PHYS 4840
Mathematical and Computational Physics II, 4 credits
University of Wyoming, Spring 2026
What you really need to know

Class Times and Locations

TR 2:45–4:00 PM, from 20 Jan 2024 to 15 May 2024
Physical Science Building room 227

Instructor

Richard Barrans, Ph.D., M.Ed., Assistant Lecturer, Physics and Astronomy
PS 116, no phone in office, rbarrans@uwyo.edu.
Office Hours: M 3:10–4:10 PM, T 1–2 PM; W 7–8 PM; F 10–11 AM. The Wednesday
evening office hours are held in PS 234. All other hours are in my office, PS 116.

TA: Sam Barber

Grading

The final grade will be determined from consensus between you and the instructor.

Item	Percent
In-class exercises	25%
Homework exercises	25%
Projects	50%

Exercises

These are short, or perhaps long, programming assignments to give you practice. Some
exercises will be posted on-line via WyoCourses, and others may be assigned directly in
class. Students are encouraged to work together on exercises, but are expected to submit
their own work. Assignments that are not completed during class time should be finished
outside of class.

You are encouraged to steal code from anywhere you can, but comments in your code should
acknowledge the source and explain how the code works.

Projects

The last several weeks of class will be devoted to independent projects of the students'
choosing. These projects apply techniques of scientific computing to a problem of physical
interest, and demonstrate the student's problem-solving ability, creativity, and content
knowledge.

Attendance and Absence Policy

Attendance is expected in class sections, but there is no grade for attendance. Classwork
should be started in class. You can get credit for two classwork assignments submitted
without attending the class.

Tentative Schedule

Week of	Tuesday	Thursday
Jan 19	Course mechanics IDLE, Python exercises	2.2–2.3 Math coding exercises
Jan 26	2.3–2.7 Functions	2.4–2.7 Serial structures, looping
Feb 2	3.1–3.4 Static visualizations	3.5 Animations 4.1–4.3 Numerical considerations
Feb 9	5.1–5.3 Even-step integrating	5.4–5.6 Higher-order integrating
Feb 16	5.6–5.9 Practical concerns in integrating	5.10–5.11 Differentiation, interpolation
Feb 23	6.1 Systems of linear equations	6.2–6.3 Systems of nonlinear equations
Mar 2	6.4 Optimization	7.1–7.4 Fourier transforms
Mar 9	8.1 First order ordinary differential equations	8.2–8.5 More ordinary differential equations
Mar 16	**Spring Break**	
Mar 23	Project discussion	Project planning conferences
Mar 30	8.6 Boundary value problems	9.1–9.2 Partial differential equations
Apr 6	9.3 Initial value problems	10.1 Generating "random" numbers
Apr 13	10.2 Monte Carlo integration	10.4–10.4 Monte Carlo simulation
Apr 20		
Apr 27		
May 4		
May 14	**Finals Week**	**Project presentations** 1:15–3:15