

Economics & Computation

⊕ SS 2023

Overview session (Vorbesprechung)

Jan 13, 2023

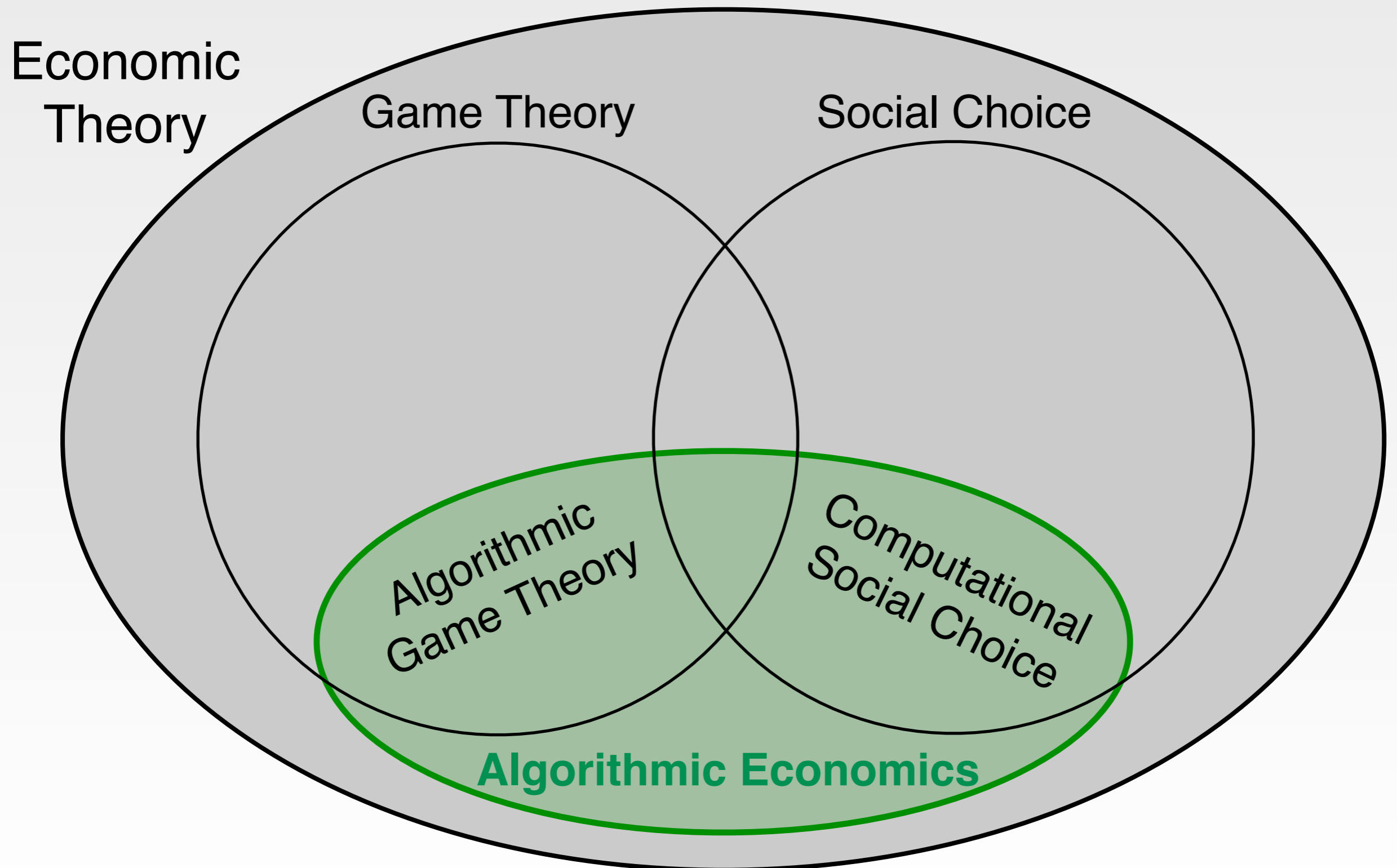
Patrick Lederer, René Romen

Plan for Today

- Introduction
- Organization of the seminar
- Articles to be chosen from
 - ▶ Matching and Allocation
 - ▶ Coalition Formation
 - ▶ Voting theory
 - ▶ Randomized social choice
- Registration/application procedure
- Your questions



The Big Picture



Related Courses

- Summer semesters
 - ▶ Course & Tutorial “[Algorithmic Game Theory](#)” (Brandt)
 - Utility theory, normal-form games, stable matchings
 - ▶ Course & Tutorial “[Operations Research \(WI IV\)](#)” (Bichler)
 - Decision theory, linear programming, discrete optimization
 - ▶ Seminar “[Economics and Computation](#)” (Brandt)
 - **Advanced research seminar (master level)**
- Winter semesters
 - ▶ Course & Tutorial “[Computational Social Choice](#)” (Brandt)
 - Rational choice, voting rules, impossibility theorems
 - ▶ Course & Tutorial “[Auction Theory & Market Design](#)” (Bichler)
 - Combinatorial auctions, spectrum license auctions, procurement
 - ▶ Seminar “[Markets, Algorithms, Incentives, and Networks](#)” (Brandt)
 - Introductory seminar (bachelor level)



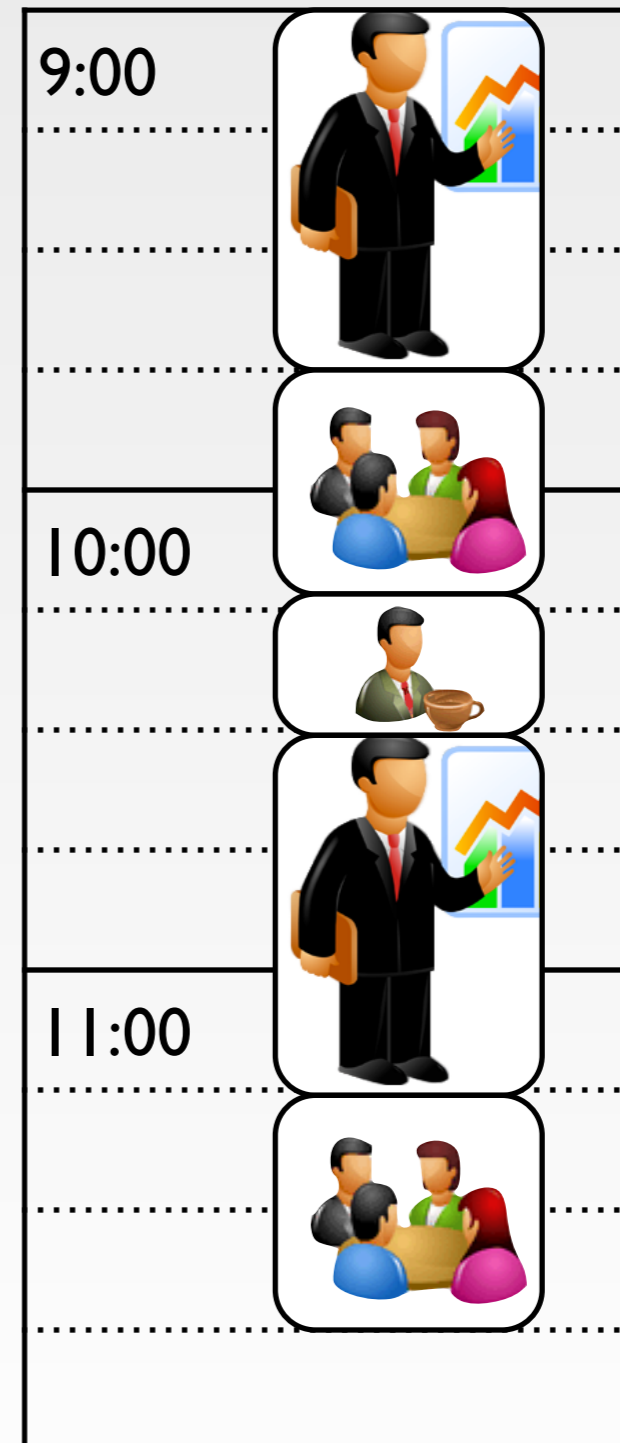
Tentative Dates

Date	Time	Topic
January, 13 ✓	14:00 - 16:00	Overview meeting
Fri, May 5	14:00 - 15:00	Kick-off meeting
Fri, June 16	09:00 - 17:00	Session 1
Fri, June 23	09:00 - 17:00	Session 2
Fri, June 30	09:00 - 17:00	Session 3



Rough Schedule

- First presentation
 - ▶ Talk (35 - 45 min)
 - ▶ Feedback (~10 min)
 - ▶ Discussions (10 - 20 min)
- Break
- Second presentation
 - ▶ Talk
 - ▶ Feedback
 - ▶ Discussions
- 4 presentations in each session



In order to pass you need to...

- Attend all meetings
 - ▶ You may only be absent if you have a *good* reason
- Write a handout for your talk/topic
 - ▶ To better prepare the audience for your talk
 - ▶ E.g., general introduction, notation, theorem statements
- Read the abstracts and handouts of your peers before their talk
 - ▶ Prepare issues for discussion
- Give a good talk (in English)
- Participate in discussions
- Chair a session
 - ▶ Introduce speaker, keep track of time, moderate discussion
 - ▶ More than process moderation



Do I have to meet my supervisor?

No, but it is **highly recommended**

- 3 weeks before your talk:
 discuss general plan of handout & talk
- 1 week before your talk:
 send slides (if you plan to use slides)
- **You** are the expert on your paper!



Matching & Allocation

- A. Abdulkadiroglu and T. Sönmez. **House allocation with existing tenants.** Journal of Economic Theory, 88(2):233–260, 1999.
- A. Abdulkadiroglu and T. Sönmez. **School choice: A mechanism design approach.** American Economic Review, 93(3):729–747, 2003.
- A. Cseh. **Popular matchings.** In U. Endriss, editor, Trends in Computational Social Choice, chapter 6. AI Access, 2017.
- A. E. Roth, T. Sönmez, and M. U. Ünver. **Pairwise kidney exchange.** Journal of Economic Theory, 125:151-188, 2005.



Fair Division

- S. Bouveret and M. Lemaître. **Characterizing conflicts in fair division of indivisible goods using a scale of criteria.** *Autonomous Agents and Multi-Agent Systems*, 30:259–290, 2016.
- D. Kurokawa, A. D. Procaccia, and J. Wang. **Fair enough: Guaranteeing approximate maximin shares.** *Journal of the ACM*, 65(2), 2018.
- S. J. Brams and A. D. Taylor. **An envy-free cake division protocol.** *The American Mathematical Monthly*, 102(1):9–18, 1995.
- A. Damamme, A. Beynier, Y. Chevaleyre, and N. Maudet. **The power of swap deals in distributed resource allocation.** In *Proceedings of the 14th International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, pages 625–633. IFAAMAS, 2015.
- A. Bogomolnaia and H. Moulin. **A new solution to the random assignment problem.** *Journal of Economic Theory*, 100(2):295–328, 2001.



Coalition Formation

- H. Aziz, F. Brandl, F. Brandt, P. Harrenstein, M. Olsen, and D. Peters. **Fractional hedonic games**. ACM Transactions on Economics and Computation, 7(2), 2019.
- H. Aziz, F. Brandt, and P. Harrenstein. **Pareto optimality in coalition formation**. Games and Economic Behavior, 82:562–581, 2013.
- A. Bogomolnaia and M. O. Jackson. **The stability of hedonic coalition structures**. Games and Economic Behavior, 38(2):201–230, 2002.
- J. Hajduková. **Coalition formation games: A survey**. International Game Theory Review, 8(4):613–641, 2006.



Voting 1

- F. Brandt, C. Saile, and C. Stricker. **Strategyproof social choice when preferences and outcomes may contain ties**. 2019. Working paper.
- J. Duggan and T. Schwartz. **Strategic manipulability without resoluteness or shared beliefs: Gibbard- Satterthwaite generalized**. *Social Choice and Welfare*, 17(1):85–93, 2000.
- C. Geist and D. Peters. **Computer-aided methods for social choice theory**. In U. Endriss, editor, *Trends in Computational Social Choice*, chapter 13. 2017.
- P. Tang and F. Lin. **Computer-aided proofs of Arrow’s and other impossibility theorems**. *Artificial Intelligence*, 173(11):1041–1053, 2009.
- F. Brandt, C. Geist, and D. Peters. **Optimal bounds for the no-show paradox via SAT solving**. *Mathematical Social Sciences*, 90:18–27, 2017.



Voting 2

- H. Moulin. **On strategy-proofness and single peakedness.** Public Choice, 35(4):437-455, 1980.
- V. Conitzer, T. Sandholm, and J. Lang. **When are elections with few candidates hard to manipulate?** Journal of the ACM, 54(3), 2007.
- R. Meir. **Iterative voting.** In U. Endriss, editor, Trends in Computational Social Choice, chapter 4. 2017.
- H. P. Young. **Optimal voting rules.** Journal of Economic Perspectives, 9(1):51–64, 1995.



Voting 3

- H. Aziz, M. Brill, V. Conitzer, E. Elkind, R. Freeman, and T. Walsh. **Justified Representation in Approval-Based Committee Voting**. *Social Choice and Welfare*, 48(2):461-485, 2017.
- M. Brill, J. Laslier, and P. Skowron. **Multiwinner Approval Rules as Apportionment Methods**. *Journal of Theoretical Politics*, 30(3), 358–382, 2018
- D. Peters, G. Pierczynski, and P. Skowron. **Proportional Participatory Budgeting with Additive Utilities**. *Proceedings of the 35th Annual Conference on Neural Information Processing Systems (NeurIPS)*, 12726-12737, 2021.



Randomized Social Choice 1

- A. Gibbard. **Manipulation of schemes that mix voting with chance.** *Econometrica*, 45(3):665–681, 1977.
- S. Barbera. **Majority and positional voting in a probabilistic framework.** *Review of Economic Studies*, 46(2):379–389, 1979.
- F. Brandl, F. Brandt, M. Eberl, and C. Geist. **Proving the incompatibility of efficiency and strategyproofness via SMT solving.** *Journal of the ACM*, 65(2), 2018.
- F. Brandt. **Rolling the dice: Recent results in probabilistic social choice.** In U. Endriss, editor, *Trends in Computational Social Choice*, chapter 1, pages 3–26. AI Access, 2017.



Randomized Social Choice 1

- P. C. Fishburn. **Probabilistic social choice based on simple voting comparisons**. *Review of Economic Studies*, 51(4):683–692, 1984.
- F. Brandl, F. Brandt, and H. G. Seedig. **Consistent probabilistic social choice**. *Econometrica*, 84(5):1839–1880, 2016
- P. C. Fishburn. **SSB utility theory: An economic perspective**. *Mathematical Social Sciences*, 8(1):63–94, 1984.



Registration

- Apply by mail (contact: rene.romen@tum.de)
 - ▶ Name, (brief) background (incl. relevant courses), motivation (up to 250 words)
 - ▶ 2 - 5 papers you are interested in (from the list of articles)
 - ▶ Additionally, you can also propose 1 - 2 papers of your own choice
 - ▶ **Rank the seminar** in the matching system
- **Deadline: January 18, 11:59pm (for mathematics students), February 15, 11:59pm (for informatics students)**
 - ▶ Notifications until mid of March including assignment of papers and supervisors
 - ▶ Registration in TUMonline will be taken care of by the end of March
- Seminar homepage: <https://www.cs.cit.tum.de/en/dss/teaching/summer-semester-2023/economics-and-computation-seminar-ss-2023/>

