Mathematical Methods

Summer 2023
(August 28 - September 15)

Instructor:	Steve Kim	**Time:**	10:00AM – 12:30PM
Email:	kimsy@uchicago.edu	**Place:**	Keller Sky Suite

TA: Ozzy Houck (ohouck@uchicago.edu)

Course Pages:

1. https://canvas.uchicago.edu/courses/50278
2. https://sites.google.com/view/stevekimphd

References: I recommend the following as supplementary material.

- Rudin, *Principles of Mathematical Analysis*, McGraw-Hill, 1976.
- Hayashi, *Econometrics*, Princeton University Press, 2000.
- Angrist and Pischke, *Mostly Harmless Econometrics*, Princeton University Press, 2009.
- Jehle and Reny, *Advanced Microeconomic Theory*, Prentice Hall, 2011.
- Greene, *Econometric Analysis*, Pearson, 2017.

Objectives: This course has 2 main objectives. First, we will review materials from your undergraduate studies and develop a deeper and more rigorous understanding of those foundational concepts. Second, we will gain exposure to new math that you will be encountering throughout the first year core. We will devote the majority of our time to linear algebra and econometrics.

Class Schedule: Lecture (10:00AM-11:20AM); TA session (11:30AM-12:30PM)

Course Schedule:

Calculus ..... Day 1 (8/28)
Calculus ..... Day 2 (8/29)
Real Analysis ..... Day 3 (8/30)
Real Analysis ..... Day 4 (8/31)
Statistics ..... Day 5 (9/01)
Linear Algebra ..... Day 6 (9/05)
Linear Algebra ..... Day 7 (9/06)
Linear Algebra ..... Day 8 (9/07)
Linear Algebra ..... Day 9 (9/08)
Linear Algebra ..... Day 10 (9/11)
Econometrics ..... Day 11 (9/12)
Econometrics ..... Day 12 (9/13)
Econometrics ..... Day 13 (9/14)
Optimization ..... Day 14 (9/15)

Homework: After each class, there will be a problem set that is optional but strongly encouraged. We will go over the solutions during the TA session the next day. The solutions are available on my personal website for use should you get stuck indefinitely or wish check your answers instantly. On Canvas, the solutions will be posted shortly after they have been covered during the TA session.

Comments: Right now is the best time for you to brush up on your math. Once the academic year starts, you will struggle to set aside enough time for reviewing and learning math. If you work hard (i.e. attend every class and do each problem set), you will be surprised by how much you can learn in 3 weeks. Last but not least, prioritize developing a rock-solid grasp on the foundational concepts over developing a familiarity with more advanced concepts.