

S1, 2015

## Mathematics II

Monday, Thursday 13:00-14:45

April 6, 2015

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The aim of this course is to provide students with basic tools in Analysis that are needed in advanced level micro and macro economics. The course covers the main part of the Mathematical Appendix in Mas-Colell, Whinston, and Green.

Course information will be posted at

<http://www.oyama.e.u-tokyo.ac.jp/mathii15/>

### Topics

1. Real numbers (Debreu 1.5)
2. Continuous functions and compact sets (MWG M.F; Debreu 1.6, 1.7)
3. Correspondences (MWG M.H; Debreu 1.8)
4. Differentiation in one variable
5. Differentiation in several variables (MWG M.A, M.B, M.E)
6. Convex sets and (quasi)concave functions (MWG M.C)
7. Negative (semi)definite matrices (MWG M.D)
8. Unconstrained maximization (MWG M.J)
9. Constrained maximization (MWG M.K)
10. Envelope theorem (MWG M.L)
11. Separating hyperplane theorems (MWG M.G, M.M)
12. Fixed point theorems (MWG M.I)
13. Dynamic programming (MWG M.N; Stokey-Lucas 4; Puterman 5, 6)

### **Textbook**

- A. Mas-Colell, M.D. Whinston, and J.R. Green, *Microeconomic Theory*, 1995.

### **References**

- G. Debreu, *Theory of Value*, Yale University Press, 1959.
- N.L. Stokey and R.E. Lucas, *Recursive Methods in Economic Dynamics*, Harvard University Press, 1989.
- M.L. Puterman, *Markov Decision Processes: Discrete Stochastic Dynamic Programming*, Wiley-Interscience, 2005.

### **Grading**

Final exam

### **Office hours**

Fridays 14:00-15:30 (starting on April 17), or by appointment  
10th floor, 1012