

WCPM/CSC joint seminar

Design principles of cellular systems from evolutionary and systems dynamics perspectives

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Monday, 13th March, 1 p.m.

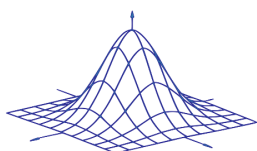
D2.02 Seminar room, Engineering

Abstract: Two key approaches in modern biology are systems and synthetic biology. Between these two powerful paradigms, a surprisingly neglected aspect is the fact that complex biological systems as well as their building blocks are the result of evolution. How can we explain evolution of complex biological systems from sub-cellular to cellular to species levels? Do common evolutionary processes, such as fluctuating environments, leave fingerprints in the architecture or dynamics of these systems? Are there inherent trade-offs in these systems, and if so, how does evolution work around such trade-offs? If we can answer these questions, can the resulting evolutionary insights be useful in our quest to (re)design biological systems in synthetic biology?

I will illustrate computational and experimental approaches towards answering such questions and deciphering the evolutionary processes that can lead to complex cellular systems. In particular, I will describe a set of recent projects where we applied a combination of in silico evolution and mathematical modeling to decipher molecular mechanisms of ultrasensitivity and multistability in signaling networks. Time permitting, I will use the last part of the talk, to describe expansion of this type of approaches to the study of cellular interactions. This part of the talk will feature our ongoing work in a recent large-scale project on understanding microbial metabolic interactions and designing multi-species, microbial ecosystems.

A buffet lunch will be available from 12:45 pm.

More info: <http://warwick.ac.uk/wcpm/seminars>



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