

BME233 (W2019): 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. The taxonomy of systems and models. Input-output and state-space models. [HW#1 issued](#).
 - 2. Order of a dynamic system. Canonical linear time-invariant systems.
- Week 3.**
 - 1. Impulse response. Convolution.
 - 2. Laplace Transform. [HW#2 issued](#), [HW#1 due](#).
- Week 4.**
 - 1. The Convolution Theorem. Transfer function.
 - 2. Poles. Equilibrium. Stability. Frequency response.
- Week 5.**
 - 1. Feedback and control. [HW#3 issued](#), [HW#2 due](#). (Take-home midterm issued)
 - 2. Nonlinear systems.
- Week 6.**
 - 1. Equilibrium states. Phase portrait.
 - 2. Linearization. [HW#4 issued](#), [HW#3 due](#)
- Week 7.**
 - 1. Stability. Attractors.
 - 2. Isoclines. Periodic orbits.
- Week 8.**
 - 1. Elementary index theory.
 - 2. [Guest Lecture](#), TBA
- Week 9.**
 - 1. Gradient systems. Lyapunov function. [HW#5 issued](#), [HW#4 due](#).
 - 2. Poincaré-Bendixson theory.
- Week 10.**
 - 1. Elementary bifurcation theory.
 - 2. Chaos Theory? [HW#5 due](#). (Take-home final issued)