# CSCE 440/840: Numerical Analysis I

Spring 2024

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| **Instructor:** | Shuai Nie | **Class Time:** | MWF 11:30 am–12:20 pm |
| **Email:** | shuainie@unl.edu | **Classroom:** | 110 Avery Hall |

**Course Pages:** https://canvas.unl.edu/courses/167247

**Teaching Assistant**

- Nedasadat Taheri
  - Email: ntaheri2@huskers.unl.edu
  - Online office hours: Wednesday 12:30 pm–1:30 pm
  - Zoom link: https://unl.zoom.us/j/93994945822

**Instructor Office Hours:** Monday 12:30–1:30 pm or by appointment at 364 Avery Hall or via Zoom at https://unl.zoom.us/j/7271015326.

**Course Description:** The course covers main topics include (1) principles of numerical computing and error analysis covering numerical error, (2) root finding, systems of equations, interpolation, numerical differentiation, and integration, (3) differential equations, (4) modeling real-world engineering problems on digital computers, and (5) effects of floating-point arithmetic.

**Required Course Material:** Richard. L. Burden *et al.*, Numerical Analysis (Tenth Edition), Cengage Learning, 2016.

**Course Components:**

- Homework (20%), Labs (30%), Midterm Exams (20%), Final Project (25%).
- There will be approximately four homework assignments in total (5% each).
- There will be approximately six lab assignments in total (5% each).
- There will be two midterm exams (12.5% each).

**Grade Scale:** Please find the table on the next page.

**Grading Policy:**

- Homework assignments should be submitted in PDF format via Canvas. It is highly recommended that you use LaTeX to organize your write-up. Please be advised that handwritten and scanned submissions will not be accepted.
- The final project is evaluated based on a final presentation, a project report, and a runnable source code package with a clear README file.

| Score | Grade |
|---|---|
| 95–100 | A+ |
| 90–94 | A |
| 87–89 | A- |
| 84–86 | B+ |
| 81–83 | B |
| 77–80 | B- |
| 74–76 | C+ |
| 70–73 | C |
| 67–69 | C- |
| 64–66 | D+ |
| 60–63 | D |
| 57–59 | D- |
| 0–56 | F |

- All assignments and exams, except the final project, are individual assignments and not for collaboration.
- For homework and lab assignments, late submissions (after submission deadlines but before solutions are posted on Canvas) will result in a 10% point deduction per day.
- No make-up tests will be given.
- Students are responsible to make sure assignments are submitted successfully—corrupted files that cannot be read are considered as late submissions.
- A bonus point of 1% will be applied upon completion of the course survey at the end of this semester.

**Course Objectives:**

- Mastery of fundamentals of Number Representation and Error Analysis.
- Mastery of the basic methods of Solutions of Equations in One Variable.
- Mastery of Interpolation and Polynomial Approximation.
- Mastery of Numerical Integration and Differentiation.

- Familiarity with Spatial Interpolation and Approximation.
- Familiarity with Systems of Linear Equations.
- Exposure to Ordinary Differential Equations.
- Exposure to Smoothing of Data and Method of Least Squares.
- Exposure to Software Verification.

**Prerequisites:**

- CSCE 155A, CSCE 155E, CSCE 155H, CSCE 155N, CSCE 155T or SOFT 160, and MATH 107.
- Topics: Mastery of basic algebra and calculus. The course also requires some familiarity with at least one programming language, Taylor series, and linear algebra.

**Important Dates (tentative):**

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| Midterm #1 | March 1, 2024 |
| Midterm #2 | April 7, 2024 |
| Homework #1 | Feb. 7, 2024 |
| Homework #2 | Feb. 21, 2024 |
| Homework #3 | March 6, 2024 |
| Homework #4 | March 27, 2024 |

**Final Project Instructions:**

- The deliverables for final projects per team include a final project report, final presentation, and code package.
- The following deadlines are set for final project progress:
  - March 25: Team members and topic finalization.
  - April 15: Final presentation schedule finalization.
  - The weeks of April 22 and April 29: Final presentation dates.
  - May 10: Deliverables submission through Canvas. No late submissions will be accepted.
- The final project (25% of total grade) will be evaluated based on the following criteria:
  - Merit of ideas (10%)
  - Final presentation (8%)
  - Final report (4%)
  - Quality of code (3%)
- Submission instruction: Please compile both the final report and slides in PDF files, and the code package in a zip file. All three files should be submitted through Canvas.

**Academic Honesty:** All students must follow the academic integrity and honesty required by the Student Code of Conduct https://registrar.unl.edu/academic-standards/policies/academic-honesty/.

**Accommodations for Students with Disabilities:** The University of Nebraska-Lincoln's office for Services for Students with Disabilities (SSD) provides accommodations for students with disabilities. More information can be found at https://www.unl.edu/ssd/.

**Counseling and Psychological Services:** The University of Nebraska-Lincoln offers a variety of options to students to aid them in dealing with stress and adversity. More information can be found at https://caps.unl.edu/.

**Instructional Continuity Plans for when In-Person Classes are Canceled:** If in-person classes are canceled, students will be notified of the instructional continuity plan for this class by Canvas Announcements.