BME233 (W2018): Dynamic Systems in Biology and Medicine—Tentative Schedule

This is a tentative schedule for BME233 (Dynamic Systems in Biology and Medicine). The schedule may change as the course develops.

Week 1. 1. Course overview and introduction.

2. Basic definitions of systems, system variables (inputs, outputs, states, parameters), and models.

Week 2. 1. No class (Martin Luther King Jr., Holiday)

2. The taxonomy of systems and models. Input-output and state-space models. HW#1 issued.

Week 3. 1. Order of a dynamic system. Canonical linear time-invariant systems.

2. Impulse response. Convolution.

Week 4. 1. Laplace Transform. HW#2 issued, HW#1 due.

2. The Convolution Theorem. Transfer function.

Week 5. 1. Poles. Equilibrium. Stability. Frequency response.

2. Feedback and control. HW#3 issued, HW#2 due. (Take-home midterm issued)

Week 6. 1. Nonlinear systems.

2. Equilibrium states. Phase portrait.

Week 7. 1. No class (Presidents' Day Holiday)

2. Linearization. HW#4 issued, HW#3 due

Week 8. 1. Stability. Attractors.

2. Isoclines. Periodic orbits.

Week 9. 1. Elementary index theory.

2. Gradient systems. Lyapunov function. HW#5 issued, HW#4 due.

Week 10. 1. Poincaré-Bendixson theory.

2. Elementary bifurcation theory. HW#5 due. (Take-home final issued)