

Welcome to FYS3150/4150 - Comp. Phys.

• Welcome back to the University!

• About me:

- Anders Kuellestad
- Postdoc in the theoretical physics group
- Background: Bergen → Oslo → Stockholm → Oslo → London → Oslo
- Work on exploring new theories in particle physics
Keywords: LHC, supersymmetry, Higgs, dark matter, statistics, coding (C++, Python, some Fortran), supercomputers, causing and fixing bugs...

• The Teaching Team:

- | | |
|-------------------------|-------------------------|
| • Me | • Maria Linea Horgen |
| • Even Marius Storhagen | • Mikkel Metzsch Jensen |
| • Kaspera Gjesver | • René Alexander Ask |

• Who are you?

- Study programmes?
- Coding experience? (minimal, one language (e.g. Python), more)
- Main motivation for taking the course?

- Solve those pesky equations!
- Learn C++ and other tools!
- I don't know, I just like computers!
- [insert option]

• C++?
• Terminal?

• Windows
vs
Mac/Linux?

About the course

- Two webpages : UiO page and Github page
- Teaching language : English
- Programming language : C++ , plus some Python scripts
 - You can use only Python , but we recommend learning C++ , and lectures and examples will be based on this.
- Have been taught by Comp.Phys. guru Morten Hjorth-Jensen for many years !
 - First time I'm in charge
 - Follows Morten's old course closely , with some personal tweaks from my side
- Philosophy : Pragmatic , learning by doing & failing
 - Will focus on concrete examples
 - Comp.Phys. is a huge field — this course is a just a first intro.
- Lectures :
Thursday 8.15 - 10.00
Friday 8.15 - 10.00
- "Lab" groups : Also Thursdays and Fridays , two-hour time slots .
 - Try to join a physical lab if possible !
 - Try not all to join the same lab... 😊
- Requirements :
 - Two problem sets . Must be passed
 - Three projects . Each count $\frac{1}{3}$ of grade (No final exam.)
 - We'll refer to everything as "projects" .

Deadlines (subject to change!)

- Project 1 : Sep. 13
- Project 2 : Sep. 27
- Project 3 : Oct. 25
- Project 4 : Nov. 22
- Project 5 : Dec. 13

- Collaboration is encouraged!

- We strongly encourage you to collaborate in small groups (3 people is ideal).
- A group hands in a joint assignment/report
- You will learn more, and we get more time per report → better feedback!

Remember:
Create group on Canvas!

- Plagiarism is very serious

- Have seen some (few!) cases in the past
- Can have very serious consequences (e.g. losing study rights)
- You must:
 - Write your own text (don't copy!)
 - Write your own code, unless it's code we've provided to help
 - Always clearly acknowledge help/contributions from others
 - Properly cite articles, books, webpages, ...

- Asking questions

- Please ask questions!
- Any time during lectures — just cut in and ask!
- More detailed / specific help with physics/coding
 - Primary forum: Lab sessions
 - Secondary forum: Course Github page
- Personal or procedural issues: email (Can also set up meetings.)

● Broad topics

- Learn basic C++, with focus on numerics
- Matrix operations , eigenvalue problems
- Solve ordinary and partial diff. eq.
- Numerical integration
- Monte Carlo methods , simulation of stochastic syst.
- Debugging ☺
- Proper presentation of results

The most useful advice you'll get all year

• Something you don't understand?

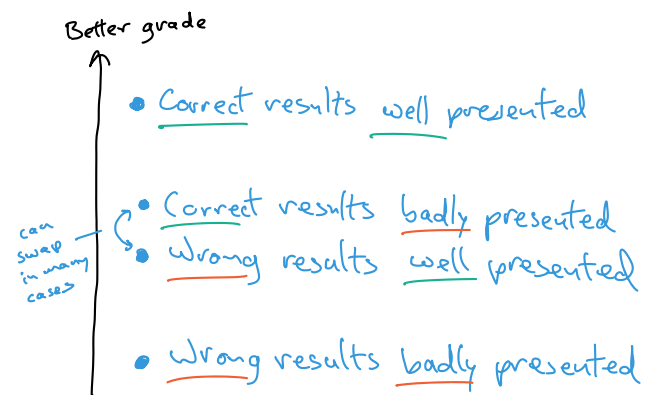
- Read and think
- Discuss with your fellow students
- Ask us!

• Code isn't working?

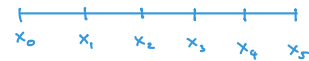
- Don't just try stuff at random!
Rarely works, you don't learn much and difficult to trust results
- Read documentation for the command
- Google error message (minus project-specific content)
Read explanations you find, don't just copy code.
- Move on debugging later...

• How you present your results matter!

- Language
- Quality of figures
- Layout
- Report structure
- Referencing



- Spend some time with pen and paper before you start coding!
 - Rough sketch of program parts and flow
 - Sketch discretizations (avoid index mistakes!)



- Boundary cond. at x_0 and x_5
- 6 elements in x array
- x range split in 5 steps

- Make sure you understand the quantities you present in plots and tables
 - much easier to spot mistakes!