1. Competition (Drake)

- Define/sketch example of niche space (n-dimensional hypervolume)
- Define fundamental vs realized niche
- Resource competition: Graphical correspondence between growth curves & dynamics
- Resource competition: R* theory
- Resource competition: Condition for displacement of one species by another
- Define interference competition
- Lotka-Volterra theory: ZNGIs, outcome of competition, transient dynamics, inequalities involving K & alpha, constraint on coexistence

2. Predator-Prey Dynamics (Park)

- Recall two sources of predator-prey dynamics
- Identify basic components of predator-prey models (births, deaths, predation, other terms)
- Understand, write down, sketch functional responses 1,2,3 (recall sources for each of 2 and 3)
- Understand/identify key stabilizing and destabilizing mechanisms
- Translate predator-prey dynamics to phase plane (and vice-versa)
- Calculate straightforward coexistence equilibria
- Sketch null clines (ZNGIs) for key models
- Populate Jacobian matrix for certain predator-prey models (as in lecture/reading)
- Understand the principle of linearization and the meaning of the zones in a trace-determinant map
- Articulate the principle of the ‘paradox of enrichment’
- Articulate key findings from paper by Krebs et al. (hare & lynx)

3. Host-Parasite interactions (Park)

- SIR compartment models (including basic adjustments in box-and-arrow form)
- R0 and factors that influence it
- Density (in)dependent contact and transmission rates
- Nt, persistence mechanisms and the endemic equilibrium
- Herd immunity and effective reproductive number, Rn, sketch R0 vs immunization threshold
- Transmission-virulence trade-off

4. Indirect Effects (Park)

- Interaction chains versus modification chains
- Apparent competition
- Indirect mutualism
- Top down versus bottom up regulation
- Keystone species
- The Janzen-Connell hypothesis
• Key ideas from NetLogo computer exercise (effects of changing grass growth rate, sheep feeding rate, wolf feeding rate; identify/add key components to food web (omnivory, apparent competition, intra-guild predation, cannibalism)
• Identify direct versus indirect effects in simple food webs

5. Measurement & Maintenance of local diversity (Drake)

• Relative abundance
• Species abundance distribution
• $\alpha$, $\beta$, and $\gamma$-diversity
• Species richness
• Simpson’s index
• Shannon’s index
• Intermediate disturbance hypothesis
• Janzen-Connell effects
• Keystone species