FUTURELAB+

Unit Flow Chart

CTE Biotechnology Pathway / Community Science

YEARS	YEAR 1				YEAR 2								
	Crowdsourcing Innovations in Biotechnology	Taking Action in Your Community: Health Equity	Nucleic Acids and Proteins: Disease Treatment Innovations	Behind the Scenes of Scientific Breakthroughs	Solution Seeking Microbes	Alternative Proteins	Plant to Pharmaceutical	Community Science					
LESSON PLANS													
	Problem Overview *Create a crowdfunding proposal to deploy a DNA collection kit that solves a community challenge.* 45 TOTAL DAYS	**Community Applications of DNA Identification** *Learn about community science and the use of DNA technology in solving challenges.* 5 DAYS	**PD1: Analyzing Community Needs and Proposal Identification** *Determine a local challenge that could be addressed with DNA identification technology.* 8 DAYS	**PD2: Competitive Landscape Analysis** *Analyze existing products and services on the market.* 3 DAYS	**PD3: Stakeholders and Inclusion** *Identify stakeholders and analyze needs and concerns.* 3 DAYS	**Tech 1: DNA Recap** *Review the structure of DNA and its function.* 2 DAYS	**Tech 2: Sanger Sequencing** *Model Sanger sequencing as a DNA identification technique.* 2 DAYS	**Tech 3: Digital PCR** *Examine digital PCR as a potential technology tool for analyzing DNA.* 1 DAY	**Tech 4: NextGen Sequencing** *Act as a member of a local health department and determine the cause of an outbreak.* 4 DAYS	**Decision Tree Creation** *Create a decision tree to guide the selection of an appropriate DNA identification technique.* 3 DAYS	**DNA Collection Kit Design** *Design a DNA kit and pitch to stakeholders.* 3 DAYS	**Final Artifact** *Develop a final community level funding proposal, including a model of the DNA kit, visual pitch deck, and "elevator speech" pitch.* 8 DAYS
INSTRUCTIONAL ACTIVITIES		**Engage in Community Science** *Students discuss what "community" means, and contribute data to a community science project.* —— **Community Science Case Studies** *Research an application of DNA technology and Jigsaw their learnings.* —— **Identifying Final Topic Interests** *Students analyze a coyote attack case study as a reference for brainstorming their own end-of unit projects.*	**Community Mapping** *Students reflect on local challenges and opportunities, and survey or interview community leaders.* —— **Data Analysis and Project Proposal** *Groups summarize interviews and surveys with graphs, identify a key issue and present a one-minute pitch.*	**Identifying Competitors Research** *Groups determine potential competitors, and research their products and services.* —— **Project Refining Pitch** *Groups compare their products to those offered by competitors, and present to the class on how their projects fit a niche need in their topic area.*	**Stakeholder Identification** *Groups brainstorm stakeholders for their project area, and then individual students exchange ideas with a peer from another group.* —— **Four Corners for DNA Technologies** *Students determine their agreement with various statements, and discuss each idea's implication for their projects.* —— **Stakeholder Analysis** *Groups determine relevant stakeholders, their interests and influence, and how to integrate these perspectives into their projects.*	**Sample of DNA** *Groups use paper-based samples of DNA to write structural rules and create a model of DNA.* —— **Structure and Function of DNA** *Students draw conclusions about DNA's structure and function, and connect this to DNA sequencing technologies.*	**Sanger Sequencing Modeling** *Students analyze chromatogram results of sequencing for introduction, and then use beads to model the PCR process for a fragment of DNA.* —— **Interpreting Sanger Sequencing** *Students complete a tutorial and reading on Sanger sequencing, and then summarize the DNA technology and its pros and cons.*	**Digital PCR Case Studies** *Student groups read about different scenarios with environmental DNA extraction, and present their case studies to the class.*	**Career Spotlight** *Students act as Epidemiologist and Environmental health specialist to track a food poisoning outbreak.* —— **BLAST Analysis and CER** *Students use DNA sequences to identify microbial species, determine virulence, and write a CER argument.* —— **NextGen Reading** *Students read about NextGen sequencing, and compare the process to steps from the outbreak case study.*	**DNA Technology Jigsaw** *Students Sanger, digital PCR, and NextGen sequencing, and discuss how customers determine which to use.* —— **Decision Tree Development and Presentation** *Groups create a decision tree to choose a DNA identification technology, and share their products with the class.* —— **Decision Tree Feedback** *Students act as Regulatory affairs managers in critiquing the work of others, and in revising their groups' own decision trees.*	**Empathize** *Students work in multiple roles to figure out the DNA collection process from a user's perspective for their projects.* —— **Ideate** *Students work in multiple roles to brainstorm their DNA collection device and procedures to use it.* —— **Model** *Students decide on elements to include in their DNA collection kits, and create an initial 3-slide model of their DNA test kit.*	**Characteristics of Successful Crowdfunding** *Students view crowdfunding campaigns, and identify characteristics to include in their own pitches.* —— **Group Work on Artifacts** *Students use a Project Management Tool to create their final decks and pitches based on their group roles lead.* —— **Elevator Pitch Presentation** *Groups present their artifacts to stakeholders, users, or selected audiences.*