Undergraduate Software Project

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# Overview

The project is a "capstone" that pulls together the data, analysis, and programming elements of the course by re-analyzing and extending an existing ODE kinetic model of a biological process. It is recommended that you use one of the [manually curated BioModels](https://www.ebi.ac.uk/biomodels/search?query=*%3A*%20AND%20curationstatus%3A%22Manually%20curated%22%20AND%20modelformat%3A%22SBML%22%20AND%20modellingapproach%3A%22Ordinary%20differential%20equation%20model%22&domain=biomodels&offset=0&numResults=10). You should choose the paper you plan use for your project by **Monday Oct 25** so that you can discuss it in class.

# Elements of the Project

Your project will be delivered as a Colab Notebook that abides by the [Rules for Writing Software](https://docs.google.com/document/d/16ODqwI4uPduJmquQMCBFsmvvzyyRzcZX9GD1d93T9FY/edit#). The notebook should have the following sections. The numbers in parentheses indicate the percent contribution to the project grade.

## Re-analysis (30%)

This is a re-analysis of a computational result in the published paper. For example, you might demonstrate that the published model can produce a key figure in the paper.

## New Study Question (10%)

This is a text description of a new science or methodology question based on the paper.

## Computational Study (50%)

This is a computational study of the new question. So, this section should include details of a simulation model you construct and output from it. Your study of the new question or methodology should draw on elements of the course such as: simulation technology, design of experiments, model accuracy, parameter estimation, and model validation.

## Discussion of Results (10%)

This is a discussion of the results, especially how they address your science question.

# Grading Rubric

Projects will be evaluated based on the following criteria:

* Project is organized as described above
* Compliance [Rules for Writing Software](https://docs.google.com/document/d/16ODqwI4uPduJmquQMCBFsmvvzyyRzcZX9GD1d93T9FY/edit#)
* Quality of the science question and the interpretation of the results

# Project Presentation

You will give a 10 minute presentation on your project in the last week of class. The presentation should include the following:

* The model you analyzed
* What you re-analyzed
* Your new science/methodology question
* The computational study you performed
  + Experimental design
  + Result accuracies and parameter variabilities
* Your conclusions from the computational study