Introduction to Genetics

Grade Level: 9th – 12th Grade

Approximate Length: 125 – 180 minutes

Objectives:

- Understand the genetic vocabulary terms (genotype, phenotype, homozygous, heterozygous, dominant, recessive, etc.)
- Discuss the importance of genetics and the role it plays in the agriculture industry
- Learn about DNA and the ways it can be used to help feed the world
- Understand how natural and artificial selection both are important and plays a role in society

Science Standards Available (Teacher will identify which standards to bundle):

- LS1-1 Genes, protein and tissues
- LS1-3 Feedback mechanisms and homeostasis
- LS1-4 Cell division and differentiation
- LS2-1 Carrying capacity of ecosystems
- LS2-2 Biodiversity and populations and ecosystems
- LS3-1 Chromosomal inheritance
- LS3-2 Inheritable genetic variation
- LS3-3 Variation and distribution of traits

Outline for Program:

- **Interest Approach (5-10 min):** Students will start the lesson by listing everything they know about genetics and all the topics that are most difficult for them in this unit. Then we will come together as a group and assess the common areas of understanding and the areas that need to have a little more focus.
- **Opening Activity (15-20 min):** During this time, students will work as a team in small groups to extract DNA from strawberries. Then as a whole group we will come together to discuss what students saw and compare and contrast their findings and thought.
- **Presentation (45-60 min):** The students will learn about some of the main topics in genetics. They will start off with a discussion on DNA and the genetic vocabulary terms to understand. The group will then split up into partners and do an activity on inherited traits and probability. The partners will end up with a new species created and they will present their results. As a whole group we will assess the commons traits expressed. Next, the group will discuss how to find percentages for traits expressed, using a Punnett Square. Students will be given a few example problems as a whole group and then they will practice their Punnett Squares with their partners. Together we will discuss these various topics and open student's eyes to the possibilities of genetics in agriculture. This can lead to them making a difference as a consumer or even a career choice.
- **IQhub Scavenger Hunt (45-60 min):** The IQhub is an interactive museum, that will help the students build on topics they have already learned and grab their attention for some new ones as well. Students can work individually or in small groups to explore the IQhub and learn about agriculture and the environment. This museum incorporates Science, Technology, Engineering and Math (STEM) to give students a well-rounded and fun learning experience.
- **Closing Activity (15-30 min):** The students will create a public service announcement (PSA) to help educate other on genetics in agriculture. Student will brain storm with their small groups and create their own PSA, which will include a written communication and a poster/ flyer. Some methods of written communications would be a press release, newspaper article, blog, radio announcement, television spot, etc. The poster or flyer will need to include images to grab people's attention.

Additional Resources on YouTube:
https://youtu.be/L0YXWXHU-84
https://youtu.be/7oi_kSj3o0Q