

Zoology/Botany Syllabus

(Honors & General Ed.)

Mr. Centanni; acentanni@tempeunion.org

Corona del Sol High School - Room E088

Office Hours: Tu & Th 2:20-3:30pm

Course Description

Zoology is the scientific study of animals and **Botany** is the scientific study of plants. **ZoBot** is a class where we use animals and plants to better understand how and why species have evolved into their current (and past) forms. We apply science & engineering practices to better understand & interact with the living world around us, developing useful life and job skills along the way.

Topics	Standards	Cross-Cutting Concepts
Core Phenomena of Evolution Mechanisms of Evolution Animal & Plant Evolution Life and Job Skills (Varies by project)	NGSS High School Life Sciences Standards NGSS Science & Engineering Practices	NGSS Cross-cutting Concepts Energy & Matter: Properties of water (polarity, osmosis, etc.), photosynthesis, etc. Scale & Proportion: Surface area-to-volume ratio Structure & Function: Protein shapes, anatomy, etc. Stability & Change: Evolutionarily stable strategies vs. new adaptations

Recommended Materials

1. A #2 pencil
2. A 1 in., 3-ring binder (can be left in the classroom)
3. Dividers (at least 4; one for each quarter)

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Classroom Rules

These rules are designed to create an engaging, scientific learning environment:

1. Do not talk while your teacher is instructing.
2. Do not talk while your peers are presenting.
3. Raise your hand to ask/answer questions.
4. Do not leave the classroom unless permitted.
5. Always exercise lab safety.
6. Only use lab equipment if you've been trained.
7. Treat all live specimens humanely.
8. Treat all preserved specimens with care.
9. Use respectful language.
10. Keep your tables & lab stations clean and tidy.
11. Compost whenever possible.
12. Phones, gaming devices, etc. are not permitted.

Consequences for Misbehavior

Consequences for misbehavior will follow the progression below:

1. **Warning** - I will ask the student to stop the behavior during class.
2. **After-class Conference** - I will speak with the student after class.
3. **Home Contact** - I will call the students' guardians to discuss the behavior.
4. **Referral** - I will refer the student to administration for disciplinary action.

In addition, students will start each day with 2 "Conduct Points". Each time they break a classroom rule, a point is deducted, until they run out for the day. Given that there are 45 days in each quarter, students' behavior scores will be out of a total of 90 points, posted each quarter for parents to see. **NOTE: Behavior scores do not affect students' academic grade; they are simply a way for parents/guardians to see information about their child's behavior in class.**

Weekly Schedule

**This schedule starts during Week 2, and is subject to change depending on holidays, half days, etc.*

Case Studies	Students will participate in an exploration of a Case Study.
Project Work	Students have time to work independently/collaboratively on their ZoBot Projects.
Lab Exercises	Students will practice biology lab techniques/exercises.
Assessment	Students will test their knowledge of key concepts.

Row	Monday	Tuesday	Wednesday	Thursday	Friday
1	Case Study	Case Study	Quiz	Lab Exercise	Project Work
2	Case Study	Case Study	Quiz	Project Work	Lab Exercise
3	Case Study	Case Study	Quiz	Lab Exercise	Project Work
4	Case Study	Case Study	Quiz	Project Work	Lab Exercise

Grading Scale

The grading scale for Mr. Centanni's class is as follows:

A = 90-100%
 B = 80-89%
 C = 70-79%
 D = 60-69%
 F = 0-59%

Evaluation Process

Students are evaluated via weekly quizzes, cumulative quarterly tests, and periodic project checks. See the next page for a more detailed overview of students' grades throughout each semester.

Grades (Semester 1)					
Weekly Quizzes Total ____/180 (+1 EC for each complete Journal entry)				ZoBot Project Total ____/110	Tests Total ____/210
____/10	____/10	____/10	____/10	ZoBot Project Proposal ____/10	Lab Safety Quiz 1____/10
____/10	____/10	____/10	____/10	Progress 1 SMART Goal ✓ ____/25	Q1 Test ____/50
____/10	____/10	____/10	____/10	Quarter 1 SMART Goal ✓ ____/25	S1 Lab Practical ____/50
____/10	____/10	____/10	____/10	Progress 2 SMART Goal ✓ ____/25	Q2 Test ____/50
____/10		____/10		Quarter 2 SMART Goal ✓ ____/25	
Semester 1 Total			____/450		

Grades (Semester 2)					
Weekly Quizzes Total ____/180 (+1 EC for each complete Journal entry)				ZoBot Project Total ____/210	Tests Total ____/210
____/10	____/10	____/10	____/10	ZoBot Project Proposal Update ____/10	Lab Safety Quiz 2____/10
____/10	____/10	____/10	____/10	Progress 3 SMART Goal ✓ ____/25	Q3 Test ____/50
____/10	____/10	____/10	____/10	Quarter 3 SMART Goal ✓ ____/25	S2 Lab Practical ____/50
____/10	____/10	____/10	____/10	Progress 4 SMART Goal ✓ ____/25	Q4 Test ____/50
____/10		____/10		Quarter 4 SMART Goal ✓ ____/25	ZoBot Project Final Evaluation ____/100
Semester 2 Total			____/550		

Honors vs. General Ed. Requirements

Students taking the course for Honors credit have higher standards of work compared to General Ed. students; the specifics are listed below:

- **Case Studies** - In addition to those completed in class during Case Study days, Honors students are expected to complete a handful of specific case studies which contain more challenging content than the rest. These case studies are identified on the Activity Calendar.
- **Tests** - Honors students have different test versions than General Ed. students, which contain more challenging questions, some of which are based on the Case Studies described above.
- **Final Project Review** - Honors students are expected to present their work to the entire class during their end-of-year review, instead of just the instructor. This simulates the process scientists go through when defending a thesis, giving a dissertation, presenting a proposal, etc.

Core Phenomena

“Phenomena” are events or patterns that occur in the natural world. “Core Phenomena” are events and patterns that are at the *core* of how and why species change.

How change happens	1. Mutation	Errors in the process of copying DNA are called mutations . When mutations occur during the creation of gametes (sex cells), the resulting offspring may have an altered <i>phenotype</i> .
	2. Gene Duplication	Mistakes during meiosis (errors in recombination , jumping genes , etc.) can result in sections of DNA (genes) becoming duplicated. These duplicate copies often accumulate mutations and gain new functions.
	3. Co-option	When an existing gene/trait evolves a new function, we say it has been <i>co-opted</i> . Since co-opting an existing trait takes fewer steps than creating a new one “from scratch,” it is very common in the story of life.
	4. Phenotype	An organism’s set of characteristics, or <i>phenotype</i> , is determined by the interaction between its genes and its environment. This phenotype, in turn, is what determines its fitness , or ability to pass on its genes.
Why change happens	5. Gene Transfer	During reproduction, organisms pass down their genes - <i>vertically</i> - to the next generation. Sometimes, organisms even exchange genes with members of other species - <i>horizontally</i> - within the same generation. Natural selection usually determines which genes are passed down more frequently, but sometimes genes get passed down more frequently due to random chance. When this happens, it’s called genetic drift .
	6. Availability	Species don’t necessarily evolve the best solutions to environmental problems. Instead, they evolve what is <i>available</i> to them in their genome (i.e. whatever mutations they happen to get, that work).
	7. Trade-off	Often, an increase in the fitness of one trait causes a decrease in the fitness of another, so whether or not a new trait is <i>selected for</i> (by “Natural Selection”) depends on if its benefits outweigh its costs.
	8. Coevolution	Organisms interact with many others on a daily basis. Those who are better at these interactions tend to be fitter . As such, species often evolve new traits <i>in response</i> to those they interact with. When this occurs, it is called <i>coevolution</i> .
	9. Niche Occupation	Niche occupation is the process of occupying a niche, wherein an organism’s niche is its unique way of interacting with its environment. Species evolve into specific niches because those who can take advantage of unique resources tend to avoid competition, and thus have higher fitness.

NOTE: Questions about Core Phenomena appear on every Quarter Test.

Key Vocabulary

Key vocabulary terms are those that are essential to know in order to communicate about plant and animal evolution. They will often appear in quiz and test questions, and can be studied via the Practice Sets posted on *app.formative.com*

Quarter 1		Quarter 2	
• Evolution • Natural selection • Gene • Allele ◦ Dominant ◦ Recessive ◦ Semi-dominant • Genotype • Phenotype • Mutation • Vertical gene transfer	• Horizontal gene transfer • Niche • Fitness • Co-option • Coevolution • Protein/enzyme • Body fossil vs. trace fossil • Germ layer • Kin selection • Analogous traits/convergence	• Homologous traits • <i>Major animal phyla & their defining characteristics:</i> Porifera, Cnidaria, Annelida, Mollusca, Nematoda, Onychophora, Arthropoda, Echinodermata, Chordata • <i>Major chordate clades & their defining characteristics:</i> Chondrichthyes, Actinopterygii, Sarcopterygii, Sauropsida, Synapsida	• Sexual Selection • Metamorphosis • Adaptive Radiation • Key adaptation • Evolutionary arms race • Surface area & volume • Reciprocity • Polarity • Cohesion/adhesion • Bipedal • Tool • Culture (<i>noun</i>)
Quarter 3		Quarter 4	
• Agriculture • Horticulture • Artificial selection • Regulatory gene • Genetic engineering • <i>The “Three Sisters” & their horticultural relationship</i> • Domestication • Soil (& its 5 components) • Soil texture vs. structure • Macropores vs. Micropores • Field capacity • Erosion • Crop Rotation	• Nitrogen fixation • Symbiosis (and types) • Mycorrhizae • Photosynthesis (reactants & products) • Cuticle • Stoma/stomata • Lignin • Gamete/spore • Gametophyte/sporophyte • Horizontal gene transfer • -phyll; -phyte/phyto- • Pollen & ovules • Seed	• <i>Major plant clades & their defining characteristics:</i> Bryophytes, Embryophytes, Lycophytes, Polypodiophytes, Gymnosperms, Angiosperms • <i>Vascular plant organs:</i> leaves, roots, stems, sporangia/cones/flowers • <i>Vascular plant cell types:</i> xylem, phloem (Bonus: parenchyma, sclerenchyma, collenchyma). • Ecological anachronism • Syndrome	• Fruit, drupe, berry • Receptor • Haustorium • <i>3 primary environmental pressures in the Sonoran Desert</i> • Somatic cell • Nurse plant • CAM vs. C₄ vs. C₃ photosynthesis (basic differences) • Invasive species • (<i>Reviews of other terms</i>)