

Applying Chemistry to Waste Management

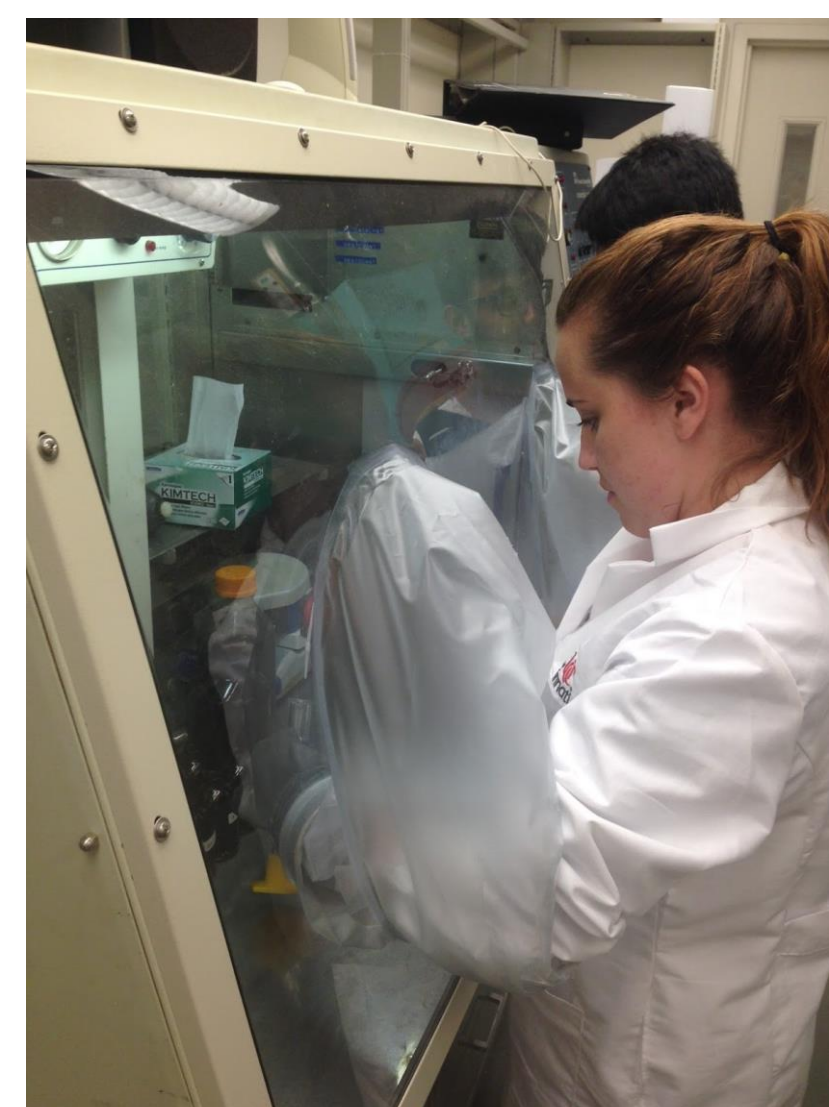
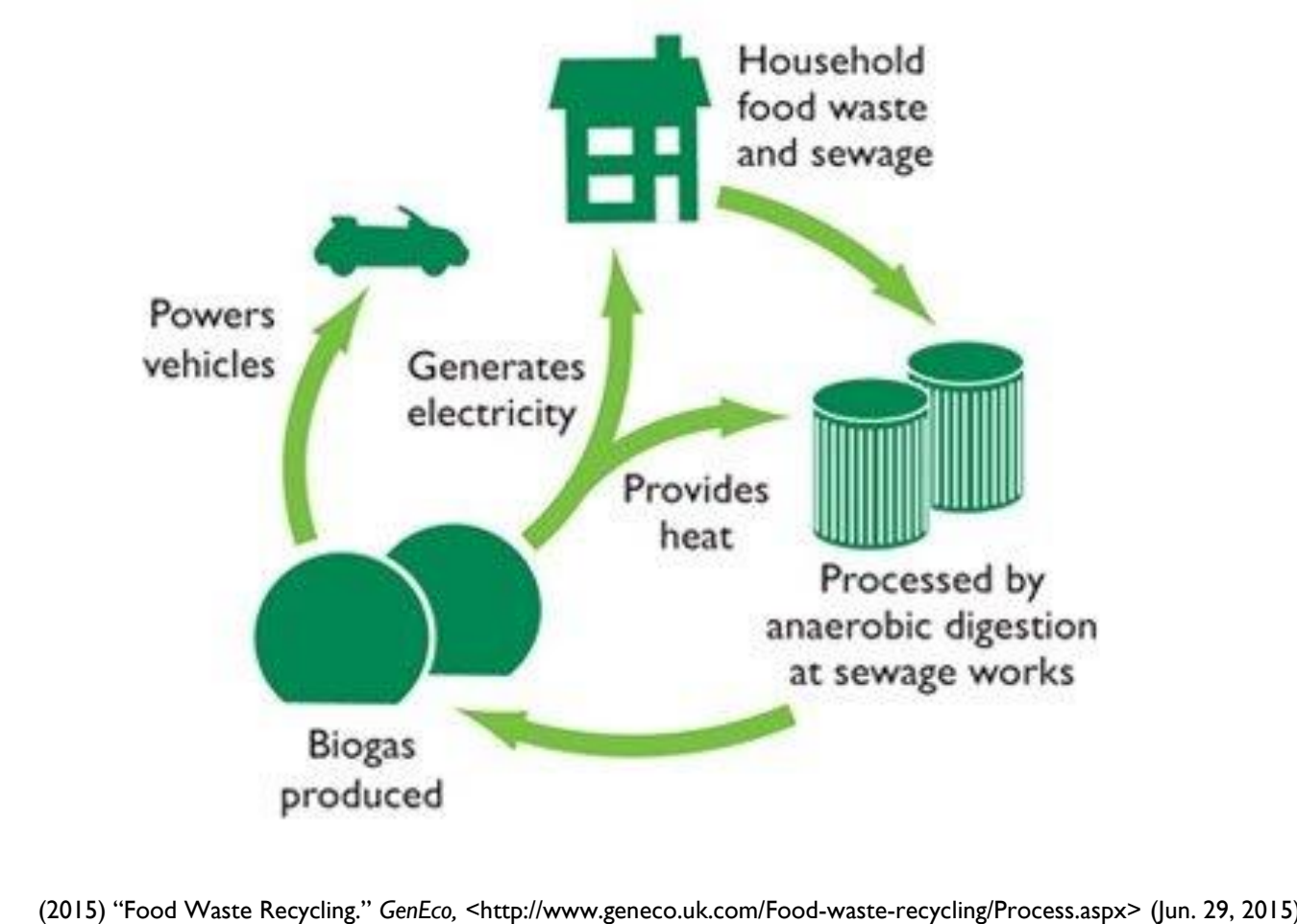
Jillian Richmond

Scarlet Oaks - Biochemistry

Summer Research

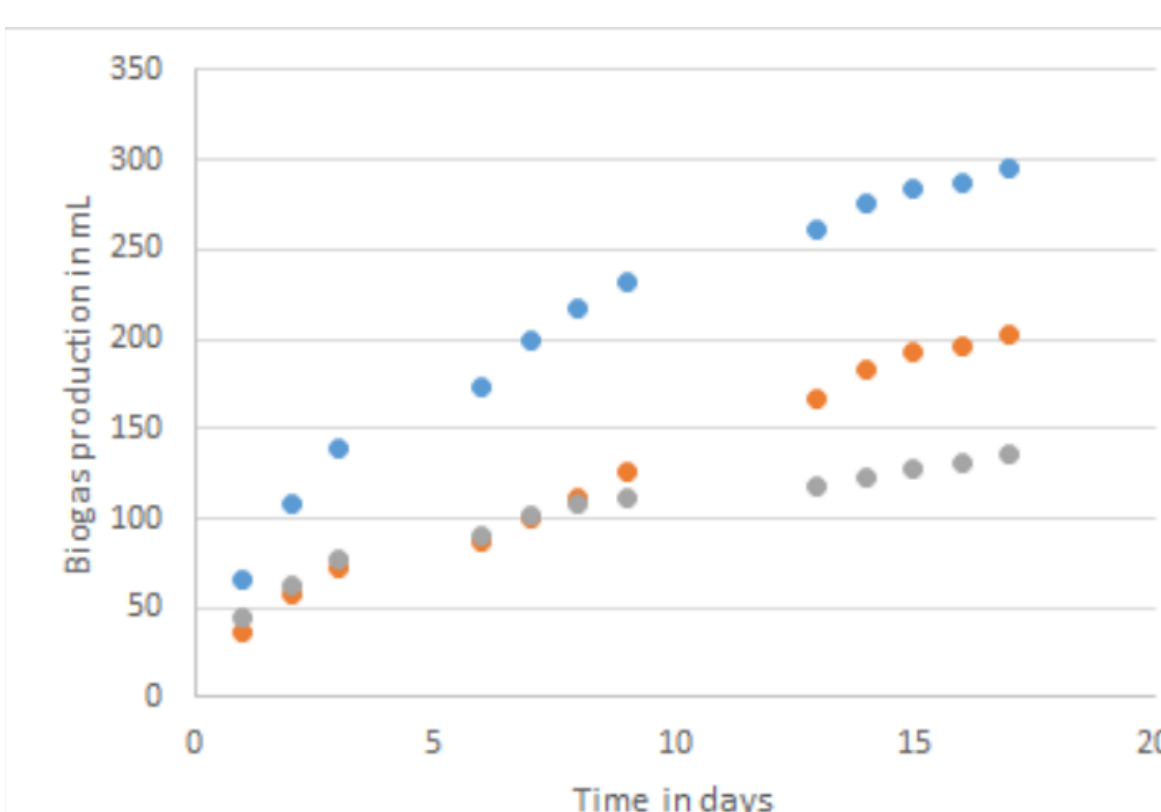
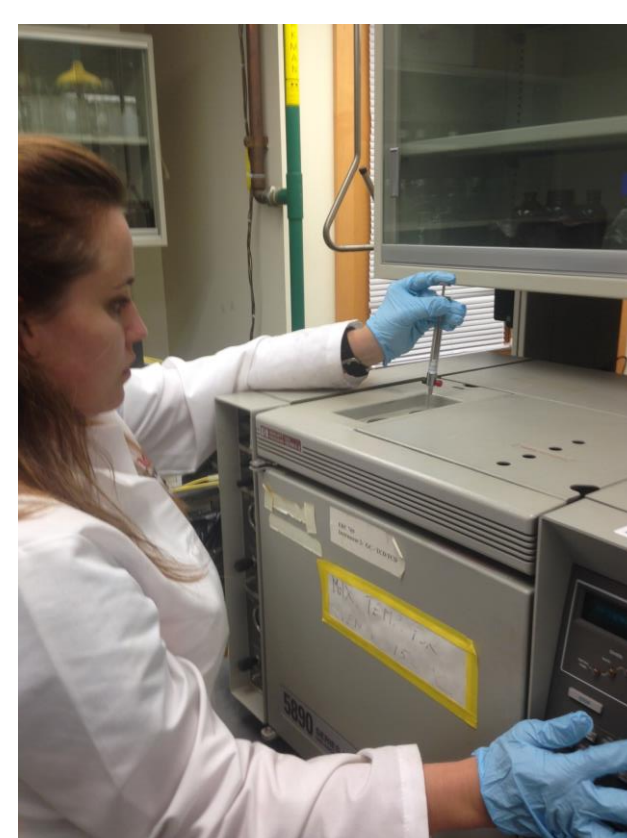
Food Waste

- 95% of the food we throw away ends up in landfills
- Once in landfills, food breaks down to produce methane, a potent greenhouse gas which contributes to climate change
- The average household wastes \$2,275 worth of groceries every year
- Capture methane to use as energy and heat



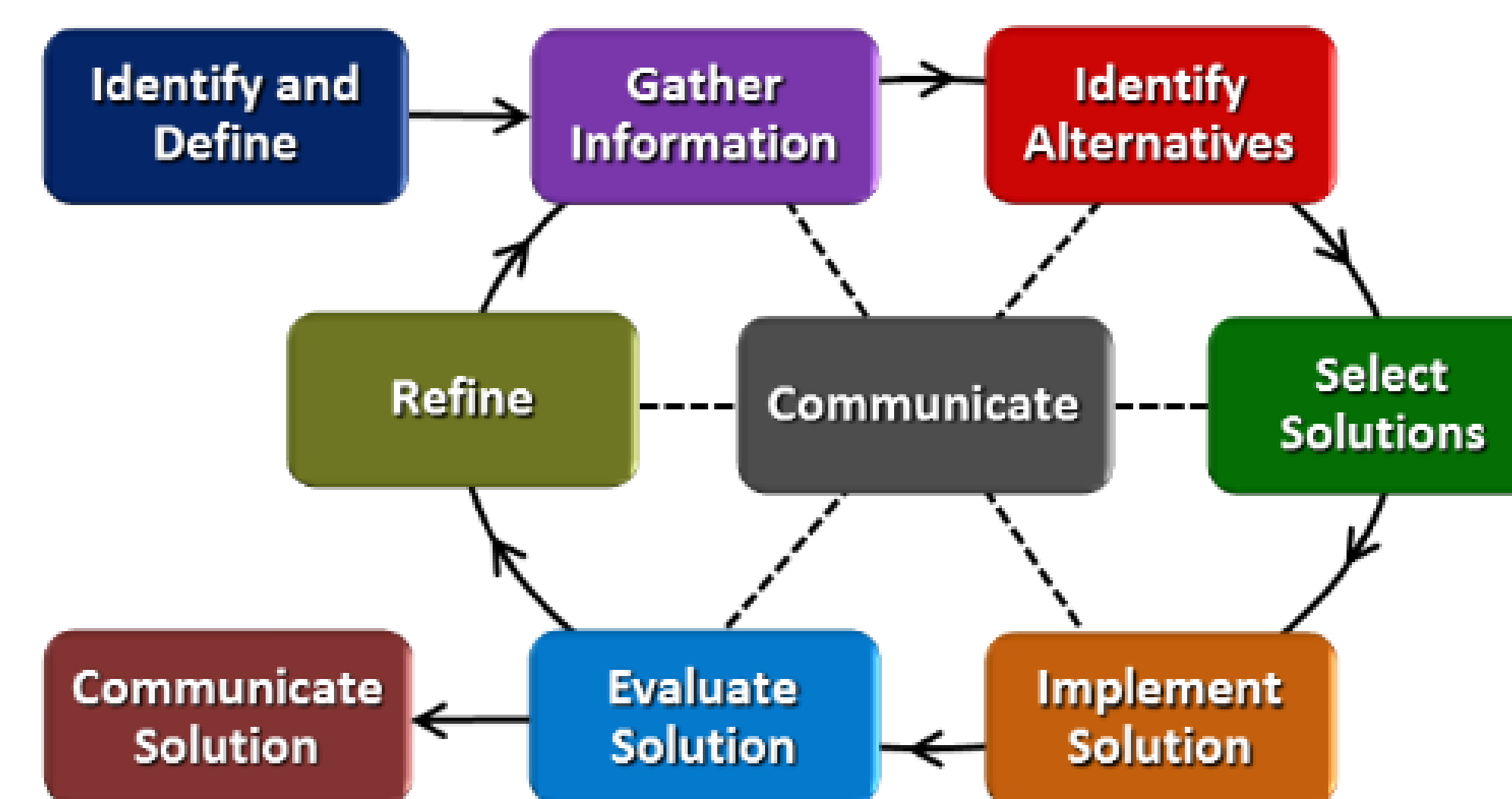
Objectives

- Objective 1: To optimize the ratio of food waste to primary sludge for maximum methane generation
- Objective 2: To study the stability of anaerobic digestion process when food waste and primary sludge are used as substrates



Challenge Based Learning

The Engineering Design Process



What is Engineering?

The branch of science and technology concerned with the design, building, and use of engines, machines, and structures



(2015) "Building a Team of Engineers." Free Great Picture, <www.freegreatpicture.com> (Jul. 16, 2015)



(2015) "Mae Jemison: Astronaut Biography." Space, <www.space.com> (Jul. 16, 2015)

Engineering is a team based practice where multiple, alternate solutions are identified under given constraints

The Big Idea

Where does your garbage go?



(2015) "Garbage Truck Backup Camera." Moving on GPS, <www.movingongps.com> (Jul. 16, 2015)



(2015) "Compost." How to Compost, <www.howto compost.org> (Jul. 16, 2015)

How does so much trash get into rivers?



(2015) "Garbage Wheel." Go2, <go2.org> (Jul. 16, 2015)



(2015) Mr. Trash Wheel, <www.twitter.com> (Jul. 16, 2015)

Reduce Reuse Recycle



(2015) "Colored and Labeled Recycling Bins." Imagine Itny, <imagineitny.com> (Jul. 16, 2015)



(2015) "Reuse Cups." Huffington Post, <www.huffingtonpost.com> (Jul. 16, 2015)