**Course Syllabus**

|  |  |
| --- | --- |
| Title of the course | **Statistical methods of analysis** |
| Title of the Academic Program  | 38.04.02. Management Master program “Management and Analytics for Business”  |
| Type of the course  | Compulsory |
| Prerequisites | Not required, but recommended:* Introductory Statistics/Probability theory
* Calculus
* Prior training in R or other statistical software
 |
| ECTS workload | 6 |
| Total indicative study hours | Directed Study | Self-directed study | Total |
| 72 | 156 | 228 |
| Course Overview | The course covers a wide range of statistical methods and some important machine learning techniques used in today’s business analytics for exploratory and segmentation analysis, as well as for the estimation of relationships and predictive modeling. Students will get ready for data management and the analysis of survey, sales and other types of data commonly used in marketing and management. Students will learn how to use the R language – the most popular language for statistical computing, modeling and data management thanks to the fact that 50% of the course is dedicated to hands-on R coding. |
| Intended Learning Outcomes (ILO) | Upon completion of the course students will be able to (competency code is given in brackets):* Choose methods adequately corresponding to the objectives of a research project
* Collect, store, process and analyze data according to high standards
* Conduct empirical research in management and marketing using modern analytic software tools
* Develop and apply new research methods
* Solve economic and managerial problems using best practices of data analysis using modern computational tools
 |
| Teaching and Learning Methods | * Every week a 2 hour tutorial is given to practice real-world data analysis skills
* 100% of time during tutorials is allocated to practicing R programming skills
* Games and engaging demonstrations are used to illustrate statistical concepts
* At the beginning of most lectures a 15-minute Kahoot game based on the previously studied material is conducted to make learning more engaging and motivate students to review the material to earn bonus points
 |
| Course Content | Introduction. Review of basic probability and statistics concepts.Introduction to the R LanguageDescribing DataRelationships between Continuous VariablesComparing Groups: Tables and VisualizationsComparing Groups: Statistical TestsIdentifying Drivers of Outcomes: Linear ModelsReducing Data Complexity (Principal Component Analysis (PCA) and Exploratory Factor Analysis (EFA))Additional Linear Model Topics (Collinearity, Logistic, Hierarchical Linear Models (HLM))Confirmatory Factor Analysis and Structural Equation Modeling (SEM)Segmentation: Clustering and ClassificationChoice Modeling (Choice-based conjoint analysis)Association Rules for Market Basket Analysis |
| Indicative Assessment Methods and Strategy  | **Assessment methods:****In-class Activity:** Regular weekly in-class tasks on which students are required to do some R coding and interpretation. To allow for the possibility of absence on a few weeks, 2 worst results are not taken into account.**DataCamp Courses: 1 course is the same for all students, the other can be chosen by each student herself.** All students should take 2 courses at home in November-December. The grade is proportional to the DataCamp tasks completion rate averaged out across the course’s modules. If a student does more than 1 additional course, the highest grade is taken into account.**Exam:** Mandatory final test (duration: 75-minutes) covering all topics. Involves answering multiple choice and free response questions, some of which require doing R calculations. **Assessment strategy:****Cumulative grade (before exam)=**0.7\*In-class Activity +0.3\*DataCamp **Final grade**=0.7\*Cumulative grade+0.3\*Exam**All grades in the formulas are integer numbers from 0 to 10. Standard rounding rules are used.****Weekly Kahoot.it challenges (quizzes)** are not graded, but allow obtaining a bonus:* Every Kahoot 5 winners are awarded with 1-5 StatCoins (virtual currency used in this course).
* After every lecture on a special sheet of paper write down your names and the number of StatCoins earned.
* At the end of the course, **before rounding your cumulative grade**, we will add from 0 to 1 point out of 10 depending on your Kahoot ranking percentile (100th percentile – 1 point, 50th percentile – 0.5 points, etc.). If your cumulative grade is already 10 points, we will add your points to the exam grade.
 |
| Readings / Indicative Learning Resources | **Mandatory** 1. R for Marketing Research and Analytics/ Chris Chapman, Elea McDonnell Feit. Springer-Verlag, Switzerland, 2015. Available through HSE’s electronic resources: <http://www.springer.com/book/9783319144351>
2. Hill, R. C. Principles of econometrics: International student version / R. C. Hill, W.E. Griffiths, G.C. Lim . – 4 th ed . – Hoboken : Wiley, 2013. – 758 p. (available in HSE’s library)

**Optional**1. Barrow, M. Statistics for Economics, Accounting and Business Studies, 7th ed., Pearson Education Limited, 2017.
2. Bolstad, W. M. Introduction to Bayesian Analysis. 2nd ed. John Wiley and Sons, 2007.
3. 3. Heumann, C., Schomaker, S., Introduction to Statistics and Data Analysis: with Exercises, Solutions and Applications in R. Springer, 2016.
4. Ohri, A. (2012). R for business analytics. Springer Science & Business Media.
5. Lander, J. P. (2014). R for everyone: advanced analytics and graphics. Pearson Education.
6. Spector, P. (2008). Data manipulation with R. Springer Science & Business Media.
7. Teetor, P. (2011). R cookbook: Proven recipes for data analysis, statistics, and graphics. O'Reilly Media, Inc.
 |
| Course Instructor | Evgeny A. Antipov, PhD, Associate Professor, Department of Management,Elena B. Pokryshevskaya, PhD, Associate Professor, Department of Management |