



AMBASSADORS AFTER-SCHOOL PROGRAM

School Year 2019-2020

OVERVIEW

Focus: The Ambassadors Program is an innovative initiative in teaching science and nutrition to students in Grades 4-6.

Participating Schools: Our students come from the four schools that collaborate with the Venture in the Urban Education Alliance: Mullanphy Investigative Learning Center, St. Louis Language Immersion School, St. Margaret of Scotland School, and Tower Grove Christian Academy.

Activities: Each year, the Ambassadors explore atmospheric science and weather, earth science and soil, and biological science and ecosystems. Meeting once a week on Tuesdays from 3:45 to 5:00 at Purcell Hall of St. Margaret of Scotland School for ten or eleven sessions each term, we carry out a major six-week experiment in growing and a variety of brief experiments. We also have field trips to local universities, parks, and sites of interest. We introduce students to the scientific method, to what it is to work as a scientist, to healthy cooking and eating, to art and oral presentation skills, and to computer research and engineering.

Educational Sponsors: Five educational institutions provide the volunteer staff that creates the activities and experiences for the students: Saint Louis University, Washington University, St. Louis Community College at the Danforth Science Center, Harris-Stowe State University, and Saint Louis University High School.

Multi-Year curricular plan: We are currently in Year 2 of a multi-year curriculum, though students can join the cycle at any time and still understand, since we do a lot of review and reinforcement as we go along.

Year 1:

In the fall, *Atmospheric Science:* storm formation; *Earth Science:* the four ingredients of all soils (sand, clay, loam, and compost); *Biological Science:* growing food plants in varying mixtures of these four ingredients; *Artistic and Presentation Skills:* creating a vivid and understandable scientific presentation.

In the spring: *Atmospheric Science:* the Jet Stream; *Earth Science:* basic chemistry of soil; *Biological Science:* growing food plants in varying quantities of one key nutrient, nitrate. *Artistic and Presentation Skills:* creating and presenting a power-point slide show of Ambassadors activities.

Year 2:

In the fall, *Atmospheric Science:* spheres above the earth and their interactions; *Earth Science:* the cycles of soil chemicals produced as dead things are broken down into compost; *Biological Science:* the importance of nutrient-rich compost for the growth of plants and how such compost is formed; *Artistic and Presentation Skills:* creating a skit to teach composting principles to others.

In the spring: *Atmospheric Science:* human influence on the spheres above the earth and their interactions; *Earth Science:* the chemistry of the nitrogen cycle; *Biological Science:* growing food plants in soil that depletes over time and in ecosystems that replenish nitrates and other nutrients. *Artistic and Presentation Skills:* creating and presenting a power-point slide show of the spring experiment and its data.

MAIN EXPERIMENTS FOR SCHOOL YEAR 2019-20

Fall Term: Fall Term: The students will focus on ecosystems and the interaction between terrestrial and aquatic life. An ecocolumn will be constructed in which the students will grow beans and radishes in the terrestrial chamber while fish, snails, and aquatic plants live in the aquatic chamber. The students will measure and observe plant growth over time as well as monitoring the water quality in the aquatic chamber. The plants will be grown in a 'food computer,' a growing chamber in which a small processor controls lighting, air movement, watering, and—in advanced models—carbon dioxide and individual nutrients. Students will record observations and measurements over six-weeks, photographing their plants and analyzing graphing, and presenting their results.

Spring Term: Students will grow five species of food plants in the 'food computer' to see which provides the best conditions for growth: good soil simply watered or gravel supplied with water from a fish tank. The aim is to compare a soil-based system without added fertilizer and an aquaponic ecosystem with fish, worms, bacteria, and other organisms that provide nutrients in a continuous cycle.

SCHEDULE FOR THE YEAR (key days in red)

September 2019

- 17 **Introduction** of staff and Undergraduate Mentors from SLU. Introduction to Fall Term activities. Discussion of what it means to be a scientist. Students plant seedlings for main experiment in a food computer. Introduction to the living things in soil (biota) and the purpose of our main experiment: to study the process of composting and ways to carry it out most effectively. *Parents and Guardians gather for 20 minutes at pick-up time (5:00 pm) for orientation.*
- 24 Introduction to composting. Review of measuring techniques. Students fill out first Experimental Observations and Measurements sheet (EOM) for plant growth in the first week.

October

- 1 **Field trip:** Students visit Saint Louis University for a healthy cooking class offered by the Department of Nutrition and Dietetics.
- 8 Soil biota: students participate in an outdoor learning activity to observe biotic and abiotic factors in soil samples taken from the Venture's I-44 Embankment Garden near St. Margaret of Scotland School. EOM Week 3.
- 15 Soil-to-food web, food chains, and the energy cycle. EOM Week 4. *Parents and guardians gather for 20 minutes at 5:00 pm for mid-term announcements, a progress report, and feedback.*
- 22 Interaction of Earth's systems and spheres of activity. Human effects on spheres and on soil ecosystems . EOM Week 5. SLU Undergraduate Mentors on Fall Break.
- 29 **Harvest day** for plants in the main experiment. Students dig up and wash root balls, writing observations about the size, health, and development of the plants and measuring final heights and sample root lengths. Students also count leaves, blossoms, and fruit, weigh the plants, and record data.

November

- 5 Analysis of data from aquaponics experiment. Introduction to graphing and visual presentation.
- 12 **Visit to SLCC Science Van.** Plan graduation skit on composting.
- 19 Costume and practice graduation skit. Discuss what it has been like to be a scientist.
- 26 **NO AMBASSADORS SESSION: Thanksgiving Break**

December

- 4 **White Coat Ceremony** at St. Margaret of Scotland. Student skit. **Holiday Reception for students, parents, guardians, and families.**

January 2020

- 21 Introduction to Spring Term activities. Information on aquaponic growing and its benefits for both humans and the planet. Discussion of students' role as scientists for the term. Plant seedlings in the food computer, half in an aquaponics setup and half in soil setup. The importance of comparisons in science. **Parents and guardians gather for 20 minutes at 5:00 pm for spring orientation.**
- 28 Introduction to the ecosystems. Nutrients required for growth and overview of the common sources of those nutrients.

February

- 4 Introduction to the vascular system of plants. How they take up nutrients from water. Introduction to soil-less growing, using fish waste as the source of nutrients. EOM Week 2.
- 11 Chemistry of aquaponics: the chemicals excreted by fish and the nitrogen cycle. Symptoms of nutrient deficiency. Students became "plant doctors" and diagnose in several case studies involving sick plants. EOM Week 3.
- 18: Atmospheric chemistry: the carbon cycle. Global warming, conservation of the earth. Preview of water testing on upcoming field trip. EOM Week 4. **Parents and guardians gather for 20 minutes at 5:00 pm for mid-term announcements, a progress report, and feedback.**
- 25 **Harvest day** for plants in the main experiment. Students dig up and wash root balls of plants grown aquaponically and in soil. They carry out measurements, as in the fall.

March

- 3 Analysis of data from aquaponics experiment. Exploration of various methods of graphing and visual presentation.
- 10 **Field trip** to Tower Grove Park. Pond-water testing, observations of soil and water biota
- 17 **NO AMBASSADORS SESSION.** SLU mentors and Mullanphy students will be on Spring Break.
- 24 **NO AMBASSADORS SESSION.** The other Alliance schools will be on Spring Break.
- 31 **Visit to STLCC Lab Van.** Plan Power Point presentation for the Graduation Ceremony.

April

- 7 Plan and practice presentation for the Graduation Ceremony.

14 **Graduation Ceremony** at Tower Grove Christian. Student presentation. *Parents and guardians assess the success of the program and have a reception with staff.*