

QBio103: Mathematical Fundamentals

Module Responsible:
Prof. Dr. Markus Kollmann

Version:
02/01/2021

Module Organizer:
Prof. Dr. Markus Kollmann

Type:
Compulsory

Lecturer:
Prof. Dr. Markus Kollmann

Total Working Time	Credit Points	Contact Time	Self Study	Duration
180 h	6 CP	60 h	120 h	1 Semester

Course Components	Group Size	Frequency
Lecture: 3 SWS Exercise: 1 SWS	P: 40 P: 40	Every Winter Semester

Learning Competencies:

Students understand the concept of an invertible function and its relation to equation solving. They understand the central concepts of linear Algebra, such as the properties of a linear vector space and the meaning of Null Space and Range for linear mappings. They understand the concept of differential calculus and can applied it to higher dimensions. They understand the properties of complex numbers and why they can appear in solving Eigenvalue problems. They are familiar with Taylor expansions and its application to convex optimisation problems.

Content:

In this first semester module, the students repeat and deepen basic arithmetic operations, systems of inequalities, and equation solving. They get introduced into Linear Algebra with focus on solving systems of linear equations. In addition, exponential and logarithmic functions are introduced and the basics of differential and integral calculus are explained. This course serves as preparation for the mathematics-intensive courses in the following semesters and is intended to bring all students to the same level of knowledge in order to compensate for possible differences in previous knowledge of mathematics.

- Basic Calculus
- Equation Solving
- Vector Spaces
- Linear System of Equations
- Eigenvalue Problems
- Functions and Differentiation
- Integration
- Vector Analysis
- Fourier Series

Conditions of Participation:

Enrolled in Quantitative Biology

Examination:

Learning portfolio consisting of

- Written Exam About the content of the lectures (80% of the final grade)
- Exercises (20 % of the final grade)

Prerequisites for Awarding Credits for this Module:

- Passing Exercises (min of 80% seriously tried questions)
- Passing Written Exam

Factor for the Overall Grade:

The grade is weighted according to the credit points (CP) in the overall grade.

Language:

English

Literature: -**Further Information: -**