

Analysis and visualization tools in bioinformatics.

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The items below are not always listed in the order in which they will be covered.

1. Biology 101: from DNA to proteins, gene expression.
Matlab, visualization of data
DOWNLOAD AND READ THE MATLAB PRIMER BEFORE APRIL 4
<http://www.weizmann.ac.il/home/fenoam/coursePage/>
2. DNA chips: cDNA spotted microarrays, Affymetrix oligonucleotide arrays.
Manipulation, visualization and representation of gene expression data
3. Linear algebra: projections, eigenvalues and eigenvectors of matrices, Distributions, variance, covariance matrix, Principal Component Analysis (PCA), MultiDimensional Scaling (MDS)
Applications to gene expression data 1
4. SNP chips, array Comparative Genomic Hybridization (aCGH) data
Manipulation, visualization and representation of gene expression data
5. Regulation of gene expression, Cancer
Applications to gene expression data 2
6. Statistical Analysis: single and multiple variable comparisons, Examples from gene expression literature.
Applications to gene expression data 3
7. Supervised Analysis; separating objects into classes.
8. Cluster Analysis: review of clustering techniques. *Practicing various clustering techniques and applying them to gene expression data; working with clustering software and servers (Cluster and Treeview, Coupled Two-Way Clustering)*
9. Bayesian analysis of transcriptional networks
10. Hidden Markov Models (optional)
11. Gene chip research at the Weizmann Institute (selected presentations).

Lecture notes and powerpoint used will be posted on the website

<http://www.weizmann.ac.il/fedomany/> under Bioinformatics Lecture Notes 05

The **exercise session**'s website is:

<http://www.weizmann.ac.il/home/fenoam/coursePage/>

Reference material: nearly all my biology slides are from *Molecular Biology of the Cell* by Alberts et al, 3rd and 4th edition.

<http://www.ncbi.nlm.nih.gov/books/bv.fcgi?call=bv.View..ShowTOC&rid=mboc4.TOC&depth=2>

I also used the book *Genomes 2* by Brown

<http://www.ncbi.nlm.nih.gov/books/bv.fcgi?call=bv.View..ShowTOC&rid=genomes.TOC&depth=2>

For data analysis and representation: Duda, Hart and Stork: *Pattern Classification*.

For clustering: Jain and Dubes, *Algorithms for Clustering Data*

Books for Statistics will be recommended later.