**Marine Biology Exam 1 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 1 – The Science of Marine Biology**

Know the characteristics of living things. What is the difference between the extrinsic and intrinsic value of an organism? What are the different types of services that organisms provide to humans? Know the different examples of why humans should be concerned about marine biology. What percentage of the world’s protein intake comes from seafood? How do photosynthetic marine organisms help reduce the effects of climate change? Carbon sinks. Know the contributions that each of the early scientists and explorers made to the study of marine biology. Know the different scientific advancements that advanced the study of marine biology (SONAR, SCUBA, ROV’s, research laboratories). **Be able to list the steps of the scientific method and describe the purpose of each step**. What must a hypothesis be to be deemed valid? How do scientific theories differ from what the general public considers a theory? What is the chief unifying principal in biology?

**Key words and Terms**: Homeostasis, extrinsic value, intrinsic value, carbon sinks, Aristotle, Captain James Cook, Georg Wilhelm Steller, Charles Darwin, Challenger Expedition, observation, hypothesis, quantitative data, qualitative data, falsifiable, theory, evolution

**Chapter 2 – The Sea Floor**

What percentage of the Earth is seawater? Know the five-major ocean basis on Earth. Which ocean is the largest? Which is the deepest? Shallowest? Know the different layers of the Earth. What is the asthenosphere? Lithosphere? Know the difference between oceanic crust and continental crust. Which is denser? Which is older? Know the theory of plate tectonics and the evidence for the theory on plate tectonics. Know the differences between mid-ocean ridges, transform faults, and trenches. Know the different types of plate boundaries and how the plates are interacting at each boundary. **Be able to describe how oceans are formed and expanded, including the different types of crust, the density of each crust, and the role of each type of curst at divergent boundaries (mid-ocean ridges) and convergent boundaries (subduction zones).** What type of plate boundary results in the formation of the San Andreas fault? Where are volcanos and earthquakes most common? **Be able to describe how oceanic islands are formed.** Know the different regions along the continental margins and which has the greatest biodiversity of marine organisms. Continental shelf, continental slope, and continental rise. What is the difference between active margins and passive margins? What type of margin is found on each coast of North America? What causes hydrothermal vents?

**Key words and Terms**: Core, mantle, crust, asthenosphere, lithosphere, plate tectonics, mid-ocean ridges, transform faults, trenches, magnetic anomalies, divergent boundary, convergent boundary, transform boundary, subduction zones, continental shelf, continental slope, continental rise, active margin, passive margin, hydrothermal vent

**Chapter 3 – The Chemical and Physical Properties of Seawater**

Know the different properties of water and how each property effects living things on Earth. **Be able to describe how water is able to act as a universal solvent. Know which state of water has the densest concentration of water molecules, and how this affects life on Earth. Know why water is able to absorb so much heat before increasing in temperature, and how this property affects life on Earth.** What does hydrophilic mean? Hydrophobic? What I the average salinity for seawater? Know the rule of constant proportions. What factors affect the density of seawater? What wavelength of light penetrates the deepest in open ocean? Coastal waters? Why are many deep-sea organisms red in color? How does pressure change with depth? Know how many meters in depth it takes to increase by 1 atm. Be able to describe the Coriolis effect and how warm air rising at the equator causes trade winds. Know the difference between trade winds, westerlies, and polar easterlies. What is Ekman transport? What are gyres? **Be able to describe how gyres are produced, including the role of trade winds and the Coriolis effect, and how gyres transport warm and cool waters along the coasts of North America.** Know the difference between the surface layer, intermediate layer, and deep layer, and know which layer contains the thermocline. How does the water density in temperate and polar regions change with the seasons? What is downwelling? Know the different characteristics of a wave including the crest, trough, wavelength, and wave period. Know the differences between seas, swells, and surf. **Be able to describe how tsunamis are formed.** Know the differences between spring tides and neap tides concerning the tidal height and the alignment of the moon and sun. How long is a tidal cycle? Know the differences between diurnal, semidiurnal and mixed diurnal tides and know what type we have in southern California. Know how to interpret a tide chart and be able to identify when there are neap tides and spring tides. **Describe how grunion use the tides and discuss why using the tides may be an advantage for them. State whether corals spawn during spring or neap tides and explain why they spawn during that particular type of tide.**

**Key words and Terms**: Polar molecule, polarity, cohesion, surface tension, solute, solvent, solution, specific heat, vaporization, hydrophilic, hydrophobic, salinity, density, atm, Coriolis effect, trade winds, westerlies, polar easterlies, Ekman transport, gyre, surface layer, intermediate layer, thermocline, deep layer, downwelling, crest, trough, wavelength, wave period, seas, swells, surf, spring tide, neap tide, tidal cycle

**Chapter 4 – The Fundamentals of Biology**

Know the 4 main elements that make up living things. Know the four major macromolecules. Know the storage and structural carbohydrates found plants and animals. Know the different functions of lipids in marine organisms. What are enzymes and what do they do? Know the different types of nucleic acids and the different functions of each (information bearing or energy transfer). What is the function of ATP? Know the reactants and products of cellular respirations and photosynthesis, and where each process occurs in the cell. **Be able to describe the relationship between cellular respiration and photosynthesis.** What is the difference between autotrophs and heterotrophs? Which one makes up the base of all food webs on Earth? Primary production. Which marine environment has the greatest net primary productivity? **Know the differences between prokaryotic and eukaryotic cells (table).** The know major organelles of eukaryotic cells and their functions. Know the definitions of diffusion, concentration gradient, dynamic equilibrium, osmosis and tonicity. Know the differences between hypertonic, isotonic, and hypotonic, and what happens to plant and animal cells when placed in each type of solution. Know how freshwater fish, saltwater fish, and cartilaginous fish, regulate water in their respective environments. Know the difference between regulators and conformers, and the different modes of thermoregulation. Know what thermoregulatory strategy is found in most marine fish? Marine mammals? Know the different modes of heat loss or gain. **Be able to explain the process of counter-current heat exchange.** Know how asexual and sexual reproduction differ in the offspring they produce. Know the differences between internal and external fertilization and which is most common in marine organisms.

**Key words and Terms**: Glycogen, starch, cellulose, chitin, blubber, enzyme, catalyst, deoxyribonucleic acid, ribonucleic acid, adenosine triphosphate, phosphorylation, cellular respiration, mitochondria, photosynthesis, chloroplast, heterotroph, autotroph, primary production, prokaryotic, eukaryotic, archaea, diffusion, concentration gradient, dynamic equilibrium, osmosis, tonicity, hypertonic, isotonic, hypotonic, lysis, turgor pressure, plasmolysis, regulator, conformer, homeostasis, endotherm, ectotherm, poikilotherm, homeotherm, conduction, convection, radiation, evaporation, asexual reproduction, sexual reproduction, internal fertilization, external fertilization.