compsimf20em
Számítógépes szimulációk
Computer simulations

Course outline and requirements
2022

Course outline and requirements

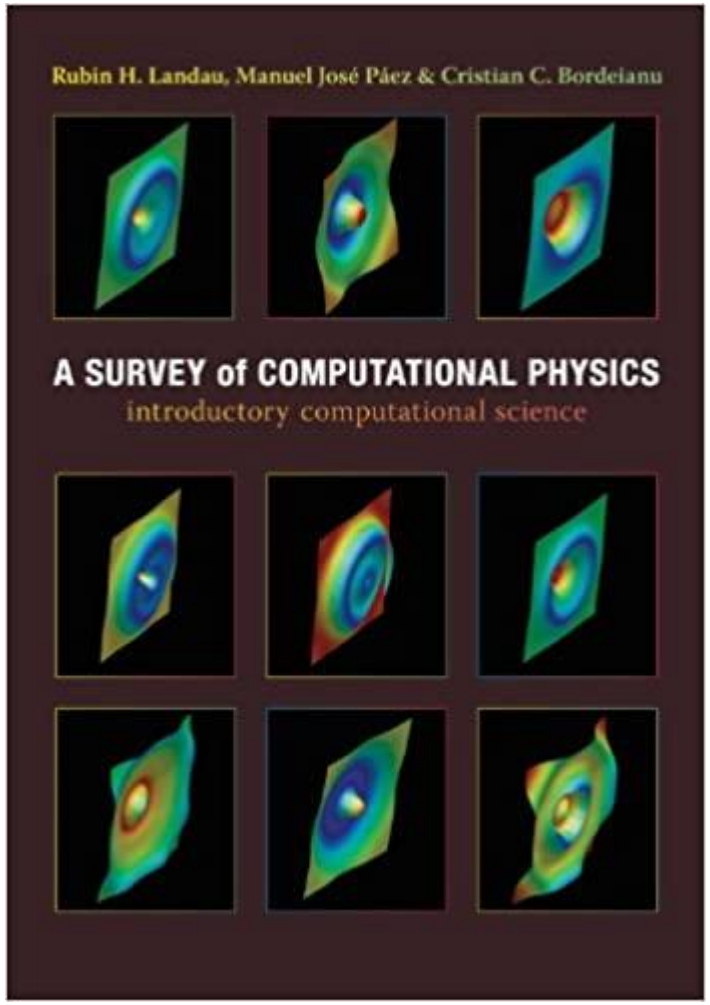
- **Course**: Computer simulations, compsimf20em,
  Mondays 12:15-13:45, ELTE TTK, 2.54 Novobátzky lecture room
  - First 3 lectures only, then consultations + presentations
  - See requirements at: https://icsabai.github.io/simulationsMsc/#reqs
- **Lecturer:** István Csabai, office: 5.102
- **Teaching assistants:** Orsolya Pipek, Zoltán Udvarnoki, András Biricz, Mirkó Mocskonyi
- **Contact:** szamszimmsc(at)gmail.com
  - Questions, requests, etc. concerning the class.
  - Special problems only: istvan.csabai(at)ttk.elte.hu
- ELTE **Teams channel**: Crs 22-23-1 compsimf20em 1
- **Web page:** https://icsabai.github.io/simulationsMsc/

Goals:

1. Learn about the role of computers in modern sciences -> **“Outlook lectures”**
2. Get an overview of computational approach in various areas of physics -> **Textbook, self-paced reading**
3. Improve computer simulation skills -> **Projects**

2. Textbook

- **Rubin H Landau**, Manuel J Paez, & Cristian Bordeianu: **A Survey of Computational Physics** -introductory computational science , Princeton University Press, 2008
  - Links at the class page for: PDF from Compadre, updates at the author's website, annotated local copy
- **YOU** have to **read the book** during the semester self-paced
- Previous year's lecture **recordings** w/ discussion of chapters are available **online** in Teams
- Chapters' topics will be reviewed on next classes
- Consultations, if needed
- The book's content is the basis of
  - **Projects**' topics
  - **Questions** at semester presentation
  - Part of your **final MSc exam**



3. Projects

- NUMERICAL EXPERIMENT -> REPORT + code/notebook (not just the code!)
  - Detailed **requirements, deadlines**: web page
- Project1: Topic related to chapters 9-13 of the course book
  - Ordinary differential equation simulations
  - Fourier analysis
  - Wavelet analysis, data compression
  - Nonlinear dynamics, chaos
  - Fractals and growth processes
- Project2: Topic related to chapters 15-20 of the course book
  - Statistical physics simulations
  - Molecular dynamics
  - Elliptic partial differential equations
  - Wave equations
  - Fluid dynamics
  - Integral equations

3. Projects – cont'd

Where to get project topic?

- Check out the "Assessment" section at the end of book chapters for ideas
- Check out my notes in the annotated book
- Check out the ideas listed on the course webpage
- Search the web for ideas
- You may repeat some (simple) numerical experiment from research papers
- Your own (related) ideas are welcome, too! If you are not sure, if it is appropriate: Ask!
- Select something interesting, but doable!

- Check out the formal requirements!
  - Submit short descriptions in advance (deadlines!)
  - Submit project report (deadlines!)
  - Review feedback
  - Presentations at the end of semester