

Quantitative Methods Course

<i>Name of the subject:</i> Quantitative Methods - PhD	<i>SUBJECT code:</i>	Weekly hours: 10 6 lectures + 4 student research work	Credit: 15 ECTS
<i>Subject leader:</i> Dr Djordje Nikolić	<i>Academic Degree:</i> Associate Professor	Prerequisites: Knowledge gained in the field of organizational science (Production management, Decision analysis, Operation research, Project Management, Quality management etc.)	

Purpose: This course aims to provide the PhD students at study program Engineering Management with a detailed understanding of the role and purpose of quantitative techniques in effective management and in the process of managerial decision making. Furthermore, Quantitative methods course is focused on the development and implementation of different models with a support of the computer software.

Course description: Quantitative methods course emphasis on model building and computer applications to help students to understand how the variety of quantitative methods and technics which they will learn by this course, are actually used in business today. In each course topic, managerial problems will be presented to provide motivation for learning the techniques that can be used to address these problems.

Schedule

Weeks	Topics
1.	Introduction to quantitative analysis: Describe the quantitative analysis approach; Understand the application of quantitative analysis in a real situation; Describe the use of modeling in quantitative analysis; Use computers and spreadsheet models to perform quantitative analysis.
2.	Probability concept and applications: Introduction; Fundamental concepts and the types of probabilities; Revising Probabilities with Bayes' Theorem.
3.	Decision analysis: Decision making under uncertainty; Decision making under the risk; Multi-criteria decision making; Group decision support systems.
4.	Regression Models: Simple linear regression; Measuring the fit and reliability of the regression model; Multiple regression models; Nonlinear regression models.
5.	Forecasting: Time-series models; Causal models; Qualitative models.
6.	Linear and nonlinear programming models with computer support
7.	Network models: Introduction; Minimal-Spanning Tree Problem; Maximal-Flow Problem; Shortest-Route Problem.
8.	Project management: Drawing the PERT/CPM Network; Calculating critical path; PERT costs.
9.	Queuing Theory models: Characteristics of a Queuing System; Queuing models examples.
10.	Simulation modeling: Introduction; Advantages and disadvantages of simulation; Monte Carlo simulation; Simulation models examples.
11.	Markov Analysis: Introduction; States and State Probabilities; Matrix of Transition Probabilities.
12.	Statistical Quality Control: Defining quality and TQM; Statistical process control; Control charts.
13.	Game Theory: Introduction; Matrix games
14.	Test

Final grade:

The grading structure is as follows:

Activity	Points
Final examination	40
Case study preparation and class presentations	20
Tests	40
Participation in class	0

Grading scale:

Points	Grade
0-50	5 (fail)
51-60	6 (satisfactory)
61-70	7 (good)
71-80	8 (very good)
81-90	9 (excellent)
91-100	10 (excellent- outstanding)

Compulsory literature:

1. B. Render, R. Stair, JR, M. Hanna, Quantitative analysis for management, Pearson, Prentice Hall, 2006
2. M. Wisniewski, Quantitative methods for decision makers (fifth edition), Prentice Hall, 2009

Supplemental literature:

1. Sweeney, D. J., Anderson, D. R., Williams, T.A., Camm, J. D., Martin, R. K. (2009), Quantitative Methods for Business, South-Western Cengage Learning, USA,
2. Research articles from the relevant scientific journals