**Syllabus of the course**

“Main Notions of Decision Making: Theory and Applications”

HSE Summer School,

Moscow, 2018

 **Lecturer** – Professor, Dr. Fuad Aleskerov (National Research University Higher School of Economics and Institute of Control Sciences of Russian Academy of Sciences)

We make decisions every day, every hour, e.g., which summer school choose, which pullover buy, where to go for vacations.

The course presents main concepts of rational and efficient individual and social decisions, including political decisions.

*Lectures 1 - 2* (4 hours). **Decision Making – why, when and under which circumstances? Aggregation models.**

Main notions and phases of decision making process are presented. Main models on multicriterial and collective decision making are given. All models are widely illustrated via examples.

Recommended reading:

1. Aizerman, M. and Aleskerov, F. (1995) *Theory of Choice*. Elsevier, North Holland, Amsterdam.
2. Aleskerov F. ‘Multicriterial Interval Choice Models,’ Information Sciences, v. 80, nos. 1 and 2, 1994, 25-41
3. Kemeny, J. and Snell, J. (1963) *Mathematical Models in the Social Sciences*. Blaisdell Publishing Company
4. Fishburn, P. (1970) *Utility Theory for Decision Making*. John Wiley, New York

*Lecture 3* (2 hours). **Applied models**

Analysis of customers’ behavior for large network. Key borrowers in a banking system. Efficiency of bank branches. Location of branches of a firm. Efficiency of retail network.

Recommended reading:

1. Aleskerov F., Ersel H., Yolalan R. ‘Personnel allocation among bank branches using a two-stage multicriterial approach’, European Journal of Operational Research, 2003, vol 148/1, 116 – 125
2. Aleskerov F., Ersel H. and Yolalan R. ‘Multicriterial Ranking Approach for Evaluating Bank Branch Performance’, International Journal of Information Technology and Decision Making, v.3, no.2, 2004, 321-335
3. Aleskerov F., Andrievskaya I., Permjakova E. Key borrowers detected by the intensities of their short-range interactions, National Research University Higher School of Economics Basic Research Program Working Paper, Series Financial Economics, WR BRP, 33/FE/2014, 18p.
4. Aleskerov F., Meshcheryakova N., Rezyapova A., Shvydun S. (2017) Network Analysis of International Migration. In: Kalyagin V., Nikolaev A., Pardalos P., Prokopyev O. (eds) Models, Algorithms, and Technologies for Network Analysis. NET 2016. Springer Proceedings in Mathematics & Statistics, vol 197. Springer, Cham. First Online: 24 June 2017. DOI: 10.1007/978-3-319-56829-4\_13
5. Aleskerov F., Meshcheryakova N., Shvydun S. (2017) Power in Network Structures. In: Kalyagin V., Nikolaev A., Pardalos P., Prokopyev O. (eds) Models, Algorithms, and Technologies for Network Analysis. NET 2016. Springer Proceedings in Mathematics & Statistics, vol 197. Springer, Cham. First Online: 24 June 2017. DOI: 10.1007/978-3-319-56829-4\_7
6. F. Aleskerov, N. Meshcheryakova, Z. Sergeeva, S. Shvydun, Centrality Measures and Clustering Analysis in a Retail Food Network // Proceedings of the 11th IEEE International Conference on Application of Information and Communication Technologies (AICT2017), September 20-22, 2017, Moscow, Russia, vol.1, p.48-52.
7. Aleskerov F.T., Belousova V.Y. Branch operating efficiency and the development of a commercial bank branch network, Proceedings of the 2d International Conference ‘Mathematical Modeling of Social and Economic Dynamic’, (MMSED - 2007), Moscow, 2007, 9-11 (ISBN 978-5-209-02632-7)

*Lecture 4.* (2 hours) **In which circumstances and why political decisions are made?**

Public goods. Elections and referenda. Participation in elections. Informing voters.

Recommended reading:

1. Ordeshook, P. (1992) A Political Theory Premier. Routledge, New York
2. Aleskerov F., Nurmi H. ‘A Method for Finding Patterns of Party Support and Electoral Change:An Analysis of British General and Finnish Municipal Elections,’ Mathematical and Computer Modelling, 2008, 1225-1269

*Lectures 5-6.* (4 hours) **Voting and Manipulation in Voting**

Some excursion in history. How a voter's opinion is described? Arrow's Paradox. Sen's Paradox. Manipulation in voting. Voting procedures in elections. The interchange of votes (log rolling). Voting by feet.

Recommended reading:

1. Aleskerov, F. *Arrovian Aggregation Models*. Kluwer, Dordrecht, 1999.
2. Aleskerov F. ‘Categories of Arrovian Voting Schemes’, in the Handbook of Economics 19, Handbook of Social Choice and Welfare, v.1, K.Arrow, A.Sen, K.Suzumura (eds.), Elsevier Science B.V., 2002, 95-129
3. Arrow, K. *Social Choice and Individual Values*. Yale University Press, 1963, 2d ed.
4. Kelly, J. (1987) *Social Choice Theory: An Introduction*. Springer-Verlag, Berlin, Heidelberg
5. Sen, A. (1970) *Collective Choice and Social Welfare*. Holden Day, San Francisco.
6. Fuad Aleskerov, Alexander Ivanov, Daniel Karabekyan, Vyacheslav Yakuba ‘Manipulability of Aggregation Procedures in Impartial Anonymous Culture’, Procedia Computer Science, Volume 55, 2015, p. 1250–1257, 3rd International Conference on Information Technology and Quantitative Management, ITQM 2015,

<http://www.sciencedirect.com/science/article/pii/S1877050915016087>

*Lecture 7-8.* (4 hours). **Power distribution in organizational bodies.**

Main notions. Coalitions. Classic power indices. Power indices taking into account preferences of agents to coalesce. Applications to banks, IMF, European Parliament.

Recommended reading:

1. Aleskerov F., Avci G., Iacouba V., and Turem Z.U. ‘European Union enlargement: power distribution implications of the new institutional arrangements’, European Journal of Political Research, 41, 2002, 379-394
2. Aleskerov F.T., Yakuba V.I. ‘A Method for Threshold Aggregation of Three-Grade Rankings,’ Doklady Mathematics, 2007, Vol. 75, No. 2, pp. 322–324
3. Aleskerov, F., V. Kalyagin, and K. Pogorelskiy. ‘Actual voting power of the IMF members based on their political-economic integration,’ Mathematical and Computer Modelling, 48, 2008, 1554-1569
4. Dan Felsenthal, Moche Machover The measurement of voting power: Theory and practice, problems and paradoxes. Cheltenham: Edward Elgar, 1998.
5. Fuad Aleskerov, Manfred J. Holler, Rita Kamalova. Power distribution in the Weimar Reichstag in 1919–1933, Annals of Operations Research. April 2014, Volume 215, Issue 1, pp 25-37.
6. Shapley, L. and Shubik, M. (1954) A method for evaluating the distribution of power in a committee system. The American Political Science Review, 48

Prerequisites: Math at high school level

Control – home works (50%) + exam (50%)