2]   No, I can cope on my own.
    [3]   No, I have to work.
    [4]   No, it is too far from where I live.
    [5]   No, for any other reason.

Questions on technology access

1.8 Which ONE of the following best describes your access to SMS–messages?

    [1]   I can receive SMS-messages on my own cell phone.
    [2]   I can receive SMS-messages on the cell phone of someone who lives with me.
    [3]   I can receive SMS-messages on the cell phone of someone I know but who does not live with me.
    [4]   I cannot receive SMS-messages at all.
    [5]   I do not know what a SMS-message is.

1.9 Which ONE of the following best describes your access to a computer?

    [1]   I have unlimited access to a computer.
    [2]   I have access to a computer but do not know how to use it for study purposes.
    [3]   I have to pay to use a computer (e.g. internet café).
    [4]   I can only use a computer as a favour.
    [5]   I do not have any access to a computer.

1.10 Which ONE of the following applies to you ?

    [1]   I do not have access to either internet or e-mail.
    [2]   I have access to e-mail.
    [3]   I have access to internet.
    [4]   I have access to both internet and e-mail.

Questions 1.11 to 1.20 require you to estimate a linear regression function $Y_t = \beta_0 + \beta_1 X_t + \varepsilon$ by OLS method.

The data is provided in Table 8.1. The same data is available on myUnisa module site, ECS3706-15-S1

Derive your answers from basic principles, that is, use MS Excel to compile a table similar to Table 1 of Studenmund (See p41 in Pearson New international edition, 2014 6th edition or Table 2.1 p39 in 6th edition (2010 edition)):: The calculation of estimated regression coefficients for the Weight/Height example), or compile a table similar to the one used in task 2.4.2a of the study guide.

Please use a spreadsheet to perform the calculations. Please use full accuracy (no rounding) in all calculations since rounding may significantly affect your results.

Y	X_1	X_2	Description
3.04	5.64	12.892	
3.05	5.65	14.506	
3.05	5.61	14.286	Y = Number of reservations
3.06	5.62	15.566	X_1 = Mean income in regions where
2.99	5.49	13.673	Tablet Travel Agency (TTA) has offices
3.15	5.68	9.874	X_2 = CPI inflation
2.93	5.44	8.824	N = Number of observations
3.02	5.52	8.709	$\overline{X}$= Sample average of series X
3.03	5.54	7.32	$\overline{Y}$ = Sample average of series Y
2.99	5.46	8.623	$x_i = X_i - \overline{X}$
3.04	5.58	6.872	$y_i = Y_i - \overline{Y}$
3.14	5.66	5.211	
3.12	5.69	5.374	
3.03	5.55	5.7	$\hat{\beta}_0$= OLS estimate of β_0
2.87	5.31	9.177	
3.15	5.7	5.806	$\hat{\beta}_1$ = OLS estimate of β_1
3.09	5.63	1.392	
2.92	5.39	3.393	
3.09	5.63	4.688	
3.21	5.78	7.09	
3.12	5.66	11.536	
3.12	5.67	7.125	
3.13	5.68	4.271	

1.11 Which of the following statements is/are correct according to the OLS method in the case of $Y_t = \beta_0 + \beta_1 X_t + \varepsilon$?

a $\hat{\beta}_0 = \dfrac{\Delta X}{\Delta Y} + \varepsilon$

b $\hat{\beta}_1 = \dfrac{\sum x_i y_i}{\sum x_i^2}$

c $\hat{\beta}_0 = \bar{Y} - \hat{\beta}_1 \bar{X}$

[1] a and b
[2] a and c
[3] b and c
[4] b
[5] a

1.12 Which of the following statements is/are **correct**?

a The degrees of freedom = 21
b $\bar{X}$= 7.3667
c $\bar{Y}$ = 3.05826 (Rounded to 5 decimal points)

[1] a and b
[2] a, b and c
[3] a and c
[4] b
[5] None of the above

1.13 Which of the following statements is/are **correct**?

a Σy^2 = 0.14933 (rounded to 5 decimals points)
b Σxy = 0.149 (rounded to 3 decimals)
c Σx^2 = 147.6231 (rounded to 4 decimals)

[1] a only
[2] b only
[3] c only
[4] a and b
[5] All statements are correct

1.14 Which of the following statements is/are **correct**?

a $\hat{\beta}_1 = 0.9125$

b $\hat{\beta}_1 = 0.70665$ (rounded to 5 decimals)

c $\hat{\beta}_0 = 0.2291$ (rounded to 4 decimals)

[1] a
[2] b
[3] c
[4] a and b
[5] b and c

1.15 Which of the following statements is/are correct?

a $\hat{Y}_2 = 3.0911$ (rounded to 4 decimals)

b $\hat{Y}_1 = 3.1029$

c $\hat{Y}_4 = 5.5909$

[1] a
[2] b
[3] c
[4] a and c
[5] Not [1], [2], [3] or [4]

1.16 Which of the following statements is/are correct?

a $e_1 = -0.0505$ (rounded to 4 decimals)

b $e_3 = 0.0202$ (rounded to 4 decimals)

c $e_1^2 = 0.0028$ (rounded to 4 decimals)

[1] a
[2] a and b
[3] b
[4] b and c
[5] c

1.17 Which of the following statements is/are correct?

    a   ESS = 0.13887 (rounded to 5 decimals)

    b R^2 = 0.9299 (rounded to 4 decimals)

    c   The sum of residuals is exactly 10

    [1]   a and b only

    [2]   a and c only

    [3]   b and c only

    [4]   a, b and c

    [5]   All statements are incorrect

1.18 Which of the statements is/are correct?

    a   A regression coefficient indicates the change in independent variable associated with a one unit in the dependent variable holding other variables constant.

    b   The coefficient $\hat{\beta}_1 = 0.70665$ indicates that a one percentage increase in income will result into 0.69569 percent increase in reservations

    c   Under normal circumstances, the adjusted R^2 should be equivalent to R^2

    [1]   a and b

    [2]   a and c

    [3]   b

    [4]   c and b

    [5]   Not [1], [2], [3], or [4]

1.19 Which of the following statements is/are correct?

    a   The estimated regression equation $Y_t = \beta_0 + \beta_1 X_{1t} + \varepsilon$ based on data provided in table 8.1 shows that there is a positive relationship between reservations and income

    b   ESS, RSS and TSS are all negative

    c   given data on table 1.1, yx ≠ xy

    [1]   a and c

    [2]   a

    [3]   b

    [4]   c

    [5]   Not [1], [2], [3] or [4]

Questions 1.20 to 1.23 require you to estimate the regression equation:

$$Y_t = b_0 + b_1 X_{1t} + b_2 X_{2t} + \varepsilon \text{ (Equation 2)}$$

Where Y and X are the same as in Table 8.1 and X_2 is the inflation rate (CPI).

1.20 Which of the following statements is/are correct?

a An addition of CPI as an explanatory variable leads to an increase in the standard error of the coefficient of X from equation 1

b R^2 fell from 0.805246 (equation 1) to 0.756358 (equation 2)

c The standard error of $\hat{b}_2 = 0.01086$

[1] a
[2] a and b
[3] b and c
[4] c
[5] None of the statements are correct

1.21 Which of the following statements is/are correct regarding the estimated coefficients of equation 2?

a $\hat{b}_0 = 0.378595$ (rounded to 6 decimals)

b $\hat{b}_2 = $ -0.00286 (rounded to 5 decimals)

c $\hat{b}_1 = 3.0548$ (rounded to 4 decimals)

[1] a
[2] a and b
[3] b
[4] b and c
[5] Not [1], [2], [3] or [4]

1.22 Which of the following statements is/are correct?

a The degrees of freedom from equation 2 equals 24

b $\Sigma X^2 = 23$

c Mean of X_2 (CPI) = 8.3438 (rounded to 4 decimals)

[1] a only
[2] b only
[3] a and b only
[4] c only
[5] b and c only

1.23 Which of the following statements is/are **correct**?

    a   Equation 2 produces a better fit than equation 1

    b   Variable X_1 in both equations explains Y

    c   The total sum of squares (equation 2) = 0.1493 (rounded to 4 decimals)

    [1]   a and c

    [2]   b and a

    [3]   b and c

    [4]   None of the above.

    [5]   All statements are correct

Questions 1.24 and 1.25 are based on the information below.

A survey about the number of light motor vehicles per household in one small town reveals the following (assuming X refers to the number of cars)

X	P(X)
0	0.012
1	0.32
2	0.372
3	0.194
4	0.077
5	0.025

1.24 Which of the following statements is/are correct?

    a   The expected value of X = 2.079

    b   It must be true that $\sum_{\text{all } X_i} P(x_i)=1$ if X is a discrete random variable

    c $0 \leq P(x_i) \leq 1$ for all x

    [1]   a, b and c

    [2]   b and c only

    [3]   a and c only

    [4]   a and b only

    [5]   Not [1], [2], [3] or [4]

1.25 Which of the following statements is/are correct?

    a   The standard deviation = 1.04344 (rounded to 5 decimals)

    b   The probability that a household has at least 3 cars = 0.12

    c   If X is a discrete random variable, it implies that X assumes countable values

    [1]   a

    [2]   a and b

    [3]   a, b and c

    [4]   a and c

    [5]   b only

Assignment 02
- is optional, but contributes significantly towards your semester mark and therefore your final mark.
- consists of typical examination type questions.
- If a question counts, say 5 marks, then the answer requires more or less 5 statements or explanations.

Question A1 (15 marks)

(a) Explain the meaniing of the following terms   (10)
   i.   Stochastic error term
   ii.   Regression analysis
   iii. Total, explained and residual sums of squares
   iv.   Degrees of freedom
   v.   Simple correlation coefficient

(b) What is wrong with the following kind of thinking: "I understand that R^2 is not a perfect measure of the quality of a regression equation because it always increases when a variable is added to the equation. Once we adjust for degrees of freedom by using $\overline{R}^2$, though, it seems to me that the higher the $\overline{R}^2$, the better the equation".   (5)

[15]

Question A2 (15 marks)

(a) List four sources of variation which contribute to the stochastic error term; explain why the stochastic error term is likely to be normally distributed and why a normally distributed stochastic error tem is desirable.   (6)

(b) Explain the meaning of the following concepts by referring to the sampling distribution of $\hat{\beta}$ (9)
   a.   An unbiased estimator of $\hat{\beta}$.
   b.   A minimum variance estimator of $\hat{\beta}$.
   c.   A consistent estimator of $\hat{\beta}$.

[15]

Question B1 (20 marks)

A model below represents a demand for electricity in a paticular economy and the regression results are given as follow;

$$Q_{de} = \underset{(11.3871)}{80} - \underset{(0.00832)}{0.07201}P_e + \underset{(0.00470)}{0.00834}P_{sp} + \underset{(0.00631)}{0.08050}Y$$

$$R^2 = 0.835; \bar{R}^2 = 0.830; DW = 1.701$$

Where DW is the Durbin-Watson statistic and the variables used are as follows:

Q$_{de}$ Quantity demanded of electricity

P$_e$ Price of electricity

P$_{sp}$ Price of a substitute product

Y   Income of households

The values within brackets (value) denote standard errors of the respective coefficients. The sample size is 150

(a) Hypothesize signs and state appropriate null and alternative hypothesis for the coefficients based on theoretical considerations (provide reasons for your choice). Calculate the t – statistics test the individual coefficients for statistical significance at the 5% level.

(12)

(b) Interpret the the overall regresion results (coefficients, R^2, DW etc) and state what role each variable plays in the demand for electricity. What is the value of the adjusted R^2?

(8)

[20]

Question 1 (20 marks)

Econometrician MJ estimates the following model, where the dependent variable is $\log(Unemp_i)$

Variable	Coefficient	Standard error	t-statistic	Probability
Constant term	-4.210	0.354	-11.893	0.000
$\log(Inf_i)$	-0.298	0.089	-3.348	0.006
$\log(Inf_{i-1})$	-0.237	0.096	-2.469	0.007

R-squared = 0.55; Durbin-Watson statistic = 1.431; N=15

The variables are as follows:

$\log(Unemp_i)$: The logarithm of the unemployment

$\log(Inf_i)$ the logarithm of inflation

$\log(Inf_{i-1})$ the logarithm of past values of inflation

Perform all statistical tests at the 5% level of significance (unless stated otherwise).

(a)   Hypothesise signs and state appropriate null and alternative hypotheses for the coefficients based on theoretical considerations (provide reasons for your choice).Test the coefficients at the 5% level of significance. (12)

(b)   Is the log of lagged inflation a useful predictor of unemployment? Support your answer with calculations (2)

(c)   Why do you think a double-log functional form is used in this model? (4)

(d)   Suppose you ran the linear version of this equation and obtained an R-squared of 0.49. What can you conclude from this result? (2)

[20]

Question 2 (20 marks)

The following regression equation has been estimated for dividends and profits for a company in country A

$$\ln Dividend = B_1 + B_2 \ln CP + B_3 Time + u_t$$

Where

Ln = natural log

CP = company profits

The time or trend variable is included in the model to allow for the upward trend in the two variables.

	Coefficient	std. error	*t*-Statistic	Prob.
Constant	0.435764	0.192185	2.267414	0.02430
LnCP	0.424535	0.077733	5.461456	0.00000
Time	0.012691	0.001421	8.930795	0.00000

R-squared	0.991424
Adj. R-squared	0.991353
F-statistic	13930
Prob (F-statistic)	0.00000
Durbin-Watson stat	0.090181

(a) Interpret fully the regression results and explain the meaning of each of the estimated coefficients. State if the signs of the coefficients bear the correct signs based on economic theory. (15)

(b) What is the problem (if any) with these results and how would you rectify such problem (if any) (5)

[20]

Question 3 (20 marks)

(a) Assume you wish to estimate a Cobb-Douglas production function $Q=aK^bL^c$ where Q measures real output, K: real capital stock and L: labour input. Explain the characteristics of this functional form, the meaning of its parameters (coefficients), how this form can be used in economics (including its shortcomings) and how its coefficients could be estimated.

(10)

(b) Assume you have annual data on the production of maize for the period 1971-2000. You wish to determine the average annual growth rate of the production of maize over this period. Explain which functional form you would use, the characteristics of this functional form and how you would estimate its coefficients, including the annual percentage growth rate.

(10)

[20]

SECOND SEMESTER ASSIGNMENTS

You must fill in your answers on an assignment mark reading sheet. Please make sure that you also complete the following sections on the assignment mark reading sheet
- your name and address and **student number**
- the code of the study unit
- the **unique assignment** number as indicated in the table above. Note that there are different assignment questions and different unique numbers for the first and second semesters.

Questions on student profile

1.1 Which ONE of the following is most true regarding your current registration.

[1] This is my first registration.
[2] I have been registered for this module before but have never written the examination.
[3] I have written the examination for this module once before.
[4] I have written the examination for this module twice before.
[5] I have written the examination for this module three or more times before.

1.2 In my matric results (students who do not have a South African matric please select the option you think is the most relevant.)

[1] I passed Mathematics (higher grade) or equivalent with a C-symbol or higher.
[2] I passed Mathematics (higher grade) or equivalent with a D-symbol or lower.
[3] I passed Mathematics (standard grade) or equivalent with a C-symbol or higher.
[4] I passed Mathematics (standard grade) or equivalent with a D-symbol or lower.
[5] I did not do take Mathematics for matric or I failed it.

1.3 In my matric results (students who do not have a South African matric please choose the option you think is the most relevant.)

[1] I passed English (higher grade) or equivalent with a C-symbol or higher.
[2] I passed English (higher grade) or equivalent with a D-symbol or lower.
[3] I passed English (standard grade) or equivalent with a C-symbol or higher.
[4] I passed English (standard grade) or equivalent with a D-symbol or lower.
[5] I did not do take English for matric or I failed it.

1.4   Which ONE of the following describes your situation best?

     [1]   I am a full-time student who does not work at all.
     [2]   I am a full-time student who works part-time for extra pocket money (not to pay for my studies).
     [3]   I am a full-time student who works part-time to pay for my studies.
     [4]   I work full-time and study only after hours, and the work that I do is not related to my degree at all.
     [5]   I work full-time and study only after hours, and the work that I do is related to my degree.

Questions on administrative matters

1.5   Regarding service delivery by the Economics Department:

     [1]   I have never tried to contact the Economics department.
     [2]   I have contacted the department but they were not helpful.
     [3]   I have tried to contact the department telephonically but was not successful.
     [4]   I have tried to contact the department by e-mail but never received a reply.
     [5]   I have contacted the department and was satisfied with the service.

Questions on study material and study programme

1.6   The section(s) of the study guide that I had to study to complete this assignment

     [1]   helped me to work through the textbook systematically.
     [2]   did not help me to understand the study material in the textbook better.
     [3]   was totally irrelevant to the assignment questions.
     [4]   I did not use the study guide at all although I have one.
     [5]   I have not received a study guide.

1.7   Do you plan to attend tutorial classes for this module?

     [1]   Yes.
     [2]   No, I can cope on my own.
     [3]   No, I have to work.
     [4]   No, it is too far from where I live.
     [5]   No, for any other reason.

Questions on technology access

1.8 Which ONE of the following best describes your access to SMS–messages?

[1] I can receive SMS-messages on my own cell phone.
[2] I can receive SMS-messages on the cell phone of someone who lives with me.
[3] I can receive SMS-messages on the cell phone of someone I know but who does not live with me.
[4] I cannot receive SMS-messages at all.
[5] I do not know what a SMS-message is.

1.9 Which ONE of the following best describes your access to a computer?

[1] I have unlimited access to a computer.
[2] I have access to a computer but do not know how to use it for study purposes.
[3] I have to pay to use a computer (e.g. internet café).
[4] I can only use a computer as a favour.
[5] I do not have any access to a computer.

1.10 Which ONE of the following applies to you ?

[1] I do not have access to either internet or e-mail.
[2] I have access to e-mail.
[3] I have access to internet.
[4] I have access to both internet and e-mail.

Questions 1.11 - 1.20 require you to estimate a regression function $HHS = b_0 + b_1 GDP + \varepsilon$ by the OLS method where

HHS: Households savings (R Millions)
CPI : CPI: Annual inflation rate (%)
GDP: Gross domestic product (R Millions)

The data is provided in Table 8.2 below. The same data will be made available on myUnisa module site ECS3706-15-S2

Derive your answers from basic principles, that is, use MS Excel to compile a table similar to Table 1 of Studenmund (See p41 in Pearson New international edition, 2014 6th edition, or Table 2.1 on p39 in 2010 6th edition): The calculation of estimated regression coefficients for the Weight/Height example), or compile a table similar to the one used in task 2.4.2a of the study guide.

Please use a spreadsheet to perform the calculations. Please use full accuracy (no rounding) in all calculations since rounding may significantly affect your results.

Table 8.2: Data to estimate $HHS = b_0 + b_1 GDP + \varepsilon$

Year	HHS	GDP	CPI	Description
1988	692	1065	12.892	
1989	757	1090	14.506	
1990	428	1087	14.286	HHS: Households savings (R Million)
1991	477	1076	15.566	
1992	1417	1053	13.673	CPI: Inflation rate (%)
1993	1146	1066	9.874	
1994	828	1100	8.824	GDP: Real gross domestic product (R Million)
1995	576	1135	8.709	
1996	744	1183	7.32	
1997	878	1215	8.623	
1998	680	1221	6.872	
1999	648	1250	5.211	
2000	610	1302	5.374	
2001	253	1337	5.7	
2002	538	1386	9.177	
2003	496	1427	5.806	
2004	335	1492	1.392	
2005	114	1571	3.393	
2006	-923	1659	4.688	
2007	-1486	1751	7.09	
2008	-1690	1815	11.536	
2009	-1048	1787	7.125	
2010	-951	1843	4.271	

1.11 Which of the following statements is/are **correct**? According to the OLS method (in the case of $HHS = b_0 + b_1 GDP + \varepsilon$):

a $\quad \hat{b}_0 = average\,(GDP)$

b $\quad \hat{b}_1 = \dfrac{\sum x_i y_i}{\sum y_i^2}$ where $x_i = GDP_i - average(GDP)$ and $y_i = HHS_i - average(HHS)$

c $\quad \hat{b}_1 = \dfrac{\sum x_i y_i}{\sum x_i^2}$ where $x_i = GDP_i - average(GDP)$ and $y_i = HHS_i - average(HHS)$

[1] a and b
[2] a and c
[3] b
[4] c
[5] Not [1], [2], [3] or [4]

1.12 Which of the following statements is/are **correct**?

    a   The degrees of freedom = 21

    b   The sample average of HHS = 240 (rounded to nearest whole number)

    c   The sample average of GDP is 191.908

    [1]   b

    [2]   a and b

    [3]   b and c

    [4]   a,b and c

    [5]   Not [1], [2], [3] or [4]

1.13 Which of the following statements is/are **correct**?

    a $\sum x^2 = 5519$

    b $\sum xy = 1344$

    c $\sum y^2 = 162803$

    [1]   a and b

    [2]   a and c

    [3]   c

    [4]   a, b and c

    [5]   Not [1], [2], [3] or [4]

1.14 Which of the following statements is/are **correct**?

    a $\hat{b}_1 = -2.8089$ (rounded to 4 decimals)

    b $\hat{b}_0 = 4015$ (rounded to nearest whole number)

    c $\hat{b}_1 = 2.8089$ (rounded to 4 decimals)

    [1]   a

    [2]   b

    [3]   a and b

    [4]   b and c

    [5]   Not [1], [2], [3] or [4]

1.15 Which of the following statements is/are **correct** ?

    a $\hat{Y}_2 = 953$ (rounded to nearest whole number)

    b $e_{14}^2 = 42.21$ (rounded to 2 decimals)

    c $\sum e_i = 2855686$ (rounded to 2 decimals)

    [1]   a and b
    [2]   b and c
    [3]   a
    [4]   b
    [5]   Not [1], [2], [3] or [4]

1.16 Which of the following statements is/are **correct**?

    a $ESS = \sum y_i^2 = 2855686$

    b $TSS = \sum e_i^2 = 1627803$

    c $ESS = TSS - RSS = 12843629$ (rounded to nearest whole number)

    [1]   a and b
    [2]   a only
    [3]   b only
    [4]   c only
    [5]   Not [1], [2], [3] or [4]

1.17 Which of the following statements is/are **correct**?

    a $R^2 = 1 - \dfrac{\sum e_i^2}{\sum (HHS_i - Average(HHS))^2} = 0.8181$ (rounded to 4 decimals)

    b   In econometrics, the residual error term (e_i) and the stochastic error term (ε_i) are the same.

    c   For an unbiased estimator, the mean should equal the true mean of the variable being estimated.

    [1]   b only
    [2]   a and b only
    [3]   b and c
    [4]   a and c only
    [5]   Not [1], [2], [3] or [4]

1.18 Which of the following statements is/are **correct**?

    a   if GDP increases by R1 million, then HHS decreases by R2 million

    b   if GDP increases by R1 million, then HHS increases by R4015 million

    c   if GDP increases by 1% then HHS decreases by more than 300%

    [1]   a and b

    [2]   a and c

    [3]   a, b and c

    [4]   b and c

    [5]   Not [1], [2], [3] or [4]

1.19 Which of the following statements is/are **correct**?

    a   The mean of X is given by $\dfrac{\sum\limits_{i=1}^{n} X_i}{n}$

    b   If $R^2 = 1$, it implies that all the points lie exactly on the regression line.

    c   the R^2, adjusted R^2 and the F-statistic measure the overall degree of fit of the equation.

    [1]   a and b

    [2]   a, b and c

    [3]   b and c

    [4]   a and c

    [5]   Not [1], [2], [3] or [4]

1.20 Which of the following statements is/are **correct**?

    a   The variance is the square root of the mean, i.e. $\mathrm{var} = \sqrt{\overline{X}}$

    b   To standardize a random variable X, we subtract its mean and then divide by its standard deviation.

    c   In an equation $Y_i = \beta_0 + \beta_1 X_i + u_i$, the residual error term $(\hat{u}_i) = Y_i - \hat{\beta}_0 - \hat{\beta}_1 X_i$

    [1]   a

    [2]   c

    [3]   a and c

    [4]   b and c

    [5]   Not [1], [2], [3] or [4]

Questions 1.21 to 1.22 require you to estimate the regression equation:

$HHS = b_0 + b_1 GDP + b_2 CPI + \varepsilon$ (Equation 2)

Where: HHS and GDP are the same as in Table 8.2 and CPI is the inflation rate.

Use Excel's Add-in or Lines (Y,X) function to estimate equation 2.

1.21 Which of the following statements is/are **correct** regarding the coefficient estimates of equation 2?

a $\hat{b}_0 = 5410.716$ (rounded to 3 decimals)

b $\hat{b}_1 = -3.3888$ (rounded to 4 decimals)

c $\hat{b}_2 = -73.8696$ (rounded to 4 decimals).

[1] a and b
[2] a and c
[3] b and c
[4] a, b and c
[5] Not [1], [2], [3] or [4]

1.22 Which of the following statements is/are **correct** in respect of the estimates of equation 2?

a SE($\hat{b}_2$) = 18.7249 (rounded to 4 decimals, SE = standard error)

b $\overline{R}^2$ changed from 0.4290 (equation 1) to 0.8977 (equation 2, both rounded to 4 decimals).

c The change in $\overline{R}^2$ caused by the inclusion of CPI in regression equation 2 indicates that there is merit in including CPI.

[1] a and b
[2] a and c
[3] a, b and c
[4] b and c
[5] Not [1], [2], [3] or [4]

1.23 Which of the following statements is/are **correct**?

Assume that X is a discrete random variable as follows (assume that values of X refer both to that of the population):

X	P(X)
10	0.150
15	0.250
25	0.250
40	0.200
55	0.150

a $\sum P(X) = 1$ in the case that X is a discrete random variable.

b   The expected value of X=10.91 (rounded to 2 decimals)(population)

c   The (population) standard deviation of X=6.7998 (rounded to 4 decimals)

[1]   a
[2]   b
[3]   a and c
[4]   a and b
[5]   Not [1], [2], [3] or [4]

1.24 Which of the following statements is/are **correct**? If $\hat{\beta}$ is the OLS estimator of the true coefficient of β of a regression equation then

a   Because OLS uses sample data and different samples may give different estimates of $\hat{\beta}$, $\hat{\beta}$ behaves like a discrete random variable

b   The distribution of all possible values of $\hat{\beta}$ is called the sample distribution of $\hat{\beta}$, while $P(\hat{\beta})$ is called the probability density function of $\hat{\beta}$.

c   the sample distribution of $\hat{\beta}$ is an indicator of the performance of $\hat{\beta}$.

[1]   a and b
[2]   a and c
[3]   b and c
[4]   a, b and c
[5]   Not [1], [2], [3] or [4]

1.25 Which of the following statements is/are **correct**? If $\hat{\beta}$ is a continuous random variable, then

a $\hat{\beta}$ can assume a range of possible values which implies that $\hat{\beta} - \beta$ is not necessarily equal to zero.

b The expected value of $\hat{\beta}$ is always equal to the true population parameter.

c the probability density function P($\hat{\beta}$) may be used to test hypothesis regarding β.

[1] b and c
[2] a, b and c
[3] a and b
[4] a and c
[5] Not [1], [2], [3] or [4]

Assignment 02
- is optional, but contributes significantly towards your semester mark and therefore your final mark.
- consists of some typical examination type questions.
- If a question counts, say 5 marks, then the answer requires more or less 5 statements or explanations.

Question 1 (15 marks)

The regression results below are based on the model $\ln(L_t) = b_0 + b_1 t + b_2 \ln(Y_t) + b_3 \ln(m_t) + \varepsilon$,

Where   L: Employment
Y: Output level (GPD)
m: Minimum wage
t: trend variable

Dependent variable: Employment

Sample	constant	trend	Y	m	DW	Adj.Rsq
1995 - 2006	2.61	-0.06	0.83	1.65	2.63	0.98
	(0.09)	(0.00)	(0.00)	(0.00)		

Where DW: Durbin-Watson statistic
Adj.Rsq: R^2
The values in the parenthesis are the t-statistics probability values

(a)   Do you think the anticipated signs of the model coefficients should be negative or positive and why?   (5)

(b)   Assess the diagonistic statistics and interpret the results. Do you think you can trust the model's results?   (10)

[15]

Question A2 (15 marks)

(a)   Explain the statement "Good economic policy requires good economic theory"   (5)

(b)   Explain in detail the interrelationships between economic facts, theory and policy. Evaluate the statement "The trouble with economic theory is that it is not practical"   (6)

(c)   What are the four basic steps of hypothesis testing?   (4)

[15]

Question B1 (20 marks)

In a univariate regression with 13 observations, R^2 of 0.9077, $\sum y^2 = 105.118$

(a)   Calculate the explained sum of squares (ESS),the residual sum of squares (RSS), the degrees of freedom from regression, residuals and TSS. What is the value of the total sum of squares (TSS)?   (12)

(b)   State the relationship between the F-statistic and the R^2. What is the value of the F-statistic? Using a 5% level of significance, do you think the estimated slope coefficient will be statistically significant?   (8)

[20]

Question 1 (20 marks)

An econometrician estimated the demand for pork model and found the following results

Dependent variable: CONPK

Variable	Coefficient	Std. Error	Other Statistics
Constant	4.2854	0.5288	$R^2 = 0.9416$
PRP	-0.0094	0.00493	Durbin-Watson = 0.5736
YD	0.03917	0.04657	F-statistic = 109.68
PRB	4.5529	0.2475	

(a)   Evaluate this result with respect to its economic meaning, overall fit, signs and significance of coefficients.

(12)

(b)   What econometric problems does this regression have? Why? How would you solve the problems (if any) associated with this model? (8)

[20]

Question 2 (20 marks)

(a)   Explain how the White test is performed. (Hint: Explain the nature of the auxiliary equation and the nature of the test statistic). (6)

(b)   Briefly explain why the White test for heteroskedasticity is better than the Park test. (4)

(c)   Compile a specification (called form 2.1) which expresses the annual gross income of econometricians (Y) as a function of
   - Number of years of work experience (NR)
   - Whether the person holds and advanced degree or not (MD: at least a M-degree in statistics)
   - Whether the person is employed in the government or the private sector (SEC).

Explain the meaning of all dummy variables used and the meaning of each of the coefficients (including their expected values). Assume that, ceteris paribus, persons earn a higher salary in the private sector compared to the public sector. (5)

40

(d)   Change form 2.1 to form 2.2 so that the $\Delta Y / \Delta NR$ is more steep if the person has an advanced degree (at least a M-degree). Explain the exact meaning of any additional elements used in form 2.2, and why this applies.   (5)

[20]

Question 3 (20 marks)

(a)   What is the meaning of each of the following terms: (10)
   i.   Double-log functional form
   ii.   Natural log
   ii.   Slope dummy
   iv.   Variance inflation factor
   v.   Durbin –Watson d statistic

(b)   Consider the following two forms:

   Y = e + f.log(X)
   Log(Y) = c + d.log(X)

In each case provide expressions for the slope, or if appropriate its elasticity, draw its chart, provide an alternative expression of the form if appropriate, and briefly explain a practical situation appropriate to each of these forms.   (10)

9   OTHER ASSESSMENT METHODS

There are no other assessment methods for this module.

10   EXAMINATION

10.1 Assessment of examination

For general examination guidelines and examination preparation guidelines, please refer to *my Studies @ Unisa* brochure.

Please note that application for, and the administration of remark of examination scripts are dealt with solely by the Examinations Department and not by academic departments

10.2 Examination admission

The management of the University decided to continue with compulsory assignments in all modules to ensure students fully benefit from the formative tuition and assessment. You are, therefore, required to submit a compulsory assignment (Assignment 01) to obtain admission to the examination.

Please ensure that you submit the correct assignments that correspond with your registration. For example, if you have registered for the first-semester course, you should submit Assignments 01 and 02 under Semester 1. Should you fail to submit Assignment 01, you will be denied admission to the examination (even if all your answers are correct). Admission to the examination will be subject to the submission of the compulsory assignment (Assignment 01) and not the marks obtained for it.
Please ensure that this assignment reaches the University before the due date! Should the assignment not be submitted in time, you will not qualify for admission to the examination.

Also, please note that a sub-minimum applies to the year mark. You must obtain at least 40% in the final examination to ensure your semester mark is included in the final mark.

For example, if you obtain 99% in the assignments and 35% in the final examination, your final mark will not include the 99% year mark because the mark obtained in the examination is less than the required sub-minimum (threshold). In this case, your final mark will be 35% (which is the examination mark). Please ensure you familiarise yourself with this important academic rule.

The examination mark

The percentage obtained in the examination is used to calculate your final mark.

Final mark

The assignments will constitute 20% of the year mark, while the examination will contribute 80% towards the final year mark.

The final mark, which is based on your semester (year) mark and the examination mark, will be calculated as follows:

Semester mark (20%) + Examination mark (80%)

OR

Semester mark (out of 100) x 20% + Examination mark (out of 100) x 80%

For example:
Suppose you obtained a semester mark of 52,5% and an examination mark of 60%. Your final mark will be calculated as follows:

$$(52,5 \times 20\%) + (60 \times 80\%)$$
$$= (52,5 \times 0,2) + (60 \times 0,8)$$
$$= 10,5 + 48$$
$$= 58,5\%$$

- If your final mark (as calculated above) is 50% or more, you pass ECS3706.
- If your final mark (as calculated above) varies between 45% and 49%, you do not pass ECS3706, but qualify for a supplementary examination.
- If your final mark (as calculated above) is 45% or less, you fail ECS3706 and you have to reregister for ECS3706.

Examination period

This module is offered in a semester period of approximately 15 weeks. This means that if you are registered for the first semester, you will write the examination in May/June 2015 and the supplementary examination will be written in October/November 2015. If you are registered for the second semester you will write the examination in October/November 2015 and the supplementary examination will be written in May/June.

During the semester, the Examination Section will provide you with information regarding the examination in general, examination venues, examination dates and examination times.

Examination paper

The structure of the examination paper for 2015 is as follows:
It is a two-hour paper and consists of 2 sections (A and B) making up a total of 100 marks.

In section A you must answer all the questions. You will be asked to explain certain concepts and relationships, and short essay type questions which are based on the content of the whole module. The total number of marks for this section is 60 marks.

In section B you must answer two out of three questions. Each question will count 20 marks. You will be asked to explain certain concepts and relationships, and short essay type questions which are based on the content of the whole module. The total number of marks for this section is 40 marks.

Previous Examination papers

Some previous examination papers are available to students on *my*Unisa under the "official study material" folder. Should you obtain previous examination papers from elsewhere, we advise you not to focus on such old papers only as the content of modules and, therefore, examination papers may change from year to year. To concentrate only on previous examination papers will not guarantee a pass. You must be able to answer questions on all the prescribed work and study outcomes.

Wishing you the best with your studies.

Mr. MJ Khumalo