**Cooperative games Syllabus**

1. Course Description
   1. Title of a Course: «Cooperative Games»
   2. Pre-requisites: basic game theory, basic microeconomics, calculus, linear algebra, probability and discrete math.
   3. Course Type (compulsory, elective, optional): compulsory

e. Abstract: Cooperative game theory is the essential and chronologically original component of modern game theory. Its key idea is to study conflicts by analyzing the abilities of possible player coalitions, disregarding the exact mechanics of coalition formation, intra-coalition bargaining and player strategic actions. This provides robust and strict approach to studying games where exact non-cooperative formalization via strategies and payoffs is too complex, unconvincing or problematic in some other way. Classical and by-far most famous application of this approach is market exchange model in general equilibrium economics.

1. *Learning Objectives:* To familiarize students with the modelling in cooperative game theory, its applications in various contexts, well know stability concepts, solutions and their properties.
2. Learning Outcomes: By the end of the course students will be able to understand the technical and conceptual differences concerning the modelling of cooperative and non- cooperative games, define the relevant core property and the stability notions in different context, and therefore understand the rationale behind long living agreements. Moreover, students will have technical skills to apply well-known solutions such as the Shapley value and the nucleolus in different problems.
3. *Course Plan:*
4. Market games, core property of competitive equilibrium.
5. Cooperative games and market design. Matchings and other applications.
6. Transferable and nontransferable utility cooperative games, core, Shapley value, other solution concepts. Axiomatic characterizations.
7. Cost sharing games
8. *Reading List*
   1. *Required*
      1. Martin J. Osborne, An introduction to game theory, Oxford University Press, 2002
      2. H. Moulin, *Axioms of cooperative decision making*, Cambridge University Press, 1988.
      3. H. Moulin, *Cooperative microeconomics*: *A game theoretic introduction.* Princeton Hall, 1995.
      4. Mas-Colell A., Whinston M. D., Green J. R. Microeconomic Theory. Oxford University Press, 1995.
   2. *Optional*
      1. The Shapley value. Essays in honor of Lloyd S. Shapley. Edited by Alvin E. Roth, Cambridge University Press, 1988.
      2. Roth, Alvin E. and Marilda Sotomayor, Two-Sided Matching: A Study in Game- Theoretic Modelling and Analysis, Cambridge University Press, 1990.
9. *Grading:* 15% attendance, 35% homework, 50% final exam
10. *Guidelines for Knowledge Assessment*

Homeworks are designed to help students improve their understanding of the lecture material. Therefore, students are advised to do their homeworks themselves and consult with the lecturer in case they have questions. Late homework will not be accepted. The common mistakes made in the homework will be discussed during the seminars. Homework and exams consist of tasks that are equivalent or similar to those which have been studied at lectures and seminars. Any fact of cheating will result in receiving a "0" (zero) for this work.

1. *Methods of Instruction*

The discipline is delivered through lectures and seminars.

1. Special Equipment and Software Support (if required): N/A