**Course Syllabus**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Title of the course | | **Quantitative Methods in Economics and Finance** | | | | | | |
| Title of the Academic Programme | | Postgraduate program | | | | | | |
| Type of the course | | Optional | | | | | | |
| Prerequisites | | Desirable, but not mandatory:   * Introductory Statistics and/or Econometrics * Calculus | | | | | | |
| ECTS workload | | 4 | | | | | | |
| Total indicative study hours | | Directed Study | | Self-directed study | | | Total | |
| 48 | | 104 | | | 152 | |
| Course Overview | | This course is designed to train postgraduate students to use R for quantitative data analysis in their applied and academic research. We presume only basic statistics knowledge and use a minimum of mathematics sufficient for using quantitative methods as a tool for an eco. Students will learn how to conduct empirical analyses in successive steps where multiple models are compared for statistical strength and practical utility. Visualization skills are taught as an integral part of data exploration and model building. This intensive course contains not only basic quantitative research methods, but also advanced concepts like structural models and transaction analysis that may be new and useful even for experienced analysts. The course reflects both traditional (“frequentist”) and Bayesian approach to statistics. | | | | | | |
| 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 (УК-3) * Collect, store, process and analyze data according to high standards (УК-4) * Conduct empirical research in economics and management using modern analytic software tools (ОПК-1) * Develop and apply new research methods (ОПК-2) * Solve economic and managerial problems using best practices of data analysis using modern computational tools (ПК 2) | | | | | | |
| Teaching and Learning Methods | | * Every week a 1-2 hour introductory tutorial is given to familiarize students with the topic * A set of case studies every week is solved in class * 90% of time is allocated to practicing R programming skills | | | | | | |
| Content and Structure of the Course | | | | | | | | |
| **№** | **Topic / Course Chapter** | | **Total** | | **Directed Study** | | | **Self-directed Study** |
| **Lectures** | **Tutorials** | |
| 1 | An Overview of the R Language | | 13 | |  | 4 | | 9 |
| 2 | Descriptive analysis | | 13 | |  | 4 | | 9 |
| 3 | Relationships Between Continuous Variables | | 13 | |  | 4 | | 9 |
| 4 | Comparing Groups: Tables and Visualizations | | 13 | |  | 4 | | 9 |
| 5 | Comparing Groups: Statistical Tests | | 13 | |  | 4 | | 9 |
| 6 | Identifying Drivers of Outcomes: Linear Models | | 13 | |  | 4 | | 9 |
| 7 | Reducing Data Complexity | | 13 | |  | 4 | | 9 |
| 8 | Additional Linear Modeling Topics. Logistic Regression. Hierarchical Linear Models | | 13 | |  | 4 | | 9 |
| 9 | Confirmatory Factor Analysis and Structural  Equation Modeling | | 13 | |  | 4 | | 9 |
| 10 | Segmentation: Clustering and Classification | | 13 | |  | 4 | | 9 |
| 11 | Association Rules for Market Basket Analysis | | 13 | |  | 4 | | 9 |
| 12 | Choice Modeling | | 9 | |  | 4 | | 5 |
| **Total study hours** | | | **152** | |  | **48** | | **104** |
| Indicative Assessment Methods and Strategy | | **Assessment methods:**  **Empirical case studies solved in class:** 75-min. tests given at classroom every week. Each Problem Set consists of 2-5 problems.  **Exam:** Final test (duration: 75-minutes) covering all topics  **Assessment strategy:**  **Cumulative grade (before exam)=** average grade across all problem sets (rounded to the nearest integer)    **Final grade**=0.7\*Cumulative grade+0.3\*Exam | | | | | | |
| Readings / Indicative Learning Resources | | Mandatory   1. Using multivariate statistics / B. G. Tabachnick, L. S. Fidell . – Sixth edition . – Harlow : Pearson Education, 2014 . – 1055 p. 2. Discovering statistics using R / A. Field, J. Miles, Z. Field . – Los Angeles : SAGE Publications, 2012 . – 957 p. 3. 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>   Optional   1. Theory-based data analysis for the social sciences / Carol S. Aneshensel . – 2nd ed . – Thousand Oaks : SAGE, 2013 . 2. Beaujean, A. A. (2014). Latent variable modeling using R: A step-by-step guide. London: Routledge. | | | | | | |
| Indicative Self- Study Strategies | | **Type** | | | | **+/–** | | **Hours** |
| Reading for seminars / tutorials (lecture materials, mandatory and optional resources) | | | | - | |  |
| Assignments for seminars / tutorials / labs | | | | + | | 34 |
| E-learning / distance learning (MOOC / LMS) | | | | + | | 34 |
| Fieldwork | | | | - | |  |
| Project work | | | | - | |  |
| Other (please specify) | | | | - | |  |
| Preparation for the exam | | | | + | | 36 |
| Academic Support for the Course | | Academic support for the course is provided via LMS, where students can find guidelines and recommendations for self-study and sample questions for exam preparation. The exam is also conducted using LMS testing functionality. | | | | | | |
| Facilities, Equipment and Software | | * VNC tool for sharing teacher’s screen with students * R package and RStudio environment   (latest versions are available from the following pages:  https://www.rstudio.com/products/rstudio/download/  https://cran.r-project.org/mirrors.html)   * Student resources are available from the course’s LMS page | | | | | | |
| Course Instructor | | Evgeny A. Antipov, PhD, Associate Professor, Department of Management | | | | | | |