CSc 30100 – Scientific Programming
Spring 2019
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Syllabus v1.0

Overview

This course provides a theoretical and hands-on introduction to the issues in scientific programming.

Prerequisites

You are expected to have a basic knowledge of computer science including a working knowledge of Python.

The formal prerequisites are

- CSc 21700: Probability and Statistics for Computer Science
- CSc 22000: Algorithms
- Math 20300: Calculus III
- Math 34600: Elements of Linear Algebra

If you have not taken (and done well in) all of these courses (or their equivalents), please check with me prior to continuing in the course.

Class Meetings

We will meet **Tuesdays and Thursdays**

- **Section L 9:30 am to 10:45 am in NAC 4/222**.
- **Section P 2:00 pm to 3:15 pm in NAC 4/222**.

Please note that per the City College calendar, no classes for this course are scheduled on February 12, April 23, and April 25.

Attendance in class is required. If you have an unavoidable conflict (e.g., a job interview) or are ill, please let me know via email, preferably in advance. If you're sick with a cold or the flu, stay home and recover. Consistent unexcused absences are not okay. Your attendance will be a component of your final grade.

Please **arrive promptly**. Arriving late is better than not arriving at all, but please allow adequate time to get to campus, especially if you come by public transit. Your arriving on time will be a component of your final grade.

Please **pay attention** in class. No texting or doing anything else on-line during class. If a personal emergency arises, please set out of the room to deal with it.

Textbook

The required textbook is

Burden, Richard L., Faires, J. Douglas, and Burden, Annette M., *Numerical Analysis, 10 Edition,* Cengage Learning, 2016, ISBN 13: 978-1-305-25366-7
or
Burden, Richard L. and Faires, J. Douglas, *Numerical Analysis, 9th Edition,* Cengage Learning, 2011, ISBN 13: 978-0-538-7335-19

Either edition will do. The later edition if slightly preferable.

Additional Reading Materials

Additional reading materials will be posted in Blackboard.

Programming Exercises

All programming in the course will be in Python and its relevant add-ins and libraries (such as NumPy, MatPlotLib, and Pandas). You are free to work in any environment that supports Python (e.g., Windows, Max, Unix, Linux). We'll be using Jupyter notebooks throughout the course. Programming exercises will be an important component of your final grade.

Final Project

During the final third of the semester, you'll work on an individual project. I'll be providing more detail about the project later. The final project will be an important component of your final grade.

Blackboard

We will be using Blackboard as our online environment. Once you're enrolled in the course and the course has started, you should have access to the Blackboard course site. We will use the course site for

- This syllabus
- Links to reference materials
- Announcements
- Posting and submission of assignments
- Classroom presentations (typically within a few days of the class session.
- Datasets
- Sample code
- Assignment grades

Course grades will not be posted on Blackboard, but rather on CUNYfirst.

Course Policies

Except where I tell you otherwise, you are free to collaborate freely with each other and to consult any sources you wish to in your work for this class.

I expect you to act professionally and respectfully to your classmates (and our occasional guests) at all times. Harassment will not be tolerated.

If for any reason your preferred name is not the one that appears on the course roster, please let me know how you would like to be addressed. I am not good at remembering names so I will asking you to submit headshots on Blackboard. These headshots will be for my use only; submitting a headshot is optional.

Grades

Your grades will be based on the following factors:

- Class attendance and punctuality 25%
- Class participation 5%
- Individual programming exercises 35%
- Individual final project 35%

Integrity

Just to refresh your memory, here's the City College statement on academic integrity:

> Academic integrity is an essential part of the pursuit of truth, and of your education. We are all are all responsible for maintaining academic integrity at City College – it is the rock on which the value of your degree is built.
>
> If you cheat on a test or plagiarize by using someone else's work or ideas, you defeat the purpose of your education. In addition, academic dishonesty is prohibited in the City University of New York, and is punishable by failing grades, suspension and expulsion.

Here's a link to a list of City College and CUNY policies (and links to them), https://www.ccny.cuny.edu/about/policies

If you use code from any source other than your own imagination for any coding assignment, be sure to list the source(s).

Your feedback

I welcome your feedback at all points in the course. If something is unclear, please speak up. If you find an error in my lectures, code examples, assignments, or in anything else, please let me know.

My Contract Information

The best (and fastest) way to reach me is via email at egrimmelmann@ccny.cuny.edu.

Office Hours

My office hours will Tuesdays and Thursdays, from 12:45 pm to 1:45 pm on days that we have class. Office hours will be held in NAC TBD. These office hours will be shared with the Machine Learning course that I'm also teaching this semester.

Occasionally I will have a conflict with these standard times for office hours; when this is the case, I will let you know in advance.

Course Schedule

The schedule below is probably more precise than it will be accurate. We'll likely end up going faster or slower on some of the topics, so we could end up being ahead or behind of this schedule at varying points in the course.

Meeting 1	January 29	Course introduction
Meeting 2	January 31	Floating-point theory
Meeting 3	February 5	
Meeting 4	February 7	Floating-point Standard
Presidents' Day	February 12	**No class**
Meeting 5	February 14	Floating-point Standard (continued) IBM Floating point Standard
Meeting 6	February 19	Summation and cancelation errors
Meeting 7	February 21	Calculus review
Meeting 8	February 26	Big-O notation Taylor series
Meeting 9	February 28	Equations of one variable [Ch 2]
Meeting 10	March 5	
Meeting 11	March 7	Interpolation and polynomial approximation [Ch 3]
Meeting 12	March 12	Differentiation [Ch 4]
Meeting 13	March 14	Integration [Ch 4]
Meeting 14	March 19	
Meeting 15	March 21	Initial value problems for ODE [Ch 5] Linear algebra review
Meeting 16	March 26	
Meeting 17	March 28	Systems of linear equations [Ch 6]
Meeting 18	April 2	
Meeting 19	April 4	Iterative techniques in matrix algebra [Ch 7]
Meeting 20	April 9	
Meeting 21	April 11	Approximation theory [Ch 8]
Meeting 22	April 16	
Meeting 23	April 18	Approximating eigenvalues [Ch 9]
Spring Break	April 19 -- 285	**No classes**
Meeting 24	April 30	Nonlinear systems of equations [Ch 10]
Meeting 25	May 2	Boundary-value problems for ODE [Ch 11]
Meeting 26	May 7	
Meeting 27	May 9	Partial differential equations [Ch 12]
Meeting 28	May 14	
	May 22	Written Projects Due