

The Chinese University of Hong Kong  
2nd Term, 2021-2022  
ECON 1111A Mathematical Methods in Economics II  
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### Syllabus

**Course Description.** We will introduce basic mathematical tools that are indispensable in modern economics. Topics include differentiation of multivariable functions, multivariable optimization, constrained optimization, and integration. Related economic applications will also be discussed.

Students are assumed to be familiar with matrix algebra and single-variable differential calculus, and are advised to take ECON1101 before taking this course.

**Learning Outcomes.** After taking this course, students are expected to be familiar with basic mathematical tools that are required for understanding and analyzing basic mathematical models in economics.

**Reading Materials.** Teaching materials are mainly based on the following two textbooks:

1. Chiang, A. C., and Wainwright, K. (2005). *Fundamental Methods of Mathematical Economics*, 4th edition (McGraw-Hill International Edition). McGraw Hill Companies.
2. Sydsæter, K., and Hammond P. (2002). *Essential Mathematics for Economic Analysis*. Prentice Hall.

Supplementary references include:

Stewart J. (2015). *Calculus*, 8th edition. Cengage Learning.

**Assessment.** The course grade is counted as follows:

Mid-term Exam	50%
Final Exam	50%

There is no make-up exam for the mid-term examination. A student who is absent from the mid-term examination due to sickness should provide a medical certificate, and the final exam will count 100% of his/her grade in this course.

**Course Outline.**

1. Differentiation of multivariable functions: partial differentiation, differentials, total differentiation, implicit function method, comparative static analysis
2. Multivariable optimization: first-order condition, second-order conditions, sign definiteness of a matrix, concave functions
3. Optimization with equality constraints: Lagrangian method, first-order condition, second-order conditions, quasiconcave functions, utility maximization, homogeneous functions, cost minimization
4. Integral calculus: indefinite integrals, integration rules, definite integrals, improper integrals
5. Optimization with inequality constraints (if time allows): Kuhn-Tucker conditions

**Academic Honesty.** Attention is drawn to University policy and regulations on honesty in academic work, and to the disciplinary guidelines and procedures applicable to breaches of such policy and regulations. Details may be found at <http://www.cuhk.edu.hk/policy/academichonesty/>.