Home Exam BIOS13 Modelling Biological Systems

Dept. of Biology, Lund University, 2025-2026

Deadline written exam: Tuesday, Jan 13th, 2026 at 16:00

Examination presentations: 15-16th, Jan, 2026

Instructions (written exam)

Solve the problems on your own, without discussing with your classmates. Needless to say, working in groups or copying text from elsewhere will be cheating and thus render repercussions. Cross-referencing of answers will be done within the class but also to exam answers from previous years and the internet. Email me questions if you need clarifications or have other issues. I will respond to the whole group.

The exam is set up as four separate assignments, corresponding to the four (main) questions found below, numbered 1-4. Prepare your answers as one main document per question (in total 4). Use Word or pdf format and all text and equations should be written in a text editor. Scanned or photographed hand-written equations or illustrations are allowed, *as long as they are easy to read and properly embedded in the total answer*.

Please paste the required R code in the answer document, with the code in the word/pdf-document it is easier for me to comment on the code. In addition, make sure to provide the code as separate R-files (you can submit several files to the same assignment). Do make sure it is obvious which code belongs to which (sub-)question! Also, do make sure that I can run the scripts, code that does not run will not be considered! Test them yourselves by clearing the workspace and using source:

```
> rm(list=ls())
> source('my_script_1.R')
```

Any code that solves the task at hand is fine with me. It is perfectly allowed to use modified scripts from exercises or lectures. *However*, make sure to remove bits of code that do not contribute to the solution of the problem at hand. Otherwise, I may get the impression you do not know what you are doing and will grade accordingly.

Present the necessary steps of all calculations, at least briefly. Even an incorrect answer can give you points if the equations were put up correctly.

If a problem depends on the answer of a previous problem, and you failed to solve the previous problem, at least describe how you would proceed *if* you had the answer.

Submit your answers at the very latest on **Tuesday, Jan 15th, 2026 at 16:00**.

Instructions (oral exam)

Upload one PowerPoint presentation per question 1-4 and prepare to present it in a 10-minute oral presentation. Be prepared to present all three presentations (I will choose which one(s)) at the oral exam session.

The presentation should clearly describe the following:

1. The overarching scope of the problem (1-2 sentences). Put the exam problem in a broad context.
2. The specific scope of the problem (1-2 sentences). Why is these problems of particular interest for science?
3. Specific questions (essentially the questions posed in the exam)
4. General description of how you answered the questions (e.g. "*I solved question a. by solving equation 1 mathematically by rearranging…*" or "*I solved question b. by coding a simulation model that includes…* ").
5. Specific description of how you answered the questions (e.g. "*Specifically I used the chain rule and I implemented my simulation using a nested for-loop*"). Show equations and code if needed but illustrations for code structure is also good.
6. Clear results in equations and plots (mind notation, panel titles, axes, scales, etc)
7. Interpretation of results given your scope

Note: Put a **strong** emphasis on points 4 and 5 above as this is what is evaluated. At least 7 minutes should be devoted to these points. Also make sure that you stick to 10 minutes, I will interrupt you when time is up.

GOOD LUCK!

Mikael Pontarp (mikael.pontarp@biol.lu.se)