

Price of Anarchy seminar - Spring 2014 - Tel-Aviv University

Prof. Michal Feldman

1 Requirements and grading

- Every student is required to read, understand and present a research paper or a book chapter, and to submit a written short summary of the paper s/he presents (presentation 80%, summary 10%).
- Class attendance is mandatory (missing one class is OK). (Class participation 10%).

2 Announcements

No class on March 12 2014 (a date for a makeup class will be chosen asap).

- AGT below refers to *Algorithmic Game Theory*, edited by Noam Nisan, Tim Roughgarden, Eva Tardos and Vijay Vazirani, Cambridge University Press.
- Tim's course refers to the course Algorithmic Game Theory in Stanford, instructed by Tim Roughgarden: <http://theory.stanford.edu/tim/f13/f13.html>.

3 Schedule

- Class 1 [Michal]: Introduction to inefficiency of equilibria.
Chapter 17 in AGT.
- Class 2 [Iddan Golumb]: Non-atomic selfish routing
T. Roughgarden and E. Tardos. How bad is selfish routing? J. ACM, 49(2):236259, 2002.
See also Lectures 11,12 in Tim's course.
- Class 3 [Nir Aviv]: Atomic selfish routing
Introduction to potential games, AGT 19.3.
T. Roughgarden. Selfish routing with atomic players. In Proc. 16th Symp. Discrete Algorithms, pp. 1184-1185, 2005.
B. Awerbuch, Y. Azar, and L. Epstein. The price of routing unsplittable flow. In Proc. 37th Symp. Theory of Computing, pp. 576-586, 2005.
- Class 4 [Nimrod Fiat]: Coordination mechanisms for selfish scheduling
Yossi Azar, Kamal Jain, Vahab S. Mirrokni: (Almost) optimal coordination mechanisms for unrelated machine scheduling. SODA 2008: 323-332
Nicole Immorlica, Li (Erran) Li, Vahab S. Mirrokni, Andreas S. Schulz: Coordination mechanisms for selfish scheduling. Theor. Comput. Sci. 410(17): 1589-1598 (2009)

- Class 5 [Oren Gilon]: Local connection games
 AGT, chapter 18
 A. Fabrikant, A. Luthra, E. Maneva, C. Papadimitriou, and C. Shenker, On a network creation game. In Proc. ACM Symp. Princ. of Distributed Systems, pp. 247351, 2003.
- Class 6 [Sivan]: Network formation games
 AGT, chapter 18
 E. Anshelevich, A. Dasgupta, J. Kleinberg, Tardos, T. Wexler, and T. Roughgarden. The price of stability for network design with fair cost allocation. In Proc. IEEE Symp. on Fdns. of Computer Science, pp. 295304, 2004.
 E. Anshelevich, A. Dasgupta, E. Tardos, and T. Wexler. Near-optimal network design with selfish agents. In Proc. 35th Annual ACM Symp. Theory of Computing, pp. 511520, 2003.
 Michal Feldman and Tom Ron: Capacitated Network Design Games. SAGT 2012: 132-143
- Class 7 [Israela]: Facility location
 Utility games and smoothness, AGT 19.4
 A. Vetta. Nash equilibria in competitive societies, with applications to facility location, traffic routing and auctions. In Proc. IEEE Symp. on Fdns. of Computer Science, pp. 416425, 2002.
- Class 8 [Nave Frost]: Load balancing,
 A. Czumaj and B. Vocking. Tight bounds for worst-case equilibria. In Proc. 13th Annual ACM-SIAM Symp. on Discrete Algorithms, pp. 413420, 2002.
 Optional: E. Even-Dar, A. Kesselman, and Y. Mansour. Convergence time to Nash equilibria. In Proc. 30th International Colloq. on Automata, Languages and Programming, pp. 502513, 2003.
 Optional class 8: Conflicting congestion effects in resource allocation games
 Michal Feldman, Tami Tamir: Conflicting Congestion Effects in Resource Allocation Games. Operations Research 60(3): 529-540 (2012)
- Class 9 [Elizabeth]: Strong price of anarchy,
 N. Andelman, M. Feldman, and Y. Mansour. Strong price of anarchy. In Proc. 18th Annual ACM-SIAM Symp. on Discrete Algorithms, 2007.
 Amir Epstein, Michal Feldman, Yishay Mansour: Strong equilibrium in cost sharing connection games. Games and Economic Behavior 67(1): 51-68 (2009)
 Lecture 15 in Tim's course.
- Class 10 [Ophir Chen]: Smoothness and static equilibrium concepts
 Mixed NE, correlated equilibrium
 Roughgarden, Intrinsic robustness of the price of anarchy, CACM 2012
 See also Lectures 13,14 in Tim's course

- Class 11 [Aviv]: Smoothness and learning equilibria
Bibliography to be announced
AGT 4.3, 4.4
See also Lectures 17,18 in Tim's course
- Class 12 [Ophir Friedler]: Bayesian price of anarchy, simultaneous first and second price auctions
George Christodoulou, Annamria Kovcs, Michael Schapira: Bayesian Combinatorial Auctions. ICALP (1) 2008: 820-832
Michal Feldman, Hu Fu, Nick Gravin, Brendan Lucier: Simultaneous auctions are (almost) efficient. STOC 2013: 201-210
Optional: Hartline, Approximation in economic design, chapter 2
Avinatan Hassidim, Haim Kaplan, Yishay Mansour, Noam Nisan: Non-price equilibria in markets of discrete goods. ACM Conference on Electronic Commerce 2011: 295-296
Kshipra Bhawalkar, Tim Roughgarden: Welfare Guarantees for Combinatorial Auctions with Item Bidding. SODA 2011: 700-709
- Class 13 [Ophir Geri]: Sequential auctions
R. Paes Leme, Vasilis Syrgkanis and Eva Tardos, Sequential Auctions and Externalities. SODA 2012.
M. Feldman, B. Lucier and Vasilis Syrgkanis, Limits of Efficiency in Sequential Auctions. WINE 2013.
optional:
Efficiently composable auctions, Syrgkanis and Tardos, STOC 2013