**Biology 20 Cumulative/Final Exam**

**Study Checklist**

**Unit 1 – Energy and Matter Exchange in the Biosphere**

\_\_\_\_\_ The Gaia Hypothesis

\_\_\_\_\_ Dynamic Equilibrium

\_\_\_\_\_ The Biosphere and its 3 Structural Components

\_\_\_\_\_ Abiotic vs. Biotic Components

\_\_\_\_\_Biodiversity & Food Chains/Food Webs

\_\_\_\_\_ Producers vs. Consumers

\_\_\_\_\_ Disturbing the Balance of Ecosystems (ex. Hunting Wolves in North America)

\_\_\_\_\_ Classifying ‘At Risk’ species (extinct, endangered, threatened, extirpated)

\_\_\_\_\_ Indicator Species and Examples

\_\_\_\_\_ Terms: Herbivore, Carnivore, Omnivore, Detritus, and Decomposers

\_\_\_\_\_ Trophic Levels (Producers, Primary Consumers, Secondary, etc.)

\_\_\_\_\_ Photosynthesis and Cellular Respiration Impact on Ecosystems

\_\_\_\_\_ Chemosynthesis and Chemoautotrophs

\_\_\_\_\_ “Energy Flows” - Energy Transfer up the Trophic Levels

\_\_\_\_\_ Thermodynamics and its explanation for energy transfer in ecosystems “Rule of 10”

\_\_\_\_\_ Ecological Pyramids & the three types

\_\_\_\_\_ “Matter Cycles”- The Biosphere as a Closed System

\_\_\_\_\_ The Organic Matter Cycle

\_\_\_\_\_ Organic vs. Inorganic Compounds

\_\_\_\_\_ In Our Bodies (Digestions, Use in Cells, Wastes)

\_\_\_\_\_ The Process of Decay

\_\_\_\_\_ The Hydrological Cycle

\_\_\_\_\_ Importance of Water to Organisms

\_\_\_\_\_ Polarity of water and what it means

\_\_\_\_\_ The Cycle Itself (Figure 5 on Page 44)

\_\_\_\_\_ Precipitation, Transpiration, Water Table, Ground Water, Percolation, Leaching

\_\_\_\_\_ Acid Deposition

\_\_\_\_\_ The Carbon Cycle

\_\_\_\_\_ Photosynthesis & Cellular Respiration’s Role

\_\_\_\_\_ The Cycle Itself (Figure 1 on Page 49)

\_\_\_\_\_ Inorganic Reservoirs

\_\_\_\_\_ Organic Reservoirs

\_\_\_\_\_ Human Impacts

\_\_\_\_\_ The Oxygen Cycle

\_\_\_\_\_ Photosynthesis & Cellular Respiration’s Role

\_\_\_\_\_ Oxygen gas and Ozone

\_\_\_\_\_ Importance to living things and chemical reactions

\_\_\_\_\_ The Nitrogen Cycle

\_\_\_\_\_ Importance of N

\_\_\_\_\_ N2 in the Atmosphere (directly useful or not?)

\_\_\_\_\_ Nitrogen Fixation

\_\_\_\_\_ Nitrification

\_\_\_\_\_ Denitrification

\_\_\_\_\_ The Cycle Itself (Figure 1 on Page 60)

\_\_\_\_\_ The Phosphorous Cycle

\_\_\_\_\_ Importance of P

\_\_\_\_\_ Long vs. Short Term Cycles

\_\_\_\_\_ The Cycle Itself (Figure 6 on Page 63)

\_\_\_\_\_The Albedo Effect

\_\_\_\_\_ Agriculture’s Impact on Nutrient Cycles

**Unit 2 – Ecosystems and Population Changes**

\_\_\_\_\_ Ecology, Ecosystems, Ecotones, Ecological Niches, and Biodiversity

\_\_\_\_\_ Populations and Communities

\_\_\_\_\_ Disturbances and Introduction of Exotic Species

\_\_\_\_\_ Methods of Species Introduction

\_\_\_\_\_ Exotic vs. Native Species

\_\_\_\_\_ What are Populations Controls? Examples?

\_\_\_\_\_ The Biosphere and Canadian Terrestrial Biomes and Aquatic Biomes

\_\_\_\_\_ Lake Ecosystems and Zones of Lakes

\_\_\_\_\_ Alberta Ecosystems (Taiga, Muskeg, Grassland, Deciduous)

* + Characteristics, areas, etc

\_\_\_\_\_ Factors Affecting Terrestrial Ecosystems

* + How does each impact the ecosystem?

\_\_\_\_\_ Layers of Soil

\_\_\_\_\_ Factors Affecting Aquatic Ecosystems

* + How does each effect the ecosystem?

\_\_\_\_\_ Seasonal Changes in Lakes

\_\_\_\_\_ Biotic Potential and the 4 Factors that Impact It

\_\_\_\_\_ Abiotic and Biotic Factors the Limit Populations (ex. light, temp, chemistry, food supply, predator, disease, competition)

\_\_\_\_\_ Carrying Capacity and Population Controls

\_\_\_\_\_ The Law of Tolerance (know the graph!)

\_\_\_\_\_ Density-Dependent & Density-Independent Factors (What are these? Examples?)

\_\_\_\_\_ Deforestation, Impacts of Deforestation, and the Three Categories of Deforestation

\_\_\_\_\_ Oligotrophic vs. Eutrophic Lakes and Eutrophication

\_\_\_\_\_ Types of Water Pollution and Indicators of Water Quality

\_\_\_\_\_ What is Evolution?

\_\_\_\_\_ Taxonomy and the 7 Taxa, Binomial Nomenclature, and the Kingdoms (& their characteristics)

\_\_\_\_\_ Eukaryotes vs. Prokaryotes

\_\_\_\_\_ Phylogeny and Phylogenetic Trees

\_\_\_\_\_ Evidence for Evolution

* + Paleontology, geological changes, biogeography
  + Anatomy, DNA and Inheritance, Artificial Selection, and Vestigial Features

\_\_\_\_\_ Theories of Evolution

* + Lamarck and Darwin`s theories(Spontaneous Generation, Inheritance of Acquired Characteristics, Natural Selection, etc.)

\_\_\_\_\_ Mutations role in Inherited Variability

\_\_\_\_\_ Sexual vs. Asexual Reproduction and their role in Inherited Variability

\_\_\_\_\_ Speciation and Allopatric Speciation

\_\_\_\_\_ Theory of Gradualism vs. Theory of Punctuated Equilibrium

\_\_\_\_\_ Macroevolution (biodiversity since beginning of life, extinction events, and divergent evolution)

**Unit 3 - Photosynthesis and Cellular Respiration**

Photosynthesis:

\_\_\_ Photons

\_\_\_ The Electromagnetic Spectrum (Energy, Wavelengths, and Types of Light)

\_\_\_ Autotrophs vs. Heterotrophs

\_\_\_ Pigments: Chlorophyll a, Chlorophyll b, Carotenoids, Absorption and Reflection

\_\_\_ Structural Components of Chloroplasts (Stroma, Thylakoid, Grana, etc.)

\_\_\_ Energy-Rich Molecules (ATP, NADPH, GLUCOSE)

\_\_\_ Step 1: - Capturing Solar Energy

- Photolysis

\_\_\_ Step 2: - Electron Transport Chain

- Redox Reactions

- Active Transport of H+

- NADP+ reduced to NADPH

\_\_\_ Chemiosmosis and ATP Synthase

\_\_\_ Step 3: - Carbon Fixation

- Calvin Cycle

- # of ATP and NADPH to make glucose

Cellular Respiration:

\_\_\_ Cellular Uses of ATP Energy

\_\_\_ Structural Components of Mitochondria

\_\_\_ Efficiency of Cellular Respiration

\_\_\_ Chemical Reaction Summary (for Aerobic & Anaerobics)

\_\_\_ Aerobic

🡪 Glycolysis

🡪 Pyruvate Oxidation

🡪 Krebs Cycle

🡪 Electron Transport Chain and Chemiosmosis

\_\_\_ Anaerobic

🡪 Glycolysis

🡪 Fermentation (Lactic Acid & Alcohol)

\_\_\_ Applications of Alcohol Fermentation

\_\_\_ VO2 Max

\_\_\_ Lactic Acid Threshold

**Unit 4A – Nutrients, Enzymes, Digestive System, Respiratory and Motor Systems**

\_\_\_ Carbohydrates (Mono, Di, & Polyssacharides, Isomers, Polymers, etc)

\_\_\_ Lipids (Saturated and Unsaturated Fatty Acids, Phospholipids, Oils, Waxes, etc.)

\_\_\_ Proteins (Amino Acids, Protein Structure, Denaturation, Coagulation, etc.)

\_\_\_ Dehydration Synthesis

\_\_\_ ID of nutrients with indicators (Benedicts, Lugols Iodine, Biuret, Paper Bag)

\_\_\_ Enzymes (Cofactors, Coenzymes, Induced-Fit Model, Factors Effecting Enzyme Reactions, Effects on Indicator reactions)

\_\_\_ Process of Ingestion

\_\_\_ Salivary Glands, Teeth, Stomach,

\_\_\_ Process of Digestion

\_\_\_ Small Intestine, Pancreas, Gall Bladder, Large Intestine

\_\_\_ Hormonal Control of Digestion (Release organ & Target organ)

\_\_\_ Process of Respiration

\_\_\_ Components of the Respiratory System (trachea, cilia, epiglottis, bronchi, alveoli, etc.)

\_\_\_ Breathing Movements (intercostal muscles, diaphragm, etc)

\_\_\_ Gas Exchange of Respiration (oxygen transport, carbon dioxide transport)

\_\_\_ Regulating Breathing Movements (chemoreceptors, body’s response to exercise, etc.)

\_\_\_ Disorders of the Respiratory System (bronchitis, emphysema, asthma)

\_\_\_ Types of Muscles (smooth vs. cardiac vs. skeletal)

\_\_\_ Antagonistic muscles, Flexor Muscles, Extensor Muscles, Fast vs. Slow Twitch

\_\_\_ Process of Muscle Contraction

**Unit 4B – Circulatory, Immune, & Excretory**

\_\_\_ Veins vs. Arteries, Arterioles, Venules, Capillaries

\_\_\_ Pulmonary vs. Systemic Circulatory Systems

\_\_\_ Deoxygenated and Oxygenated Blood

\_\_\_ The Heart (Atria, AV Valves, Semi-Lunar Valves, Ventricles, Chordae Tendonae, SA Node, AV node, Purkinje Fibres)

\_\_\_ Coronary Arteries

\_\_\_ Atherosclerosis and Aneurysms

\_\_\_ ECG, Diastole, Systole, Blood Pressure, Diastolic Blood Pressure, Systolic Blood Pressure

\_\_\_ Cardiac Output, Stroke Volume, Heart Rate

\_\_\_ Blood Components and Functions

\_\_\_ Capillary Fluid Exchange, Extracellular Fluid, Edema

\_\_\_ Lymphatic System

\_\_\_ Thermoregulation, Responses to Body Temperature Change,

\_\_\_ Red Blood Cells, White Blood Cells

\_\_\_ Anemia

\_\_\_ Blood Clotting Process, Agglutination

\_\_\_ Blood Types and Transfusions

\_\_\_ First Line of Defence = Skin, Lysozymes, Mucus, Cilia, Stomach Acids and Enzymes

\_\_\_ Second Line of Defence = Phagocytosis, Inflammatory Response, Fever

\_\_\_ Third Line of Defence = Complement Proteins, B Cells, T Cells, Antigen-Antibody Relationship, Helper T Cells, Killer T Cells, Suppressor T Cells, Memory B Cells

\_\_\_ Allergies, Transplant Rejections, Autoimmune Diseases

\_\_\_ Excretory System, Deamination, Anatomy of the Urinary System, Cross Section of a Kidney

\_\_\_ The Parts of the Nephron

\_\_\_ Formation of Urine (Filtration, Reabsorption, Secretion)

\_\_\_ pH Balance in Kidney, Hormonal Control of Excretion, Diabetes, Nephritis, Kidney Stones, Kidney

Transplants