



## Syllabus

**Term:** 2026/27/1      **Subject name:** Mathematics - lecture      **Subject code:** ENBIOB0101

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**Unit (Unit code)** (BIOLOGIA)

**Lecturer responsible for the course:** SZABÓ Rebeka

**Requirement:** Exam

**Classes per week :** 2/0/0

**Classes per term:** 26/0/0

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### Purpose of education:

Students completing the course will have a knowledge on the prevalently used methods of Mathematical Analysis/Calculus (MAC), on its terminology. They obtain sufficient knowledge to study subjects requiring an elementary understanding of MAC and the ability to use it. They will be able to use methods of MAC in solving certain problems. They will be open to follow a mathematical approach to problems and intend to deepen their mathematical knowledge and extend their problem solving abilities. They will be able in a stand-alone way to recognize the applicability of methods of MAC in solving certain problems and solve them using the learned techniques.

### Contents:

Introduction; Big Picture of Calculus; Big Picture: Derivatives.

Max and Min and Second Derivative; The Exponential Function.

Big Picture: Integrals; Derivative of  $\sin x$  and  $\cos x$ .

Product Rule and Quotient Rule; Chains  $f(g(x))$  and the Chain Rule.

Limits and Continuous Functions; Inverse Functions  $f^{-1}(y)$  and the Logarithm  $x = \ln y$ .

Derivatives of  $\ln y$  and  $\sin^{-1}(y)$ ; Growth Rates & Log Graphs.

Linear Approximation/Newton's Method; Power Series/Euler's Great Formula.

Differential Equations of Motion; Differential Equations of Growth.



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### Contents:

Six Functions, Six Rules, and Six Theorems.

Topics in Mathematical Biology/Chemistry (e.g., Reaction Diffusion Equations, Lotka–Volterra and Replicator Systems; Mendelian Population Genetics; Epidemic Models)

### System of examing and valuation:

Problem solving tests on the 6th and 13th week at the seminar (practical part of the course). Written tests involve problems considered in the practical courses. They are graded on a five-point scale. Mark 1 (failed) tests have to be repeated.

The final mark is calculated as a weighted average of the grades of the two tests 50%-50% weights, respectively. The mark is 1 (insufficient), if either of the tests finally conclude in grade 1.

### Bibliography:

Highlights of Calculus (electronic materials): <https://ocw.mit.edu/resources/res-18-005-highlights-of-calculus-spring-2010/>

Online Calculus textbook: <https://ocw.mit.edu/resources/res-18-001-calculus-online-textbook-spring-2005/textbook/>

Videos on Youtube: <https://www.youtube.com/watch?v=X9t-u87df3o&list=PLBE9407EA64E2C318>

### Bibliography: