

LITCHFIELD PUBLIC SCHOOLS
Core Curriculum Scope and Sequence
Grade 11 & 12 Biotechnology (Semester Course)

	CT Frameworks/ Standards	Content and Skill Objectives Students will be able to:	Assessments	Resources
Organic Chemistry 3 Weeks		Organic Chemistry <ul style="list-style-type: none"> Identify, name, sketch, and build structures for alkanes, alkenes, alkynes, isomers, alcohols, organic acids, amines, amides, aldehydes, ketones, esters, and ethers Related molecular polarity, geometry, and intermolecular forces to the properties and formation of organic macromolecules Polymerize monomers and relate polymer structure to properties 	<u>Lab</u> : Molecular Model Building <u>Lab</u> : Synthesis and Purification of Esters/Aspirin <u>Activity</u> : Polymerization (molit #282) <u>Lab</u> : Preparation and Properties of a Cross-Linking Polymer (ACS Source book)	Chemistry text, Flinn ChemTopic Labs, molecular modeling kits, molit.concord.org, ACS Sourcebook
Biochemistry 3 Weeks		Biochemistry <ul style="list-style-type: none"> Identify carbohydrates and relate molecular structure with properties Illustrate amino acids and the formation of peptide linkages Outline protein structure Predict protein folding patterns Identify lipid structures and utility in soap production Outline RNA function in protein synthesis 	<u>Demonstration</u> : Glucose Fermentation (Flinn) <u>Demonstration</u> : Lactose Intolerance – Enzyme Digestion (Flinn) <u>Activity</u> : Tree of Life’s Macromolecules (molit #226) <u>Lab</u> : Chemistry of Life Lab <u>Lab</u> : Introduction to Carbohydrates (Flinn) <u>Lab</u> : Identifying Proteins and Amino Acids (Flinn) <u>Lab</u> : Physical Properties of	Chemistry text, Flinn ChemTopic Labs, molecular modeling kits, molit.concord.org, Kreuzer & Massey <i>Recombinant DNA and Biotechnology</i> chapter 3

			Proteins (Flinn) <u>Activity</u> : From Genes to Proteins (Kreuzer & Massey)	
Biotechnology DNA Extraction and Function 1 Weeks		Biotechnology <ul style="list-style-type: none"> • Extract and evaluate DNA • Understand DNA structure and function • Demonstrate transcription 	<u>Activity</u> : DNA to Proteins (molit #315) <u>Lab</u> : DNA Extraction and Analysis	Flinn ChemTopic Labs, molecular modeling kits, molit.concord.org, Kreuzer & Massey <i>Recombinant DNA and Biotechnology</i>
Biotechnology DNA Restriction and Separation 2 Weeks		Biotechnology <ul style="list-style-type: none"> • Demonstrate proper lab techniques for dilution, micro pipetting, sterile handling, etc. • Conduct DNA restriction digestion • Electrophoresis separation of fragmented DNA • Analysis or restriction products 	<u>Activity</u> : Lab technique video (Bio-Rad) <u>Activity</u> : Template Based synthesis PCR (molit #260) <u>Activity</u> : Restriction maps for DNA Goes to the Races (Kreuzer & Massey, p 172) <u>Lab</u> : Restriction Digestion and Analysis of Lambda DNA (Bio-Rad)	Bio-Rad lab supplementals, molit.concord.org, Kreuzer & Massey <i>Recombinant DNA and Biotechnology</i>
Biotechnology Genetic Engineering 4 Weeks		Biotechnology <ul style="list-style-type: none"> • Culture target bacteria • Perform genetic transformation • Test samples and control genetic modification • Perform Polymerase Chain Reaction (PCR) • Identify genetic modified plants by extraction of DNA, PCR, and electrophoresis 	<u>Activity</u> : Fluorescence: Molecular tagging (molit #256) <u>Lab</u> : pGLO Transformation (Bio-Rad) <u>Lab</u> : GMO Investigator (Bio-Rad)	Bio-Rad lab supplementals, molit.concord.org

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Biotechnology Medical Applications 2 Weeks		Biotechnology <ul style="list-style-type: none"> • Relate molecular structure to drug performance • Investigate biodefense and immunology • Utilize enzyme-linked immunosorbant assay (ELISA) to track disease outbreaks detect antigens in biological samples 	<u>Activity</u> : Drug Design – Protein Structure and Function (molit #299) <u>Activity</u> : Amplification of Biochemical Signals – ELISA Test (molit #248) <u>Lab</u> : ELISA Immuno Explorer (Bio-Rad)	Bio-Rad lab supplementals, molit.concord.org
Biotechnology Forensics 2 Weeks		Biotechnology <ul style="list-style-type: none"> • Apply biotechnology techniques for forensic investigations • Investigate fictitious crime and identify perpetrator based on forensic evidence • Teach forensic classes biotechnology techniques for forensic investigations 	<u>Lab</u> : Forensics – DNA Fingerprinting (Bio-Rad) <u>Activity</u> : Teach Forensic Class students techniques for successful DNA Fingerprinting investigation	Bio-Rad lab supplementals, molit.concord.org
Name of Unit Weeks				
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