LUNDS UNIVERSITET
Lunds Tekniska Högskola

*Course syllabus*

# Biomatematik
# Biomathematics

## FMAN01, 7,5 credits, A (Second Cycle)

**Valid for:** 2023/24
**Faculty:** Faculty of Engineering, LTH
**Decided by:** PLED F/Pi
**Date of Decision:** 2023-04-18

## General Information

**Elective for:** E4-mt, F4, F4-bm, Pi4-biek
**Language of instruction:** The course will be given in English on demand

## Aim

The main aim of the course is to give a basic introduction to mathematical theory and methods in biology, with enough scope to enable the student to handle biologically phrased problems. An additional aim is to help the student develop his or her ability in problem solving, both with and without a computer. A further aim is to prepare the student for further studies in e.g. biological systems or evolution biology.

## Learning outcomes

*Knowledge and understanding*
For a passing grade the student must

- be able to present clearly and independently use basic mathematical concepts in biology, in particular regarding cell modelling, evolution dynamics and diffusion phenomena.
- be able to present and give an informal explanation of the mathematical theory behind some central biological models, such as non-linear difference equations, non-linear differential equations and reaction-diffusion equations.

*Competences and skills*
For a passing grade the student must

- be able to use a computer to simulate solutions of biological problems.
- be able to show good capability to independently identify biological problems which can be solved with mathematical modelling, and be able to choose an appropriate

method.
- with proper terminology, in a well structured way and with clear logic be able to explain the solution to a biological modelling problem.

## Contents

Population models with discrete or continuous time. Pharmacokinetics and -dynamics. Qualitative analysis of systems of differential equations. Modelling of the spread of infectious diseases. Bifurcations, limit cycles and excitable media with applications to, e.g., predator-prey models. Spatial methods with application to diffusion and nerve conduction.

## Examination details

**Grading scale:** TH - (U,3,4,5) - (Fail, Three, Four, Five)
**Assessment:** Compulsory assignments. Approved results on these are enough to pass the course. To get a higher grade it is required to pass a written and an oral examination.

The examiner, in consultation with Disability Support Services, may deviate from the regular form of examination in order to provide a permanently disabled student with a form of examination equivalent to that of a student without a disability.

## Admission

**Assumed prior knowledge:** Basic course in linear systems, e.g. FMAF10.
**The number of participants is limited to:** No

## Reading list

- Edelstein-Keshet, L.: Mathematical models in Biology. SIAM, 2004, ISBN: 0-07-554950-6.

## Contact and other information

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