

UNIVERSITY  
OF MIAMI



Dr. BRUNO BENEDETTI  
Ungar Building, office 533  
OFFICE HOURS: TUE 10:00–12:00  
(or by appointment: [bruno@math.miami.edu](mailto:bruno@math.miami.edu))

## MTH 785T: Graph Theory and Linear Programming

CLASS: TuTh 6:00PM - 7:15PM

**Textbook:** I will try to integrate Gartner–Matousek’s *Understanding and Using Linear Programming*, Springer, with my own notes on graph theory. My notes are based on many books, among which Diestel’s *Graph Theory*, Golumbic’s *Algorithmic Graph Theory*, and Aigner–Ziegler’s *Proofs from the Book*. You’re not expected to buy any of the books above.

**Content:** Tentative topics list:

- Chapter 0: Introduction. History and definitions of graph, multigraph, planarity and duality.
- Chapter 1: Networks. Max Flow Min Cut. Consequences on Marriage.
- Chapter 2: Linear Algebra techniques. Consequences on Friendship.
- Chapter 3: Seven classes. Perfect, chordal, co-comparability, interval, unit–interval, Hamiltonian, Eulerian graphs.
- Chapter 4: Inequalities, LP and games. The duality and the minimax theorem.
- Chapter 5: Fundamental theorem of polytopes.
- Chapter 6: The simplex method and convex optimization.

**Grading policy:**

- Students will have to present a couple of seminars throughout the course. The presentation can be either at the whiteboard, or using an overhead projector; as in the previous semester, I will tediously interrupt with questions and objections, partly because it’s my job, partly because it’s my character.
- Attendance and interactive participation will play a key role. The presentations are integrating part of the course, so the other students should attend too. There will be no final.

**General rules:**

- A basic linear algebra course is a good prerequisite. That said, the course is accessible to all first-year grad students.
- Cell phones are allowed in class, but must be on silent mode. Same policy for pets, kids, and lovers.

**Remarks:**

We won’t have classes if I am at conferences; you can check in advance my travel schedule at [www.math.miami.edu/~bruno/events.html](http://www.math.miami.edu/~bruno/events.html)

With this, I wish you a lovely Spring semester here at The U!

Bruno Benedetti  
Assistant Professor