New York University Tandon School of Engineering
Computer Science Engineering

Bridge to Computer Science

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Program Pre-requisites

Students must complete undergraduate study before taking the CS Bridge Program.

Program Description

The bridge program is an intensive study of the required topics which are requisite information for general admission into the NYU-Tandon CSE graduate program. Conventionally, covering these topics take three to four semesters to complete and must be done sequentially. Under the bridge program, you will complete your studies in one, intensive, semester which includes all of the material from the conventional courses in a more compact form. The bridge will require as much as 100 hours of study, but scheduling of each module can be done at a time of your discretion, due to the online nature of the program. Working at an average of about 16 hours of study each week, the bridge program will be completed in one semester. You are expected, and required to attend a weekly online meeting as well.

Program Objectives

By the end of the CS Bridge Program students should have:

1. Basic understanding of how data is represented and how computers execute instructions to use and modify data in order to solve problems.
2. Understanding of computational thinking: how to develop algorithms using decisions, repetition, and decomposition into manageable components to solve problems.
3. Ability to implement and test moderate sized programs in C++, using constructs including variables, operators, decision statements, loops, functions, and built-in data types.
4. Ability to understand basic object-oriented programming concepts.
5. Ability to code, use, analyze the performance of, and modify fundamental data structures.
6. Have a firm understanding of operating systems topics related to processes, threads, thread concurrency, deadlocks, and memory management.
7. Understanding of fundamental concepts in discrete math

Program Structure

The CS Bridge Program is conducted entirely online, which means you do not have to be on campus to complete any portion of it. You will participate in the program using NYU Classes located at https://newclasses.nyu.edu.

- The program will run 17 weeks, from 4/9 to 8/3.
  During this time, we will have 15 weeks, numbered 'week 1' through 'week 15'. In each such week, you learn new material.
  In addition, we have two special weeks:
  - 'Catch-up week' - from 6/4 to 6/8. This week gives you the opportunity to catch up on topics you feel less comfortable with. During this week, you will have your second midterm.
  - 'Exam week' - from 7/30 to 8/3. During this week, you will have your final exam.
- Some lectures will become available at the beginning of each week and will be delivered through Active Learning Modules in NYU Classes.
- A weekly virtual meeting on Thursday from 10:00AM until 1:00PM EST to discuss the lecture and/or present new material. Attendance at this meeting is mandatory.
  Sometimes we will end early, but please schedule this time.
- You will also be asked to read some topics covered in the lectures/webinars in order to get a deeper and more detailed understanding of them.
- In addition to active learning modules and virtual meetings, participation will play a key role in this course. Students are expected to participate in weekly discussion forums and webinar sessions.
- You will have 4 exams during this period. The exams are taken online and will be proctored by 'ProctorU' – an online proctoring service.
  The dates and topics are given below**. Make all required arrangements to be available to take the exams at the specified times.**

Grade Breakdown (%)

- Weekly Assignments: %20
- Engagement (forums and virtual sessions): %5
- Midterm 1: %15
- Midterm 2: %15
- Midterm 3: %15
- Final Exam: %30

Program Communication

Announcements - Announcements will be posted on NYU Classes on a regular basis. You can locate all class announcements under the *Announcements* tab of our class. Be sure to check the class announcements regularly as they will contain important information about class assignments and other class matters.

Discussion Forums – Discussion forums are an excellent way for you to engage with the course material and with your peers. Each module will have an accompanying discussion board question posted in the *Forums* tab. You are expected to read the discussion boards and engage in

thoughtful discussions. We will read all discussion posts and provide content clarification and feedback when necessary.

Email – You are encouraged to post your questions about the course in the Forums discussions on NYU Classes. This is an open forum in which you and your classmates are encouraged to answer each other's questions. But, if you need to contact us directly, you may email.

Weekly Virtual Meetings – Once a week, on Thursdays 10:00am to 1:00pm EST, we will hold a virtual class meeting through the *Meetings* tool on NYU Classes. In this weekly meeting, we will teach some new topics, and offer extra practice on the topics that were introduced on the videos. This meeting is also an opportunity for you to ask questions and gain clarification about the content from us and your peers. You are highly encouraged to attend these meetings. We understand that not all students will be available to attend these virtual meetings. Due to this fact, the meetings will be recorded so you can watch them when you are available. Attendance is **MANDATORY** via either live or recorded session.

Netiquette – When participating in an online class it is important to interact with your peers in an appropriate manner. Always use professional language (no netspeak) in your discussion board posts and emails. Please be respectful of your classmates at all times even if you disagree with their ideas.

Interaction Policy

You are required to be an active online learner in this program and expected to participate in the Active Learning Modules, weekly discussion boards, weekly virtual meetings, etc.

Readings

The required texts for the course is:

1. Problem Solving with C++, Ninth Edition, Walter Savitch, University of California, ISBN-10: 0133591743 • ISBN-13: 9780133591743
2. Modern Operating System, Fourth edition, Andrew S. Tanenbaum, Pearson Prentice Hall, ISBN-13: 978-0133591620, ISBN-10: 013359162X
3. Data structures and Algorithms in C++, Fourth edition, Mark Allen Weiss, Pearson, ISBN-13: 978-0132847377, ISBN-10: 013284737X
4. Discrete Mathematics and it's Applications, 7th Edition, Kenneth H. Rosen, The McGraw Hill Companies, 2012; ISBN: 978-0-07-338309-5.

Recommended book:

Introduction to Algorithms, 3rd Edition, Cormen, Leiserson, Rivest, and Stein, MIT Press, 2009; ISBN-13: 9780262033848; ISBN: 0262033844.

You can access NYU's central library here: http://library.nyu.edu/
You can access NYU Tandon's Bern Dibner Library here: http://library.poly.edu/

Program requirements

Participation is paramount to your success in the CS Bridge Program. You must attend, or watch all virtual meetings in the week in which we cover it. Be sure to log into NYU Classes multiple times a week, read all announcements, complete all Active Learning Modules and assignments on time, and participate in Discussion Forums.

First Midterm Exam, given on **Thursday May 10th 6pm** (during 'week 5'), 15%
Topics covered: System Hardware, Number systems, Data types, Expressions, Branching statements, Iterative statements, Sets, Mathematical functions, Basic counting and Combinatorics (weeks 1-4)

Second Midterm Exam, given on **Thursday June 7th 6pm** (during 'Catch-up week'), 15%
Topics covered: All from Exam 1 and, Algorithm Analysis, Functions, Arrays, Strings, Pointers, Dynamic storage, Recursion, Induction, The pigeonhole principle, Probability (weeks 1-8)

Third Midterm Exam, given on **Thursday July 5th 6pm** (during 'week 12'), 15%
Topics covered: All from Exam 2 and, Object oriented, File processing, Searching and Sorting, Linked lists, Stacks and Queues, Trees and Binary search trees (weeks 1-11)

Final Exam, given on **Thursday August 2nd 6pm** (during 'Exam week'), 30%
Topics covered: All

Topics Covered in the Program:

- Fundamentals of system hardware
- Number Systems
- Compilation and Execution process
- Data types and Expressions
- Branching statements
- Iterative Statements
- Propositional logic
- Sets basics
- Mathematical functions
- Basic counting and combinatorics
- Intro to probability
- The Pigeonhole Principle
- Intro to algorithm analysis and Order of growth
- Coding functions, Abstraction and Runtime stack
- Arrays
- Strings
- Pointers and Dynamic allocation
- Induction
- Recursion
- Searching and Sorting
- Object Oriented Programming concepts
- File Processing
- Linked Lists
- Stacks and Queues

- Trees and Binary Search trees
- Computer Organization
- Assembly language basics
- Intro to OS Concepts
- Processes & Threads
- Thread concurrency and deadlocks
- Memory Management

Moses Center Statement of Disability

If you are student with a disability who is requesting accommodations, please contact New York University's Moses Center for Students with Disabilities (CSD) at 212-998-4980 or mosescsd@nyu.edu. You must be registered with CSD to receive accommodations. Information about the Moses Center can be found at www.nyu.edu/csd. The Moses Center is located at 726 Broadway on the 2nd floor.

NYU School of Engineering Policies and Procedures on Academic Misconduct

(from the School of Engineering Student Code of Conduct)

A. Introduction: The School of Engineering encourages academic excellence in an environment that promotes honesty, integrity, and fairness, and students at the School of Engineering are expected to exhibit those qualities in their academic work. It is through the process of submitting their own work and receiving honest feedback on that work that students may progress academically. Any act of academic dishonesty is seen as an attack upon the School and will not be tolerated. Furthermore, those who breach the School's rules on academic integrity will be sanctioned under this Policy. Students are responsible for familiarizing themselves with the School's Policy on Academic Misconduct.

B. Definition: Academic dishonesty may include misrepresentation, deception, dishonesty, or any act of falsification committed by a student to influence a grade or other academic evaluation. Academic dishonesty also includes intentionally damaging the academic work of others or assisting other students in acts of dishonesty. Common examples of academically dishonest behavior include, but are not limited to, the following:

1. Cheating: intentionally using or attempting to use unauthorized notes, books, electronic media, or electronic communications in an exam; talking with fellow students or looking at another person's work during an exam; submitting work prepared in advance for an in-class examination; having someone take an exam for you or taking an exam for someone else; violating other rules governing the administration of examinations.
2. Fabrication: including but not limited to, falsifying experimental data and/or citations.

3. Plagiarism: intentionally or knowingly representing the words or ideas of another as one's own in any academic exercise; failure to attribute direct quotations, paraphrases, or borrowed facts or information.
4. Unauthorized collaboration: working together on work that was meant to be done individually.
5. Duplicating work: presenting for grading the same work for more than one project or in more than one class, unless express and prior permission has been received from the course instructor(s) or research adviser involved.
6. Forgery: altering any academic document, including, but not limited to, academic records, admissions materials, or medical excuses.

Access the entire School of Engineering Student Code of Conduct here:
engineering.nyu.edu/academics/code-of-conduct