

Things to know for the first Ichthyology lecture exam

The first exam will cover lecture material up to and including the 30 September lecture. This includes chapters 1-5 and 13, 14, and 16 in Moyle and Cech. Topics presented **only** in the lab will not be on the exam. This is not necessarily a complete list – but it covers the key things you need to know.

- 1) Famous ichthyologists and what they are known for (book and handout)
- 2) Physiology: fish form/function groups (you will need to know basic external anatomy for some of these)
 - a. Rover predators, bottom hidiers, etc.
 - b. Know their body shape, mouth type, fin placement and other adaptations
 - c. Know why (functionally) they have these characteristics
- 3) Physiology: Locomotion
 - a. What do high (and low) Reynolds' numbers mean? What fish feature most directly affects Reynolds' number?
 - b. Swimming types/forms (know the names, and general concepts like which ones are for fast swimming vs. maneuverability)
 - c. Adaptations for improved swimming performance
- 4) Physiology: Respiration and circulation
 - a. Know the difficulties of breathing in water and what affects oxygen in water?
 - b. Gill physiology
 - c. Alternatives to respiration with gills
 - d. Hemoglobin
 - i. What is it and how does it work?
 - ii. Know how to draw hemoglobin saturation curves for different fish (active vs. sluggish, low O₂ environment vs. high O₂ environment)
 - iii. Know how Bohr and Root effects affect hemoglobin binding of oxygen
 - e. Anatomy of the heart and blood cell types and functions
 - f. Factors affecting heart rate and blood flow
 - g. Adaptations for low oxygen environments or for high oxygen demands by fish
 - h. Know the common gill ailments covered in class
- 5) Physiology: buoyancy and thermoregulation
 - a. How do swim bladders work? What other adaptations are there for buoyancy?
 - b. Know the terms “root off,” “root on,” and salting-out
 - c. How do fish thermoregulate? (And why?)
- 6) For many topics, I presented real world examples or demonstrated how scientists measure or quantify the variable – know these examples and methods (e.g., measuring respiration or swimming performance, effects of global warming on trout)
- 7) Diversity:
 - a. With what groups did certain features arise and why were they important?
 - b. Understand what is meant by the “arms race” in terms of fish evolution
 - c. Know the special developments and adaptations of the hagfish and lamprey
 - d. Know the special developments and adaptations of the:
 - i. Sarcopterygii (Coelacanthiformes, and Dipnomorpha)
 - ii. Actinopterygii (Chondrostei: Polyteriformes, Acipenseriformes; Neopterygii: Lepisosteiformes, Amiiformes)