Course KB8019 Comparative Genomics, 7.5 hp
Schedule for 2018, version 5/2/18.

Hosted by Stockholm University, DBB.

Course goals: to learn current techniques for analysing genomes and how comparative genomics can be used to understand the organisation, evolution, and function of genomic sequences.

Course literature:
- Web resources.
- Zvelebil and Baum, Understanding bioinformatics. Not strictly required as it is partly outdated, but recommended for its in-depth explanations of many algorithms.

Course begin/end: 2/5-1/6 2018
- Lectures by Prof. Erik Sonnhammer
- The listed literature must be read before each lecture. Time is reserved for this in the morning of lecture day.
- Practicals are done in the DBB computer room. Assistants will be present 10-15 on days with no lectures.
- Instructions for practicals are published on the lecture day; reports should be submitted during the week they are listed, but at the latest the Monday after.
- Practicals assistants: Miguel Castresana, Stefanie Friedrich, Deniz Secilmis
- Course information at http://www.nada.kth.se/~erison/

Week 1. The structure of prokaryotic and eukaryotic genomes; Gene prediction
Lectures May 2, 10.15-13.00 (Arrhenius KÖL K441):
Introduction
1. Genome organisation
2. Gene prediction

Literature:
http://en.wikipedia.org/wiki/Biological_databases
http://en.wikipedia.org/wiki/List_of_biological_databases
http://www.yourgenome.org/facts/what-is-a-genome
http://en.wikipedia.org/wiki/Bioinformatics
http://en.wikipedia.org/wiki/Genome
https://en.wikipedia.org/wiki/Gene_prediction
http://en.wikipedia.org/wiki/Introduction_to_genetics
http://en.wikipedia.org/wiki/Human_genome
http://en.wikipedia.org/wiki/Genome_evolution
Zvelebil:
Chapter 3 Dealing with Databases
Chapter 9 Revealing Genome Features
Chapter 10 Gene Detection and Genome Annotation

Practical 1: Basic genome analysis. Briefing in computer room May 2, 14.00
Practical 2: Gene prediction. Briefing in computer room May 3, 10.00

Week 2. Evolution of genes and genomes
Lectures May 7, 13.15-15.30 (Arrhenius KÖL K441):
3. Phylogenetics
4. Phylogenomics

Literature:

http://evolution.berkeley.edu/evolibrary/article/phylogenetics_01
https://en.wikipedia.org/wiki/Phylogenetic_tree
https://en.wikipedia.org/wiki/Phylogenomics
http://genome.cshlp.org/content/8/3/163.long
https://en.wikipedia.org/wiki/Phylogenetic_profiling
https://en.wikipedia.org/wiki/Phylogenetic_network
https://en.wikipedia.org/wiki/List_of_phylogenetics_software
https://en.wikipedia.org/wiki/Phylogenetic_tree_viewers
https://en.wikipedia.org/wiki/Phylogenetics

Zvelebil:

Chapter 7: Recovering Evolutionary History
Chapter 8: Building Phylogenetic Trees

Practical 3: Phylogenetic reconstruction. Briefing in computer room May 8, 10.00
Practical 4: Phylogenomics. Briefing in computer room May 10, 10.00

Week 3. Synteny and orthology analysis

Lectures May 14, 13.15-15.30 (Arrhenius KÖL K441):

5. Gene order
6. Orthology

Literature:

https://en.wikipedia.org/wiki/Synteny
https://en.wikipedia.org/wiki/Sequence_homology
http://questfororthologs.org/
http://orthology.benchmarkservice.org/

Zvelebil:

Chapter 7.2 Molecular Evolution and its Consequences

Practical 5: Gene order analysis. Briefing in computer room May 15, 10.00
Practical 6: Orthology. Briefing in computer room May 17, 10.00

Week 4. Function and interaction prediction

Lectures May 21, 13.15-15.30 (Arrhenius KÖL K441):

7. Function prediction
8. Networks

Literature:

https://en.wikipedia.org/wiki/Biological_network
https://en.wikipedia.org/wiki/Interactome
https://en.wikipedia.org/wiki/Systems_biology
http://funcoup.sbc.su.se

Zvelebil:

Chapter 17: Systems Biology

Practical 7: Function prediction. Briefing in computer room May 22, 10.00
Practical 8: Interaction networks. Briefing in computer room May 24, 10.00

Week 5. Project assignments: reports and preparation of group presentations

Fri 1/6 – 10.15-14.30 (SciLifeLab, Milkyway, Alfa 2): group presentations.