

Principles of genetic circuit design: programming living cells to perform novel

Living cells possess the remarkable ability to sense diverse environmental signals, make decisions based on these signals and actuate a biochemical response. Underlying these decision-making capability and responsive behavior of living cells are genetic circuits. Genetic circuits are regulatory interaction networks that control gene expression in time and space at the transcriptional, post-transcriptional, translational and post-translational levels. Engineering genetic circuits allows for programming user-defined sense and response behavior into living cells for a wide range of biomedical and biotechnological applications. The “Principles of genetic circuit design: programming living cells to perform novel functions” workshop will give an overview on the design process of synthetic genetic circuits as gene expression control systems, composition of genetic circuits from different classes of gene regulators, different computer-aided design and modelling tools used in the genetic circuit design workflow, common failure modes encountered in genetic circuit design and engineering strategies to overcome these failure modes and optimize the genetic circuit design.