

# Systems and Synthetic Biology

7<sup>th</sup> – 11<sup>th</sup> of April 2014

## Instructors:

Pedro Beltrao (PB) – Group Leader, EMBL-EBI, [www.ebi.ac.uk/research/beltrao](http://www.ebi.ac.uk/research/beltrao)

Silvia Santos (SS) – Group Leader, Clinical Sciences Center, MRC

[www.csc.mrc.ac.uk/Research/Groups/EPI/QuantitativeCellBiology](http://www.csc.mrc.ac.uk/Research/Groups/EPI/QuantitativeCellBiology)

Thomas Lemberger (TL) – Chief Editor, Molecular Systems Biology <http://msb.embopress.org/>

## Course Plan

### Monday (PB)

10:00 to 12:00: Introduction to Systems Biology

12:00 to 13:00: Lunch Break

13:00 to 16:00: Bioinformatics, Supervised /Unsupervised Machine learning

### Tuesday (PB)

9:30 to 12:00: \*Omics, Pros/Cons of different high-throughput methods

12:00 to 13:00: Lunch Break

13:00 to 17:00: Practical course 1 - Programming

### Wednesday (PB)

9:00 to 12:00: Preparing for public speaking exercise

13:00 to 17:00: Practical course 2 - Image analysis

### Thursday (SS)

9:30 to 12:00: Design principles of regulatory signaling networks I: Topology and dynamics

12:00 to 13:00: Lunch Break

13:00 to 14:00: Design principles of regulatory signaling networks II: Spatial dimension

14:00 to 17:00: Problem set (writing a paper)

### Friday (PB, SS, TL)

9:30 to 11:30: Synthetic Biology – engineering biological circuits (PB)

11:30 to 13:00: Public Speaking (SS)

13:00 to 14:00: Lunch Break

14:00 to 16:00: Introduction to Publishing (TL)

16:00 to 17:00: Academic track and open QA (PB,SS,TL)

(Please, bring 1 laptop per two students for the practical courses)

## Reading Material

References for the different sub-sections will be given during the week. Please read the following short commentary papers **before** Monday:

1. Can a biologist fix a radio?--Or, what I learned while studying apoptosis. Lazebnik Y. Cancer Cell. 2002 Sep;2(3):179-82.
2. Q&A: Systems biology. James E. F. Jr. Journal of Biology. 2009.
3. The meaning of Systems Biology. Marc Kirschner. Cell 2005

## Bioinformatics and Image Analysis

- Practical course in Perl programming and Image Analysis

### **Software to install:**

*For all (PC and Mac):*

Install CellProfiler (<http://www.cellprofiler.org/download.shtml>)

Install Cluster3.0 (<http://bonsai.hgc.jp/~mdehoon/software/cluster/software.htm>)

Install TreeView – Mac:TreeView-1.1.6r2-osx.zip; Win:TreeView-1.1.6r2-win.zip  
(<http://sourceforge.net/projects/jtreeview/files/jtreeview/1.1.6r2/>)

*On a Windows PC:*

Install ActivePerl 5.14 x86 (<http://www.activestate.com/activeperl/downloads>)

Install Notepad++ (<http://notepad-plus-plus.org/>)

*On a Mac:*

Install TextWrangler (<http://www.barebones.com/products/TextWrangler/>)

*On a Linux:*

Whatever editor you like.