# SYLLABUS *

# NUMERICAL ANALYSIS I

FALL 2021

https://www.phys.uconn.edu/~rozman/Courses/m3510_21f/

Last modified: August 31, 2021

**Course description:** The goal of numerical analysis is the design and analysis of techniques to give approximate but accurate solutions to hard problems. MATH 3510 *Numerical Analysis I* teaches this analysis concentrating on direct methods of solution of linear systems, finding zeros of non-linear equations, approximating and interpolating, numerical differentiation and integration, and on solving initial value problem for ordinary differential equations. The attention is given to sources and propagation of numerical errors and to computational efficiency of the algorithms.

**Course format:** in-person instructions

**Lectures:** TuTh 5:00 – 6:15, MONT 421

**Course website:** https://www.phys.uconn.edu/~rozman/Courses/m3510_21f/

**Instructor:** Michael Rozman

| | |
|---|---|
| email: | michael.rozman@uconn.edu |
| gitlab username: | m3510_21f_in |
| office hours: | Tu 6:15 PM – 7:15 PM in MONT 421,<br>Th 6:15 PM – 7:15 PM in MONT 421,<br>and by appointments |

*Syllabus information may be subject to change. The most up-to-date syllabus is located on the course website linked above.

**Textbook:** T. Driscoll and R. Braun, *Fundamentals of Numerical Computation*, SIAM, 2017
Do not purchase the textbook before the third week of classes.

**Exams:** Two midterm exams; no final exam

**Grading scheme:** The course grade will be calculated using the following scheme.

| | |
|---|---|
| Homework projects | 50% |
| 2 Midterms | 50% |

Course grade = 0.5*HW + 0.25*(M1 + M2), correctly rounded to integer and capped at 100%.

The rounding to integers is done using the default rounding mode specified in the IEEE754 standard for floating point arithmetic.

The percent grades are converted to the letter grades as following.

| **Percent grade** | **Letter grade** |
|---|---|
| 94+ | A |
| 90-93 | A- |
| 87-89 | B+ |
| 83-86 | B |
| 80-82 | B- |
| 77-79 | C+ |
| 73-76 | C |
| 70-72 | C- |
| 67-69 | D+ |
| 63-66 | D |
| 60-62 | D- |

**Course objectives:** By the end of the semester, you should be able to: choose, develop and apply the appropriate numerical techniques to your problem, interpret the results, and assess their accuracy.

**Class schedule:** this is a *preliminary* schedule.

| Week(s) | Subject |
|---|---|
| 1-2 | Matlab programming |
| 3-5 | Linear systems of equations |
| 6 | **Midterm I** – Tue, Sep 28 |
| 6-7 | Overdetermined linear systems |
| 8-10 | Solution of nonlinear equations |
| 10 | **Midterm II** – Thu, Oct 28 |
| 11-12 | Piecewise interpolation. Numerical differentiation and integration |
| 13 | Initial value problem for ODE |
| 14 | **Thanksgiving recess** |
| 15 | Initial value problem for ODE |

For an up-to-date schedule consult the *Academic Calendar* at https://www.phys.uconn.edu/~rozman/Courses/m3510_21f/downloads/calendar.pdf

**Communications:** talking in person (including videoconferencing) is the preferred method to communicate with the instructor; email is an option to ask/answer a very short question or to schedule an appointment.

- use your UConn email account for class communications.
- include the tag `[math3510]` in the subject of your email
- the subject line of your email should communicate what the email is about so that the recipient can prioritize the email's importance without opening it. E.g. "[math3510] Tacoma bridge collapsed - cannot come to the final" would be a good email subject (assuming email existed in 1940 . . . ); "urgent", "important", "a question" are bad ones. Do not use your name as subject – the sender name is already visible as a part of email header.
- do not send emails with attachments or embedded graphics unless requested by the instructor.
- do not include commercial advertising into your emails

**Homework:** Homework assignments submitted on time may be returned (at the discretion of the instructor) for corrections after initial grading.

Homework assignments are not accepted after the solutions had been discussed in class, and/or had been posted online, and/or graded assignments returned. Individual emergencies can be accommodated by extra credit assignments.

You are welcome to discuss the homework's problems with others in order to better understand them but the work you turn in must be your own. In particular, you must run your own calculations (where applicable) and communicate and explain the results in your own words.

Members of collaborating groups must consistently list all collaborators names and submit assignments together.

Assignments that are hard to understand are also hard to grade correctly, therefore: (a) use words and pictures to supplement your equations; (b) work must progress linearly down the page – recopy solutions that are too nonlinear.

Requirements for written assignments:

- Use letter-size paper. Use only one side of each sheet.
- Box your final answer(s) and important intermediate results.
- When submitting an assignment on paper, staple your notes together, (i.e. no paper clips, torn or folded corners) with the assignment cover page

  Highly recommended: make copies of homework assignments for your own files
- If submitting an assignment online, scan your submission, and convert the scan(s) into a single pdf document.

**Computer programming:**

Homework projects typically require writing simple computer programs. (Knowledge of at least one programming language is a prerequisite for the class.) Matlab is used as a programming language for teaching in MATH3510 (as well as the follow-up course MATH3511).

**Student responsibilities and academic policies:**

Students at the University of Connecticut are held to certain standards and academic policies. Review these important standards, policies — the links are provided on the course website.