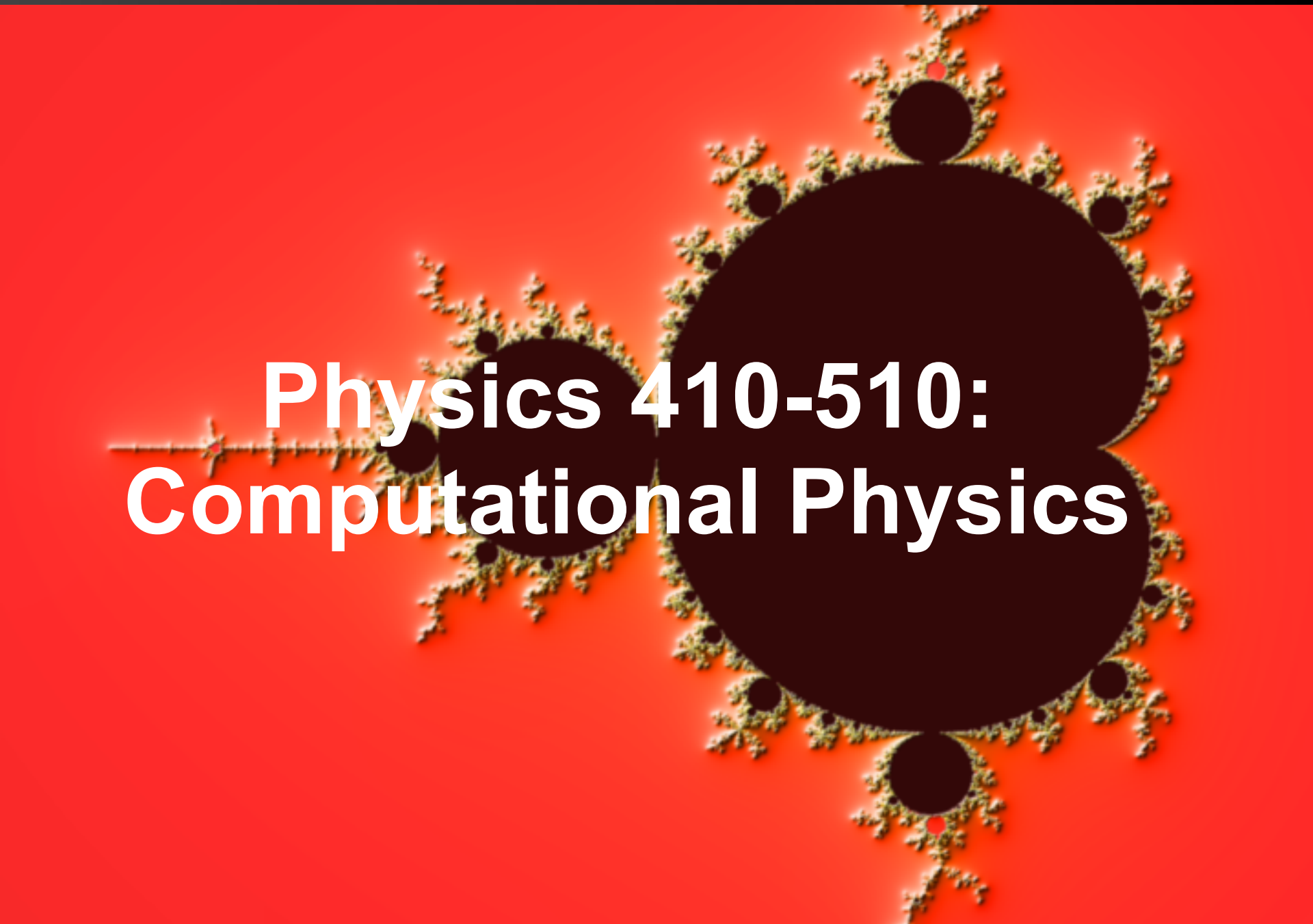

Physics 410-510: Computational Physics

Some practical information

- Monday/Wednesday 12:30-13:45
- Required textbook: Computational Physics by Mark Newman
  - It's not expensive, and very well written. We will follow it closely (though not always), and most of the assignments and a lot of the work will come from it. **READ THE BOOK!!!**
- A lot of material here and in assignment is taken directly or indirectly from this wonderful course by Sal Rappoccio: https://indico.cern.ch/event/831093/timetable/#20190826.detailed
  - May not be a bad resource for you, either!

What we will cover (partially following the text)

1. Pseudocode and how to be a good programmer and computational physicist
2. What is happening inside computers?
3. A bit of accuracy vs speed discussion + python extras!
4. Integrals and derivatives
5. Linear and non-linear equations
6. Fourier transforms
7. Ordinary differential equations
8. Partial differential equations
9. Random processes and MC methods

Textbook has early chapters on python and visualization. We will not go over them, but if you don't know python (or even if you do!) they are an important and useful read

Grading

- Problem sets every ~2 weeks, each with the same weight: combined total, 70% of grade
  - All to be due roughly 1 week after we finish a chapter/ topic. Due dates are on the syllabus
  - Start the HW early **and if time allows, in class**! If you get stuck and need help, make an appointment to talk to me. **The homework is NOT short**, but you also have no exams in the course, so I expect you to put in many hours on them
  - Please ask for help if you don't understand solutions (we'll briefly go over them in class, but not over everything)
  - I know **this is a rough time for us all**: I will drop the lowest homework grade. There is no other extra credit
- Final assignment: 30% of grade

Grading

- After weighting problem sets and final presentation, the grades will be:
  - A: 93-100%
  - A-: 87-93%
  - B+: 82-87%
  - B: 74-82%
  - B-: 67-74%
  - C+: 60-67%
  - C: 55-60%
  - D: 50-55%
  - F: 50% or less

I reserve the right to shift this scale, but only in the direction that helps you

On late assignments

- Assignments are due when class begins
- Assignments submitted after class begins on the date they will due will have a 5% penalty applied to them if they are submitted within 24 hours. Submission 24-48 hours after the due date will lead to a 10% penalty, 48-72 hours will be 15%…. and so one
- Without strong justification, no late final assignment will be accepted
- This syllabus contains all the due dates, so enter them in your calendars, now!
- I understand that these continue to be difficult times, so I'm happy to work with you, but late assignments are only accepted with a valid excuse. Talk to me in advance or as soon as possible

On homework and assignments

- I don’t want to keep you from working with others, but any work that you hand in must be your own
  - Solutions found on the web are a form of plagiarism
  - “Can I copy your solutions?” are also plagiarism
- I do want you to help your classmates, however... and don’t forget that office hours are there for those who need assistance, too

Office hours

- Purely by appointment - it doesn't make sense to have set virtual times
  - I am happy to meet via phone, Teams, Skype or otherwise. Please e-mail me (jahred.adelman@niu.edu) to set up an appointment. When you write to me, please include your availability for the week that you'd like to meet so that I can compare to my calendar and come up with a mutually agreed-upon slot

Attendance

- Please come to class (shouldn't need to ask this of you, but I state it anyway)
  - The work that we go over will be important to follow and understand
  - I am not taking attendance - but this course should be fun, and you will not learn as much if you don't come to class

We will follow the schedule outlined on the next slides. When we finish material for one topic, it is time for you to start exploring the code in-class, to ask questions, and if you are up for it, to start your homework assignments! We are a small enough group that I can help you individually, as needed. Should help make the homeworl less daunting

Tentative schedule

Date	Chapter we'll be covering during class	Homework
Jan 11	4 + intro stuff	
Jan 13	4	
Jan 20	4	
Jan 25	Numpy / fitting / Python	
Jan 27	Numpy / fitting / Python	HW #1 (Chapter 4)
Feb 1	5	
Feb 3	5	
Feb 8	5	HW #2 (Fitting)

Tentative schedule

Date	Chapter we'll be covering during class	Homework
Feb 10	5	
Feb 15	5	
Feb 17	6	
Feb 22	6	HW #3 (Chapter 5)
Feb 24	6	
March 1	6	

Tentative schedule

Date	Chapter we'll be covering during class	Homework
March 3	7	
March 8	7	HW #4 (Chapter 6)
March 10	7	
March 15	8	
March 17	8	HW #5 (Chapter 7)
March 22	8	

Tentative schedule

Date	Chapter we'll be covering during class	Homework
March 24	8	
March 29	9	
March 31	9	
April 5	9	HW # 6 (Chapter 8)
April 7	10	
April 12	10	
April 14	10	HW #7 (Chapter 9)

Tentative schedule

Date	Chapter we'll be covering during class	Homework
April 19	10	
April 21	10	

Chapter 10 homework and final exam both due April 30 at 12:30 pm

On the pandemic

The world is a mess. It is getting better, but better only on average. **None of us asked for this**.

If you have any need for help, please **don't hesitate to reach out to me**. Please **be accommodating** to me, and I will do my best to do the same for you. This course would be much better in person. I would enjoy teaching it more, and you would get more out of it. That is a fact of life.

I do I hope I get to see you all in person one day soon!

Disability statement

If you need an accommodation for this class, please contact the Disability Resource Center **as soon as possible**.The DRC coordinates accommodations for students with disabilities. It is located on the 4th floor of the Health Services Building, and can be reached at 815-753-1303 (V) or drc@niu.edu. Also, please contact me privately as soon as possible so we can discuss your accommodations. Please note that you will not be required to disclose your disability, only your accommodations. The sooner you let me know your needs, the sooner I can assist you in achieving your learning goals in this course.

My aim is for you to enjoy this course and to learn the material - please let me work with you so that we can achieve our goals.

About me

- I answer to “Jahred”, “Professor Adelman”, “Professor Jahred”, “Dr Adelman”, “Dr Jahred” and occasionally “Professor Dr. Adelman”, if needed
- But I **may not** answer to “hey you” or to emails that do not have an appropriate greeting (such as “Hello XYZ” or “Greetings, ABC”, etc)

About me … and you

- I am a particle physicist working on measurements of and searches for new physics with Higgs bosons using the ATLAS experiment at the LHC (at CERN)
  - I'll try and point out my research during the class, as appropriate
  - We use a lot of computers, but this is often new material for me, too!

NIU@CERN!
(Your professor wasn't at CERN for that photoshoot)

About me ... and you

- I'll try to update my teaching style as the semester goes on, based on my experience, observations and your feedback
  - If I am going too fast... or too slow, or if my style (or hand-writing) is incomprehensible, please speak up

About me ... and you

- Not a “computational physicist” per se, but we are heavily reliant on computation for pretty much all of particle physics
  - And other areas of physics are focusing more and more on computation, too!

About me … and you

- This is the first time I'm teaching the course, so apologies in advance for bugs, typos, unclear items, my confusion and my failures
  - Please help me to make this course better!
  - The material is a LOT of fun, so we should be enjoying ourselves this semester