References

Main Textbooks

Roger Webster: convexity.
G. Giorgi, Angelo Guerraggio, J. Thierfelder: Mathematics of Optimization
Hukukane Nikaido: introduction to sets and mappings in modern economics.

Convexity

Niels Lauritzen: Undergraduate convexity
Valeriu Sultan: lectures on convex sets
Mark Steinberger: A course in low-dimensional geometry
Wayne Roberts, Dale Varberg: Convex functions
Stephen Robinson: Convexity and Monotonicity in Finite-Dimensional Spaces
Steven Lay: Convex Sets and their application.

Optimization

Mokhtar Bazaraa, Hanif Sherali, C.M. Shetty: Nonlinear programming
Alberto Cambini, Laura Martein: Generalized Convexity and Optimization
Monique Florenzano and Cuong Le Van: Finite Dimensional Convexity and Optimization

Topology

Michael Muger: Topology for the working mathematician
Claude Berge: Topological spaces
Kenneth Hoffman: Analysis in Euclidean space

fixed point theory

Kim Border: Fixed Point Theorems with Applications to Economics and Game Theory
P. V. Subrahmanyam: Elementary Fixed-Point Theorems

Topics

Euclidean spaces

Flats, hyperplanes, affine maps, affine dimension, compactness, continuity

Convex sets

Projection and nearest points, relative interior, Separation and support theorems.

Theorems of the alternative

Linear inequalities, Farkas, Fredholm, Gordan, stiemke, de Finetti...

Optimization

The theorems of Weierstrass, Fritz John, and Arrow-Enthoven.

Convex polytopes

Polytopes, simplices, Polyhedra, facial structure, double description, finite basis theorem.

Convex and quasi-convex functions

Continuity, differentiability, support, characterization.

Brouwer's fixed point theorem

Simplices, subdivision, Sperner's lemma.

Evaluation

Take-home exam, in-class exam.