Karatina University

School of Business

Instructor; John Karuitha

Monday, February 21, 2022

COURSE OUTLINE: ECO 113 INTRODUCTION TO MATHS II

COURSE PURPOSE

The program aims to equip the student with mathematical analysis skills for making decisions that form the basis for advanced courses in economics such as Advanced Microeconomics, Advanced Microeconomics, Economics Statistics and Econometrics. The course seeks to build mathematical intuition in students instead of merely plugging numbers into formulas.

COURSE TOPICS

Number System. Functions; Exponential and logarithm. Higher - order determinants. Matrix Inversion. Cramer's Rule. Calculus: Maxima and Minima. Integration and applications First - order Differential Equation.

COURSE LEARNING OUTCOMES

At the end of the course, the learner should be able to;

1. Distinguish different types of functions.
2. Solve equations in different functional forms.
3. Solve systems of equations using matrices.
4. Apply differential and integral calculus to economic settings.

COURSE CONTENT

- The Number System.
- Functions.
  - Background and Definitions.
  - Linear equations and functions.
  - Quadratic and other special functions.
  - Exponential and logarithmic functions.
- R and R Studio.
  - Introduction to R and R studio.
  - Introduction to latex, knitr and R markdown.
  - Writing a report in R Markdown.
- Matrix algebra
  - Introduction to matrices and related terminology.
  - Matrix addition, subtraction and multiplication.

  - The determinant and inverse of a matrix.
  - Solving systems of equations - Crammer's Rule.
  - Applications of matrix algebra- the Leontief input-output models.
  - Matrix algebra in R.

- Higher order determinants
  - Determinants for matrices of higher dimensions (greater than 2X2).
  - Applications.

- Differential calculus
  - Introduction to differential calculus.
  - Terminology and notation.
  - Rules of differentiation.
  - Applications of differentiation.

- Integral calculus
  - Introduction to differential calculus.
  - Terminology and notation.
  - Rules of integretion.
  - Applications of integration.

- First order differential equations

MODE OF DELIVERY OF THE COURSE

The course will be delivered using online lectures and discussions based on case studies and presentations by students.

INSTRUCTIONAL MATERIALS/ EQUIPMENT

- Please make a point of checking YouTube and online resources like EdX and Coursera for additional material and clarification.
- I have made arrangements that technicians at the computers labs at the University install `R` and `R Studio` on the computers.
- For students who own personal computers, please install both `R` and `R studio` from the internet. Confirm whether your computer is 32-bit or 64 bit and install the appropriate version. Each software is free.
- `R` is availabe on this link https://cran.r-project.org/bin/windows/base/.
- `R_Studio` is available on this link https://rstudio.com/products/rstudio/download/.
- Both `R` and `R-Studio` are available for Mac, Linux, and Windows-based systems. Choose the appropriate version for your computer.
- For students who own tablets, you can neither install `R` nor `R Studio`. However, you can access the service online through `R Studio Cloud`. You have to be connected to the internet to access and use this service. Students with personal computers may also opt for this route.

Table 1: Course Evaluation

Assessment	Contribution
CAT 1: Multiple Choice	5%
CAT 2: Multiple Choice	5%
CAT 3: Sit in: Essays and Computations	10%
CAT 4: Project report	10%
Final Examination	70%
TOTAL	100%

COURSE ASSESSMENT

The course will be assessed using 3 continuous assessment tests, 1 project-based class assignment and 1 final exam, as shown in Table 1.

References

Harshbarger, R. J., & Reynolds, J. J. (2012). Mathematical applications for the management, life, and social sciences. Nelson Education.

Wainwright, K. (2005). Fundamental methods of mathematical economics. McGraw-Hill/Irwin.

I will share on-line resources especially on YouTube in the course of the class.