# CSC 215 (D01A)

# Computer Systems

# Course Syllabus

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| **Instructor** | Jeffrey Elkner |
| **Session** | Fall 2025 |
| **Meeting Days** | Section1: A Day 8:00 to 9:24 am / Section 2: B Day 11:32 am to 12:55 pm |
| **Location** | Arlington Career Center Room 512 |
| **Contact** | jde232@email.vccs.edu |

**Course Description**

Examines the hierarchical structure of computer systems. Explores the representation of instructions and data, memory organization/structure, structure of a CPU, programming hierarchy and operating system interactions. 3 credits.

**General Course Purpose**

CSC 205 or CSC 215 is intended to fulfill a first course in Computer Architecture, Organization and Systems in the CS curriculum. The focus of CSC 215 is on Systems with a sampling of Architecture and Organization content.

**Course Prerequisites/Co-Requisites**

Prerequisite: CSC 221

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**Course Objectives**

- Machine level data representations
    - Describe how numbers, text, and other analog or discrete information can be represented in digital form.
    - Interpret computer data representation of unsigned integer, signed integer (in 2's complement form) and floating-point values in the IEEE-754 formats.
    - Explain the impact due to the limitations of data representations such as rounding effects and their propagation affect the accuracy of chained calculations, overflow errors, and mapping of continuous information to discrete representation.
- CPU and Instruction Set Architecture
    - Differentiate various instruction set architectures.
- Memory Hierarchy
    - Identify the memory technologies found in a computer processor and computing systems.
    - Describe the various ways of organizing memory and the impacts on cost-performance tradeoffs, speed, capacity, latency, and volatility (also include long term storage with tape drives, hard drives, and SSDs with performance enhancements like RAID).
    - Describe the operation of common cache mapping schemes: Direct, Associative, and Set associative.
- Digital Logic, Digital Systems, and Digital Design
    - Design a simple combinational circuit using logic gates.
    - Apply Boolean functions, algebraic theorems, and Karnaugh Maps to simplify combinational circuits.
- Memory model
    - Explain how high-level languages structure memory into stack, static, and dynamic regions and explain how each is used to include mapping logical addresses to physical memory chips.
- Virtual Memory
    - Examine the hardware and control structures that support virtual memory.
    - Explain how logical addresses are mapped to physical addresses by the OS.
    - Explain how VM is used for caching and memory protection.
- Security
    - Explain how security concerns impact the development and design of computer systems.

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- Operating Systems
    - Explain the general structure of a multi-programmed operating system.
    - Explain how a common file system works, including structure, I/O operations, and security.
    - Describe the role of the kernel in operating systems.
    - Compare processes vs. threads in terms of how each are created, what resources are shared, and how they communicate.
- Language hierarchy
    - Explain how programming language abstractions at multiple levels are translated to lower levels and executed.
- C/Linux
    - Complete C programming projects on the command line using common Linux utilities (e.g., cd, ls, pwd, mkdir, rmdir, rm, cat, cp, man, tar, nano).
    - Compile and run C programs using gcc and makefiles.
    - Debug C programs using gdb to step through code, stop at breakpoints, and examine variables/registers/memory.
    - Write C programs that perform low-level manipulations involving bitwise operations, masking, memory manipulation and management, structs and unions, signed vs. unsigned integers, strings, arrays, and file I/O.

**Major Topics to be Included**

- Machine level data representations
- CPU and Instruction Set Architecture
- Memory Hierarchy
- Digital Logic, Digital Systems, and Digital Design
- Memory model
- Virtual Memory
- Security
- Operating Systems
- Language hierarchy
- C/Linux

**Required Instructional Materials**

- Altair 8800 Operators Manual
- Intel 8080 Assembly Language Programming Manual
- The BD Software C Compiler
- Other freely available resources as provided by instructor

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**Course Credit**: 3 credits

**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

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| Course Start Date | Tuesday, August 26, 2025 |
| Course Drop Date | Wednesday, September 17, 2025 |
| Course Withdrawal Date | Tuesday, November 25, 2025 |
| Final Exam Date | January 29, 2026 |
| Course End Date | Thursday, January 29, 2026 |

**B. Final Exam Date:** *The final exam will be given during the last day of class, Thursday, January 29.*