TATM38: Mathematical Models in Biology, 6 credits Course information, period 1, September-October 2023

Göran Bergqvist

Course homepage: http://courses.mai.liu.se/GU/TATM38/

Aim

In this course you learn to formulate, analyze and interpret mathematical models that are used in biology and biotechnical applications. You learn both mathematics needed for building a model as well as modeling through formulating and solving basic models used in, e.g., population dynamics, epidemiology and morphogenesis.

Prerequisites

It is assumed that you have studied some courses in linear algebra and calculus of one and several variables. Materials for repetition of how to solve differential equations and of eigenvalues and eigenvectors is provided on the course page (you may want to refresh your knowledge on these topics by having a look in your old maths books). No biology courses are assumed.

Literature

• Edelstein-Keshet: Mathematical Models in Biology, SIAM 2004

Teaching

The teaching consists of 30 two-hour seminars. Please consult the separate course program for the contents of the seminars, and the study guide (studieinfo) for the syllabus.

It is strongly recommended that you prepare the seminars beforehand by looking through the relevant sections in the book, or by having a look at the notes. It will help you understand the seminars better, and make interesting discussions possible. Some notes with materials for repetition have simple test questions that you should try to answer. Exercises with solutions are also provided for the different parts of the course. Lectures notes and exercises will be available on the course page. Three seminars are reserved for discussions of exercises, and the last three for presentations of projects.

Examination

The examination consists of a written exam (4.5 credit points) and a project (1.5 credit points). The written 5-hour exam consists of 6 problems, each worth 4 points. To obtain a grade 3, 4 or 5, you need 10, 14 or 18 points, respectively. You must not use any aids (no textbooks, notes, calculators or other electronic tools). The projects are carried out in groups of 3 - 5 students. Each group must produce a written report on a chosen topic and present the results at a seminar. The project is only graded pass (G) or non-pass (U). The total grade of the course is determined by the grade of the written exam.