BISC 204 Potential Final Paper Topic Ideas

Biochemistry/Cell-Molecular Biology – many of the papers that are touched on in the *Modeling Life* text could be investigated in more detail for a project:

- Boiteux, A., Goldbeter, A., & Hess, B. (1975). Control of oscillating glycolysis of yeast by stochastic, periodic, and steady source of substrate: a model and experimental study. Proceedings of the National Academy of Sciences, 72(10), 3829–3833.
- Chou, H., Berman, N., & Ipp, E. (1992). Oscillations of lactate released from islets of Langerhans: evidence for oscillatory glycolysis in beta-cells. American Journal of Physiology- Endocrinology and Metabolism, 262(6), E800–E805.
- Gardner, T. S., Cantor, C. R., & Collins, J. J. (2000). Construction of a genetic toggle switch in Escherichia coli. Nature, 403(6767), 339–342.
- Aihara, K. (09/1985). "An alternating periodic-chaotic sequence observed in neural oscillators". *Physics letters. A (0375-9601)*, 111 (5), doi: 10.1016/0375-9601(85)90256-7
- Using predator-prey type equations to model oscillating REM sleep cycles: McCarley & Massaquoi, *Amer. J. Physiology* (1986)

Ecology

- Trophic chaos: Hastings, A., & Powell, T. (1991). Chaos in a three-species food chain. Ecology, 72(3), 896– 903.
- Replicator dynamics promoting multiple stable evolutionary strategies: Nahum, Harding, & Kerr. (2011) Evolution of restraint in a structured rock-paper-scissors community, *PNAS*. doi:1 0.1073/pnas.1100296108
- Insect range shifts with climate change: Crozier & Dwyer. (2006). Combining population-dynamic and ecophysiological models to predict climate-induced insect range shifts, *American Naturalist*, doi: 10.1086/504848
- ***Many*** examples from modeling in aquatic ecology in: Soetaert & Herman, *A Practical Guide to Ecological Modeling* (2009), particularly chapter 6

Epidemiology

- Different types of SIR (susceptible-infected-recovered) models that capture seasonal dynamics (measles) and delays (asymptomatic infectious period) outlined in SIRmodels_EEID2011.pdf