

Practical summer course: Modeling for Systems Biology

June 29 – July 4, 2014
Centre for Genomic Regulation
Barcelona

- Schedule -

Activity Organized by:



SystemsX.ch
The Swiss Initiative in Systems Biology

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**Sunday – Day 1: “*Basic Mathematical Concepts & Introduction to MatLab*”
(Optional)**

Hosts: James Sharpe & Johannes Jäger

Teachers: Kai Dierkes, Andreea Munteanu & Marie Trussart

When	What	Topic	Where
11:00am – 01:00pm	LECTURE	Linear Algebra	Marie Curie
	Lunch		Inner square
02:00pm – 04:00pm	LECTURE	Ordinary Differential Equations	Marie Curie
	Break		Inner square
04:30pm – 6:30pm	LECTURE & PRACTICAL	Introduction to Matlab	Marie Curie
8:30pm	WELCOME’S DINNER	- optional -	Restaurant Sotavento

Monday – Day 2: “*Dynamical systems theory, networks*”

Host: Johannes Jäger

Teacher: Mukund Thattai

Assistants: Alba Jimenez Asins, Berta Verd Fernandez & Kai Dierkes

When	What	Topic	Where
09:00am – 09:30am	WELCOME		Marie Curie
09:30am – 10:15am	LECTURE 1	The physical basis of gene regulation	Marie Curie
	Break		Inner square
10:30am – 11:30am	LECTURE 2	Genetic networks	Marie Curie
11:30am – 12:30pm	PRACTICAL 1	Dynamical systems and bifurcation analysis I (whiteboard)	Marie Curie
01:00pm – 02:00pm	Lunch		PRBB Canteen
02:00pm – 02:30pm	LEARNING EXPERIENCE	Networks	Inner square
02:30pm – 04:00pm	PRACTICAL 2	Dynamical systems and bifurcation analysis II (Matlab)	Marie Curie
	Break		Inner square
04:30pm – 05:30pm	LECTURE 3	Physical limits of biological control	Marie Curie
05:30pm – 06:00pm	DISCUSSION		Marie Curie

Tuesday – Day 3: “Stochastic systems”

Host: James Sharpe

Teacher: Jordi Garcia Ojalvo

Assistants: Daeyeon Kim & Berta Verd

When	What	Topic	Where
09:00am – 10:00am	LECTURE 4	Noise in biochemical reactions	Marie Curie
	Break		Inner square
10:15am – 11:15am	LECTURE 5	Continuous description of stochastic processes	Marie Curie
	Break		
11:30pm – 12:30pm	PRACTICAL 3	Simulating the chemical Langevin equation	Marie Curie
01:00pm – 02:00pm	Lunch		PRBB Canteen
02:00pm – 03:00pm	LECTURE 6	Discrete stochastic simulations	Marie Curie
	Break		Inner square
03:30pm – 05:00pm	PRACTICAL 4	Controlling noise in stochastic simulations	Marie Curie
	Break		Inner square
05:00pm – 05:30pm	DISCUSSION		Marie Curie

Wednesday – Day 4: “Multivariate and multidimensional data analysis”

Host: Matthieu Louis

Teacher: Fernando Amat

Assistants: Anton Crombach & Felix Campelo Aubarell

When	What	Topic	Where
09:00am – 10:00am	LECTURE 7	Multivariate analysis and dimensionality reduction techniques	Marie Curie
	Break		Inner square
10:15am – 11:15am	PRACTICAL 5	Dimensionality reduction techniques	Marie Curie
	Break		
11:30pm – 12:30pm	LECTURE 8	Unsupervised pattern recognition methods	Marie Curie
01:00pm – 02:00pm	Lunch		PRBB Canteen
02:00pm – 02:45pm	PRACTICAL 6	Clustering methods	TBA
	Break		Inner square
03:00pm – 04:00pm	LECTURE 9	Supervised pattern recognition methods	Marie Curie
04:00pm – 05:00pm	PRACTICAL 7	Supervised learning techniques	Marie Curie
	Break		Inner square
05:15pm – 05:30pm	DISCUSSION		Marie Curie
07:00pm – 09:00pm	GUIDED TOUR BARCELONA	- optional -	TBA

Thursday – Day 5: “Parameter inference, reverse engineering”

Host: Johannes Jäger

Teacher: Theodore Perkins

Assistants: Anton Crombach & Marco Musy

When	What	Topic	Where
09:00am – 10:00am	LECTURE 10	Inference of static network models	Marie Curie
	Break		Inner square
10:15am – 11:15am	PRACTICAL 8	Practicing static network inference using the gap gene system of <i>Drosophila</i>	Marie Curie
	Break		Inner square
11:30pm – 12:30pm	LECTURE 11	Inference of dynamic network models	Marie Curie
01:00pm – 02:00pm	Lunch		PRBB Canteen
02:00pm – 03:30pm	PRACTICAL 9	Practicing dynamic network inference using the gap gene system of <i>Drosophila</i>	Marie Curie
	Break		Inner square
04:00pm – 05:00pm	LECTURE 12	Inference of stochastic network models	Marie Curie
05:00pm – 05:30pm	DISCUSSION		Marie Curie



Friday – Day 6: “*Simulating tissue morphogenesis and signaling*”

Host: James Sharpe

Teacher: Dagmar Iber

Assistants: Felix Campelo Aubarell & Javier Diego Iñiguez

When	What	Topic	Where
09:00am – 10:00am	LECTURE 13	Introduction to Reaction-Diffusion Models	Marie Curie
	Break		Inner square
10:15am – 11:15am	PRACTICAL 10	Reaction Diffusion Models	Marie Curie
	Break		Inner square
11:30pm – 12:30pm	LECTURE 14	Patterning dynamics on growing domains	Marie Curie
01:00pm – 02:00pm	Lunch		PRBB Canteen
02:00pm – 03:00pm	PRACTICAL 11	Reaction Diffusion Models on growing domains (MATLAB)	Marie Curie
	Break		Inner square
03:30pm – 04:30pm	LECTURE 15	Simulating Tissue Morphogenesis	Marie Curie
04:30pm – 05:30pm	PRACTICAL 12	Image Segmentation & Calculation of Displacement Fields (MATLAB)	Marie Curie
05:30pm – 06:00pm	DISCUSSION & CLOSURE		Marie Curie
	Break		Inner square
06:30pm	GOODBYE DRINK		5th floor Terrace