

Mathematical Modeling Project Instructions

Communicating the conclusions obtained from a model and explaining the methods used in creating it are equally important parts of successful modeling process as the model creation. You should know how to effectively and convincingly write and speak about your methods, results and conclusions obtained. Because of this, your project will consist of both a written report and an oral presentation of your project problem.

Instructions for the report. The report should consist of three parts: the introduction explaining the study, the main part containing the results and explanations of the mathematical methods used, and the conclusion. Throughout the report, make sure that your sentences are clear and your spelling, grammar and punctuation correct. Avoid long sentences and do not use complicated words when you can communicate something using simple and clear phrases.

In the **introduction**, you can start with the problem statement and the background of the problem. You should clearly state what the objective is. Then you can give a brief summary of the methods used and conclusions obtained.

In the **main part**, you should list any assumptions that you might had made in order to create a model. Then you should explain how the model was developed from the data given and/or assumptions made. This should be followed by all mathematical data manipulation, calculations and algebraic or numerical work. Make sure that each step is clear and justified. This part should conclude with results obtained and/or list of test value outcomes.

Finally, you should list your **conclusions** and the data justifying your choice of the model or data testifying the validity and effectiveness of the model.

If needed, you can attach the **appendices**. For example, you should attach all the M-files that you used in the appendix in case that you are using Matlab. Also, include the printout of Matlab code and answers that you get when executing the M-file using the data given or the test points.

The technical level of your report should depend on the profile of the readers. For example, if you are presenting your report on making and using a mathematical model to a group of mathematicians, you will be communicating your material at a different level than if you are to present the same topic to a group of non-mathematicians. For this report, you should assume that you are to present your report to a group of people with **no knowledge of mathematics above general Calculus 2 course**. Thus, you can assume that your audience is familiar with derivatives, integrals, idea of best-fit curve and basics of differential, difference equation and Matlab but no knowledge beyond that should be assumed.

Instructions for the presentation. When preparing a presentation, make sure not to put too much information on a single slide. Also, use large enough font so that the words are clearly visible from any corner of the room. Plan what you will say in advance and rehearse your presentation at least once. Time yourself while you are rehearsing and make any modifications if your timing is off. Do not write the entire presentation out and read it either from paper or from slides. This makes the talk boring and people will loose interest.

It is important to **know who your audience is** when preparing an oral presentation just as when writing a report. For this presentation, you should assume that you are presenting to a group

of people who are not familiar with your project formulation nor with any of the methods used in mathematical modeling. You can think of this as a training for a situation in which you need to present a topic, result, paper or a grant proposal to a group of people that are not in your field and that have very different backgrounds. In the future, you will often find yourself in this situation.

The second important thing to keep in mind is **how long the presentation should be**. The presentation of your project should not be longer than 15 and should not be shorter than 10 minutes. Ideally, you should present for about 12 minutes that will leave some time for questions and some time for you to make all the technical preparations to start the presentations. The time frame will help you decide how much of the material to present. Keep in mind that you should present all the important parts of your report. For example the problem statement, objective, methods used and main conclusions should all be a part of your presentation. Make sure that everybody in the audience can understand what your problem is about, what your main result is, why is this result important, what mathematics is required for solving the problem and why is the model you used effective, realistic and reliable.

The **introduction** is very important. A good and effective opening might capture your audience's attention and it will be easier for you to keep it until the end of the talk.

In the **main part**, make sure that all your explanations are clear and all terms well defined. The important part is to find the right balance between being clear without being overly technical.

The **closing statement** is also very important. Try to avoid finishing by trailing off into a silence. A good closing statement may transform an otherwise average talk into an above average presentation.