

SYLLABUS

Old Dominion University • College of Sciences • Department of Computer Science
CS 417/517 • Computational Methods and Software • Spring 2026

Instructor Dr. Andrey Chernikov

- Email: achernik@odu.edu, please include course number in the subject line.
- Office location: ECS 3311A, phone: 757-683-7732.
- Office hours: MW 12:45pm – 2:45pm. Zoom link: <https://odu.zoom.us/my/chernikov>.
- Send email for appointments outside office hours.

Mode of delivery Scheduled in-class meetings, Tuesdays and Thursdays 11:00am – 12:15pm, Dragas Hall 1117.

Catalog description Laboratory work required. Algorithms and software for fundamental problems in scientific computing. Topics: properties of floating point arithmetic, linear systems of equations, matrix factorizations, stability of algorithms, conditioning of problems, least-squares problems, eigenvalue computations, numerical integration and differentiation, nonlinear equations, iterative solution of linear systems.

Prerequisites

- MATH 316 Introductory Linear Algebra, with prerequisite
MATH 212 Calculus II, with prerequisite
MATH 211 Calculus I,
- and a grade of C or better in any of: CS 250 Programming with C++, CS 251 Programming with Java, CS 253 Transfer Credit for Programming with Python, ECE 250 Object-Oriented Programming in C++ for Engineers.

Course Objectives Students completing this course should be able to develop effective and efficient solutions to basic computational problems that involve finite-precision approximations of continuous systems via

- analyzing the degree of precision and the computational costs of the existing numerical methods with respect to the common problems,
- selecting and customizing a solution technique for a given task,
- encoding the solution using a programming language, executing it on a computer, and analyzing the results.

Outline

- Machine arithmetic and related matters[†]
- Approximation and interpolation[†]
- Numerical differentiation and integration[†]
- Nonlinear equations[†]
- Matrices and systems of linear equations*

Required textbooks

[†] Numerical Analysis (2nd edition) by Walter Gautschi, Birkhäuser, 2012

* Elementary Numerical Analysis: An Algorithmic Approach (3rd edition) by S.D. Conte and Carl de Boor, 1980

Attendance policy

- Class attendance is not factored into the grade. However, participation in class meetings is strongly encouraged as they provide a helpful environment to stay focused and to ask questions.
- **Extended absences** Reasonable accommodations, at the discretion of the instructor, will be provided to students who encountered extended roadblocks, or absences, to making progress that have been verified by the Student Outreach & Support (SOS) office. The definitions of recognized events that cause extended absences, as well as required documentation can be found at <https://www.odu.edu/life/dean-students/student-outreach#tab134=1&done1612907281342>. The request for an absence notification must be filed within five business days of the event.
- **Short absences** Disruptive life events that are not recognized as extended absences by the SOS office will not be considered valid excuses for missed deadlines. In order to minimize the impact of such events it is strongly advised to submit all assignments well before their deadlines. A one-time blanket excuse, however, is automatically granted

to every student that consists in not counting their lowest biweekly assignment score (which could be a zero due to a missed deadline) towards the final grade.

Disability Students are encouraged to self-disclose disabilities that have been verified by the Office of Educational Accessibility by providing Accommodation Letters to their instructors early in the semester in order to start receiving accommodations. Accommodations will not be made until the Accommodation Letters are provided to instructors each semester.

Assignments

- 75% of the overall grade is allocated to all biweekly assignments (six expected) that include both analytical questions and short programming exercises.
- 25% is allocated to the final exam which will be open online on Wednesday, May 13th from 9:00 am to 11:59 pm (expected to take two to three hours to complete). The exam includes only analytical questions.

Grades The final percentage score will be computed as follows:

$$\text{final score} = \frac{\text{individual total biweekly assignment score} - x}{\text{maximum total biweekly assignment score} - y} \times 75 + \frac{\text{individual final exam score}}{\text{maximum final exam score}} \times 25,$$

where x is student’s lowest biweekly assignment score, and y is the number of points allocated for it. The letter grade will be looked up from the following tables.

CS 517 final score:	0				60	65	70	75	80	85	90	95	100
letter grade:		F			C-	C	C+	B-	B	B+	A-	A	

CS 417 final score:	0	43	48	53	58	63	68	73	78	83	88	93	100
letter grade:		F	D-	D	D+	C-	C	C+	B-	B	B+	A-	A

Graduate students in cross-listed courses are required to do more than undergraduate students, which is reflected by the difference of two percentage points worth of assignments. Graduate courses have no D grades.

Submission rules

- All assignments will be published and submitted through the Canvas system. No other medium will be accepted without prior instructor’s permission.
- Late assignments will not be accepted. Make-up assignments may be allowed only if student’s extended absence has been verified by the SOS office. The final exam can be taken outside the scheduled interval only with the permission from the dean’s office.
- An interruption in the Canvas accessibility will not be recognized as a reason for deadline extension, unless accompanied by a note from the university ITS department.
- Biweekly assignments will have two-week long intervals for submission. Once the interval expires, the Canvas assignment will close automatically.
- For code-upload questions any of the three prerequisite programming languages (C++, Java, or Python) are allowed. The preferred language is Python. If the code does not compile and/or run on the CS Linux cluster, it will not be counted towards the assignment grade.

Academic integrity

- All assignments must be completed individually. No person or artificial intelligence, except the instructor and the teaching assistant, can be asked for help with solving the assignments.
- Issues related to coding, such as programming language constructs or the use of standard libraries, may be solved by querying any sources available, including search engines, AI, and other people. Moreover, routine use of such sources is encouraged.
- The instructor may question the student to determine if submitted work corresponds to student’s proficiency and assign the grade accordingly.
- Students must be familiar with and abide by the University Honor Code: <https://www.odu.edu/about/monarchcitizenship/student-conduct/code>.