# MATHEMATICS WITH FINANCIAL ENGINEERING, MASTER STUDY PROGRAMME COURSE DESCRIPTIONS

## Course name: STATISTICAL PRACTICUM

Number of ECTS credits: 6

## Content:

• Overview of the basics in programming language R: Expressions and objects Functions and arguments Vectors and matrices Factors Data frames Computational operations

- The R environment: Workspace Printouts Datasets included with R Graphics Programming Importing data
- Examples of application: Probabilistic distributions Descriptive statistics Testing hypotheses Regression Logistic regression Time series.

## Course name: FINANCIAL MARKETS

Number of ECTS credits: 6

## Content:

- Economic and financial institutions
  - Definition of institutional framework, objective functions and actions
  - Definition of basic institutional concepts (institutions, instruments)
  - Definition of political and economic context and legal constraints.
- Principles of economic analysis
  - Supply and demand, elasticity, price stability
  - Utillity function, consumer behaviour, profit maximisation and the theroy of the firm
- Market structure theory
  - Perfect competition
  - monopoly
  - duopoly (Bertrand, Cournot and Stalckenberg models)
  - The theory of the economic growth
  - Production function
    - Stability and economic growth
    - Labour market, investments, capital
- Monetary policy

#### Mathematics with Financial Engineering, master - course descriptions

- Quantitative theory of money and money market (stable price trajectories and monetary policy)
- Rational expectations
- Interest rates (Taylorjevo rule, central banking and objective functions)
- Price stability (ODE's)
- Fiscal policy
  - Taxes and tax distortions (consumer/producer surplus)
  - Budgetary policy

## Course name: SELECTED TOPICS IN THEORY OF FINITE GEOMETRIES

Number of ECTS credits: 6

## Content:

The course is focused on most important current areas of research in finite geometries. Among other things, it may include the following topics:

- Steiner systems
- Designs
- Almost linear spaces
- Linear spaces
- Configurations, Pappus and Desargues configurations
- Projective spaces
- Affine spaces
- Polar spaces
- Generalized quadrangles
- Partial geometries

## Course name: SELECTED TOPICS IN NUMBER THEORY

Number of ECTS credits: 6

## Content:

The course is focused on most important current areas of research in number theory. Among other things, it may include the following topics:

- Diophantine equations
- Geometry of numbers
- Additive number theory
- Algebraic number theory