**Marine Biology Exam 3 Study Guide**

Key words or terms are new vocabulary from each lecture, which will likely be used in true or false, or multiple-choice questions. **Short answer and short essay questions will come from emboldened topics.** **Long essay questions will come from the emboldened and underlined topics**

**Chapter 7 – Marine Invertebrates II**

Know the characteristics of chordates including their development, symmetry, coelom, and skeleton. **Know the four characteristics of chordates and the what each develops into**. Know the different chordate subphyla and examples of organisms in each subphylum. What subphyla is closely related to vertebrates? What are the characteristics of vertebrates?

**Key words and terms**: urochordate, cephalochordate, vertebrata, pharyngeal gill slits, notochord, dorsal hollow nerve cord, post-anal tail

**Chapter 8 – Marine Fishes**

Know the characteristics found in most fishes. Know the major groups of fishes and the examples of fish found in each group (Agnatha, Chondrichthyes, Osteichthyes, Spiny-rayed fishes). **Be able to explain how respiration occurs in fish.** Know the differences in the way cartilaginous fish and bony fish take in water for respiration. How many heart chambers do fish have? How many circuits? How does the circulatory system in fish differ from birds and mammals? Know how marine, freshwater and cartilaginous fish osmoregulate? Know the different modes of reproduction found in fish and which one is most common in bony fish. Know the characteristics of hagfish and lampreys. What did the evolution of jaws allow for? Know the characteristics of chondrichtyans. Where can sharks be found in the ocean? What are claspers and what are they used for? Ampullae of Lorenzini. What fish can elevate their internal body temperature? Differences between skates and rays. Know the two classes within Osteichthyes and the fish found in each class (Sarcopterygii and Actinopterygii). **Know the anatomy of the fish including the nares, operculum, lateral line, swim bladder, and names of the fins (fill in).** Know the different ways that fins have been modified. What is the function of the lateral line? **Know the differences between cartilaginous fish and bony fish including the location of the mouth, gill opening, scales, tail shape, and method of buoyancy**. What are the advantages of schooling behavior? Rostral organ. Where does caviar come from? Know the characteristics of teleost fishes. Jaw protrusion. What is the difference between anadromous and catadromous. Know the fish that are anadromous. What are photophores and which fish contain photophores? Know the characteristics of spiny-rayed fishes and the examples of fish found in this group. Know the different types of hermaphrodites. Which fish spawn on the beach? Males of which type of fish carry the eggs in a pouch?

**Key words and terms**: Agnatha, Chondrichthyes, Osteichthyes, Spiny-rayed fishes, counter-current gas exchange, hypertonic, hypotonic, isotonic, ovuliparity, oviparity, ovoviviparous, viviparous, cartilaginous skeleton, placoid scales, spiral valve intestine, Elasmobranchii, Holocephali, claspers, ampullae of lorenzini, Sarcopterygii, Actinopterygii, nares, operculum, lateral line, swim bladder, dorsal fin, caudal fin, pectoral fin, pelvic fin, anal fin, Rostral organ, teleost, jay protrusion, catadromous, anadromous, photophore, bioluminescence, asending process, pharyngeal dentition, ctenoid scales, hermaphrodite, simultaneous hermaphrodite, sequential hermaphrodite,

**Chapter 9 – Marine Reptiles and Birds**

Know the changes that occurred during the evolution of tetrapods. What did the amniotic egg allow for? Know the different parts of the amniotic egg and their function. Know the characteristics of reptiles. Know the difference between the scutes, carapace, and plastron found in turtles. Know the characteristics of sea turtles. Which sea turtle is the largest? How does temperature affect sex of the offspring in reptiles? Know the threats to sea turtles. Know the characteristics of snakes and lizards. What do marine iguanas eat? Where are marine iguanas found? Know the different ways that marine reptiles remove excess salt from their blood. What are the differences between crocodiles and alligators? Know the characteristics of birds. What are birds closely related to? Know the adaptations of birds that allow for flight. What is the keel and what role does it play in flight? Know the different ways birds respond to heat stress and cold stress. **Be able to describe how marine birds remove excess salt using slat glands.** Know the advantages and disadvantages of flocking behavior. **Know the differences between reptiles, birds and mammals concerning the inner ear bones, heart, thermoregulation, reproduction and egg shell (Table).** Know the different feeding strategies in birds. Why do most seabirds nest on islands and cliffs? Know the characteristics of penguins and their adaptations for swimming. Know the major groups of seabirds and examples of birds found in each group. **Be able to explain the process of dynamic soaring**. What animal has the longest migration? What is sexual dimorphism? **Be able to explain the concept of resource partitioning**.

**Key words and terms**: Tetrapod, pectoral and pelvic girdle, amniotic egg, amnion, yolk sac, chorion, allantois, scutes, carapace, plastron, lacrimal gland, nasal glands, salivary glands, furcula, keel, plunge diving, surface feeding, pursuit diving, kleptoparasitism,

**Chapter 9 – Marine Mammals**

Know the characteristics of mammals. Know the different types of teeth and their function. How do the digestive tracts of herbivores and carnivores differ? What are the advantages of providing offspring with milk? Know the three major groups of mammals, the characteristics of each group and examples of organisms found in each group (Monotremes, Marsupials, Eutherians). What characteristics support the terrestrial origin of marine mammals? **Be able to describe the concept of convergent evolution.** Know the differences between baleen whales (Mysticeti) and toothed whales (Odontoceti). Know the different ways that baleen whales feed. What is the largest animal to have ever existed? **Be able to describe how toothed whales perform echolocation to find prey.**  Know the differences between dolphin and porpoise. What is the largest toothed whale? What does it eat? Know the ways that whales sleep. Where do most whales migrate and when do they migrate? Know the hypotheses as to why whales breach. What whales use bubble netting to catch fish? What do manatees eat? Know the differences between seals and sea lions. What does it mean to be polygynous? How do walruses use their tusks? How do sea otters stay warm? How many hairs per square inch of fur in sea otters? Know the adaptations in polar bears that allow them to survive in the arctic. What marine mammals can hold their breath the longest? Know the adaptations for deep diving in marine mammals.

**Key words and terms**: Mammary glands, mandible, incisors, canines, premolars, molars, cecum, lactation. Monotremes, Marsupials, Eutharians, cloaca, marsupium, convergent evolution, Mysticeti, Odontoceti, rorquals, ventral pleats, melon, dolphin, porpoise, breaching, Sirenia, carnassial pair, polygynous, apneustic breathing, myoglobin, anaerobic metabolism