Modern Complexity Theory

Lecture 0

Course Topics

- Intro to Proofs
- Circuits
- Turing machines
- NP Hardness
- Randomized Computation
- Advanced Topics (we will cover only 4-5 of these).
  - Quantum Computing
  - Learning Theory?
  - Complexity of Communication
  - Complexity of Counting
  - Interactive Computation
  - Computational Game Theory
  - Probabilistically Checkable Proofs

Mode of Teaching

Given that all of you may not have reliable internet connections, we ill be using a flipped classroom model:

- Some Videos will be shared ahead of time, along with Light Quizes and Reading Topics (T-2 days)
- Scheduled lecture will be used for clearing doubts.
- Additional Office hours for doubt clearing.

Evaluation

- Light Quiz (25%)
  - During or Before Every Lecture.
  - Best of 18 out of 24
- Deep Quiz (25%)
  - After every Topic (3-4 lectures)
  - Best of 6 of 8
- Assignments (25%)
  - Every week
  - Best of 8 of 10
- Project/Presentation (20%)
- Participation in Discussion Forum (5%)
- Bonus (5%)

Textbook

- Introduction to Theoretical Computer Science by Boaz Barak. https://introtcs.org/public/index.html

- Introduction to the Theory of Computation by Michael Sipser

*REFERENCE BOOKS:

- Computational Complexity: A Modern Approach by Boaz Barak, Sanjeev Arora https://theory.cs.princeton.edu/complexity/book.pdf