

Stat 254 – Syllabus

1. The statistical significance of sequence features

- The notion of statistical tests.
- Calculating the P-values at the base of BLAST with random walks.
- Implications of searching a data base.

2. Which genes change expression: the problem of multiple comparison in arrays

- Definition of the problem of multiple comparison and introduction of multiple global error criteria.
- Resampling methods to control a global error of choice.
- Application to the problem of identifying differentially expressed genes from array experiments.

3. Identifying subtle motifs via the Gibbs Sampler

- Review of the Bayesian inferential framework.
- Introduction to Markov Chains and Gibbs Sampler algorithms.
- A model for sequence motifs and a Gibbs sampler chain to explore the derived posterior distribution.

4. A dictionary for the genome and the MM algorithm

- Review of Maximum Likelihood Estimation.
- Introduction of EM and MM algorithms.
- An MM algorithm for sequence analysis.

5. Gene expression and sequence data analysis

- Review of Multivariate Regression.
- The problem of model selection.
- Bootstrap confidence intervals and tests.
- Models that connect sequence information with gene expression data.

Stat 254 – F05 Calendar

Homework, Project

There will be 4 homework, each due roughly 10 days after it is handed out.

There will be a final project, done in groups of 3-5 students (depending on the number of enrolled students). Topics for the final projects will be given and groups will be formed during the 7/8th week of the quarter. The final week of classes will be devoted to oral presentations of the projects (which are going to be work in progress at this stage). The final projects will be due on Friday December 16 at 12 noon in the instructor office: Gonda 6357a. There will not be a final exam.

Make-up classes

- Instead of the regular lecture on Thursday Oct 27, we will meet on Friday Oct 28 at 11-12:20 in 5303 Gonda.
- Instead of the regular lecture on Thursday November 3rd, we will meet on Wednesday November 9 at 11 - 12:20 in 5303 Gonda.
- **NOT CONFIRMED** Right now, we are planning a regular lecture on Thursday Oct 13, but it is possible that we will need to cancel that and meet, instead, on Friday Oct 14 at 11-12:20 in 5303 Gonda.