

Course: Systems Biology

Instructor: Professor Ka-Lok Ng

Course description

This course is designed to give students a general understanding of the systems biology. Systems biology is a term used to describe a number of trends in bioscience research, and a movement which draws on those trends. Proponents describe systems biology as a biology-based inter-disciplinary study field that focuses on complex interactions in biological systems, claiming that it uses a new perspective (holism instead of reduction). Particularly from year 2000 onwards, the term is used widely in the biosciences, and in a variety of contexts. An often stated ambition of systems biology is the modeling and discovery of emergent properties, properties of a system whose theoretical description is only possible using techniques which fall under the remit of systems biology.

References

Gil Alterovitz, Marco F. Ramoni, *Systems Bioinformatics - An Engineering Case-Based Approach*, Artech House, Inc. 2007, USA.

Cesario, F. Marcus, *Cancer systems biology, bioinformatics and medicine*. Springer, 2011

E. Barillot, L. Calzone, P. Hupe, J.P. Vert and A. Zinovyev, *Computational systems biology of cancer*, CRC press, 2012.

Course Schedule

Basic molecular biology

From genome to proteome

Transcriptome

Microarray data analysis

Protein-protein interactions

Mathematical tools – probability and statistics

Topological analysis - Graph theory

Visualization tools

Mid-term exam

Profile analysis - Transcription factor binding site analysis

ncRNAome

Next generation sequencing technology

Metabolomics

Integration of omics data

Student presentation

Student presentation

Student presentation

Final exam

Course evaluation

Passing score for graduate course is 70. In general, score is allocated between class attendance, homework, mid-term written exam, final written exam, term paper and student oral presentation. Course instructor reserves the right to adjust the grading scheme.