TEXTBOOKS: There is no single text available that covers all relevant material at a suitable level. Thus I propose that students supplement class lectures by choosing one or more of the following books; they should be available at the BU Barnes and Noble.


I recommend #1 to everyone. It is a nice introduction to real analysis and, being a Dover series paperback, should be inexpensive, say about $10. The book by Ok is optional. It is more advanced and covers much more than we will need in the course, but it could serve as a useful reference in future years. I will not rely on any of the books explicitly - lectures will be comprehensive and assigned exercises will be written out in full and distributed. I will also distribute lecture notes, albeit only in outline form. Thus you might manage well without either book.
COURSE OUTLINE:

1. Metric Spaces: metrics, convergence, closed/open/compact sets, continuous functions, usc/lsc functions, Weierstrass Theorem, normed spaces. Important examples: $C([a, b])$ with the sup norm, $\ell_p$ spaces ($1 \leq p \leq \infty$)

2. Correspondences: upper and lower hemicontinuity, Maximum Theorem

3. Fixed Point Theorems: Brouwer, Kakutani, existence of "equilibrium"

4. Dynamic Programming: Value functions, Principle of Optimality, Bellman equation, complete metric spaces, the Contraction Mapping (or Banach) Theorem, Blackwell’s sufficient conditions

5. Convexity: convex sets in $\mathbb{R}^n$, concave/convex functions, quasiconcave/quasiconvex functions, separation theorems

6. Constrained optimization: Kuhn-Tucker Theorem

How Will the Course be Run?

There will be two lectures and one tutorial weekly. Problems will be assigned regularly, some of which will be graded. I emphasize that it is crucial that you attempt all exercises—the ONLY way to learn the material is by attempting to solve as many problems as possible. Even where solutions are posted, simply reading the solutions is a waste of time. Many of the exercises are nontrivial and you will often need help understanding the “how” and “why” of the posted solutions. That is the role of the tutorials where most important aspects of the problems will be discussed. You are strongly urged to attend.

GRADING: Grades will be based on exercises (20%), a midterm (30%), and a final exam (50%).