

Math Camp: Mathematics for Economists 508A

Instructor: Saumya Deojain

Summer 2020

Course:	Mathematics for Economists 508 A
Timing:	Mon-Fri, 1:00pm-3:00pm
Office hours:	By appointment, shoot me an email and we will fix a zoom meeting.
Email:	deojain@wustl.edu
Textbook:	Simon and Blume, <i>Mathematics for Economists</i>

Description

The purpose of this course is to equip you all with basic mathematical tools you will need to tackle fundamental problems in micro, macro and econometrics. We will go through several economic examples along the way to familiarize ourselves with each concept. At the end of this course you should be comfortable with solving systems of equations, unconstrained and constrained optimization in multiple variables, the envelope theorem, necessary and sufficient conditions for optimization and the meaning of the Lagrange multiplier.

Books

Our interactions in the lectures should be sufficient in providing you all that you need. However, my notes and examples will be based off of *Simon and Blume, "Mathematics for Economists"*. You may also find the books listed below useful for reference to deepen your understanding of each subject. Feel free to look at lecture slides from previous years as we will be following that syllabus very closely.

Other references

Stokey and Lucas, "Recursive Methods in Economic Dynamics"

Sundaram, "A First Course in Optimization Theory"

Turkington, "Mathematical Tools for Economics"

Wainwright and Chiang, "Fundamentals of Mathematical Economics"

Topics

- Linear algebra: Matrices, Systems of Equations
- Calculus: Multivariate differentiation (Total differentiation, Implicit function derivatives etc), Integration (Single variable)
- Concave sets: Open sets, compact sets, sequences and limits

- Concave, quasi-concave functions: Sufficient and necessary conditions
- Unconstrained optimization: Necessary and sufficient conditions (Weistrass thm, FOCs etc)
- Constrained optimization: Necessary and sufficient conditions (Lagrangian, Karush-Kuhn-Tucker etc)
- Meaning of the Lagrange multiplier
- Envelope theorem: Unconstrained and constrained optimization

Grading

There will be 2 assignments over the first two weeks and 1 final quiz at the end.

- Attendance: 30%
- Assignments: 40% , released on Friday and submission on Monday
- Final Quiz: 30%

Tentative Calendar

The following is a tentative calendar that may change based on the pace of our classes. The chapters in parenthesis refer to the chapters in Simon and Blume that the lectures will be based off of.

Monday	Tuesday	Wednesday	Thursday	Friday
Aug 24th Linear Algebra (ch. 8)	25th Linear Algebra (ch. 7)	26th Calculus (ch. 13, 14)	27th Calculus (ch. 14, 15)	28th Concave Sets (ch. 12)
31st Concave functions (ch. 21) A1 due	Sep 1st Quasi-concave functions (ch. 21)	2nd Unconstrained optimization (ch. 17)	3rd Unconstrained optimization (ch. 17)	4th Constrained Optimization (ch. 18)
7th Constrained Optimization (ch. 18, 19) A2 due	8th Lagrange Multiplier (ch. 19)	9th Envelope Theorem (ch. 19)	10th Envelope Theorem (ch. 19) & Review	11th Final Quiz