



Engineering For All ^x

At-A-Glance

Intended Audience: Grades 6-8

Course Length: 14 weeks

The Engineering for All (EfA) project has been funded by the National Science Foundation (Grant # DRL 1316601) to create, test, and revise two seven-week modules for middle school technology education classes on the important social contexts of food and water. The units are built on four "drivers" that underpin the Engineering for All approach. These include:

- Promoting the potential of engineering as a social good.
- Revisiting unifying engineering and technology themes (i.e., design, modeling, systems, resources, and human values) in authentic social contexts.
- Using design-based engineering activities as authentic contexts for teaching and learning Science, Technology, Engineering and Mathematics (STEM) ideas and practices
- Using *informed design* as the core pedagogical methodology.

Vertical Farms: Fresh Food for Cities

In order to address the Grand Challenge of producing food for a growing world population, students become "experts" in designing and constructing hydroponic systems. Once their hydroponic systems are up and running and plants are growing, the students receive a message that their firm has been asked to design a hydroponic system for the wall of an existing apartment building.

Small teams compete to design the best possible system. Their work culminates in design drawing and a presentation to their classmates, who will consider each design on its merits, and then work together to plan the best possible design for their client. The overarching goal of this unit is for students to develop engineering design and systems analysis skills while coming to understand that engineering has great potential to be a social good by solving such critical problems as providing food and water for people around the world.

Water: The World in Crisis

To address the grand challenge of improving water availability and safety, students will explore issues of water scarcity, including the effects of unsafe water, water contaminants, and water filtration methods. The unit begins as students are told they have been accepted to be part of a team of engineering students working with the local chapter of Engineers across Borders. Students learn about the world water crisis and water scarcity and become "experts" in "traditional" design and construction of water filtration systems