# CS 280: Programming Language Concepts
# Spring 2024

## Syllabus

**CS 280 - Programming Language Concepts**
Prerequisites: CS 114 or CS 116 or IT 114 or equivalent with a grade C or better.
Conceptual study of programming language syntax, semantics and implementation. Course covers language definition structure, data types and structures, control structures and data flow, run-time consideration, and interpretative languages.

## Instructor:


**Course Instructor:** **Dr. Bassel Arafeh**
GITC, Rm. 4408
E-mail: ba62@njit.edu

Office Hours:
Monday: 1:10 pm to 2:10 pm
Wednesday: 10:00 am to 12:00 noon
Thursday: 1:10 pm to 2:10 pm
Or by Appointment

## Textbook:

No official textbook is adopted for the course. However, the following sources are recommended as supporting references for the topics of the course, since most of the course materials are prepared based on them.

- **R1:** Robert W. Sebesta, Concepts of Programming Languages, 12th Edition., Pearson, 2019.
- **R2:** Nell Dale; Chip Weems; Tim Richard, Programming and Problem Solving with C++, 6th/7th Edition, Jones & Bartlett Learning.
- **R3:** Michael D. Adams, Lecture Slides for Programming in C++ [The C++ Language, Libraries, Tools, and Other Topics] (Version 2021-04-01)
  http://www.ece.uvic.ca/~mdadams/cppbook

## Goals for the Course:

At the conclusion of this course, the successful (passing) student would have learned:

1. The student will be able to recognize similar features of different programming languages.
2. The student will have an easier time learning new programming languages.

3. The student will gain an appreciation of the strengths and weaknesses of different programming languages.
4. The student will demonstrate an ability to apply knowledge of computing and mathematics appropriate to the discipline.
5. The student will demonstrate an ability to analyze a problem, and identify and define the computing requirements appropriate to its solution.
6. The student will demonstrate an ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs.
7. The students will recognize the need for and an ability to engage in continuing professional development.
8. The student will demonstrate an ability to use current techniques, skills, and tools necessary for computing practice.

## Major Topics:

- Common features of programming languages
- Language syntax and semantics
- Lexical and syntax analysis
- Variables bindings, scopes and lifetimes
- Data types
- Expressions, and assignment statements
- Control flow statements
- Subprograms
- Abstract data types
- Support for object-oriented programming
- Exception Handling

## Weight of Each Course Component:

| | |
|---|---|
| Programming Assignments | **30%** |
| Recitation Assignments | **20%** |
| Midterm | **20%** |
| Final | **30%** |

## Grading Scale:

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|---|---|
| **A** | **>= 88%** |
| **B+** | **82%-88%** |
| **B** | **76%-82%** |
| **C+** | **70%-76%** |
| **C** | **60%-70%** |
| **D** | **50%-60%** |
| **F** | **< 50%** |

## Course Format and General Policies

CS280 is being taught in lecture/lab format. Lectures will be held on **Thursdays**, and lab sections will meet on **Mondays.** More detailed instructions related to recitation assignments (RAs), programming projects (PAs), vocareum environment and Exams will be given next.

1. **Recitation Assignments**
   Recitation Assignments (RA) are short programming assignments that will be graded as part of your final course grade. **There will be 9 recitation assignments with a weight of 20% of your total grade. A RA work that is assigned at a lab class on Monday will be due by midnight on Friday at 11:59 PM. Extended submission period of RAs will be allowed till Sunday at 11:59 PM with a penalty of 25% deduction from the student's score. Note, no RA submissions will be considered after Sunday at 11:59 PM.**

2. **Programming Assignments**
   There will be 3 programming projects with a weight of **30%** of your total grade. All submissions are done through Canvas to the Vocareum Environment. **Extended submission period of PAs will be allowed with a fixed penalty of 25% deduction from the student's score. PAs submissions with penalty will extend for 3 days after its announced due date.** The tentative schedule of posting the programming projects and their due dates are shown in the following table. See also the course calendar schedule for more details.

| Programming Project | Points (%) Total: 30 | Posting Date | Due Date | Deadline with Penalty |
|---|---|---|---|---|
| 1 | 10 | 2/19/2024 | 3/3/2024 | 3/6/2024 |
| 2 | 12 | 3/18/2024 | 4/4/2024 | 4/7/2024 |
| 3 | 8 | 4/15/2024 | 4/28/2024 | 5/1/2024 |

   **Note: All programming assignments must be written in C++, and must be submitted through Canvas to the Vocareum Environment for automatic grading.**

3. **Mid-term and Final Exams**
   **All Exams are conducted online in the designated exam rooms. All exams require Respondus Lockdown Browser. Please read the following NJIT policy in regard to using Lockdown Browser as the proctoring method. The course will use the "New" quizzes engine on Canvas. The instructions required to prepare yourself for an online quiz with a Lockdown Browser are shown below.**

   The common midterm will be on **Saturday 1:00pm - 2:45pm – 3/23/2024**. The final exam date will be determined later on. However, the **Fall 2023** finals will be during the period **May 3-9, 2024**. **Both exams MUST be taken by all students and cannot be rescheduled.**

## General Language for All Courses

*NJIT policy requires that all midterm and final exams must be proctored, regardless of delivery mode, in order to increase academic integrity. Note that this does not apply to essay or authentic based assessments. Effective beginning Fall semester 2019, students registered for a fully online course section (e.g., online or Hyflex mode) must be given the option to take their exam in a completely online format, with appropriate proctoring.*

In this course you will be required to use the following proctoring method to ensure academic integrity for exams. Please see NJIT's response to questions about online proctoring here. See below for more information about how exams will be proctored in this course.

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**For "New" Quizzes in Canvas:**

If a *New Quizzes* assessment requires the use of LockDown Browser, it will automatically launch from the student's regular browser session. At the end of the quiz, LockDown Browser will close, allowing the student to continue with their standard browser. To be clear, the LockDown Browser application must first be installed to the computer or device. But once installed, it will automatically launch (and close) as needed with New Quizzes.

1. Download and install LockDown Browser from this link: http://www.respondus.com/lockdown/download.php?id=264548414
2. Once your download and installation has finished, log into Canvas using your standard browser.
3. From your Dashboard or under "Courses", click on the course in which you have to take the exam that requires LockDown Browser.
4. After you enter the course, find the exam and click on it.
5. A new tab will open with a message stating "Assessment Loading". You will also see a pop-up window asking you to open Lockdown Browser. Click "Open Lockdown Browser".
6. Lockdown Browser will automatically launch and your quiz will be loaded into Lockdown Browser. Click "Begin" to take the quiz. Once a quiz has been started with LockDown Browser, you cannot exit until the "Submit Quiz" button is clicked.
7. If you are required to use a webcam (Respondus Monitor), you will be prompted to complete a Webcam Check and other Startup Sequence steps.

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**YWCC Tutoring for CS 280**

**Tutoring assistance is provided to CS 280 students through the College. Please visit the College page for Spring 2024 undergraduate tutoring scheduled periods at https://computing.njit.edu/tutoring.**

## Notes:

1. When you communicate with me by email, please include CS280-0xx where xx is your section number in the Subject line of any email you send me.
2. If your inquiry is about a recitation class material, a recitation assignment or C++ help, please contact your Recitation class Instructor first.
3. You will have one calendar week from when a grade for any assignment or exam is posted on Canvas to raise any questions that you may have about your grade to me or the instructor of your recitation class. After that time, I will not discuss any grading changes.
4. You are responsible for any material that you miss if you don't attend a lecture or a recitation class.
5. No request for an assignment submission extension will be considered, if it is not supported by a confirmed evidence from the Office of the Dean of Students.
6. For tutoring assistance, visit the YWCC site for undergraduate tutoring.
7. **If you need accommodations due to a disability please contact Scott Janz, Associate Director of Office of Accessibility Resources and Services (OARS), Kupfrian Hall 201 to discuss your specific needs. A Letter of Accommodation Eligibility from the office authorizing student accommodations is required.**

## Academic Integrity:

Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the academic code of integrity policy that is found at: http://www5.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf.

Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. Any student found in violation of the code by cheating, plagiarizing or using any online software inappropriately will result in disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the university. If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at dos@njit.edu

## Course Calendar:

| Week | Date | Lect./Lab Topic | Reference: Chapter(s) | RA/PA Assignment | RA/PA Due Date |
|---|---|---|---|---|---|
| 1 | Thurs. Jan. 18, 2024 | Introduction & Preliminaries | R1: 1 | | |
| | Mon. Jan. 22, 2024 | Lab 1: Introduction to C++ | | RA1 | 1/26/2024 |
| 2 | Thurs. Jan. 25, 2024 | Description of Syntax and Semantics | R1: 3 | | |
| | Mon. Jan. 29, 2024 | Lab. 2: C++ Streams & Files | R2: 4 | RA2 | 2/2/2024 |
| 3 | Thurs. Feb. 1st, 2024 | Variables, Pointers & References | R1: 5 R2: 10.7, 10.8 | | |
| | Mon. Feb. 5, 2024 | Lab. 3: Functions and Arrays | R2: 8, 11 | RA3 | 2/9/2024 |
| 4 | Thurs. Feb. 8, 2024 | Data Types | R1: 6 R2: 12 | | |
| | Mon. Feb. 12, 2024 | Lab. 4: Classes | R2: 12 | RA4 | 2/16/2024 |
| 5 | Thurs. Feb. 15, 2024 | Lexical Analysis | R1: 4.1-4.2 | | |
| | Mon. Feb. 19, 2024 | Lab. 5: PA 1-Building a Lexical Analyzer | | PA 1 (Lexer) | Sunday 3/3/2024 |
| 6 | Thurs. Feb. 22, 2024 | Operator overloading, Generic Functions & Class Templates | R2: 16.1-16.3 R3: 2.4.3 | | |
| | Mon. Feb. 26, 2024 | Lab. 6: Implementation Issues of PA 1 | | RA5 | 3/1/2024 |
| 7 | Thurs. Feb. 29, 2024 | Syntax Analysis | R1: 4.3 | | |
| | Mon. Mar. 4, 2024 | Lab. 7: Recursion | R2: 18.1-18.2 | RA 6 | 3/8/2024 |
| 8 | Thurs. Mar. 7, 2024 | Expressions and Statements | R2: 5-7 | | |
| | Mon. Mar. 11, 2024 | Spring Recess | | | |
| 9 | Thurs. Mar. 14, 2024 | Spring Recess | | | |
| | Mon. Mar. 18, 2024 | Midterm Exam Review: Examples & Exercises | | | |
| 10 | Thurs. Mar. 21, 2024 | No Lectures Due to Midterm Exam | | | |
| | Sat. Mar. 23, 2024 1:00 pm-2:45 pm | Midterm Exam | | | |

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| | **Mon. Mar. 25, 2024** | **Lab. 8**:<br>**PA 2-Building a Parser** | | **PA 2 (Parser)** | **Sunday 4/7/2024** |
| **11** | **Thurs. Mar. 28, 2024** | **STL: Containers, Iterators & Algorithms** | **R2: 17** | | |
| | **Mon. April 1st, 2024** | **Lab. 9:**<br>**Using STL Containers** | | **RA7** | **4/5/2024** |
| **12** | **Thurs. April 4, 2024** | **Support for OPP: Inheritance** | **R2: 15.1-15.2**<br>**R3: 2.9.1** | | |
| | **Mon. April 8, 2024** | **Lab 10:**<br>**PA 3: Mixed Mode Expressions** | | **RA8** | **4/12/2024** |
| **13** | **Thurs. April 11, 2024** | **Support for OPP: Polymorphism** | **R2: 15.3**<br>**R3: 2.9.2-2.9.3** | | |
| | **Mon. April 15, 2024** | **Lab 11:**<br>**PA3-Building an Interpreter** | | **PA 3 Interpreter** | **Sunday 4/28/2024** |
| **14** | **Thurs. April 18, 2024** | **Exception Handling** | **R2: 16.4**<br>**R3: 3.6.1-3.6.3** | | |
| | **Mon. April 22, 2024** | **Lab 12:**<br>**Inheritance & Polym.** | | **RA 9** | **4/26/2024** |
| **15** | **Thurs. April 25, 2024** | **Final Exam Review Lecture** | | | |
| | **Mon. April 29, 2024** | **Final Exam Review Examples & Exercises** | | | |
| **16** | **Thurs. May 2nd, 2024** | **Reading Day 2** | | | |
| | **May 3-9, 2024** | **Final Exams** | | | |