

## CSYE 6205. Concepts of Object-Oriented Design with C++

### Course Information

Course Title: Concepts of Object-Oriented Design with C++

Course Number: CSYE 6205 **CRN: 17538**

Term and Year: Fall 2025

Credit Hour: 4

Course Format: ON ZOOM, Every Saturday 9 AM to 12 NOON PST for 15 weeks

### Instructor Information

Full Name: Jagadeesh Vasudevamurthy Ph.D.

Email Address: [j.vasudevamurthy@northeastern.edu](mailto:j.vasudevamurthy@northeastern.edu)

<https://bayarea.northeastern.edu/faculty/#coe>

Office Hours: 8 AM – 9 AM Saturday

### Course Description

This course covers object-oriented programming using modern C++ (**C++ 2017 and above**). These include class definition using templates, smart pointers for memory management, inheritance, and polymorphism for code reuse and error handling through exceptions. Detailed coverage of the following concepts that help in building large software will be covered: const, auto, references, smart pointers, operator overloading, I/O and file streams, templates, and the Standard Template Library (STL). Exposure to basic data structures like vectors, set, and hash using C++ STL library.

### Course Learning Outcomes:

1. *An ability to identify, formulate, and solve complex engineering problems.*
2. *An ability to write an effective and efficient program using modern C++ (2017 and above).*
3. *An ability to express ideas using object-oriented programming and exploiting C++ to implement.*
4. *An ability to read, understand and critic the existing C++ programs.*
5. *An ability to exploit and apply Standard template library (STL) to implement large software.*
6. *An ability to produce solutions that meet specified end-user needs in C++ with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.*

### Required Tools and Textbook

The following textbook is required. It contains a wealth of information beyond what we can cover in the lecture; it is certain to enhance your understanding of modern C++.

*Beginning C++17: From Novice to Professional 5th ed. Edition,*

Author: Ivor Horton

Publisher: *Apress*

ISBN-13: 978-1484233658

ISBN-10: 1484233654

You must install C++ compiler (2017 and above)

### **Course Schedule/Topics Covered**

1. Principles of object-oriented analysis and design
2. Need for const and const correctness.
3. Need for pass by value, reference, and pointers
4. Memory management, dynamic array declarations, and smart pointers
5. User-defined objects using templates
6. Static member variables and static member functions
7. Friend functions and friend classes
8. Function overloading and operator overloading
9. Standard template library (STL)
10. Reuse code and extend existing data types through inheritance
11. Polymorphism concept using virtual function
12. Exceptions handling techniques using try/catch syntax
13. Stream classes for input/output and to read/write files

### **Grading**

Your grade for the course will be based on the following components:

1. Programming assignments, (includes problems in Leetcode and Hacker Rank)
2. Midterm exam,
3. Final exam.

**25% Midterm, 25% Final, 50%  
Homework**

## Letter Grade Conversion Scale

Final percentage scores will align with the following letter grades and their Grade Point Equivalents (accurate to three decimal places, as used in transcripts and Degree Audits). These percentage ranges are defined to ensure clarity:

Percentage Range	Letter Grade	Grade Point Equivalent
95.0–100.0%	A	4.000
90.0–94.9%	A-	3.667
87.0–89.9%	B+	3.333
84.0–86.9%	B	3.000
80.0–83.9%	B-	2.667
77.0–79.9%	C+	2.333
74.0–76.9%	C	2.000
70.0–73.9%	C-	1.667
69.9% and Below	F	0.000

### Attendance/Late Work Policy

#### Attendance Policy

In each term, students enrolled in on-ground sections are expected to be on campus and attending class beginning with the first day of classes. Students in online sections are expected to log in and participate in class beginning with the first day of classes.

Students who join a class after the first day of class during the university add period, or who are approved for late registration by the instructor and the Graduate School of Engineering, are responsible for all coursework missed prior to enrolling. In the interest of students' success, the college does not support the arrival of students to class after the university add deadline. **Enrolled students who do not attend class during the first week of a semester risk being dropped from the course.**

In cases where an enrolled student cannot arrive to campus by the first day of class due to circumstances beyond their control, it is the student's responsibility to contact the instructor for approval and notify the Graduate School of Engineering.

Students registered in MGEN courses (INFO, CSYE, and DAMG) are allowed **a maximum of 2 absences per course**, with 3 or more absences resulting in an 'F' for that course. Course instructors are not expected to make accommodations and students are expected to inform their instructors of any absences in advance of the class. Should a student anticipate being unable to attend 3 or more classes, they should discuss their situation with their Academic Advisor to explore other types of leave and accommodations in accordance with the University's academic and global entry expectations. Students may be asked to share communications about class absences with their Academic Advisor. If a student is sick long-term or experiences a medical issue that prevents class attendance, it is strongly encouraged that they speak with their Academic Advisor ([coe-](#)

[gradadvising@northeastern.edu](mailto:gradadvising@northeastern.edu)) to learn more about the Medical Leave of Absence. International students should review the Office of Global Services webpage to understand their visa compliance requirements.

Teaching Assistants (TAs) or Instructional Assistants (IAs) will be present at each class to collect student attendance.

#### Late Work Policy

Students must submit assignments by the deadline in the time zone noted in the syllabus. Students must communicate with the faculty prior to the deadline if they anticipate work will be submitted late. Work submitted late without prior communication with faculty will not be graded.

#### Course Evaluations

Student feedback on their learning experience is valuable and helps improve future courses. We encourage all students to complete the course evaluation surveys when they become available.

Surveys are distributed at both the midterm mark and the end of the term via email and are completely anonymous and confidential. Any questions about the surveys can be directed to [mgen-programs@coe.northeastern.edu](mailto:mgen-programs@coe.northeastern.edu)

#### MGEN Student Feedback

Students who would like to provide the MGEN unit with anonymous feedback on this particular course, Teaching Assistants, Instructional Assistants, professors, or to provide general feedback regarding their program, may do so using this survey:

[https://neu.co1.qualtrics.com/jfe/form/SV\\_cTIAbH7ZRaaW0Ki](https://neu.co1.qualtrics.com/jfe/form/SV_cTIAbH7ZRaaW0Ki)

#### Academic Integrity

A commitment to the principles of academic integrity is essential to the mission of Northeastern University. The promotion of independent and original scholarship ensures that students derive the most from their educational experience and their pursuit of knowledge. Academic dishonesty violates the most fundamental values of an intellectual community and undermines the achievements of the entire University.

As members of the academic community, students must become familiar with their rights and responsibilities. In each course, they are responsible for knowing the requirements and restrictions regarding research and writing, examinations of whatever kind, collaborative work, the use of study aids, the appropriateness of assistance, and other issues. Students are responsible for learning the conventions of documentation and acknowledgment of sources in their fields. Northeastern University expects students to complete all examinations, tests, papers, creative projects, and assignments of any kind according to the highest ethical standards, as set forth either explicitly or implicitly in this Code or by the direction of instructors.

The following is a broad overview, but not an all-encompassing definition, of what constitutes a violation of academic integrity:

*Cheating:* The University defines cheating as using or attempting to use unauthorized materials, information, or study aids in any academic exercise. When completing any academic assignment, a student shall rely on their own mastery of the subject.

***Fabrication:*** The University defines fabrication as falsification, misrepresentation, or invention of any information, data, or citation in an academic exercise.

***Plagiarism:*** The University defines plagiarism as using as one's own the words, ideas, data, code, or other original academic material of another without providing proper citation or attribution. Plagiarism can apply to any assignment, either final or drafted copies, and it can occur either accidentally or deliberately. Claiming that one has "forgotten" to document ideas or material taken from another source does not exempt one from plagiarizing.

***Unauthorized Collaboration:*** The University defines unauthorized collaboration as instances when students submit individual academic works that are substantially similar to one another. While several students may have the same source material, any analysis, interpretation, or reporting of data required by an assignment must be each individual's independent work unless the instructor has explicitly granted permission for group work.

***Participation in Academically Dishonest Activities:*** The University defines participation in academically dishonest activities as any action taken by a student with the intention of gaining an unfair advantage over other students.

***Facilitating Academic Dishonesty:*** The University defines facilitating academic dishonesty as intentionally or knowingly helping or contributing to the violation of any provision of this policy.

Please visit <https://osccr.sites.northeastern.edu/academic-integrity-policy/> to access the full academic integrity policy.

### **University Health and Counseling Services**

As a student enrolled in this course, you are fully responsible for assignments, work, and course materials as outlined in this syllabus and in the classroom. Over the course of the semester if you experience any health issues, please contact UHCS.

For more information, visit <https://www.northeastern.edu/uahcs>.

### **Student Accommodations/Disability Access Services (DAS)**

Northeastern University and the Disability Access Services (DAS) are committed to providing disability services that enable students who qualify under Section 504 of the Rehabilitation Act and the Americans with Disabilities Act Amendments Act (ADAAA) to participate fully in the activities of the university. To receive accommodations, students must provide appropriate documentation as provided by the DAS office.

If the course is conducted in an on-ground (in-person) format, students are expected to attend class physically as scheduled. Professors are **not required to provide virtual attendance links** unless a student has documented accommodation approved by the **Disability Access Services (DAS) office** and their **Academic Advisor**. If a student requires accommodation for remote participation, they must submit a formal request through the **Disability Office** and coordinate with their **Academic Advisor** prior to the course start date.

For more information, visit <https://disabilityaccessservices.sites.northeastern.edu/>

## Office of Global Services

As an F-1, J-1, or Study Permit student, you must meet certain obligations in order to maintain lawful nonimmigrant status. Maintaining status is necessary in order to retain eligibility for the benefits of F-1 or J-1 status, such as employment authorization and program extension, and can be crucial to a successful application for a change or adjustment of nonimmigrant status in the future. Failure to maintain your nonimmigrant status can result in serious problems with immigration and *could lead to deportation from the U.S. or Canada.*

Students must maintain on-ground presence throughout the academic term. At Northeastern, there are four different defined instructional methods: Traditional, Hybrid, Live Cast, and Online. Traditional, Hybrid, and Live Cast courses meet the Visas' on-ground presence requirements. **Online courses do not meet the Visas' on-ground presence requirements.**

Students enrolled in Summer courses should adhere to OGS guidelines on maintaining status during the Summer term.

For more information please visit, <https://international.northeastern.edu/ogs/current-students/understanding-visa-requirements/guidelines-on-maintaining-status/>

## Library Services

The Northeastern University Library is at the hub of campus intellectual life. Resources include over 900,000 print volumes, 206,500 e-books, and 70,225 electronic journals.

For more information and for education specific resources, visit <https://library.northeastern.edu>  
Network Campus Library Services: Northeastern University Library Global Campus Portals

## 24/7 Canvas Technical Help

For immediate technical support for Canvas, call 617-373-4357 or email [help@northeastern.edu](mailto:help@northeastern.edu)

Canvas Student Resources: <https://canvas.northeastern.edu/student-resources/>

For assistance with my Northeastern e-mail, and basic technical support:

Visit ITS at <https://its.northeastern.edu>

Email: [help@northeastern.edu](mailto:help@northeastern.edu)

ITS Customer Service Desk: 617-373-4357

## Outreach, Engagement, Belonging

Northeastern University is committed to fostering a community of belonging, which is essential to the advancement of Northeastern University's mission of teaching and research. Our university is stronger as a result of the varied backgrounds, experiences, and perspectives that all members of our global community bring to the pursuit of knowledge. Embracing this pluralism is not the work of one office, department, or academic unit. It is a shared responsibility that spans disciplines and boundaries. By harnessing the power of our differences, we will continue to light the path to bold new ideas and life-changing discoveries.

It is my intention that students from all backgrounds and perspectives will be well served by this course, and that the diverse experiences that students bring to this class will be viewed as an asset. I welcome individuals of all ages, backgrounds, beliefs, ethnicities, genders, gender identities, gender expressions, national origins, religious affiliations, sexual orientations, socioeconomic background, family education level, ability – and other visible and nonvisible differences. All members of this class are expected to contribute to a respectful, welcoming and belonging environment for every other member of the class. Your suggestions are encouraged and appreciated.

Please visit [Belonging at Northeastern – Northeastern Provost](#) for complete information.

### Title IX

Northeastern University complies with federal, state, and provincial civil rights laws and prohibits discrimination within any of its programs, activities, and services in accordance with *Title VI of the Civil Rights Act of 1964, Section 504 of the Rehabilitation Act of 1973, Title IX of the Education Amendments Act of 1972, Age Discrimination Act of 1975, U.S. Department of Homeland Security Regulation 6 C.F.F. Part 19, and other applicable civil rights laws and regulations.*

In case of an emergency, please call 911.

Please visit <https://ouec.northeastern.edu/services/> for a complete list of reporting options and resources both on- and off-campus.