**12th Grade Biology Syllabus – Zoology and Evolution**

**October 24th – November 18th 2016**

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**Guiding Block Questions:**

1. What is life?
2. How did life begin?
3. How is it that life transforms?
4. Where has life’s diversity come from?
5. How is it that the complex organizational patterns of life arise?
6. What was the first animal? How did animals evolve?
7. What are the patterns/links of commonality between animals, plants and other organisms?
8. Where did human beings come from? What is the story of human evolution?
9. What is our place, as human beings, in the animal kingdom?
10. How can we learn from nature’s systems and apply its patterns to our systems/technologies?

**Guiding Block Goals**

1. Students continually draw connections between the content of the block and their own experiences.
2. Students’ perspectives, and understanding of the world are transformed and deepened.
3. Students feel as if they are an integral part of the classroom community.
4. Students feel comfortable taking risks and that failure is a precursor to attaining success.

**Curricula may include these topics:**

Zoological Classification System

Major Phyla of the Animal Kingdom

Evolutionary Theory, Population Genetics and Ecology

Origins of Life

Evolutionary History of the Animal Kingdom

**Grading Major Dates**

Participation/Labs 15% Tuesday, November 1st – No School

Quizzes 10% Monday, November 7th – Midterm Exam

Midterm 25% Tuesday, November 8th – Election Day, vote if you can!

Final 25% Friday, November 11th – No School, Veteran’s Day

MLB 25% Friday, November 18th – Final Exam, Last Day of Block!

 Monday, November 21st – Main Lesson Book Due

**Participation:** Students will be graded daily on participation. Students must actively participate in careful observation, thoughtful analysis and reflection. Students are expected to participate cooperatively and wholeheartedly in all activities, including listening carefully to others and helping to create an environment where others can learn.

**Main Lesson Book Structure**

How can you organize the content of your book so that you understand the linkages between the different concepts; that you see it as one unfolding, interconnected story? Address the guiding block questions. Keep a log of your questions.

Your main goal for the book is to create a cohesive narrative that weaves together the concepts, ideas, and phenomena from this block. That being the main goal, you are free to structure the book in any way you’d like. The main function of the book is to assist you with the exams, so piece it together in a way that it tells the story of this block, but do it in a way that makes sense to you. The book ***is not*** expected to be of a finished quality, it should function as a resource for your success.

**Biology IV: Course Outline**

**Course Introduction:** Block Goals, grading, content, course structure, block themes/questions

**Day 1 –**

The Emergence of Earth and the Solar System (The Universe Story; pgs. 81 – 95)

 Crisis and Catastrophe as Creative Forces…

What is Life? (Chapter 1; pgs. 2 – 18)

The Properties of Living Things

 Levels of Biological Organization

 From Ecosystems to Cells

 Ecosystems Dynamics and Energy Conversion

 The Specialness of Cells

 Emergent Properties of Systems

 Grouping Life

 The Three Domains

 The Tree of life

The Origin of Life on Earth: Abiogenesis (Chapter 26; pgs. 512 – 516)

HW: Read “Researchers May Have Solved the Origin of Life Conundrum” and

 “Meet Luca, the Ancestor of All Living Things”

**Day 2 –**

Continue The Origin of Life on Earth: Abiogenesis

 Prokaryotes (Chapter 27; pgs. 534 – 547)

 Structure and Functions

 Reproduction

 Adaptations

 Roles and Symbiotic Relationships

Photosynthesis and the Oxygen Revolution (Review Chapter 26; pgs. 522 – 525)

 The Invention of Photosynthesis through Electron Transport Systems

 Endosymbiosis (Chapter 28; pgs. 550 – 551)

**Lab:** Emergent Properties of Coacervates

**Day 3 –**

Darwinian Evolution and the Modern Synthesis

 Review of DNA Structure and Function

 Review of Protein Biosynthesis

 Mutations and their Role in Evolution (Chapter 17; 328 – 330)

 The Fossil Record

 Mass Extinctions and Eons, Eras, Periods & Epochs

 Review of Darwinian Evolution (Chapter 22)

 Predarwinian Ideas on Evolution (pgs. 438 – 441)

 Linnaeus

 Hutton

 Lamarck

 Malthus

 Cuvier

 Lyell

 Darwin’s Research

Adaptation and Natural Selection (pgs. 441 – 446)

The Evolution of Populations (chapter 23)

 Microevolution (pgs. 454 – 455)

 Gene Pools and Frequencies (pgs. 455 – 456)

 Forces of Evolution other than Natural Selection (pgs. 459 – 462)

 Natural Selection as the primary Force of Adaptive Evolution (pgs. 462 – 470

The Evidence for Evolution (pgs. 446 – 451)

The Origin of Species through Macroevolution Events (Chapter 24)

**Day 4 –**

The Protists (Chapter 28; pgs. 549 – 571)

Characterization

 Basic Characteristics (pgs. 549 – 550)

 Characteristics of :

Euglena (pgs. 553 – 554)

 Paramecium (pgs. 556 – 558)

 Diatoms (pgs. 559 – 560)

 Radiolaria, Foraminifera (pg. 563)

Amoeba (pg. 564; Gymnamoebas & Figure 28.24))

 Algae: Red, Green, Spirogyra and Volvox (pg. 567 – 568)

Conjugation and Reproduction: Contrasts with the Prokaryotes (pg. 557)

**Lab:** Bacteria and Antibiotic Resistance

**Lab:**  Protist Viewing

**Day 5 –**

 Patterns of Relationship within the Animal Kingdom

The Systematics and Phylogeny of Animals (Chapter 25)

Linneaus Classification Structure (Chapter 26; pgs. 529 – 531 & Chapter 32; pgs 633 – 636)

 Characteristics of Animals (Chapter 32)

 Cell Structure and Specialization (pgs. 626 – 627)

 Reproduction and Development (pg. 627)

 Body Plans (pgs. 630 – 633)

What were the first animals? How did they arise? What makes an animal an animal?

 The Colonial Flagellate Hypothesis (Chapter 26; pgs. 525 – 526 & Chapter 32; pg. 628)

The Cambrain Explosion (Chapter 32; pgs. 628 – 629)

 Phylum Porifera (Chapter 33; pgs. 638 & 642 – 643)

**Lab:** Examining Phylum Porifera

**Lab:** Bacteria and Antibiotic Resistance – Observations

**Day 6** –

**Finish Lab:** Examining Phylum Porifera

**Finish Lab:** Bacteria and Antibiotic Resistance – Observations

Radiate Animals

 Phylum Cnidaria (Chapter 33; pgs. 643 – 645)

Bilateral Animals

Phylum Platyhelminthes (Chapter 33; pgs. 646 – 648)

**Day 7 – Lab Work**

**Lab:** Observations of Phylum Cnidaria

**Lab:** Observations of Phylum Platyhelminthes

 Pseudocoelomate Animals

 Phylum Nematoda (pgs. 655 – 656)

 Phylum Rotifera (pgs. 648 – 649)

 Phylum Tardigrada

**Day 8 –**

 **Lab:** ObservingPhylum Nematoda

 **Lab:** ObservingPhylum Rotifera

 **Lab:** Observing Phylum Tardigrada

**Day 9 –**

**Midterm Review**

**Day 10**

**Midterm Exam**

**Day 11 –**

Coelomate Animals

Phylum Mollusca (pgs. 650 – 653)

Phylum Annelida (The CO2 Revolution) (pgs. 653 – 655)

Phylum Arthropoda (The Colonization of Land) (pgs. 656 – 665)

**Day 12 –**

**Lab:** Phylum Mollusca

 **Lab:** Phylum Annelida

 **Lab:** Phylum Arthropoda

**Day 13 –**

The Deuterostomes

 Phylum Echinodermata (pgs. 665 – 668)

 Phylum Chordata (Chapter 34)

 Defining Characteristics

 Subphylum Urochordata (Tunicates)

 Subphylum Cephalochordata (Lancelets)

**Day 14 –**

**Labs**: Phylum Echinodermata

Urochordata and Amphioxus

**Lecture/Discussion**

Vertebrate Evolution

 Craniates

 Class Myxini (Hagfishes)

Subphylum Vertebrata

 Gnathostomes

 Class Chonrichthyans

 Ray and Lobe – Finned Fishes (Clade Osteichthyes)

 Tetrapods

 Class Amphibia

 Amniotes

 Class Reptilia

 Birds

 Class Aves

 Mammals

 Class Mammalia

**Day 15 –**

**Labs:** Examining Fish, Amphibians, Reptiles, and Mammals (45 min.)

**Lecture/Discussion:** Human Evolution – The Australopithecines

**Day 16 –**

**Lecture/Discussion:** Human Evolution – The Homo Genus

**Labs:** The Pathways of Human Evolution (30 min.)

**Day 17 –**

**Course Review**

**Day 18**

**Final Exam**