

# CME 305: Discrete Mathematics and Algorithms

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## 1 Logistics

Classes are **TTh 11-12:15, Gates B12**. Amin's office hours are for an hour after each class in his office Terman 317, and by appointment. Adam and Alex's office hours are TBD.

The course webpage will be used to post lecture notes, announcements, homeworks, etc.:

[www.stanford.edu/class/cme305/](http://www.stanford.edu/class/cme305/)

Announcements will also be made via email over the class mailing list.

## 2 Recommended Texts

1. **Algorithm Design** by Kleinberg and Tardos
2. **Discrete Mathematics** by Lovasz, Pelikan and Vesztergombi
3. **A Course in combinatorics** by van Lint and Wilson

## 3 Topics

1. Basic concepts and definitions
  - (a) Cayley's theorem, Prufer codes
  - (b) Minimum Spanning Trees, Applications in phylogeny
2. Introduction to algorithms
  - (a) Matching, flow, LP-duality
  - (b) Eulerian and Hamiltonian cycles, DNA sequencing
  - (c) NP-hardness
3. Advanced techniques
  - (a) Randomization
    - i. probabilistic method, random graphs
    - ii. random walks on graphs, hitting and cover times
    - iii. matching via matrix inversion
  - (b) Approximation algorithms
  - (c) Algorithms and game theory

Topics illustrated with EE, CS and Bioinformatics applications

## 4 Course Requirements

The requirements for this course are three homeworks (one every two weeks approximately), an in-class midterm examination and a project.

Ideas for course projects will be posted on the webpage. Students may work in teams of 2 or 3. Proposals will be due near the beginning of quarter. Rough drafts will be due mid-quarter.