



## Educational Offerings



**BUGSS** is a community laboratory that promotes education and understanding of biotechnology through courses, community projects, informational talks, student science-fair project assistance, and open access to a modern biological laboratory.

The **mission** of Baltimore Under Ground Science Space, Inc. is to foster a community of citizen- scientists, who can explore biotechnology in a safe, constructive and socially responsible manner.

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**BUGSS provides creative learning experiences, responsive to the interests of our community members.**

Neiyer Correal-Winters and his two sons Naige and Patrick read about groundbreaking CRISPR technology that allows rapid and efficient genome editing. Eager to try their hands with the technology, they obtained a family membership to BUGSS, ordered materials online, and developed their own CRISPR project under the guidance of lab staff and mentors. At the BUGSS lab, they are able to pursue this unique family activity!

**BUGSS motivates students with socially relevant science.**

Ella Coleman is a home schooled student who joined the BUGSS team for the International Genetically Engineered Machines competition (iGEM). The six high school students conceived of a project, engineering bacterial cells to degrade plastic and help clean up pollution in the Inner Harbor. Ella traveled to Boston with the team, delivered oral and poster presentations at the International Jamboree of high school and college students, talked about her work with faculty judges, and won a team bronze medal. The team's incredible work was recognized with an article and video of Ella on the front page of the *Baltimore Sun*!



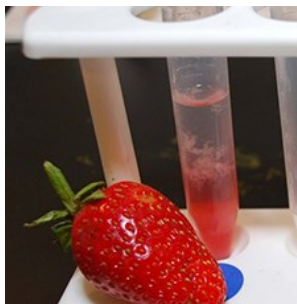
**BUGSS inspires science and technology careers.**

Rachael Avidor, Julius Gingles, and Mercedes Thompson are three students from Baltimore city high schools who participated in BUGSS' 2016 iGEM team. While these three students had long been interested in science, the iGEM experience was unique in allowing them to take leadership and ownership of a scientific project. Each is continuing to excel on their scientific path, engaging in additional research at Johns Hopkins and the NIH, winning full scholarships to Brown and Johns Hopkins Universities, and founding Baltimore Beyond Plastic. These students will lead the scientific revolution of the next generation!

## Offerings for Elementary School and Up!

### The A C T G's of Fruit ! 1.5 hour course

What is DNA? What is a gene? We'll learn by using chemistry to extract DNA from several fruits. Can you guess the number of chromosomes in each based on the amount of DNA?



### Grow an ecosystem ! 1.5 hour course



Winogradsky columns allow you to grow your own ecosystem and learn how different soil bacteria use different nutrients to live. Come learn about soil ecosystems and create a long-term experiment to go home with!

### Agar Art 1 hour course

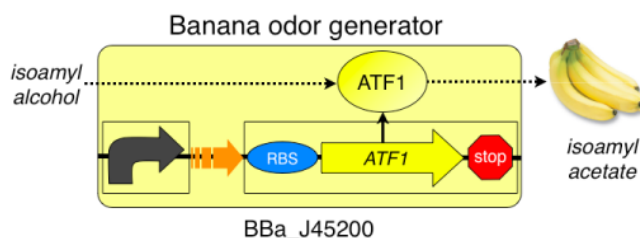
Use colored bacteria and yeast to create your own living art works by drawing with colored organisms on petri dishes.



## Offerings for Middle School and Up!

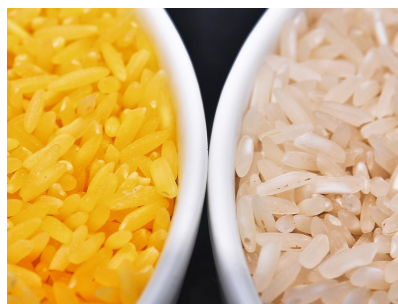
### Eau That Smell! 10 hour course

In this lab, normally stinky smelling bacteria are made to smell sweet, like bananas. Four strains are compared for their banana smells. The activity teaches microbiology, genetics, and bioengineering.



### Golden Rice 15 hour course

Genetically-modified foods are sometimes described as life-saving approaches to malnutrition, and sometimes protested as unnatural and unsafe. In this series of labs, you will work with a genetically modified organism that can be used to bake breads containing a super-dose of Vitamin A. You will test the bright orange yeast for vitamin production and for the food quality.



## Offerings for High School and Up!

### Molecular Biotechnology Boot Camp

#### 10 or 20 hour course

Learn all the basics of DNA manipulation, including DNA plasmid isolation, restriction digest, PCR, gel electrophoresis, ligation, and transformation. With these skills, you'll be ready to design your own experiments!



### iTUNE Device 4 hour course

This lab focuses on predictable design. Students will examine the role of parts, such as promoters and ribosome binding sites, in determining the output of a genetic device. The students measure  $\beta$ -galactosidase enzymatic activity as the device's output, enabling them to look through the lens of molecular genetics to evaluate a device's behavior.

