**Algorithmic Game Theory and Economics**

**Objectives:**  Students will learn state-of-the-art algorithmic tools in game theory and their applications to problems at the intersection of Computer Science and Economics.

**Topics:**

1) Nash Equilibrium:  existence and complexity of computing it.

     Correlated equilibria and polynomial time algorithm for computing them.

2) Market equilibria: Positive results via convex programs.

Combinatorial algorithms for rational convex programs

capturing market equilibria.

3) Learning in games: Regret minimization and partial information model.

4) Mechanism design: Incentive compatible cost sharing algorithms,

stable marriage, profit maximization, distributed algorithms,

online mechanisms.

5) Inefficiency of equilibria: price of anarchy and other measures.

**Textbook**: *Algorithmic Game theory*

By N. Nisan, T. Roughgarden, Eva Tardos, and V. Vazirani (Editors)

**Grading:**

Home work assignments

Paper presentations

Take-home examination

Extra-Credit: original research