CSC 222 (D01A)

Object-Oriented Programming

Course Syllabus

Instructor	Jeffrey Elkner
Session	Fall 2025
Meeting Days	B Days
Times	8:00 to 9:24 am
Location	Arlington Career Center Room 512
Contact	jde232@email.vccs.edu

Course Description

Introduces the concepts and techniques of object-oriented programming to students with a background in procedural programming and problem solving. Uses a high-level computer language to illustrate and implement the topics. Second course in a three-course sequence (CSC 221, CSC 222, CSC 223). 4 credits.

General Course Purpose

CSC 221, CSC 222, and CSC 223 comprise the standard sequence of minimal programming content for computer science majors. The course sequence will teach the students to use high-level languages and their applications to problem solving by using algorithms within procedural and object-oriented languages, while ensuring data adheres to a structured model. The Introduction to Object-Oriented Programming course covers the topics of classes, objects, encapsulation, cohesion, inheritance, abstraction, and polymorphism. JAVA is the preferred language for this course, institutions may offer using a different language to align with primary 4-year partner requirements.

Course Prerequisites/Co-Requisites

Prerequisite: CSC 221 or equivalent.

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Course Objectives

- Civic Engagement
    - Engage and build technology that responds to human needs and helps people navigate institutional systems
- Critical Thinking
    - Assess why certain solutions might not work and to save time in coming up with a more efficient approach
- Professional Readiness
    - Work well with others and display situationally and culturally appropriate demeanor and behavior.
- Quantitative Literacy
    - Perform accurate calculations, interpret quantitative information, apply and analyze relevant numerical data, and use results to support conclusions.
- Scientific Literacy
    - Represent real-world objects and processes virtually by identifying properties, behavior, and operations relevant to solving problems on a computer.
- Written Communication
    - Develop, convey, and exchange ideas in writing, as appropriate to a given context and audience.
- Review of Procedural Problem-Solving Concepts
    - Describe activities related to program development.
    - Solve problems using techniques such as pseudocode, flowcharts, UML, and model development.
    - Evaluate algorithms for errors.
    - Discuss the presence of algorithms in various activities.
- Review of Procedural Programming
    - Design programs using appropriate program design techniques.
    - Develop programs using sequential and selection operations.
    - Choose adequate repetition structures based on the type of application.
    - Solve problems using procedures.
    - Develop applications using arrays.

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- Object-Oriented Design
    - List the members of a class and identify the purpose of each.
    - Describe the mechanisms used to provide and restrict access to class members.
    - Explain the difference between overloading and overriding.
    - Explain how to construct and release objects within a program.
    - Explain cohesion and how to achieve high cohesion.
    - Compare procedural design to an object-oriented design.

- Development & Testing Tools
    - Apply a variety of tools for program development and testing.
    - Apply a version control system in team or multiple revision scenarios.
    - Apply the use of an automated debugger to set breakpoints and examine data values.

- Abstract data type (ADT) Implementations & Applications
    - Design and implement classes.
    - Design, implement, and manipulate objects belonging to classes.
    - Explain the difference between data structures that are internal versus external to a class.

- Recursion
    - Explain the parallels between ideas of mathematical and/or structural induction to recursion and recursively defined structures.
    - Create a simple program that uses recursion.
    - Describe how recursion is implemented on a computer.

- Inheritance & Polymorphism
    - Explain the benefits and restrictions of inheritance
    - Distinguish between inheritance of implementation and inheritance of design
    - Design class hierarchies using inheritance and interfaces.
    - Create a class which implements an interface
    - Explain how inheritance and virtual functions implement dynamic binding with polymorphism.

- Files & Exceptions
    - Create programs using file handling techniques.
    - Describe the use of relative and absolute paths to identify a file.
    - Detecting end of input conditions and common error conditions.
    - Explain encapsulating exceptions.
    - Demonstrate throwing and catching exceptions.
    - Write code to implement try catch and finally blocks.
    - Write code to create a custom Exception.

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Major Topics to be Included

- Review of Procedural Problem-Solving Concepts
- Review of Procedural Programming
- Object-Oriented Design
- Development & Testing Tools
- Abstract data type (ADT) Implementations & Applications
- Recursion
- Inheritance & Polymorphism
- Files & Exceptions

Required Instructional Materials

- A C++ Book for Undergraduate Computer Science Majors, *by Jeffrey Elkner*
- Other freely available resources as provided by instructor

Course Credit: 4 credits

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Policies

I. Expectations

A. Introduction to Computer Science is a rigorous, college level course that will require sustained and consistent engagement from students.

B. An average of 90 minutes of homework will be assigned for each 90 minutes in class. We will be utilizing a flipped classroom learning environment, where the lecture portion of the course material will be viewed individually at home *before* class meets, and class time will be used for collaborative engagement and discussion.

C. Frequent "mini quizzes" at the beginning of class will be used to be sure homework readings and practice have been completed. To be successful in this class, students will be expected to be prepared for these quizzes when they arrive in class.

II. Grading Policies

A. Grading Scale: A= 100 - 90 B= 89 - 80 C= 79 - 70 D=69 - 60 F= 59 and below

B. Students will receive a weekly cumulative letter grade that will incorporate daily quizzes, tests, projects, and presentations. These weekly evaluations can be challenged by the student, *but only during the week immediately following when the evaluation is given*.

C. The average of the weekly evaluations will make up 70% of the final grade, with the course final exam making up 30%.

D. In cases where district grading policies conflict with college grading policies, the high school and college grades may differ; this may include assignment/test retakes, extended assignment due dates, capped minimum grade allowed, among other such district policies.

E. It is important that students check their final NOVA grades in SIS as soon as their course is completed.

F. Course Grade Appeals

i. Students who think that a semester grade is in error should contact the instructor immediately to present their concerns. Students who wish to appeal their grade or otherwise report a grievance will need to submit Form 125-021 within 20 days of the end of the semester. The original grade will stand if the student delays in submitting their appeal.

ii. NOVA's Student Grievance policy can be found here: https://www.nvcc.edu/policies/_files/608-Student-Grievances.pdf

iii. Form 125-021 can be found here: https://www.nvcc.edu/forms/

III. Course Policies

A. Student Rights and Responsibilities

i. Students should be familiar with the college's specific expectations concerning the conduct of its students. These expectations apply to all students, including Dual Enrollment students.

ii. Student Rights and Responsibilities are outlined in the Student Code of Conduct, found here: https://www.nvcc.edu/students/handbook/conduct.html

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B. Academic Integrity
   i. Academic integrity requires that you recognize and acknowledge information derived from others and take credit only for ideas and work that are yours. It should be the guiding principle for all that you do, from taking assessments and making presentations to writing papers. More about academic integrity at NOVA can be reviewed on the Student Conduct and Integrity page on the NOVA website: https://www.nvcc.edu/students/handbook/conduct.html.
   ii. Violating the Academic Integrity Policy will incur consequences. Your instructor may give you a failing grade for the assignment or for the course. Further, you may be referred to NOVA Cares, reported to an academic dean, or even referred to the Dean of Students for disciplinary action depending on how serious an infraction was committed.
   iii. Please review NOVA's Academic Integrity Policy here: https://www.nvcc.edu/policies/_files/224-Academic-Integrity.pdf.

C. Accommodations and Accessibility Services
   i. NOVA is committed to ensuring all students have an opportunity to pursue a college education regardless of the presence or absence of a disability. Information on NOVA's Accommodations and Accessibility Services, including how to reach a Accommodations and Accessibility Services counselor, can be found here: https://www.nvcc.edu/accommodations.
   ii. Students must reach out to contact NOVA's Accommodations and Accessibility Services to apply for accommodations. A student with a 504 plan or IEP at their high school will still need to apply with NOVA's Accommodations and Accessibility Services – those plans do not automatically carry over to your Dual Enrollment course. If accommodations are agreed upon, students will receive a Memorandum of Accommodation (MOA) by AAS. All information is kept confidential and may increase your chances of success in the academic setting.

D. Advocacy and Privacy of Student Records
   i. Students are expected to reach out to their instructor if they do not understand content or expectations.
   ii. You, as a NOVA student, have a right to review your NOVA grades and other records. Your high school may share grades and other records with NOVA, and NOVA will share your post-secondary (college) grades with your high school. The grades you earn at NOVA are part of a permanent transcript, and you will be required to include your NOVA transcript as part of any future college or graduate school application. NOVA instructors and other college personnel generally may not release a student's educational records without written consent of the student. For dual enrolled students under 18, parents or guardians may generally access records and grades which are created by or shared with a student's high school. For the purposes of these privacy rules, your Dual Enrollment instructor is considered a NOVA employee.
   iii. To grant parents or guardians direct access to NOVA records, students will be required to submit a notarized copy of NOVA Form 125-356, found here: https://www.nvcc.edu/forms/pdf/125-356.pdf.
   iv. For more information about student privacy, parent limitations of access to students' educational records, and other restrictions on sharing students' personally identifiable information, please review NOVA Policy 613 (FERPA): https://www.nvcc.edu/policies/_files/613-FERPA.pdf.

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E. Campus Services
   i. Dual enrolled students have access to full NOVA campus services to include tutoring, library, and counseling services; student resources are found here: http://www.nvcc.edu/students/index.html.

F. Office of Wellness and Mental Health
   i. During your time at NOVA, you may experience challenges including struggles with academics, finances, or your personal well-being. NOVA has support resources available. If you are seeking resources and support or if you are worried about a friend or classmate: https://www.nvcc.edu/wellness/index.html.

G. Course Drop and Withdrawal Policy
   i. Please note two important dates related to your enrollment in a course:
      a. The "Drop" date (also known as census date) for a course is the last day to drop a course. Dropping a course before the drop date will not appear on your NOVA transcript.
      b. The "Withdrawal" date is the last day to withdraw without a grade penalty. Dropping a course after the drop date and before the withdrawal date will result in a 'W' grade appearing on your transcript.
      c. To identify these dates for your dual enrollment course, please see below on the 'Course Schedule' chart or log into your myNOVA account and SIS.
   ii. Withdrawal Process
      a. Dual enrolled students are responsible for requesting to drop or withdraw from their DE classes, using Form 125-03, found at the following link: https://dashboard.nvcc.edu/Forms/125-03
      b. Dual enrolled students will use their myNOVA credentials to access the withdrawal form and will select one or more enrolled DE classes to withdraw.
      c. The withdrawal form is then routed to the assigned DE instructor and the Office of Dual Enrollment for review and approval.
      d. Check your VCCS email for the status of your request.

H. Communication
   i. Students are required to use their VCCS email accounts (_____@email.vccs.edu) to communicate with college personnel and should check their email accounts regularly. Students may access their VCCS email accounts through myNOVA.

I. Title IX
   i. Title IX is a civil rights law that prohibits discrimination on the basis of sex in educational programs, activities, admission and employment. Complaints of sex-based discrimination, sexual violence, domestic violence, and sexual or gender-based harassment are governed by the Title IX Policy. For more information about Title IX or to make a report: https://www.nvcc.edu/titleix/index.html.

IV. Additional Course Information

A. DE students are expected to engage in college level course contents and discussions appropriate for adult learners. Mature topics may be discussed.

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V. Course Schedule

A. Critical Course Dates

Course Start Date	Tuesday, August 26, 2025
Course Drop Date	Wednesday, September 17, 2025
Course Withdrawal Date	Tuesday, November 25, 2025
Final Project Due Date	Wednesday, January 28, 2026
Course End Date	Wednesday, January 28, 2026

B. Final Exam/Project Dates: *The CPE certification exam will be given on Monday, November 3, and the final project will be due on the last day of class, Wednesday, January 28.*