Syllabus

Course syllabus

Course Title	PHYS343 INTRODUCTORY COMPUTATIONAL METHODS FOR PHYSICISTS
Lecturers	Cenk Tüysüz, Berat Yenilen, Barış Malcıoğlu
Grading	Midterm %30, Term project %20, Attendance %10,Hands-on sessions & homeworks %40

Hands-On sessions

- **Attendance to all of the hands-on sessions, and submitting the assigned hands-on work is mandatory. Any missed hands-on session, or assigned hands-on work will result in N/A grade. Only officially documented cases (such as medical reports) will be considered for exemption.**
- **In order to be able to attend hands-on sessions,** the consent form (https://forms.gle/ALcnDc-JdTQGByBpK6) **has to be filled beforehand. If you don't fill in and agree on the consent form, please drop this course.**

Theoretical sections

> Attendance to all of the theoretical sessions is not mandatory, however, an attendance above %50 will see a contribution to the final grade up to %10.

Tentative Course Contents

- Recap of Fundamental concepts of Quantum Theory
- **Qubits operators & Measurement**
  - Quantum operators
  - The Bloch Sphere
  - Measurement postulate
  - Quantum Circuit diagrams

- Complexity theory
- Other Computational Models for Quantum Computing
- **A review of current hardware & software**
  - Building and assessing
  - Neutral atom
  - NMR
  - NV Diamond
  - Photonics
  - Spin Qubits
  - Superconducting Qubits
  - Topological Quantum Computation
  - Trapped ion
  - Software libraries

- Teleportation, superdense coding, Bell's inequality
- Code walkthroughs

Term projects

- **The term project is the final exam.**
- There are two parts: Presentation (~20 minutes), Q&A session after the talk (~10 minutes)
- The presenter will be graded according to the scientific quality of the presentation
- The audience will be graded according to their participation in the Q&A session.
- The term projects will be presented in the last 3-4 weeks
- **Attendance to the term project presentations is mandatory.** The first missed week will result in a reduction of your final grade to %65. The second missed week will result in a reduction of your final grade to %35. If you miss three weeks, you will receive N/A grade.
- Only one missed week might be allowed with a valid official excuse.

Textbooks

- Qiskit textbook (https://forms.gle/ALcnDcJdTQGByBpK6)
- Jack D. Hidary, Quantum Computing: An Applied Approach
- Lecture notes from various sources on my webpage

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