Introduction to Computer Programming Syllabus CSCI-SHU 011

Subject to Change Statement

The syllabus and course schedule may be subject to change. Changes will be communicated via email and in NYU LMS (Brightspace). It is your responsibility to check email messages and course announcements to stay current in the course.

Instructor Information

Fall Term	Spring Term
Instructor: Professor Lihua Xu Office: S752 Instructor office hours: TBA Additional contact hours: by appointment Email: lx615@nyu.edu	Instructor: Professor Promethee Spathis Office: S738 Instructor office hours: TBA Additional contact hours: by appointment Email: ps147@nyu.edu

Course Description

Introduction to Computer Programming is designed to be a "gentle introduction" to the fundamentals of computer programming, which is the foundation of Computer Science. ICP is a foundational course designed for students with little to no prior programming experience. This course provides a comprehensive introduction to the principles of computer science through the lens of Python, a versatile and beginner-friendly programming language. By the end of this course, students will be able to design, write and debug computer programs. No knowledge of programming and no prior CS background are assumed.

Course Goals

This course aims to build a solid foundation in computer programming using Python, equipping students with the skills needed for further studies in computer science and for practical application in various fields. By the end of the course, students will be confident in their ability to tackle programming challenges and pursue advanced topics in computing.

Upon completion of this course, students will be able to:

• Apply problem solving skills to develop algorithms that solve small to medium-sized computational problems.

• Design and write Python code to implement a program description that follows propre syntax and best practices.

• Use standard software engineering practices to document and test their programs.

• Identify and fix common programming errors and debug their code effectively.

Course Schedule

	Module	Topic	Reading
1	Introduction	• Computer design: Hardware vs. Software • Computer data • Programming languages • Compilation vs interpretation • Programming workflow	

2	Data types	• Data types
		  - string
		  - numerical values: integer floating point, complex.
		  - data type conversion
		• Strings
		  - indexing
		  - slicing
			• Read chapter 1 in the textbook
			• Watch self-paced modules 1:
			  - https://cs.nyu.edu/elearning/CSCI_UA_0002/module01.php

3	Variables - Input & Output	• Variables
		  - assignment
		  - naming rules
		• User input
		  - input built-in function
		  - input conversion
		• User output
		  - Print function arguments
		  - sep and end arguments
		  - formatting, truncating, padding strings
			• Read chapter 2 in the textbook
			• Watch self-paced modules 2:
			  - https://cs.nyu.edu/elearning/CSCI_UA_0002/module02.php

4	Decision Structure	• Booleans
		  - comparison operators (==, !=, >, >=, <, <=)
		  - membership operators (in, not in)
		  - logical operators (not, and, or)
		• Decision structure
		  - if statement
		  - if-else statement
		  - if-elif-else statement
		  - nested if statement
			• Read chapter 3 in the textbook
			• Watch self-paced modules 3:
			  - https://cs.nyu.edu/elearning/CSCI_UA_0002/module03.php

5	Repetition Structure 1 - While loops	• While loops
		  - loops vs iteration
		  - sentinel and accumulator variables
		  - augmented assignment operators
		• Modules
		  - importing modules
		  - calling a function from an imported module
			• Read chapter 4 in the textbook (you can skip 4.3)
			• Watch self-paced modules 4:
			  - https://cs.nyu.edu/elearning/CSCI_UA_0002/module04.php

6	Repetition Structure 2 - For loops	• For loops
		  - sequence of values (range, string, list, tuple)
		  - loop controlling variable
		  - iterating overing a string
		• While vs For Loops
		  - when to use one or the other
		  - condition-controlled vs count-controlled
		• Nested loops
		  - inner vs outer loops
		  - inner loop full iterations per outer loop iterations
			• Read chapter 4 in the textbook with special attention to paragraph 4.3
			• Watch self-paced modules 5:
			  - https://cs.nyu.edu/elearning/CSCI_UA_0002/module05.php

7	Functions	• Functions
		  - Function syntax: Void vs returning-value functions
		  - Function header: def keyword and function names
		  - Namespace and variable scope: local, global, and built-in
		  - Passing data to a function: arguments vs parameters
		  - The main function
		  - The return statement
		• Strings
		  - Strings as objects
		  - String methods
			• Read chapter 5 in the textbook
			• Watch self-paced modules 6 & 7:
			  - https://cs.nyu.edu/elearning/CSCI_UA_0002/module06.php
			  - https://cs.nyu.edu/elearning/CSCI_UA_0002/module07.php

8	Lists & Tuples	• Mutable vs Immutable Sequences
		  - Tuples vs Lists
		• What is a List and how to create one?
		  - heterogenous, mutable, and iterable
		  - comprehension
		• Accessing elements from the List:
		  - indexing and slicing
		• Operations on Lists:
		  - find the length, concatenation, repetition, and membership test
		  - iterating over a List
		  - list of lists
		• Manipulating a List
		  - adding elements
		  - removing element
		• Passing a List by reference
			• Read chapter 7 in the textbook
			• Watch self-paced modules 8:
			  - https://cs.nyu.edu/elearning/CSCI_UA_0002/module08.php

9	Files & Exceptions	• File I/O
		  - Opening and closing a file in Python
		  - Reading opened files:
		    ‣ Iterating over each line in the file
		    ‣ Reading the entire content of the file
		  - Reading and writing opened file
		• Exceptions
		  - Raising an exception
		  - Handling exceptions with the try-except statement
		  - The else clause
		  - The finally clause
			• Read chapter 6 in the textbook with special attention to paragraph 4.3
			• Watch self-paced modules 8:
			  - https://cs.nyu.edu/elearning/CSCI_UA_0002/module09.php

10	Dictionaries	• What is a dictionary? • Dictionary syntax • Dictionaries and lists, compared • Insertion of elements • Dictionary methods • Iterating through a dictionary	• Read chapter 9.1 in the textbook • Watch self-paced modules 8: - https://cs.nyu.edu/elearning/CSCI_UA_0002/module10.php

11	Sets	• What is a set?
		• Set syntax
		• Adding and removing elements
		• Iterating over a set
		• Set theory
		• Modifying a set
		• Sorting Techniques
		  - Sorting a list
		  - Lambdasorting a dictionary
			• Read chapter 9.2 in the textbook

| 12 | Object-oriented programming & Recursion | • Procedural and object-oriented programming
• Classes
• Working with instances
• Inheritance
• Introduction to recursion
• Problem solving with recursion
• Examples of recursive algorithms | • Read chapters 10 & 11 in the textbook
• Watch self-paced modules 8:
  - https://cs.nyu.edu/elearning/CSCI_UA_0002/module10.php |

Course Material

Lecture Notes

- Available in the "Lessons" section of Brightspace website for this course.

Course Videos

- Accessible at https://cs.nyu.edu/elearning/CSCI_UA_0002/

Required Textbook

- *Starting Out with Python,* (4th or later Edition), Tony Gaddis, Addison-Wesley.

Required Hardware/Software

- Students are required to bring their laptops.

- The main software package that we will be working with this semester is the Python programming language version 3.

- We will program with Python IDLE, freely available at https://www.python.org/getit/

Optional: Free online resources

- A Byte of Python - Swaroop C H. - http://www.swaroopch.com/notes/Python

- How to Think Like a Computer Scientist: Learning with Python 3 - Jeffrey Elkner, Allen B. Downey, and Chris Meyers - http://openbookproject.net/thinkcs/python/english3e/

- Python for Informatics: Exploring Information – Charles Severance, http://www.pythonlearn.com/book.php

- Companion Website to accompany Starting Out with Python, Third Edition by Tony Gaddis - http://wps.pearsoned.com/ecs_gaddis_sowpython_3/

Course Requirements

Attendance (5%)

- I as your instructor will do my part to create an environment that fosters the open, respectful, and inclusive sharing of ideas, thoughts, and questions.
- The level of preparation, engagement with course materials, quality of questions, and amount of enthusiasm you bring to class will directly impact everyone's success and enjoyment of the course.
- You are required to come to class prepared and on time. Students are expected to contribute thoughtful comments, raise critical questions, take notes, actively listen, and engage classmates in discussion. Be respectful of others.
- If you cannot come to class, please let me know by email beforehand.

Online Quizzes (10%)

You will take 10 online quizzes on Brightspace. An online quiz consists of 10 questions. It will be opened for one week following the corresponding lecture. Your grade will be published in Brightspace gradebook.

Class Quizzes (30%)

You will take 11 pen and paper quizzes. Class quizzes will be given in class for a duration of 30 minutes before the start of the lectures. A class quiz consists mainly of predict output questions covering examples given during the previous lecture.

Midterm (25%) & Final (30%) Exams

You will take 1 midterm exam and 1 final exam. The exams will conducted in pen and paper mode. The duration of the exams is 90 minutes. It will consists of predict output questions, mystery function questions, display pattern questions and coding problems. A double side A4 handwritten cheat sheet will be allowed if not provided by your instructor.

Grading Criteria for Algorithmic Problems

Data Manipulation - Evaluates the validity of the solution in terms of:
- data transfers (input, output, persistent storage),
- declaration and manipulation of variables, assignment of values, of pointers
- usage of composite data types such as arrays, strings, lists, sets, trees, graphs, and dictionaries

Structural Design - Evaluates the correctness of the solution in terms of:
- respect of the problem specifications in order to produce the expected results/behavior
- valid control of the flow (conditional structures, repetition structures, function calls, recursion, event notifications, exceptions, …
- reasonable complexity, efficiency, and conciseness,
- adequate use of calls to external libraries, built-in functions, system services, …

Code Clarity - Evaluates the quality of the solution in terms of:
- formatting and documentation for human consumption
- decomposition of the algorithm into coherent and reusable blocks
- appropriate use of syntax, variable names, indentation, comments, …

Course Grading

The grade for this course will be determined according to the following formula:
- 60% for exams (35% for final, and 25% for midterm),
- 30% for class quizzes,
- 10% for online quizzes,
- 5% for attendance.

Letter Grades

Letter grades for the entire course will be assigned as follows:

A	95-100
A-	90-94
B+	87-89
B	83-86
B-	80-82
C+	77-79
C	73-76
C-	70-72
D+	67-69
D	63-66
F	less than 63

You must get a grade of D or better to complete the course. No exceptions will be made.

Course Policies

Attendance and Tardiness

Attendance is mandatory and absent without a valid reason will negatively impact the grade. This notification must be provided either in advance or within two days of the missed class. Additionally, active engagement in in-class discussions is highly encouraged as it not only enriches the learning experience but also demonstrates the understanding of the course material.

Absences and Grades

- 3 absences will lead to an F for your participation grade.
- 5 absences will lead to a 15% reduction in your final grade.
- 8 absences will lead to failure of the course.

Absence Exceptions

Observance of Religious Holidays: You may miss class for the observance of religious holidays. If you anticipate being absent because of religious observance, notify me in advance so we can create a plan for making up missed work. For more on this policy: https://www.nyu.edu/about/policies-guidelines-compliance/policies-and-guidelines/university-cal endar-policy-on-religious-holidays.html

Competitions, Conferences, Presentations: You are permitted to be absent from classes to participate in competitions, conferences, and presentations, either at home or out of town, as approved by the Associate Provost for Academic Affairs. Review the Undergraduate Bulletin for the conditions you must meet to obtain approval for this kind of absence.

Illness: When students are ill, they are expected to notify professors in advance of class, if at all possible. If the instructor determines that it is an excused absence then the student should negotiate with the professor the time and place for make-up of assignments, tests and/or examinations missed. Students who have been seriously ill, hospitalized and/or miss more than a week of classes due to medical reasons, should contact their academic advisor to discuss appropriate options for missed classes and/or coursework.

A student with an injury or medical condition that requires ongoing accommodations (temporary or permanent) should contact the NYU Moses Center for Student Accessibility (CSA). If an accommodation is recommended by the Moses Center, then Academic Affairs may communicate on behalf of students to advocate for excused absences/extensions. Reasonable accommodations, considering the course objectives, student learning, and fair standards, are ultimately decided by the professor.

Students who, in the judgment of the instructor, have not substantially met the requirements of the course or who have been excessively absent are not considered to have withdrawn from the course if they remain on the roster and may be given the final grade of F.

You will be asked to leave the class if you do not comply to the rules, and that will count towards your attendance.

Tardiness

Punctual arrival is mandatory for this class. Be on time. Please do not leave in the middle of class unless it is an emergency.

Late Assignments

Assignments are due at the date and time indicated on this syllabus. The late penalty for late submission is one third of a letter grade per day (an A becomes an A-, etc.) All other late assignments will earn an F.

Electronic Devices

Mobile Devices: You may not use mobile devices (phones, smartphones, etc.) in class unless otherwise indicated. Laptops are allowed during the labs and for taking notes (WIFI OFF unless otherwise stated). iPads or tablets are allowed for taking notes (WIFI OFF unless otherwise stated).

Recording Class: To ensure the free and open discussion of ideas, you may not record classroom lectures, discussion and/or activities without my advance written permission; any such recording can be used solely for your own private use. If you have approved accommodations from the Office of Disability Resources permitting the recording of class meetings, you must present the accommodation letter to me in advance of any recording. Distribution or sale of class recordings is prohibited without the written permission of the instructor and other students who are recorded.

Instructional Technology Tools and Assistance: If you need background on specific instructional technology tools, such as Zoom, NYU LMS (Brightspace) and Voicethread, check the RITS Student Toolkit. You may also email shanghai.rits@nyu.edu for assistance.

Use of Generative AI Tools

Use of ChatGPT and related tools is allowed in this class, but only in ways noted in the assignments. When you use any of these tools, you must include a note describing how you used them with the assignment.

Instructional Technology

Email Communication: I will contact you regularly via the NYU LMS (Brightspace). You should check for emails from me (reminders, logistics, updates, etc.) at the email address connected to NYU LMS (Brightspace). Please note that I will try to respond to your emails within 24 hours. Do not expect immediate responses to emails sent late at night or on the weekends.

Assignment Notification: All quizzes will be posted to our class NYU LMS (Brightspace) Site. You are responsible for looking at NYU LMS (Brightspace) after each class period to learn about the next homework assignment.

Academic Honesty/Plagiarism

Carefully read NYU Shanghai's Statement on Academic Integrity (in the Undergraduate Bulletin). Breaches of academic integrity could result in failure of an assignment, failure of the course, or other sanctions, as determined by the Academic Affairs office.

Disability Disclosure Statement

NYU Shanghai is committed to providing equal educational opportunity and participation for students with disabilities. It is NYU Shanghai's policy that no student with a qualified disability be excluded from participating in any NYU Shanghai program or activity, denied the benefits of any NYU Shanghai program or activity, or otherwise subjected to discrimination with regard to any NYU Shanghai program or activity. Any student who needs a reasonable accommodation based on a qualified disability should register with the Moses Center for Student Accessibility for assistance. Students can register online through the Moses Center and can contact the Academic Accommodations Team at shanghai.academicaccommodations@nyu.edu with questions or for assistance.

Title IX Statement

Title IX of the Education Amendments of 1972 (Title IX) prohibits discrimination on the basis of sex in educational programs. It protects victims of sexual or gender-based bullying and harassment and survivors of gender-based violence. Protection from the discrimination on the basis of sex includes protection from being retaliated against for filing a complaint of discrimination or harassment. NYU Shanghai is committed to complying with Title IX and enforcing University policies prohibiting discrimination on the basis of sex. Shakera Turi (shakera.turi@nyu.edu), Executive Director of the Office of Equal Opportunity, serves as the University's Title IX Coordinator. The Title IX Coordinator is a resource for any questions or concerns about sex discrimination, sexual harassment, sexual violence, or sexual misconduct and is available to discuss your rights and judicial options. University policies define prohibited conduct, provide informal and formal procedures for filing a complaint and a prompt and equitable resolution of complaints.

Links to the Title IX Policy and related documents:
- Sexual Misconduct, Relationship Violence, and Stalking Policy
- Procedures for Complaints Against Students
- Procedures for Complaints Against Employees
- Resource Guide for Students
- Resource Guide for Employees