

# Introduction to Scientific Computing, PSCB57, Fall 2016

## Assignment 6

### Your own project!

- The deadline for this assignment is Thursday, December 1st, 5pm.
- You must submit the assignment electronically at <http://rein.utsc.utoronto.ca/submit/>. The username is `pscb57`, the password is `2016`.

### What to do:

This is the last assignment for PSCB57. In this assignment, you find your own small project to work on. What subject area you want to work on is entirely up to you. You can work with data that you collected in a lab for a different course. You can also use data that you find online in any field that interests you. Or you can write a simulation and create your own data.

You have to submit a short report as well as the python code that you wrote for simulating, analyzing and/or visualizing. Make sure your submission satisfies all the following criteria:

1. Out of the following list of topics that we covered in this course, select three topics. For each topic you choose, use one of the algorithms/methods in your project. For example, use the Euler method, then perform a linear interpolation and plot the final results. Or, do a Lagrange interpolation, find the roots with Newton's method and visualize the results on a plot.
  - **Root finding:** Bisection method, Newton's method
  - **Interpolation:** Linear/linear interpolation, cubic splines, Lagrange interpolation
  - **Fitting:** (Linear) Least Square Fit
  - **Solving ODEs:** Euler method, mid-point method
  - **Stochastic processes:** Monte Carlo, Markov Chain Monte Carlo
  - **Plotting:** matplotlib
2. Your program should be written in python 3.
3. You can use any library that you want for this project.
4. Place all the code that you wrote into one file. The file should run and reproduce all the data/plots for your project. There are no restrictions on the length. Don't include any data files.
5. Write a report. The report should be two pages or less. Describe which project you worked on, what you tried to find out, which methods you used. Show the results and discuss them.
6. The report should be a single pdf file with all tables and plots embedded in the file.

## Grading scheme

This assignment will count twice as much as the other assignments. Here is the grading scheme that will be used to evaluate your report and the code you wrote:

20% Project choice

20% Choice of appropriate numerical methods, accurate use of numerical methods

20% Coding style

40% Report, presentation of results, plots, tables