**М.2.Б.01.1 Quantitive methods in Public Sector Decision-making**

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| **1. Course number, title, and ECTS** | **М.2.Б.01.1, Quantitative Methods in Public Management Decision-making, 5 ECTS**  Fisrt year, Basic Course  Lectures 24  Seminars & Practical Classes 60  Contact Hours 85  Self-study Hours 106 |
| **2. Course instructors during Self-Evaluation year and site visit year** | Mr. Fuad Aleskerov, Doctor of Techn. Sciences, Tenured Professor  Mr. Alexander Belenky, Doctor of Techn. Sciences, Tenured Professor  Mrs. Sofia Kiselgof, PhD in Mathematical Modelling, Associate Professor  Mr. Alexey Myachin, Lecturer |
| **3. Prerequisites for the course** | М.1.Б.00.2 Public Economics-2 |
| **4. Course objectives in relation to total curriculum** | The course has been designed to provide an introduction for the students to a variety of decision-making quantitative methods as analytical tools applicable in public management. |
| **5. Learning outcomes** | As a result of studying the course, the students are expected:   * To understand basic concepts of decision-making theory, system analysis, game theory, and optimization methods, * to be able to develop and analyze mathematical models formalizing real-life situations in public management, * to be able to process data to determine patterns in available data and to use formal decision-support models to analyze socio-economic and political problems in public management. |
| **6. Course description** | Students study decision-making theory, choice theory, system analysis, optimization methods, and game theory by comprehending applications of all these theories to analyzing important public management problems and by discussing the theories and their applications with the course instructors. Public management problems discussed in this course include: a) approaches to the formation, analysis, and execution of municipal budgets, b) regulations governing retail services, c) regulations determining legal foundations of advertising, d) approaches to the formation, analysis, and execution of municipal contracts, e) principles of education management, f) approaches to the formation and analysis of service tariffs, g) approaches to forming public-private partnerships and regulations determining their functioning, h) principles of public transportation system functioning and principles of managing these systems; j) concepts and methodological principles of spatial planning, k) concepts and methodological principles of public health management. |
| **7. Learning and teaching methods** | The following educational techniques are used in teaching the course:   * Lectures * Seminars * Practical Classes * Homework and course work assignments |
| **8. Major topics covered** | 1. Multi-criteria decision making and the cost-benefit analysis.  2. Collective decision making in politics.  3. Threshold aggregation.  4. Power indices.  5. Fair division.  6. Stable matching and its applications in public health management and in education management.  7. Applied decision-making models in public management.  8. System analysis and its application to solving public management problems. Linear programming, convex programming, multi-criteria optimization, and their applications in formalizing problems that arise in a) the formation, analysis, and execution of municipal budgets, b) organizing and running retail services, and c) planning advertisement campaigns.  9. Integer programming, mathematical programming with mixed variables, and their applications in formalizing problems that arise in a) the formation, analysis, and execution of municipal contracts, b) education management, and c) human resources management.  10. Basic approaches to and principles of mathematical modeling in public management and an illustration of their use on the examples of developing game-theoretic models applicable in forming public-private partnerships and in calculating service tariffs.  11. Basic concepts of graph theory and flows in networks and examples of using graph and network models in public transportation management and in spatial planning.  12. Principles of developing and using decision-support systems in public management and examples of matrix input-output models applicable in solving health insurance management problems and in providing public services. |
| **9. Prescribed books and readings** | 1. Aleskerov F., Bouyssou D., Monjardet B. “Utility Maximization, Choice and  Preference”, Springer Verlag, Berlin, 2007, ISBN 978-3-540-34182, 283 p.  2. Льюс Р. Д., Райфа Х. Игры и решения. Москва, «Иностранная литература», 1961. <http://reslib.com/book/Igri_i_resheniya__Vvedenie_i_kriticheskij_obzor#1>  3. Брамс С., Тейлор А. Делим по справедливости. М.: Синтег, 2002.  4. Вентцель Е.С. Теория вероятностей. -М.: Высшая школа, 1999.  5. Айзерман М.А., Алескеров Ф.Т. Задача Эрроу в теории группового выбора (анализ проблемы) // Автоматика и телемеханика. 1983. № 9. С. 127-151.  6. Ларичев О.И. Теория и методы принятия решений. М.: Логос, 2002.  7. Мюллер Д. Общественный выбор III. М.: Изд. дом ГУ-ВШЭ, 2007.  8. Робертс Ф. Дискретные математические модели. М.: Наука, 1986.  9. Aleskerov, F. Arrovian Aggregation Models. Kluwer Academic Publishers, Dordercht, 1999.  11. Алескеров Ф.Т., Ортешук П. Выборы. Голосование. Партии. М.: Академия, 1995.  12. Алескеров Ф.Т., Благовещенский Н.Ю., Сатаров Г.А., Соколова А.В., Якуба В.И. Влияние и структурная устойчивость в Российском парламенте (1905-1917 и 1993 - 2005 гг.). М.: Физматлит, 2007.  13. Fishburn, P. Utility Theory for Decision Making. John Wiley, New York, 1970.  14. Kreps D. Notes on the Theory of Choice, Vestview Press, Boulder and London, 1988.  15. Алескеров Ф. Т., Карабекян Д. С., Санвер Р. М., Якуба В. И. Оценка степени манипулируемости известных схем агрегирования в условиях множественного выбора // Журнал новой экономической ассоциации. 2009. Т. 1. № 1. С. 37-61.  16. Юдин, Д., Юдин, А., Экстремальные модели в экономике, Либроком, 2010.  17. Подиновский, В., Введение в теорию важности критериев, Физматлит, 2007.  18. Пападимитриу Х., Стайглиц К., Комбинаторная оптимизация. Алгоритмы и сложность., Мир, 1984.  19. Руководство по закупкам (под редакцией Н. Димитри, Г. Пига, Дж. Спаньоло), Высшая Школа Экономики, 2013.  20. Воробьев Н., Теория игр для экономистов-кибернетиков, Наука, 1985.  21. Романов Б., Оптимизация инвестиционного производственного проекта на основе модели "затраты-выпуск", Компании Спутник +, 2009.  22. Вентцель Е., Теория вероятностей. Высшая школа, 2001.  23. Гнеденко Б., Коваленко И., Введение в теорию массового обслуживания, ЛКИ, 2007  **Additional readings**:  1. Алескеров Ф.Т., Яновская Ю.М. Применение теории справедливых решений к трудовым спорам // Управление персоналом. №1. 2003. С. 59-61.  2. Алескеров Ф.Т. Слияние фирм: анализ трех ключевых проблем // Финансовый бизнес. №6. 2002. С. 3-7.  3. Басакер Р., Саати Т. Конечные графы и сети. М.: Наука,1974.  4. Кини Р., Райфа Х. Принятие решений при многих критериях. М.: Радио и связь, 1981.  5. Brams, S.J., Taylor, A. Fair Division. Cambridge University Press, New York, 1996.  6. Fishburn P.C. Nontransitive Measurable Utility // J. of Mathematical Psychology. 1982. No. 26, p. 3l–67.  7. Alain Chateauneuf, Michèle Cohen, Jean-Marc Tallon. Decision under risk : The classical Expected Utility Model, 2008.  8. Кирута А.Я., Рубинов А.М., Яновская Е.Б. Оптимальный выбор распределений в сложных социально-экономических задачах. - Л.: Наука. Ленингр. отд-ие, 1980.  9. Duggan J. 2007. A systematic approach to the construction of non-empty choice sets // Social Choice and Welfare. 2007. V. 28. P. 491-506.  10. Алескеров Ф.Т., Субочев А.Н. Об устойчивых решениях в ординальной задаче группового выбора. Доклады Академии Наук. 2009. Т. 426. №3. Стр. 318-320. 7. Kemp R., The Municipal Budget Crunch: A Handbook for Professionals, McFarland, 2012.  11. Galuzsca, A., Step-by-Step Guide for Running a Retail Store Business: How to Operate and Market a Retail Shop to Maximize Profits, Amy Galuzsca, 2012.  12. Stephens, D., The Retail Revival: Reimagining Business for the New Age of Consumerism. Wiley, 2013  13. Erikson, G., Dynamic Models of Advertising Competition: Open- and Closed-Loop Extensions (International Series in Quantitative Marketing), Springer 2013.  14. Hubner, A., Retail Category Management: Decision Support Systems for Assortment, Shelf Space, Inventory and Price Planning (Lecture Notes in Economics and Mathematical Systems), Springer, 2011  15. Agrawal, N., Smith, S. (Editors) Retail Supply Chain Management: Quantitative Models and Empirical Studies (International Series in Operations Research & Management Science), Springer, 2008.  16. Elkhateeb, T., Total Quality Management Model in Higher Education, Scholars’s Press, 2013.  17. Шамова Т., Давиденко Т., Шибанова Г., Управление образовательными системами, Академия, 2008.  18. Фадеев, Ю., Подготовка, переподготовка и обучение кадров, ЭКСМО, 2007  19. Алпатов А., Пушкин А., Джапаридзе Р., Государственно-частное партнерство. Механизмы реализации. Альпина Паблишер., 2011.  20. Шефель О., Первая полная энциклопедия ЖКХ.  21. Гарнер Д., Оуэн Р.. Конвей Р., Привлечение капитала (перевод с английского), Wiley, 1995.  22. Крохин Л., Экономико-математические методы в оперативном управлении на транспорте, ВИНИТИ РАН, 2009.  23. Коссой Ю., Экономика и управление на городском электрическом транспорте, МАСТЕРСТВО, 2002.  24. Швецов А., Экономика и управление преобразованиями сложных социально- экономических систем, Едиториал УРСС, 2004.  25. Сернова М., Гордуновский В, Самохвалов С., Балансовые и оптимизационные модели принятия решений, МГИМО (У) МИД России, 2003.  26. Малишевский А., Качественные модели в теории сложных систем., Наука, 1998.  27. Экономика здравоохранения: учебное пособие / Под науч. ред. М.Г.Колосницыной, И.М. Шеймана, С.В.Шишкина; М.: Изд. дом ГУ ВШЭ., 2008.  28. Шейман И.М. Теория и практика рыночных отношений в здравоохранении. М.: Изд. дом ГУ ВШЭ, 2007.  29. Rice T., Unruh L., The Economics of Health Reconsidered, Third Edition, Health Administration Press, 2009.  30. The Complex System Modeling Group (CSMG), Modelling in Healthcare, American Mathematical Society.  31. A. Belenky, Operations Research in Transportation Systems: Ideas and Schemes of Optimization Methods for Strategic Planning and Operations Management, Kluwer Academic Publishers, 1998, Springer, 2010. |
| **10. Way of examining** | The assessment criteria and their weights are the following:   |  |  | | --- | --- | | Course work | 0,06 | | 2 written tests | 0,24 | | Written or oral exam | 0,7 | |