

**The Chinese University of Hong Kong**  
**2nd Term, 2018-2019**  
**Econ 4110 Introductory Mathematical Economics**  
**Teacher: Wong Kam-Chau**  
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### **Syllabus**

**Course Description.** This course discusses basic tools in mathematical analysis and their applications to mathematical economics. Students will learn formal mathematical reasoning, and learn how to read and write formal proofs. Mathematical topics include tools that are widely used in economic theory, such as logic, sets, functions, sequences, continuity, open sets, closed sets, compact sets, maximum existence theorem, separating hyperplanes, and fixed points. Economic topics include basic problems in the general equilibrium theory, such as preference, utility, demand, competitive equilibrium, and Pareto optimality.

Student are assumed to be familiar with basic differentiable calculus and linear algebra (as introduced in Mathematical Methods in Economics I,II).

Teaching materials are mainly based on lecture notes. Other supplementary references will also be used.

**Learning Outcomes.** After taking this course, students should be familiar with basic results in mathematical economics. They should be able to read papers in academic journals.

**Course Schedule.** Discussion topics are scheduled as follows:

**Weeks 1-2** Logic, Proofs, Sets and Functions

**Weeks 3-4** Preference and Utility

**Weeks 5-7** Sequence, Limit, Continuity

**Week 8** Mid-term

**Weeks 9-10** Existence of Utility Representation

**Week 11** Compact Set and Maximizer Existence

**Week 12** Consumer Demand

**Weeks 13-15** Exchange Economy  
Existence of Competitive Equilibrium  
Two Welfare Theorems  
Separating Hyperplanes and Fixed Points.

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

Mid-term      50%

Final            50%

The final examination will be scheduled centrally and no substitute examination will be offered.

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**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/>.

## References

- [1] Arrow, K. J., and Debreu, G. (1954): "The Existence of an Equilibrium for a Competitive Economy," *Econometrica*, 22: 265-290.
- [2] Arrow, K. J., and Intrilligator (eds) (1981). *Handbook of Mathematical Economics, Volume II*. North Holland Publishing Company, New York.
- [3] Bartle, R. G., and Sherbert, D. R. (2000). *Introduction to Real Analysis*, 3rd edition. John Wiley & Sons, Inc., New York.
- [4] Border, K. C. (1955). *Fixed Point Theorems with Applications to Economics and Game Theory*. Cambridge University Press, London.
- [5] Chiang, A. C., and Wainwright, K. (2005). *Fundamental Methods of Mathematical Economics*, 4th edition. McGraw Hill Companies, Inc., New York.

- [6] Debreu, G. (1982): “Existence of Equilibrium,” in [?], Chapter 15.
- [7] Mas-Colell, A., Whinston, M. D., and Green, J. (1995). *Microeconomic Theory*. Oxford University Press, Inc., New York.
- [8] Rudin, W. (1976). *Principles of Mathematical Analysis*, 3rd edition. McGraw-Hill, New York.
- [9] Varian, H. (1984). *Microeconomic Analysis*, 2nd edition. W.W. Norton & Company, New York.