ECON 1101 Mathematical Methods in Economics I

A: Mon 4:30-6:15pm
B: Tue   8:50-10:15am

Instructor: Vinci Chow (vincichow@cuhk.edu.hk)
Office hours: By appointment (https://www.econ.cuhk.edu.hk/booked/Web/schedule.php?sid=2)
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Purpose of this Course

We will introduce basic mathematical tools that are indispensable in modern economics. Topics include sets, matrix algebra, exponential and logarithmic functions, differentiation and unconstrained optimization. Related economic applications will also be discussed.

Learning Outcomes

Upon completing this course, students are expected to be familiar with basic mathematical tools such as matrix and differentiation. They should be able to use them to analyze basic mathematical models in economics. They should also be able to use computer programs to aid their analysis.

Special Arrangement due to COVID-19

Lecture recordings will be available on Blackboard after each class.

Textbook

Required textbooks:

- Ron Larson: Elementary Linear Algebra 8th Edition
- James Steward: Calculus, International Metric Version 8th Edition

Python

We will frequently use the Python programming language to solve mathematical problems in class. You can access Python via the Department of Economics' SCRP High Performance Computing Cluster (https://scrp.econ.cuhk.edu.hk/). As an alternative, you can install on your own computer the Anaconda Scientific Python Distribution for Python 3.8 (https://www.anaconda.com/download/), which supports all major operating system platforms.

Honesty in Academic Work

Please visit the following website for details of university policy on Honesty in Academic Work: http://www.cuhk.edu.hk/policy/academichonesty/.

Tentative Grading Scheme

Assignments   - 50%
Final Exam   - 50%

Assignments
There will be assignments in most of the weeks. You must submit your assignment electronically on Blackboard. When calculating your course grade, the assignment with the lowest grade will be dropped.

Make up exam
A student who does not show up in an exam will be given a zero for that exam. Except in an emergency, I do not want to give make-up exams.

Re-grades
If you feel that an error has been made in the grading of the question on an examination you are can submit the exam in question for a regrade. Regrade requests have to be submitted no more than one week after the examination in question was returned to you. Please note that the entire exam will be reviewed for accuracy.

Class Schedule

1. Introduction
    a. Number Systems
    b. Sets
    c. Functions

2. Linear Models and Matrix Algebra
    a. Gauss-Jordan Elimination   (Larson 1.2)
    b. Matrix Operations   (Larson 2.1, 2.2)
    c. Markov Process   (Larson 2.5)
    d. Determinant   (Larson 3.1-3.3)
    e. Inverse   (Larson 2.3, 3.4)
    f. Vector Space   (Larson 4.1-4.3)
    g. Ordinary Least Square   (Larson 5.4)
    h. Eigenvalues and Eigenvectors (If time permits)

3. Differentiation
    a. Limit and Continuity   (Stewart 1.3-1.6)
    b. Definition of Derivative   (Stewart 2.1-2.2)
    c. Differentiation Rules   (Stewart 2.3, 2.5)

4. Unconstrained Optimization
    a. First-Order Condition   (Stewart 3.7)
    b. Second-Order Condition

5. Partial Differentiation   (If time permits)