

M449: Syllabus and tentative plan (Fall 08)

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Yost 104

Topic	Dates/week
1. Single population dynamics (Ch. 1) a. Discrete and continuous population models b. Metapopulations c. Age structure	8/25-9/10 (25, 27, 8, 10)
2. Population dynamics of interacting species (Ch.2) a. Host-parasitoid interactions b. The Volterra - Lotka predator-prey: equilibria, stability, phase-plane analysis c. Competition	9/12-9/22 (12, 15, 17, 22)
3. Infectious diseases (Ch. 3) a. Population models (SEIR methodology): persistence, eradication and control b. Vector-borne diseases c. Macro-parasite diseases d. Individual-based models	10/1-10/8 (1, 3, 6, 8)
4. Population genetics and evolution (Ch.4) a. Mendelian genetics and selection b. The balance between selection and mutation c. Evolution of genetic systems	10/10-10/15 (10,13,15)
5. Biological motion (Ch. 5) a. Macroscopic theory of motion and Chemotaxis b. Biological invasion c. Traveling wave solutions of reaction-diffusion equations	10/13-10/29 (27,29,31)
6. Molecular and cellular biology (Ch. 6) a. Bio-chemical kinetics and metabolic pathways b. Neural modeling c. Basic immunology and HIV/AIDS	11/3-11/12 (3,5,10,12)
7. Pattern formation (Ch.7) a. Turing instability and bifurcations in activator-inhibitor systems b. Incorporating biological movement; mechano-chemical models	11/17-11/21 (17, 19, 21)
8. Tumor modeling (Ch.8)	12/5
9. Project presentations	12/9