# EK130 Introduction to Programming and Data Science with Python for Engineers Fall 2022, College of Engineering, Boston University Course Information

**Motivation:** Engineers (and more generally all knowledge workers) will need to use and sometimes develop software as a regular component of their careers. This course is intended to give all engineering students a strong foundation in programming as the basis for solving engineering problems and for developing computer-based engineering products (software). Any student that successfully completes this course will be well-prepared to apply computing tools as part of their problem solving and design process as engineering students and in their careers, and for further study in software and computing.

**Course Goals (ENG):** The goal of this course is to introduce first-year engineering students to programming and problem solving using the Python language, libraries, and associated development environments. Basic programming concepts will be covered including operators, assignments, branching, looping, functions, input/output, data structures. Emphasis will be on programming style, debugging techniques, top-down design and code quality.

Course Outcomes (ENG): As an outcome of completing this course, students will:

- Gain knowledge of programming concepts and computational thinking
- Become proficient in the use of modern computational tools
- Develop problem solving skills
- Develop experience in designing solutions to engineering problems using software
- Be able to document solutions to engineering problems and communicate the results
- Learn to work in engineering design teams.

### **Course Staff:**

Instructors:	Prof. Jeffrey Carruthers
	Section A1, Mondays and Wednesdays, 9:05am-9:50am
	Office Hours: Fridays, 4:00-5:00pm, Zoom
	Meeting ID: 941 8825 7748 Passcode: sweep
	Email: jbc@bu.edu

### **Course Websites:**

Main:https://curl.bu.edu:9999/ek130/fall2022/Discussion Board:http://edstem.org/

**Ed Discussion:** This semester we will be using Ed as a discussion board. The system is highly catered to getting you help quickly and efficiently from both the course staff and your fellow classmates. *Please use the discussion board for all conceptual, logistical, and other course-related issues. Emailing instructors should be reserved for issues of a personal nature.* 

### Prerequisites: None. Corequisites: None.

**Videos:** This course will move toward the EK125 model of being a fully "flipped" course. The supporting video sequence for this is still in the process of being developed. When videos are available in support of upcoming topics, announcements will be made.

**Textbook:** There is no required textbook, but here are some candidates for future textbooks that can be used as reference:

- "Introduction to Computation and Programming Using Python: With Application to Computational Modeling and Understanding Data", 3rd edition. John V. Guttag
- "Python Crash Course: A Hands-On, Project-Based Introduction to Programming", 2nd Edition. Eric Matthes.

# Grading:

Letter grades are given only for the entire course, not for individual assignments or tests. Numerical grades will be calculated for every student, based on the following percentages:

- Class (including online pre-class and in-class Practice Problems) 15%
- Lab 15%
- Homeworks and Final Project 30%
- Quizzes 10%
- Exam 1 15%
- Exam 2 15%

Core Topics. Over the course of the semester, we will cover the following:

### 1. Foundations of Programming

- expressions, assignments, variables, operators and function calls
- data type and conversions
- input and output
- boolean logic and branching
- iteration
- functions
- data structures: strings, lists
- algorithms and program structure
- error handling:

### 2. Software Development

- Development environments: editors, IDEs, terminals
- Using Linux and command-line operations
- File I/O
- Debugging: process and tools
- Design methods, readability and style, documentation

### 3. Engineering Computation and Data Science

- Numerical data types: capabilities and limitations
- Numerical data organization: vectors and matrices
- Visualization: plotting, basic statistics
- Python computation and data science tools

### General Policies:

• <u>Academic misconduct</u>: The student handbook defines academic misconduct as follows:

Academic misconduct occurs when a student intentionally misrepresents his or her academic accomplishments or hurts other students' chances of being judged fairly for their academic work. This basic definition applies to EK130. If you are ever in doubt as to the legitimacy of an action, please talk to an instructor immediately. The penalty for academic misconduct at BU is severe. For further information on the BU Academic Code of Conduct, visit the following website: https://www.bu.edu/academics/policies/academic-conduct-code/

- <u>Incomplete grades</u>: Incomplete grades will not be given to students who wish to improve their grade by taking the course in a subsequent semester. An incomplete grade may be given for medical reasons if a doctor's note is provided. The purpose of an incomplete grade is to allow a student who has essentially completed the course and who has a legitimate interruption in the course, to complete the remaining material in another semester. Students will not be given an opportunity to improve their grades by doing extra work.
- <u>Drop dates</u>: Students are responsible for being aware of the drop dates for the current semester. Drop forms will not be back-dated.
- <u>COVID 19 & BU Community Health Expectations</u>: All students are expected to follow all university guidelines with respect to symptom checks, testing, social distancing, and mask wearing when they leave their dorm or home. For a detailed description of official BU policies regarding COVID, please visit:

http://www.bu.edu/dos/policies/lifebook/covid-19-policies-for-students/

- <u>Inclusion</u>: This class is to be a place where you will be treated with respect, and it welcomes individuals of all ages, backgrounds, beliefs, ethnicities, genders, gender identities, gender expressions, national origins, religious affiliations, sexual orientations, ability and other visible and non-visible differences. All members of this class are expected to contribute to a respectful, welcoming, and inclusive environment for every other member of the class.
- <u>Accommodations for Students with Documented Disabilities</u>: If you are a student with a disability or believe you might have a disability that requires accommodations, requests for accommodations must be made in a timely fashion to Disability & Access Services, 25 Buick St, Suite 300, Boston, MA 02215; 617-353-3658 (Voice/TTY). Students seeking academic accommodations must submit appropriate medical documentation and comply with the established policies and procedures http://www.bu.edu/disability/accommodations/