Information for Course Syllabus

Name of Course: STEM Biotechnology I

Grade Level: 9-12

School: ORHS

Major Assignments: None

Field Trips: None

How can parents access instructional materials? Canvas

STEM Biotechnology I
2021-2022

Term 1

Basics of Chemistry and Prep of Solutions	Making stock solutions and dilutions from stocks.
	Demonstrate proper use, application, and simple maintenance of basic laboratory equipment.
	Use of standard personal equipment: pipetting aids, personal protection equipment.
	Use of community equipment: Centrifuges, balances, autoclaves, incubators and shakers, biosafety cabinets.

Prep of Common Reagents and Growth Media	Calculation of needed materials.
	Basics of acids and bases.
	Units of concentration (molar, normal, %, parts per X).
	Dilution of stock solutions.
	Adjusting pH.
	Sterilization methods.
	Proper Storage.

Special Solutions-Media	Composition, special consideration for components, types, and preparation.
	Preparation of liquid and solid media.
	Sterilization
	Autoclaving
	Filter-sterilizing
	Ethylene gas
	Dry Heat

STEM Biotechnology I
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Term 1

Basics of Microbiology I	Compare the structure and function of cellular organelles in both prokaryotic and eukaryotic cells.
	Describe the processes of cell growth and reproduction.
	Associate structural, functional, and behavioral adaptations with the ability of organisms to survive under various environmental conditions.
	Distinguish among the structure and function of the four major organic macromolecules found in living things.
	Proper methods for culturing, storing, and controlling microorganisms.

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Term 2

Basics of Microbiology I cont.	Demonstrate proper basic microbiological techniques.
	Proper use of a microscope.
	Aseptic technique
	Isolation Streaking
	Sterile Transfers
	Preparation of Freezer Stocks
	Disinfection Protocols
	Environmental Sampling

Basics of Microbiology II	Discuss major features of *Escherichia coli* including: Its basic biology and Its use as an industrial microorganism.
	Discuss major features of *Saccharomyces cerevisiae* including: Its basic biology and Its use as an industrial microorganism.
	Describe the breadth of microorganisms used in industrial application including: Useful bacterial species and Useful fungal species.

Microorganisms in non-industrial applications	Bioremediation
	Food and beverage production

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Term 2

DNA Basics I	Intro to genetics, nucleotides and nucleic acids, replication.
	Describe basic biochemical pathways that synthesize nucleotides.
	Biosynthesis of deoxyribonucleotides.
	Biosynthesis of ribonucleotide.
	Significant differences between organisms.
	Describe replication of chromosomal DNA.
	Mechanism and enzymology of bacterial replication.
	Mechanism and enzymology of eukaryotic replication.
	Viral replication-classic examples.