**Course KB8019 Comparative Genomics, 7.5 hp**  
Preliminary schedule for 2020, version 3/12/20, subject to change.

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 as up to date as the web resources but has more in-depth explanations of many concepts and algorithms.

Course begin/end: May 4 – June 5 2020 (21/5 is a holiday)
- Classes by Prof. Erik Sonnhammer
- The listed literature must be read before each class. Time is reserved for this in the morning of the class day.
- Practicals are done in the DBB computer room, A244 at Arrhenius. Assistants will be present on times listed below. Note that the computer room is only accessible during office hours.
- Reports for practicals should be submitted during the week they are listed, but at the latest the Monday after.
- Slides will be provided after the class.
- Teacher assistants: Miguel Castresana and Deniz Secilmis
- Course information at [http://www.nada.kth.se/~erison/](http://www.nada.kth.se/~erison/)
- Students need to add themselves to Canvas at [https://canvas.instructure.com/enroll/W7FA9P](https://canvas.instructure.com/enroll/W7FA9P) in order to take the quizzes.

**Week 1. The structure of prokaryotic and eukaryotic genomes: Gene prediction**

May 4, 10.15 (DBB computer room): Roll call  
Introduction to course and start of practicals  
Practical 1: Basic genome analysis. Briefing in computer room May 4, 11.00  
Practical 2: Gene prediction. Briefing in computer room May 4, 13.30  
TAs present in the computer room on May 4, 6, 8, 10.30-16.30

May 5, 14.00-16.30 (Arrhenius KÖL K438):  
Quiz 1 14.05-14.15 on your own device.  
14.15-14.30: Information about the fall semester.  
Class 1. Genome organisation  
Class 2. Gene prediction  

Literature:
- [http://www.yourgenome.org/facts/what-is-a-genome](http://www.yourgenome.org/facts/what-is-a-genome)  
http://en.wikipedia.org/wiki/Human_genome
https://en.wikipedia.org/wiki/Repeated_sequence_(DNA)
https://en.wikipedia.org/wiki/Non-coding_DNA
http://en.wikipedia.org/wiki/Genome_evolution
https://en.wikipedia.org/wiki/C-value

Zvelebil:
Chapter 3 Dealing with Databases
Chapter 9 Revealing Genome Features
Chapter 10 Gene Detection and Genome Annotation

**Week 2. Evolution of genes and genomes**
May 11, 14.00-16.30 (SciLifeLab, Gamma lunch room, level 2):
  - Quiz 2 14.05-14.15 on your own device.
  - Class 3. Phylogenetics
  - Class 4. Phylogenomics

Practical 3: Phylogenetic reconstruction. Briefing in computer room May 12, 10.30
Practical 4: Phylogenomics. Briefing in computer room May 14, 10.30
TAs present in the computer room on May 12 and 14, 10.30-16.30

Literature:
http://evolution.berkeley.edu/evolibrary/article/phylogenetics_01
https://en.wikipedia.org/wiki/Phylogenetick_tree
https://en.wikipedia.org/wiki/Bootstrapping
https://en.wikipedia.org/wiki/UPGMA
https://en.wikipedia.org/wiki/Neighbor_joining
https://en.wikipedia.org/wiki/Phylogenomics
http://tiny.cc/3uzk6y (Lambkin et al., 2009)
http://genome.cshlp.org/content/8/3/163.long (Eisen, 1998)
https://en.wikipedia.org/wiki/Phylogenetic_profiling
https://en.wikipedia.org/wiki/Phylogenetic_network
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

**Week 3. Synteny and orthology analysis**
May 18, 14.00-16.30 (SciLifeLab, Gamma lunch room, level 2):
  - Quiz 3 14.05-14.15 on your own device.
  - Class 5. Gene order
  - Class 6. Orthology

Practical 5: Gene order analysis. Briefing in computer room May 19, 10.30
Practical 6: Orthology. Briefing in computer room May 20, 10.30
Final project assignment: Briefing in computer room May 20, 10.45
TAs present in the computer room on May 19 and 20, 10.30-16.30
Note: May 21 is a red day and the computer room is closed.
Week 4. Interaction networks
May 25, 14.00-16.30 (SciLifeLab, Gamma lunch room, level 2):
  Quiz 4 14.05-14.15 on your own device.
  Class 7. Interaction networks

Practical 7: Interaction networks. Briefing in computer room May 26, 10.30
TAs present in the computer room on May 26 and 28, 10.30-16.30

Week 5. Project assignments: report writing and preparation of group presentations
(Briefing in week 3)
TAs present in the computer room on June 2 and 4, 10.30-16.30

June 5, 10.15 (SciLifeLab, Gamma lunch room, level 2): group presentations of final project assignments.