# Applications of Mathematics in Economics:

#### Semester 1

### 1. Linear Algebra and Analytic Geometry I 6 ECTS

To acquaint students with the construction of complex field, various forms of complex number and fundamental theorem of algebra of complex numbers. To teach students the ability to use matrix algebra and to solve systems of linear equations. To familiarize students with the basic notions of the analytic geometry in space.

#### 2. Mathematical analysis I 8 ECTS

The aim of the course is to familiarize students with the basic concepts of mathematical analysis, such as the notion of a real number and the limit of a sequence. Students should understand these concepts and gain practical ability to solve related tasks.

#### 3. Repetitory course 2 ECTS

The main aim of study is to prepare students to study Mathematics.

#### 4. Introduction to logic and set theory 6 ECTS

The aim of the course is to familiarize students with the basic concepts of logic and set theory. Students should understand these concepts and gain practical ability to solve related tasks.

#### Semester 2

# 1. Linear Algebra and Analytic Geometry II 6 ECTS

To familiarize students with the important examples of finite and infinite dimensional linear spaces. To familiarize students with the concept of linear transformation and matrix of linear transformation.

#### 2. Mathematical analysis II 8 ECTS

The aim of the course is to familiarize students with the basic concepts of mathematical analysis, such as the notion of the limit and continuity of a function, the derivative, indefinite and definite integrals. Students should understand these concepts and gain practical ability to solve related tasks.

#### **3.** Discrete mathematics **3** ECTS

The aim of the course is to introduce students with the basic methods of discrete mathematics.

### 4. Mathematics of Finance 3 ECTS

To acquaint the students with the basics of mathematics of finance and familiarize them with the principles and rules applicable in various financial accounts.

#### 5. Introduction to Computer Science 4 ECTS

The aim of the subject is to familiarize students with the basic software supporting mathematical calculations and editing mathematical texts.

#### Semester 3

#### 1. General Algebra and Number Theory 6 ECTS

The main aim of study it to teach students the basic notions and theorems from Number Theory, Group Theory, Rings and Fields.

### 2. Mathematical analysis III 5 ECTS

The aim of the course is to familiarize students with the basic concepts of mathematical analysis. Students should understand these concepts and gain practical ability to solve related tasks.

# 3. Computer Science 5 ECTS

The aim is to acquaint the students with the symbolic computation software Computer Algebra System – MAXIMA.

#### 4. Topology of metrics spaces 5 ECTS

To teach basic notions of topology of metric spaces and their properties. Metric, open and closed sets, sequences, complete spaces, connected spaces, compact spaces. Continuous functions and their properties.

### 5. Monographic lecture I 3 ECTS

Introduction of the chosen topics of the higher mathematics. The subject of lectures will be chosen by students.

#### Semester 4

### 1. Mathematical Analysis IV 6 ECTS

The aim of the course is to familiarize students with the basic concepts of mathematical analysis, such as the notion of the curve, surface, multiple integral, line integral, surface integral. Students should understand these concepts and gain practical ability to solve related tasks.

# 2. Proseminar 2 ECTS

The aim is to teach the student the proper way of presenting different topics of higher mathematics.

### 3. Probability 6 ECTS

The purpose is to explore the basic concepts and methods of probability.

### 4. Differential Equations 5 ECTS

To familiarize students with the fundamentals of ODEs theory.

### 5. Information Technology 2 ECTS

The aim of the course is to acquaint the student with advanced functions of some chosen applications such as: text editor, spreadsheet, creator of multimedia presentations, e-mail client.

### 6. Introduction to the Theory of Complex Functions 3 ECTS

Extending the concept of real numbers - the concept of complex numbers and algebraic operations on complex numbers, analogies and differences in terms of operations on real numbers. Extending the concept of complex functions of a complex variable functions. The ability to calculate derivatives oran borders. Interpretations of these concepts.

#### Semester 5

# 1. Operational Research / Optimization Theory 5 ECTS

The purpose is to introduce students to use quantitative methods and techniques for effective decision–making and constructing models that are used in solving business decision problems.

# 2. Numerical Methods 2 ECTS

The aim of the course is to introduce students with the basic numerical methods.

# 3. Statistics 4 ECTS

The purpose is to explore the basic concepts and methods of mathematical statistics.

# 4. Monographic Lecture II 3 ECTS

Introduction of the chosen topics of the higher mathematics. The subject of lectures will be chosen by students.

# 5. Monographic Lecture III 4 ECTS

Introduction of the chosen topics of the higher mathematics. The subject of lectures will be chosen by students.

### Semester 6

# 1. Econometrics / Difference Equations 6 ECTS

The objective is to acquaint the student with basic questions and methods of econometrics.

# 2. Mathematical Economics 5 ECTS

Introduction of fundamental problems of mathematical economics. The structuring and solving mathematical models of economy.

# 3. Actuarial Mathematics 4 ECTS

The purpose is to acquaint students with the basics of insurance mathematics and familiarize them with the simplest models of risk.