



**Dovolujeme si vás pozvat na přednášku:**

**We invite you to the lecture:**

**Are Complex Systems so Important in Biomedical Research:  
Self-Organization and Emergence?**

**Dr. Jiří Kroc from Biomedical Center, Faculty of Medicine in  
Pilsen, Charles University in Prague**

**Abstract enclosed**

**Kde: Fyziologický ústav AV ČR, v.v.i.**

**Where: Institute of Physiology, CAS**

Vídeňská 1083, Praha 4, 142 20, CZ

Budova Dal / Building Dal

Zasedací místnost odd. biomatematiky 010

Lecture room of the Department of Biomathematic 010

**Kdy: Čtvrtek 22. září 2016 od 15:00h**

**When: Thursday 22 September 2016, from 3:00 p.m.**

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ABSTRACT:

## **Why Are Complex Systems so Important in Biomedical Research: Self-Organization and Emergence?**

Over past 20 years, complex systems (CSs) are gaining an increasing importance in mathematical description of biology. Knowledge achieved by CSs in biology is not so easy to grasp. This presentation enables you to smoothly immerse into the subject and overcome the starting barrier. Complex systems are simply said “building complexity through mutual interactions of many identical copies of several generic processes where a higher-level response of the system is not deducible from any of its constituting parts operating at the lower-level”. Initially, we build background knowledge necessary for understanding CSs (cellular automata and lattice gasses). Then self-organization and emergent principles are demonstrated on a few ‘primitive’ models such as is the cellular automaton called the “Game of Life” or models performing self-assembly of buildings. The very basic principles of thinking in systems is demonstrated on several simple cases—where flow of information, mass, and other quantities along with the purpose and the goal(s) of the system are carefully traced—with possible extensions into the field of your interest. Finally, as time allows, a set of fruitful biological applications of CSs is shown based on Agent Based Models, Lattice-Boltzmann Method, etc.