SYLLABUS

COMPUTATIONAL PHYSICS

FALL 2023

https://www.phys.uconn.edu/~rozman/Courses/P2200_23F/

Last modified: September 3, 2023

Course description: Physics 2200 *Computational Physics* provides an introduction to the following topics:

- numerical methods for the physical sciences
- programming and programming languages
- analysis of algorithms
- operating systems and programming tools

The goal of this course is to give an introduction to using computers for solving hard problems that arise in the physical sciences. The approach requires a combination of "real" mathematics, skill in making legitimate approximations, and intelligent use of computers. We will start with assorted tools of the trade and simple problems and progress toward more challenging topics.

Course website: https://www.phys.uconn.edu/~rozman/Courses/P2200_23F/

Lectures: MoWe 5:00PM – 6:15PM, in GS-119

Computer programming:

- a laptop is required for every class meeting
- individual Linux virtual machines are provided for class work to all enrolled students.

Instructor: Michael Rozman

email:	michael.rozman@uconn.edu
gitlab username:	p2200_23f_in
office hours:	Mo 6:15 PM – 7:15 PM in GS-119, We 6:15 PM – 7:15 PM in GS-119, and by appointment

Textbook: No required textbook. Handouts for the lectures will be provided.

Exams: Three midterm exams, no final. Parts of the exams may be substituted by take-home projects.

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

Homework assignments	40%
3 Midterms	60%

Course grade = 0.4*HW + 0.2*(M1 + M2 + M3), correctly rounded to integers 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-

Mid-semester progress: the percent grade is calculated using the rule 0.5*HW + 0.5*M1, correctly rounded to integers and capped at 100%.

Class schedule: this is a *preliminary* schedule.

Week(s)	Subject
1-4	Programming in Julia. Version control systems, git. Linux OS. Image processing: seam carving. Errors of numerical methods.
5	**Midterm I** - Wed, Sep 27
5-8	Numerical methods: ODE; molecular dynamics; white dwarfs
9-10	Monte Carlo methods; phase transitions
10	**Midterm II** - Mon, Oct 30
11-14	Numerical methods: PDE; chain reactions; solitons
13	**Thanksgiving recess**
15	Distributed computing
15	**Midterm III** - Wed, Dec 6

For an up-to-date schedule consult the *Academic Calendar* at https://www.phys.uconn.edu/~rozman/Courses/P2200_23F/downloads/calendar.pdf

Honors conversion:

Students interested in honors conversion should contact the instructor during the *second* week of classes.

Homework: Homework assignments submitted on time may be returned (at the discretion of the instructor) for corrections with a followup regrading.

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.

Requirements for written assignments:

- Use letter-size paper.
- Box your final answer(s) and important intermediate results.
- When submitting an assignment on paper, use only one side of each sheet, **staple** your notes together, with the assignment cover page (if applicable).

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

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.

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

- use your UConn email for class communications.
- please include the tag ``[phys2200]'' (without quotes) in the subject of your email, e.g. "[phys2200] midterm II review session".
- the subject line of your email should communicate exactly what the email is about so that the recipient can prioritize the email's importance without opening it. E.g. "[phys2200] Tacoma bridge collapsed - cannot come to the exam" 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

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