

1.1 Introducing the mini-projects

To enable you to apply the skills you have developed over this module we provide some modelling challenges for you to explore. These come from a diverse range of subject areas and we hope will provide a starting point for you to apply the techniques you have learned in your own area of research.

1.1.1 The mini-project report

To complete SysMIC module 1 choose **one** project to investigate and submit a report on your work. Your report should include the following content:

I. Abstract

This should be a very brief overview of the project and outcomes of your work.

II. Description of the Biological system explored

In this section you should provide an overview of the important features of the system and discuss the motivation for building a model of the system.

You should try to describe the context for your work, for example by summarising the current or historical modelling work which deals with the system, and noting the impact that this work has had.

If the project definition contains experimental results you should summarise them here. If no experimental data is provided you are encouraged to perform a literature search. Try to find suitable data that can be compared and contrasted to your model's output.

III. Description of the model used

Start with the suggested model for the system. You should:

- Describe the model in full.

Where relevant refer to its origins, historical context, and any significant papers it features in. You should also include diagrams and mathematical equations sufficient for the reader to understand the model.

- Discuss the simplifying assumptions the model makes.

You should include how assumptions are justifiable or necessary and what caveats will apply to any conclusions drawn from the model. You might also describe how the assumptions could be tested, and how more realistic assumptions could be incorporated into the model at a later stage.

- Discuss your approach to setting up any parameter values or initial conditions required by the model.

For example these might be set arbitrarily to investigate the systems behaviour, come from experimental results or literature, or be your own estimated values.

IV. Code listings

In order for us to check your work its necessary to be able to have access to any code you develop and use to investigate the model. Please submit any relevant code files alongside with your miniproject report, and include an example code listing section in your report, e.g.

- a function file that encodes the model
- a script file containing the commands that run the `ode45` solver and plot the output.

Your submitted code should be able to be executed by MATLAB without error messages, and be annotated with comments so it is easy to understand.

V. Extended discussion

Describe how you explored the behaviour of the model discuss the results of your work. This should include:

- Suitable cross checks that show your code and model behaves correctly.
- Comments on the models behaviour using appropriate figures.
- A discussion on how your findings relate to the biological system modelled.
- A critical discussion on the quality of your results, e.g. Are they qualitative or quantitative? What assumptions do your conclusions rest upon?

VI. Outlook

Summarise the outcomes of your work, and then suggest how your investigation might be extended. This could include:

- Ways to modify or improve the model to make it more realistic.
- The important biological questions that could be addressed with the help of your model (or a refined and improved version of it).

1.1.2 Markscheme

In order to pass the module your submitted miniproject report must include all of the content as listed in the example report structure.

Achieving a distinction for your report

We will credit minireports with a distinction if your report:

- shows a significant amount of work above and beyond the minimum requirements.
- shows you have an solid understanding of the underlying concepts.
- is well written with appropriate figures and clear examples of your code.

Resubmission of reports

We will request that you resubmit your report if:

- your report fails to include the required sections as described in our guidance.
- the models or code you developed contain significant mistakes.
- your work demonstrates serious misconceptions in your understanding of the model or interpretation of the results.