Agreaux-Ecology: Knowledge and Technology to Feed the World"

Lesson Overview and Activities
11.02.2018 @ Lee High School - Bldg "D" WOW Space

Overarching Goal: Increase the number of students who are interested in and value STEM as a fascinating and satisfying career choice.
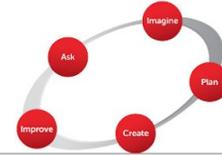
- Apply STEM skills and practices in fun and relevant challenges.
- Problem-solve critical global issues in a team setting.
- Apply the Engineering Design Process while learning more about the fields of mechanical, civil, and environmental engineering.
- Students will learn the concepts of how agriculture and all natural resource areas are interrelated, and how the use of new technologies are key to increase food production.
- Students will understand the importance of moving toward sustainable farming systems to conserve natural resources, mitigate climate change, reduce erosion and protect water quality and quantity, and promote pollination.

8:00 **-** **8:30** **(30m)**	**Welcome, Agenda, & Goals** ○ Teams settle in (15m) ○ Overview of the day and volunteer introductions (10m) **Video:** https://www.youtube.com/watch?v=VcSX4ytEfcE ○ Students will gain an understanding of the main issue: *There are many articles that estimate the population of the Earth to be approximately 9 billion by the year 2050. One of the primary concerns for the agricultural industry is how will farmers be able to grow enough food to feed this growing population, while also protecting natural resources such as soil, water, air, wildlife, and forestry resources.* (VERY BRIEF)	Articles Demonstrations Breakout groups
8:30 **-** **9:25** **(55m)**	**Activity 1 "Crops: Growing Problems"** ○ **Break-out Groups:** teams separate into 6 focus groups (topics: soil, pollinator health, weed management, dead zones, fossil fuels, water) Resources: http://www.foodsystemprimer.org/food-production/crops-and-ecology/ http://www.foodspanlearning.org/_pdf/lesson-plan/unit2/lesson1-crops-handout.pdf ○ Each group reads respective article, discusses, participates in a demo and creates a visual ○ Break-out groups present to whole group	
9:30 **-** **9:50**	**Activity 2: Soil** ○ Soil demonstration by guest speaker (Brandon Waltman a Resource Soil Scientist with the USDA) **Short Break (10m)**	

Time	Activity	Materials
10:00 - **10:30** **(30m)**	**Activity 3: Exploring Technology in Agriculture** NOTES: High Technology Farming is a broad concept which refers to a wide range of new tools (Robotics, ICT, Big Data, Earth Observation, etc.) which allows the shifting to the new paradigm of Sustainable Precision Agriculture. Accelerating the adoption of high and new technologies that can improve the performance of farming practices and farm management. Specific objectives are: adoption of advanced agri-technologies in small and family farms; new solutions for early detection of pests and diseases; improvement of livestock health and wellbeing. They are segmented in the following technology areas: EYES & TOUCH to monitor what is happening (Meteo sensors, Soil sensors, Canopy sensors, Product sensors; On-board/proximal sensors), MIND to elaborate data and provide instructions (Data acquisition, Data analysis, Layers/images, DSS), INTELLIGENT ARMS to do precise and timely activities (Machineries, Programming/Automation, Robotic), technology oriented SERVICES (Installing, Maintenance, Repairing), and educational oriented SERVICES (Training, Demo farms and sites). ○ **Intro and pass out tablets** (5min) ○ Each team assigned a technology to 'research' & create a poster (15 min) ○ Gallery walk to view all posters (10 min)	Videos Tablets Chart paper
10:35 - **10:50**	**Activity 4: Career Panel** **Career Panel (15m)** **Small Break (10m)**	Volunteers
11:00 - **11:45** **(45m)** **"Working lunch"**	**Activity 5: Main Challenge - Sustain Louisiana** Each team is assigned 1 Louisiana agricultural industry product and must find a way to make it more sustainable and use some kind of technology they have learned about. Teams will use the engineering design process to brainstorm solution, build a model, and present to entire group via technology or oral presentation. A rubric will be used to rank teams according to quality of research, sustainable practices used, innovative tech used, organization and delivery of model. ○ Intro to challenge and parameters ○ Research Link: https://www.lsuagcenter.com/portals/communications/publications/publications_catalog/crops_livestock/best%20management%20practices	Model Materials Tablet Research materials and links
11:50 **12:50** **(60m)**	**Main Challenge Student Showcase** ○ Each team presents their challenge and their solution (35 min) ***Students will complete post-survey before getting on buses*** (10m)	Tablets

	EXTRA: Career interest surveys and sites on careers in Ag
	
	● https://www.agexplorer.com/
	  ○ https://www.agexplorer.com/career-interactive
	● Journey 2050 Game(s)
	  ○ http://www.journey2050.com/games/webgl/index.html
		Tablets and Chromebooks

Engineering Design Process

ASK or Identify Problem	Why is farming an important occupation? • What would happen if we ran out of food? How do we balance having affordable food and products and having responsibly run farms? • What are farmers already doing to carefully produce your product?
IMAGINE Solutions & Research	What are the water, soil quality needs? Is erosion an issue? How can wildlife co-exist? How will you treat diseases and pests? What sustainable practices should be used?
DESIGN	Diagram the model. Note materials needed. What will the farm look like? What products will be used? What materials are needed to build a model?
CREATE	Use materials to build model. Create a script to tell the story.
TEST & Improve	Be ready to explain why you chose these solutions. Why do they work best?
SHARE	Tell your story of a better build. What is your favorite part of the design? What aspect could be improved?

Rubric   Team: _____

	4 Points (Exemplary)	3 Points (Average)	2 Points (Okay)	1 Point (Weak)
Research	Accurate information taken from several sources	Accurate information taken from a couple of sources	Accurate information taken from 1 source	Weak level of information
Sustainable practices	Several solid sustainable practices	A couple of sustainable practices	One solid sustainable practice	Weak level of sustainable practices used
Use of technology	Exemplary innovation	Solid technology innovation	Weak technology innovation	Very weak technology use
Design sketch	Neat and very detailed	Somewhat detailed	Very little detail	Almost no detail
Model construction	Great care and follows plan w details	Construction good but could use more details	Construction okay has some detail	Poor construction and little detail
Presentation	Amazing organization and delivery	Average organization and delivery	Okay organization and delivery	Weak organization and delivery

AgroEcology Teacher Notes	GEN READY
Our Favorite Sites for Agriculture and Environmental Education	
FoodSpan - Teaching the Food System from farm to fork	http://www.foodspanlearning.org/
Food System Primer - Great resource for information in all areas of agroecology	http://www.foodsystemprimer.org/
Ag in the Classroom - Amazing set of lessons and activities	https://www.agclassroom.org/index.cfm
Ag in the Classroom - Simulation Games	https://www.agclassroom.org/student/games.cfm
Discovering FarmLand - Great source of lessons, interactives, infographics	http://www.discoveringfarmland.com/curriculum
Iowa - Ag Literacy Lessons and Curriculum	http://www.iowaagliteracy.org/resources/lesson-plans/lesson-plans.aspx
The Purple Plow - Great Lessons	http://www.purpleplow.org/past-challenges/

Our Sites:

http://FoundationEBR.org

http://GENREADYLA.org