



**Keilir**  
Miðstöð vísinda,  
fræða og atvinnulífs

## **Mathematics 3B (STÆ3B06)**

### **Preliminary University Studies Department**

#### **Course description**

This course involves for example working on decomposition, power rules, exponential functions, roots, arithmetic and algebraic functions. It also involves working on decimal fractions, algebraic fractions, division, equations and inequalities, absolute value equations, second-degree equations, parabola, power rules, logarithms and functions. In addition, decomposition and division of algebraic functions and square roots will be covered.

Finally, composite, interval, surjective, injective and bijective functions will be taught. The course will also cover inverse functions and growth rate of a function along with the equation for a tangent. The concept of functions will be covered along with some of the operations used on functions. The concept of limit, including one-sided limit and limit at infinity, is defined through mathematical analysis. Work will be done on the definition of a derivative, finding the first and second derivative of a function and taking a look at the function's graph/s.

#### **Prerequisites (required preparation):**

10 credits, competence level 2

#### **Competence level**

3

#### **Credits**

6

#### **By the end of the course**

##### **The student has acquired knowledge and understanding of:**

- main rules of algebra: decomposition, division, fractions and solutions
- algebraic functions
- equations, inequalities and absolute value equations
- concept of functions
- power rules, exponential- and logarithm rules
- definition of limit/s
- basic methods of differentiation

- rules of derivation: the derivative of a summation, multiplication and the quotient of functions. Furthermore, students are expected to be able to calculate the derivative of a known function
- local extrema, monotonic interval/s, point of inflexion and how the curve bends
- mathematical programs to aid problem solving
- income, cost and profit functions

**The student has acquired the skill to:**

- solve algebraic problems and write out solutions in a systematic way
- solve algebraic functions with different methods as for example division, decomposition or zero/s of a function
- work with different functions and be able to draw them using a table of values or with the help of the computer program, Geogebra
- apply the rules of power, exponential- and logarithms in problems that are related to daily life, as for example in calculating population growth and more
- calculate simple limits and infinity limits
- calculate derivative problems in an organized manner in accordance with rules of derivation
- examine different functions of derivatives, i.e. local extrema and point of inflexion
- say where the function is increasing and decreasing
- solve the first and second derivative of a function
- calculate real problems based on issues from the economy, i.e. income, cost or profit

**The student can use the knowledge and skill which he/she has acquired to:**

- understand and apply the meaning and relation of concepts in the curriculum
- write their solutions systematically, share ideas with others about them and explain their ideas and tasks, verbally or graphically
- use critical and creative thinking and show initiative and intuition in solving problems
- apply methodical techniques in seeking solutions to problems, i.e. through proofs and equations
- follow and understand verbal and written assignments and apply simple reasoning
- apply methodical techniques in seeking solutions to problems linked to known solutions in similar problems, work his/her way back from known variables or by setting up equations
- understand the relation of mathematics to everyday life

**Course assessment:**

The course is assessed in a variety of ways, there among group work, individual assignments, quizzes and a final exam that will make up part of the final grade.