Computational Systems Biology (Spring, 2020)

Instructor: Tiejun Li (Peking Univ., http://dsec.pku.edu.cn/~tieli)

Course Outline:

Lect01: ODE modeling for cellular systems: I
Lect02: ODE modeling for cellular systems: II
Lect03: Stochastic modeling for cellular systems
Lect04: Exactly solvable models
Lect05: SSA and tau-leaping method
Lect06: Large volume limit and fluctuations
Lect07: Multi-scale analysis framework
Lect08: Multi-scale analysis for CKS
Lect09: Rare events for diffusion process
Lect10: Rare events for CKS
Lect11: mRNA and Protein bursting
Lect12: Sub-diffusion of protein molecule
Lect13: Non-equilibrium steady state theory: I
Lect14: Non-equilibrium steady state theory: II
Lect15: Turing pattern dynamics

References:

1. J. Keener and J. Sneyd, *Mathematical Physiology*, 2nd Edition, Springer, 2009.
2. D.T. Gillespie, *Markov Processes: An Introduction for Physical Scientists*, Academic Press, 1992.
3. W. E, T. Li and E. Vanden-Eijnden, *Applied Stochastic Analysis*, AMS, 2019.
4. U. Alon, *An Introduction to Systems Biology: Design Principle of Biological Circuits*, 2nd Edition, CRC Press, 2020.
5. J.D. Murray, *Mathematical Biology*, 3rd Edition, Springer, 2003.
6. H. Qian, *Chemical Biophysics*, Cambridge University Press, 2008.