Week 2

Project 1
Growing Life from the Scratch.
Project 4
Hacking Booze – The Art of Fermentation.
Project 6
Fungi Fashion – Mushrooms clothing.

Resources:
Bacteria, algae samples, nutrient medium (preferably LB Agar), essential microbiology lab equipment (pipettes, swabs, Petri dishes, plates, flasks, pipette holder), compound optical microscope.
Resources needed: 2L Cider vinegar, 2 kg granulated sugar, ten live kombucha culture, 20 tea bags, essential lab equipment.

Explored questions and topics:
- Lab equipment handling.
- Intro to Microbiology
- Microbial Culturing
- Algae culturing
- Outline of future work
    - fungi culture
    - green tech
    - bio-engineered clothing
    - Product design.
    - Fermentation

Week 3

Project 2

"PCRing" DNA – Assembling Biotech Legos

Resources:

Complete OpenPCR kit

Description:

Learning how to build a DIY PCR Machine with an OpenPCR kit. Intro to the theoretical aspects and laboratory techniques of PCR. Students gain practical experience performing PCR as well as experimenting with optimization of the reaction. Discussion of applications of PCR used in DNA fingerprinting, diagnostic medicine, genome mapping, evolutionary relationship determination, and epidemiology.

Explored questions and topics:

- Experimental controls (what are they, when to use them)
- The polymerase chain reaction (PCR)
- Flowchart and experimental design
- electrophoresis

Week 4

Project 3

Biohacking with CRISPR

Project 5

Plastic Eating Bacteria

Project 7

Coding life with open source tools

Resources:

1) Resources needed for Bacterial CRISPR tinkering: LB Agar, LB Strep/Kan Agar, Glass bottle for pouring plates, E. coli HME63 strain, Inoculation Loops/Plate Spreader, 10-100uL variable volume adjustable pipette(1uL increments), Box of 96 Pipette Tips, 14 Petri Plates, Microcentrifuge tube rack, Nitrile Gloves, Microcentrifuge tubes, 50mL Tube for measuring, Bacterial transformation buffer 25mM CalCl2, 10% PEG 8000 5% DMSO, LB Media for transformation recovery, Cas9 and tracrRNA plasmid, crRNA plasmid, Template DNA, microcentrifuge.
2) Empty 2 L Soa Bottles, Bushnell Hass Broth, Soil, an accurate scale, cut up strips of plastic bags, Petri dishes, and Agar, Autoclave, Sealable test tubes, Sterile gloves, Bunsen Burner, Tweezers, Inoculating Loop.
3) Computers/ Internet Acess/ Open source software.

Description:

1) Learning CRISPR technique -the most important and promising biotechnology technique recently developed. Once students know CRISPR, they will have very few limits on Genetic Engineering beyond creativity.
2) Isolating plastic degrading bacteria from soil. Testing bacterial degradation of the plastic material

Explored questions and topics:

Design, construction, and validation of CRISPR/Cas9 reagents.

Designing projects for CRISPR/Cas9-mediated gene knockouts, amino acid substitution, reporter gene knockins, and creation of conditional alleles

Environmental Biotechnology consciousness, bacterial isolation, green tech techniques. Anaerobic bacteria behavior.

Week 5

Project 7

Coding life with open source tools

Project 8

Programming a Bioimplant

Resources:

Computers, Internet Access, Implantable Biochips, Open source software.

Description:

(7): Learning about Biotechnology bioinformatics tools.
(8): Programming a Bioimplant from identity to security functions. A possible partnership with vet professional on Pedra Branca community (community engagement) to implant biochips on animals for GPS tracking.

Explored questions and topics:

Information theory and biology
Databases: Structure of databases, Sequence databases, Relational databases
Sequence analysis, Software resources
Sequence alignment and database searches
Phylogenetic analysis
Predictive methods
Informatics and automation in genome mapping
Genome mapping
Genome analysis
Bioimplants state of the art

Week 6

Project 8

Programming a Bioimplant

Project 9

Biomimicry - Learning from nature

Resources:

Computers, Internet Access, Implantable Biochips, Open source software.

Description:

(8): Programming a Bioimplant from identity to security functions. A possible partnership with vet professional on Pedra Branca community (community engagement) to implant biochips on animals for GPS tracking.
(9): Theoretical - Learning about Biomimicry – from Da Vinci to Festo. Including principles of creating artificial leaves, molecular auto assembly on biocement. Duration: 2 hours.

Explored questions and topics:

Bioimplants state of the art.
Body augmentation discussion, transhumanism discussion.