

Botanical Engineering

PROGRAM OVERVIEW

NGSS Alignment

DCI strands supported:

- LS1.A - Structure and Function
- LS2.B - Cycles of matter and energy transfers in ecosystems.
- LS4.C - Adaptations
- LS4.D - Biodiversity and Humans
- ESS2.A - Earth's Materials and Systems.
- ESS2.C - The Roles of Water in Earth's Surface processes.
- ESS2.D - Weather and Climate
- ESS3.A - Natural Resources
- ESS3.C - Human Impacts on Earth's systems.
- ESS3.D - Global Climate Change
- PS3.B - Conservation of Energy and Energy Transfer
- PS3.D - Energy in Chemical Processes and Everyday Life
- ETS1 - Engineering Design (all)

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



About the Program

Designed for students in 3rd through 12th 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, Temperate House 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.
- 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.

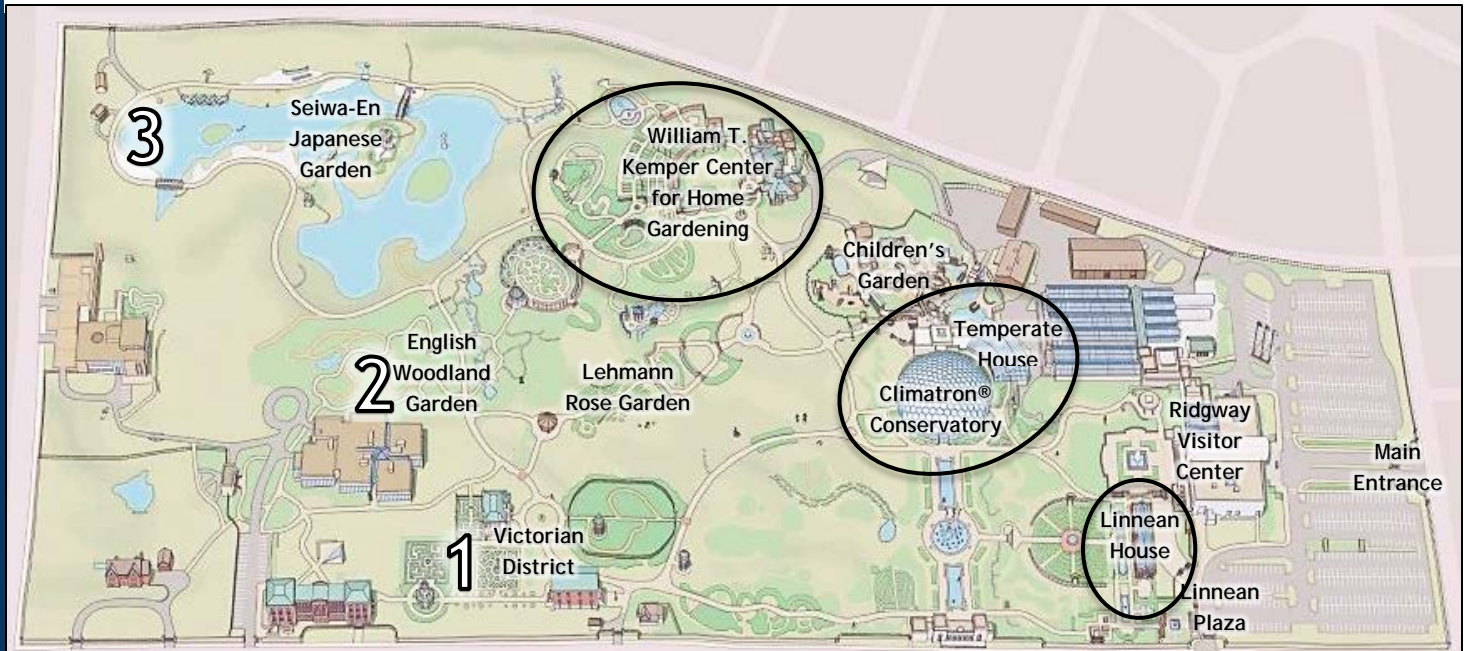
Your students will receive a small sample of duckweed and will be challenged to create an environment for their tiny plants that enables them to grow, reproduce and thrive.



This Program Features:

The Linnean House, Climatron®, Temperate House and Kemper Center

During your group's 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 1800s, 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 Schoenberg Temperate House, erected in 1990, showcases strategies for creating an arid environment for plants from the Mediterranean. Finally, the William T. Kemper Center for Home Gardening showcases strategies humans have used to breed plants that suit our purposes, whether that purpose is to produce more food for us, create more abundant and varied blooms, or just survive in Missouri for a given period of time.



Other Places to Explore...

Make the most of your visit by taking your students to explore the following areas after your program:

1. **The Victorian District** - Visit Henry Shaw's country home and experience what life was like in St. Louis during the mid-1800s. Then enjoy the Kaiser Maze and the ornate Victorian gardens.
2. **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.
3. **Seiwa-en** - Our 14-acre Japanese strolling garden offers students an opportunity to experience a garden designed around Japanese culture. Feed the koi, walk the zig-zag Yatsushashi bridges, interpret the dry garden landscapes and see how many different stone lanterns you can find!

Logistics for Teachers

- ✿ Each Seasonal Snapshot program lasts 2 hours and serves a maximum of 60 students.
- ✿ Up to two programs may be booked on the same day at the same time, pending availability.
- ✿ 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.
- ✿ Groups booking this program may eat lunch in their assigned program space if they wish. (Please note that picnicking on the Garden's grounds is prohibited.)
- ✿ Program availability is limited! Book early!

For more information or to book this program, please visit www.mobot.org/schoolprograms or call the School Programs office at 314-577-5185.



MISSOURI BOTANICAL GARDEN

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