Botanical Engineering

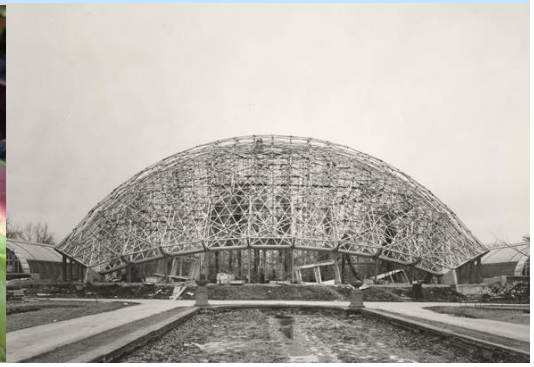
PROGRAM OVERVIEW

NGSS Alignment

LS4.C: Adaptation
LS4.D: Biodiversity and Humans
LS1.C: Organization for Matter and Energy Flow in Organisms
ESS2.D: Weather and Climate
ESS3.C: Human Impacts on Earth Systems
LS1.B: Growth and Development of Organisms
LS4.B: Natural Selection

Pre- and Post-visit resources include suggestions for integrating **Science and Engineering practices** and **Crosscutting Concepts** into activities that align with this experience.

For more information, or to book this program please visit: https://www.missouribotanicalgarden.org/learn-discover/students-teachers/school-programs-and-field-trips
or call the School Programs office and 314-577-5185.



About the Program

Designed for students in 3rd through 8th grades, the *Botanical Engineering* class looks at survival from two perspectives: first: what do plants need to do to adapt to their environments, and second: what do we as human curators of living collections have to do to create a space that will allow highly adapted species to survive here in Missouri? During this program, students will:

- **Discuss the relationship between adaptations and fitness**, as they relate to a given plant's ability to thrive in a given ecosystem.
- **Compare adaptations of plants from different biomes around the world**, noting the structural adaptations each has developed to equip it to survive the challenges posed by those biomes.
- **Visit the Climatron, Kemper Center and Linnean House** to investigate how greenhouses have developed over history and what we do today to simulate rainforest, desert and aquatic environments for our plants. A visit to 1 or more of our **cultural gardens** will show how a "built" environment can house many plants that have the same adaptations native to our Missouri climate.
- **Receive a sample of duckweed** to take home or to the classroom for which students can construct an appropriate environment.

Why Duckweed?

*While duckweed (*Lemna minor*) is often the source of aggravation for aquarium enthusiasts, its ecological and potential economic value has made it a subject of study in recent years. This tiny floater is among the world's smallest flowering plants, and is native to nearly every continent. It prefers calm water and will reproduce quickly under suitable conditions to form a mat over the surface, controlling algae growth. Duckweed also removes impurities from the water, and serves as a high-protein food source for wildlife. In fact, its protein content is so high that dehydrated duckweed is considered a good additive for livestock feed and may even become an important food source for humans in the future.*

Your students will receive a small sample of duckweed and will be challenged to create an environment for their tiny plants that enables them to grow, reproduce and thrive.

This Program Features:

The Linnean House, Climatron®, Chinese Garden, Butterfly Garden/Glade area and Kemper Center

During these outdoor explorations, your students will explore our onsite conservatories, each of which was designed in a different era to enable exotic plants to survive in Missouri's climate. The Linnean House, constructed in the late 1800's, was created to be a Victorian "orangery where citrus and other tropical plants could be housed over winter. The Climatron®, constructed in 1959, used newly-available aluminum, Plexiglas and climate controls to simulate a rainforest environment. The Margaret Grigg Nanjing Friendship Garden, And Ottoman garden are outdoor spaces that host plants with many of the same adaptations found in those native to our Missouri climate and showcase attempts to reconcile gardening with the surrounding "built" environment.

Finally, the William T. Kemper Center for Home Gardening showcases strategies humans have used to breed plants that suit our purposes, such as producing food for us, creating more abundant and varied blooms, or to just survive in Missouri for a given period of time.

- **The Victorian District - Enjoy a walk around the ornate Victorian gardens. Henry Shaw's country home and the Kaiser Maze are also located in the Victorian District, however, both are closed during this time.**
- **The English Woodland Garden - Stroll through a temperate forest and observe the "floor". Look for evidence of decomposition in action, and see what plant/animal interactions you can find.**
- **Seiwa-en - Our 14 acre Japanese strolling garden where students have an opportunity to experience a garden designed around Japanese culture. Feed the koi, walk the zig-zag Yatsuhashi bridges, interpret the dry garden landscapes and see how many different stone lanterns you can find!**

Logistics for Teachers

- Each Botanical Engineering program is approximately **90 minutes** on Garden grounds and 30-45 minutes for pre and post activities (prior to and after visiting the Garden). This program serves a maximum of 60 students.
- Program fees include admission for up to six adults per 30 students. (Additional adults will be charged normal admission rates.) Please try to bring at least **one adult for every five students**.
- Currently there is no lunch space available on Garden grounds and picnicking is prohibited. Please schedule your visit and mealtimes accordingly
- Program availability is limited! Book early!

MISSOURI BOTANICAL GARDEN
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