EK121 Introduction to Programming
Spring 2024, College of Engineering, Boston University
Course Information and Syllabus

Course Staff:

Professor

Name	Email (@bu.edu)
Prof. Jeff Carruthers	jbc

Graduate Student Teacher

Name	Email (@bu.edu)
James Roberts	jmr

Teaching Assistants

Name	Email (@bu.edu)
Emma Braatz	ebraatz
Tanveer Dhilon	tdhilon
London Leachman	leachman
Griffin Paradise	gdise
Susie Pompi	spompi
Arnav Shah	ashah
Varsha Singh	varsingh
Adeep Srivastava	adeepdev
Makayla Tajalle	mtajalle
Ankita Tiwari	ankita04
Katie Villalba	kvilla

ENG IT: Main Office 353-5303; email enghelp@bu.edu

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: 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: 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 Websites: There will a course website (on curl) and a course discussion system (on slack). Details to follow.

Prerequisites: None.
Corequisites: None.

Half-Semester Format: This course is a 2-credit class over a half-semester timespan. This means that you have less opportunity to "check out" from the class and catchup with the material at a later time. It is critically important to your success in this class that you fully engage with the material every week: complete readings and pre-class material review, attend classes and labs, complete homeworks, prepare for quizzes and exams.

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, exams, or other assessments. Numerical grades will be calculated for every student, based on the following point values:

- In-class exercises (ICEs): 200 points, after-class exercises (ACEs): 50 points
- Homeworks and Project: 250 points
- Quizzes (3, 30 points each) and Tests (3, 70 points each): 300 points
- Final Exam: 200 points

The conversion from your total score out of a 1000 will use the following chart:

$[950, 1000]$	A
$[900, 950)$	A-
$[867, 900)$	B+
$[833, 867)$	B
$[800, 833)$	B-
$[767, 800)$	C+
$[733, 767)$	C
$[700, 733)$	C-
$[600, 700)$	D
$[0, 600)$	F

Core Topics: We will cover the following topics:

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

Assessment Schedule: On Fridays, in discussions, there will be a review followed by a quiz (first six Fridays) or a review, with an exam to follow later in the day (the last Friday) as follows:

- Friday Jan 26, Discussion / Quiz
- Friday Feb 2, Discussion / Test
- Friday Feb 9, Discussion / Quiz
- Friday Feb 16, Discussion / Test
- Friday Feb 23, Discussion / Quiz
- Friday Mar 1, Discussion /Test
- Friday Mar 8, Exam (4:30-6:15pm)

Homeworks will be due every Sunday evening starting January 28th and concluding on March 3rd.

The final project will be due on March 5th.

Course Schedule: Here are the lecture topics and the length of each topic.

```
0. Intro to the Course (1/2)
1. Computers and Programming (1)
2. Calculations (1)
3. Storing and Displaying Results (1)
4. Floating Point Numbers (1/2)
5. Making Decisions (1 1/2)
6. Our first game (1)
7. Employing Repetition (2)
8. Organizing Software: Functions (2)
9. Organizing Software: Modules (1)
```

10. Movable Data Structures: Lists (2)
11. Data Science (2 1/2)

General Policies:

- *Academic misconduct:* 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 EK121. 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/

- *Incomplete grades:* 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.

- *Drop dates:* Students are responsible for being aware of the drop dates for the current semester. Drop forms will not be back-dated.

- *COVID 19 & BU Community Health Expectations:* 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/

- *Inclusion:* 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.

- *Accommodations for Students with Documented Disabilities:* 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/