



Main Criteria: New Hampshire College and Career Ready Standards

Secondary Criteria: JoVE

Subject: Science

Grade: 9-12

Correlation Options: Show Correlated

Adopted: 2006

STRAND / STANDARD	NH.SPS1.	Science Process Skills: Scientific Inquiry and Critical Thinking Skills
STANDARD / GLE	S:SPS1:11:1.1.	<p>Making Observations and Asking Questions: Students will apply skills from previous grades and ask questions about relationships among variables that can be observed directly as well as those that cannot.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Ethics in Psychology Research • Experimentation using a Confederate • From Theory to Design: The Role of Creativity in Designing Experiments • Manipulating an Independent Variable through Embodiment • Observational Research • Pilot Testing • Placebos in Research • Realism in Experimentation • Reliability in Psychology Experiments • The Factorial Experiment • The Multi-group Experiment • The Simple Experiment: Two-group Design • Within-subjects Repeated-measures Design
STANDARD / GLE	S:SPS1:11:1.2.	<p>Making Observations and Asking Questions: Students will apply skills from previous grades and use complex classification criteria and keys to identify items/organisms.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Introduction to Caenorhabditis elegans • An Introduction to Drosophila melanogaster • An Introduction to Saccharomyces cerevisiae • An Introduction to the Chick: Gallus gallus domesticus • An Introduction to the Laboratory Mouse: Mus

		<p>musculus</p> <ul style="list-style-type: none"> • An Introduction to the Zebrafish: <i>Danio rerio</i> • Basic Chick Care and Maintenance • Basic Mouse Care and Maintenance • <i>C. elegans</i> Chemotaxis Assay • <i>C. elegans</i> Development and Reproduction • <i>C. elegans</i> Maintenance • Chick ex ovo Culture • Culturing and Enumerating Bacteria from Soil Samples • Detection of Bacteriophages in Environmental Samples • Development and Reproduction of the Laboratory Mouse • Development of the Chick • <i>Drosophila</i> Development and Reproduction • <i>Drosophila</i> Larval IHC • <i>Drosophila</i> Maintenance • <i>Drosophila melanogaster</i> Embryo and Larva Harvesting and Preparation • Filamentous Fungi • In ovo Electroporation of Chicken Embryos • Introducing Experimental Agents into the Mouse • Isolating Nucleic Acids from Yeast • Mouse Genotyping • RNAi in <i>C. elegans</i> • Tree Identification: How To Use a Dichotomous Key • Tree Survey: Point-Centered Quarter Sampling Method • Using GIS to Investigate Urban Forestry • Yeast Maintenance • Yeast Reproduction • Yeast Transformation and Cloning • Zebrafish Breeding and Embryo Handling • Zebrafish Maintenance and Husbandry • Zebrafish Microinjection Techniques • Zebrafish Reproduction and Development
STANDARD / GLE	S:SPS1:11:1.3.	<p>Making Observations and Asking Questions: Students will apply skills from previous grades and evaluate complex methods of classification for a specific purpose.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Introduction to <i>Caenorhabditis elegans</i> • An Introduction to <i>Drosophila melanogaster</i> • An Introduction to <i>Saccharomyces cerevisiae</i> • An Introduction to the Chick: <i>Gallus gallus domesticus</i> • An Introduction to the Laboratory Mouse: <i>Mus musculus</i> • An Introduction to the Zebrafish: <i>Danio rerio</i> • Bacterial Transformation: Electroporation • Bacterial Transformation: The Heat Shock Method • Basic Chick Care and Maintenance • Basic Mouse Care and Maintenance • <i>C. elegans</i> Chemotaxis Assay

		<ul style="list-style-type: none"> • C. elegans Development and Reproduction • C. elegans Maintenance • Categories and Inductive Inferences • Chick ex ovo Culture • Culturing and Enumerating Bacteria from Soil Samples • DNA Gel Electrophoresis • Detection of Bacteriophages in Environmental Samples • Development and Reproduction of the Laboratory Mouse • Development of the Chick • Drosophila Development and Reproduction • Drosophila Larval IHC • Drosophila Maintenance • Drosophila melanogaster Embryo and Larva Harvesting and Preparation • Filamentous Fungi • Gel Purification • In ovo Electroporation of Chicken Embryos • Introducing Experimental Agents into the Mouse • Isolating Nucleic Acids from Yeast • Mouse Genotyping • Plasmid Purification • Purification of a Total Lipid Extract with Column Chromatography • RNAi in C. elegans • Separating Protein with SDS-PAGE • Sonication Extraction of Lipid Biomarkers from Sediment • The ELISA Method • The Western Blot • Tree Identification: How To Use a Dichotomous Key • Tree Survey: Point-Centered Quarter Sampling Method • Using GIS to Investigate Urban Forestry • Yeast Maintenance • Yeast Reproduction • Yeast Transformation and Cloning • Zebrafish Breeding and Embryo Handling • Zebrafish Maintenance and Husbandry • Zebrafish Microinjection Techniques • Zebrafish Reproduction and Development
STANDARD / GLE	S:SPS1:11:1.4.	<p>Making Observations and Asking Questions: Students will apply skills from previous grades and identify limitations of a given classification system and identify alternative ways of classifying to accommodate anomalies.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Introduction to Caenorhabditis elegans • An Introduction to Drosophila melanogaster • An Introduction to Saccharomyces cerevisiae • An Introduction to the Chick: Gallus gallus domesticus

		<ul style="list-style-type: none"> • An Introduction to the Laboratory Mouse: Mus musculus • An Introduction to the Zebrafish: Danio rerio • Bacterial Transformation: Electroporation • Bacterial Transformation: The Heat Shock Method • Basic Chick Care and Maintenance • Basic Mouse Care and Maintenance • C. elegans Chemotaxis Assay • C. elegans Development and Reproduction • C. elegans Maintenance • Categories and Inductive Inferences • Chick ex ovo Culture • Culturing and Enumerating Bacteria from Soil Samples • DNA Gel Electrophoresis • Detection of Bacteriophages in Environmental Samples • Development and Reproduction of the Laboratory Mouse • Development of the Chick • Drosophila Development and Reproduction • Drosophila Larval IHC • Drosophila Maintenance • Drosophila melanogaster Embryo and Larva Harvesting and Preparation • Filamentous Fungi • Gel Purification • In ovo Electroporation of Chicken Embryos • Introducing Experimental Agents into the Mouse • Isolating Nucleic Acids from Yeast • Mouse Genotyping • Plasmid Purification • Purification of a Total Lipid Extract with Column Chromatography • RNAi in C. elegans • Separating Protein with SDS-PAGE • Sonication Extraction of Lipid Biomarkers from Sediment • The ELISA Method • The Western Blot • Tree Identification: How To Use a Dichotomous Key • Tree Survey: Point-Centered Quarter Sampling Method • Using GIS to Investigate Urban Forestry • Yeast Maintenance • Yeast Reproduction • Yeast Transformation and Cloning • Zebrafish Breeding and Embryo Handling • Zebrafish Maintenance and Husbandry • Zebrafish Microinjection Techniques • Zebrafish Reproduction and Development
STANDARD / GLE	S:SPS1:11:2.1.	Designing Scientific Investigations: Students will apply skills from previous grades and apply scientific theories and laws to new situations to generate hypotheses.

		<p><u>JoVE</u></p> <ul style="list-style-type: none"> • The Multi-group Experiment • The Simple Experiment: Two-group Design
STANDARD / GLE	S:SPS1:11:2.2.	<p>Designing Scientific Investigations: Students will apply skills from previous grades and state a hypothesis and prediction based on available evidence and background information.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Calibration Curves • The Multi-group Experiment • The Simple Experiment: Two-group Design
STANDARD / GLE	S:SPS1:11:3.1.	<p>Conducting Scientific Investigations: Students will apply skills from previous grades and select and use apparatus and material safely.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Introduction to Working in the Hood • An Introduction to the Centrifuge • An Introduction to the Micropipettor • Aseptic Technique in Environmental Science • Common Lab Glassware and Uses • Conducting Reactions Below Room Temperature • Histological Sample Preparation for Light Microscopy • Introducing Experimental Agents into the Mouse • Introduction to Fluorescence Microscopy • Introduction to Light Microscopy • Introduction to Serological Pipettes and Pipettors • Introduction to the Bunsen Burner • Introduction to the Microplate Reader • Introduction to the Spectrophotometer • Making Solutions in the Laboratory • Measuring Mass in the Laboratory • Regulating Temperature in the Lab: Applying Heat • Regulating Temperature in the Lab: Preserving Samples Using Cold • Understanding Concentration and Measuring Volumes
STANDARD / GLE	S:SPS1:11:3.2.	<p>Conducting Scientific Investigations: Students will apply skills from previous grades and use instruments effectively and accurately for collecting data.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Introduction to Working in the Hood • An Introduction to the Centrifuge • An Introduction to the Micropipettor • Common Lab Glassware and Uses • Histological Sample Preparation for Light Microscopy • Introduction to Fluorescence Microscopy • Introduction to Light Microscopy

		<ul style="list-style-type: none"> • Introduction to Serological Pipettes and Pipettors • Introduction to the Bunsen Burner • Introduction to the Microplate Reader • Introduction to the Spectrophotometer • Making Solutions in the Laboratory • Measuring Mass in the Laboratory • Regulating Temperature in the Lab: Applying Heat • Regulating Temperature in the Lab: Preserving Samples Using Cold • Understanding Concentration and Measuring Volumes
<p>STANDARD / GLE</p>	<p>S:SPS1:11:4.1.</p>	<p>Representing and Understanding Results of Investigations: Students will apply skills from previous grades and compile and display data, evidence and information by hand and computer, in a variety of formats, including diagrams, flow charts, tables, graphs and scatter plots.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Introduction to Behavioral Neuroscience • An Introduction to Caenorhabditis elegans • An Introduction to Cell Division • An Introduction to Cell Metabolism • An Introduction to Cognition • An Introduction to Developmental Neurobiology • An Introduction to Drosophila melanogaster • An Introduction to Endocytosis and Exocytosis • An Introduction to Learning and Memory • An Introduction to Modeling Behavioral Disorders and Stress • An Introduction to Motor Control • An Introduction to Neurophysiology • An Introduction to Reward and Addiction • An Overview of Alkenone Biomarker Analysis for Paleothermometry • An Overview of Genetic Analysis • An Overview of Genetics and Disease • An Overview of bGDGT Biomarker Analysis for Paleoclimatology • Analysis of Earthworm Populations in Soil • Annexin V and Propidium Iodide Labeling • Anterograde Amnesia • Anxiety Testing • Approximate Number Sense Test • Are You Smart or Hardworking? How Praise Influences Children's Motivation • Assessing Dexterity with Reaching Tasks • Bacterial Growth Curve Analysis and its Environmental Applications • Balance and Coordination Testing • Basic Mouse Care and Maintenance • Binocular Rivalry

- **Biofuels: Producing Ethanol from Cellulosic Material**
- **Blood Pressure Measurement**
- **C. elegans Chemotaxis Assay**
- **Calcium Imaging in Neurons**
- **Calibration Curves**
- **Capillary Electrophoresis (CE)**
- **Carbon and Nitrogen Analysis of Environmental Samples**
- **Categories and Inductive Inferences**
- **Cell Cycle Analysis**
- **Cell-surface Biotinylation Assay**
- **Children's Reliance on Artist Intentions When Identifying Pictures**
- **Chromatin Immunoprecipitation**
- **Chromatography-Based Biomolecule Purification Methods**
- **Column Chromatography**
- **Community DNA Extraction from Bacterial Colonies**
- **Conducting Reactions Below Room Temperature**
- **Conversion of Fatty Acid Methyl Esters by Saponification for Uk'37 Paleothermometry**
- **Coordination Chemistry Complexes**
- **Crowding**
- **Cyclic Voltammetry (CV)**
- **DNA Methylation Analysis**
- **Decision-making and the Iowa Gambling Task**
- **Decoding Auditory Imagery with Multivoxel Pattern Analysis**
- **Detecting Environmental Microorganisms with the Polymerase Chain Reaction and Gel Electrophoresis**
- **Detecting Reactive Oxygen Species**
- **Determination Of Nox in Automobile Exhaust Using UV-VIS Spectroscopy**
- **Determination of Moisture Content in Soil**
- **Determining Rate Laws and the Order of Reaction**
- **Dichotic Listening**
- **Electro-encephalography (EEG)**
- **Electrochemical Measurements of Supported Catalysts Using a Potentiostat/Galvanostat**
- **Enzyme Assays and Kinetics**
- **Event-related Potentials and the Oddball Task**
- **Executive Function and the Dimensional Change Card Sort Task**
- **Executive Function in Autism Spectrum Disorder**
- **Expression Profiling with Microarrays**
- **Extraction of Biomarkers from Sediments - Accelerated Solvent Extraction**
- **Eye Tracking in Cognitive Experiments**
- **FM Dyes in Vesicle Recycling**
- **Fate Mapping**
- **Fear Conditioning**

- Fractional Distillation
- Förster Resonance Energy Transfer (FRET)
- Gas Chromatography (GC) with Flame-Ionization Detection
- Gene Silencing with Morpholinos
- Genetic Crosses
- Growing Crystals for X-ray Diffraction Analysis
- Habituation: Studying Infants Before They Can Talk
- High-Performance Liquid Chromatography (HPLC)
- How Children Solve Problems Using Causal Reasoning
- Ideal Gas Law
- Inattentive Blindness
- Incidental Encoding
- Internal Standards
- Introduction to Catalysis
- Introduction to Mass Spectrometry
- Introduction to Titration
- Introduction to the Microplate Reader
- Invasion Assay Using 3D Matrices
- Ion-Exchange Chromatography
- Isolating Nucleic Acids from Yeast
- Just-noticeable Differences
- Language: The N400 in Semantic Incongruity
- Le Châtelier's Principle
- Lead Analysis of Soil Using Atomic Absorption Spectroscopy
- Learning and Memory: The Remember-Know Task
- MALDI-TOF Mass Spectrometry
- Making Solutions in the Laboratory
- Measuring Children's Trust in Testimony
- Measuring Grey Matter Differences with Voxel-based Morphometry: The Musical Brain
- Measuring Reaction Time and Donders' Method of Subtraction
- Measuring Tropospheric Ozone
- Measuring Verbal Working Memory Span
- Measuring Vital Signs
- Memory Development: Demonstrating How Repeated Questioning Leads to False Memories
- Mental Rotation
- Metabolic Labeling
- Metacognitive Development: How Children Estimate Their Memory
- Method of Standard Addition
- Modeling Social Stress
- Motion-induced Blindness
- Motor Learning in Mirror Drawing
- Motor Maps
- Multiple Object Tracking
- Mutual Exclusivity: How Children Learn the Meanings of Words

- Nuclear Magnetic Resonance (NMR) Spectroscopy
- Numerical Cognition: More or Less
- Nutrients in Aquatic Ecosystems
- Object Substitution Masking
- PCR: The Polymerase Chain Reaction
- Patch Clamp Electrophysiology
- Performing 1D Thin Layer Chromatography
- Pericardiocentesis
- Peripheral Vascular Exam Using a Continuous Wave Doppler
- Perspectives on Cognitive Psychology
- Perspectives on Neuropsychology
- Photometric Protein Determination
- Physiological Correlates of Emotion Recognition
- Piaget's Conservation Task and the Influence of Task Demands
- Plasmid Purification
- Positive Reinforcement Studies
- Prospect Theory
- Protein Crystallization
- Purification of a Total Lipid Extract with Column Chromatography
- Purifying Compounds by Recrystallization
- Quantifying Environmental Microorganisms and Viruses Using qPCR
- RNA Analysis of Environmental Samples Using RT-PCR
- RNAi in *C. elegans*
- Raman Spectroscopy for Chemical Analysis
- Removal of Branched and Cyclic Compounds by Urea Adduction for Uk'37 Paleothermometry
- SNP Genotyping
- Self-administration Studies
- Separation of Mixtures via Precipitation
- Solid-Liquid Extraction
- Solutions and Concentrations
- Soxhlet Extraction of Lipid Biomarkers from Sediment
- Spatial Cueing
- Spatial Memory Testing Using Mazes
- Spectrophotometric Determination of an Equilibrium Constant
- Surface Plasmon Resonance (SPR)
- Tandem Mass Spectrometry
- The ATP Bioluminescence Assay
- The Attentional Blink
- The Costs and Benefits of Natural Pedagogy
- The ELISA Method
- The Ideal Gas Law
- The Inverted-face Effect
- The Morris Water Maze
- The Precision of Visual Working Memory with Delayed Estimation

		<ul style="list-style-type: none"> • The Rouge Test: Searching for a Sense of Self • The Split Brain • The Staircase Procedure for Finding a Perceptual Threshold • The TUNEL Assay • The Transwell Migration Assay • The Western Blot • Ultraviolet-Visible (UV-Vis) Spectroscopy • Understanding Concentration and Measuring Volumes • Using Diffusion Tensor Imaging in Traumatic Brain Injury • Using TMS to Measure Motor Excitability During Action Observation • Using Your Head: Measuring Infants' Rational Imitation of Actions • Verbal Priming • Visual Attention: fMRI Investigation of Object-based Attentional Control • Visual Search for Features and Conjunctions • Visual Statistical Learning • Visualizing Soil Microorganisms via the Contact Slide Assay and Microscopy • Water Quality Analysis via Indicator Organisms • Yeast Maintenance • fMRI: Functional Magnetic Resonance Imaging
STRAND / STANDARD	NH.SPS2.	Science Process Skills: Unifying Concepts of Science
STANDARD / GLE	S:SPS2:11:1.1.	<p>Nature of Science: Students will apply skills from previous grades and explore new phenomena through investigations conducted for different reasons, or to check on previous results.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Turbidity and Total Solids in Surface Water
STANDARD / GLE	S:SPS2:11:1.2.	<p>Nature of Science: Students will apply skills from previous grades and test how well a theory predicts a phenomena.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Turbidity and Total Solids in Surface Water
STANDARD / GLE	S:SPS2:11:1.3.	<p>Nature of Science: Students will apply skills from previous grades and recognize that sometimes scientists can control conditions in order to focus on the effect of a single variable; when that is not possible for practical or ethical reasons, they try to observe as wide a range of natural occurrences as possible to be able to discern patterns.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Calibration Curves • Ethics in Psychology Research

		<ul style="list-style-type: none"> • Experimentation using a Confederate • From Theory to Design: The Role of Creativity in Designing Experiments • Manipulating an Independent Variable through Embodiment • Observational Research • Pilot Testing • Placebos in Research • Realism in Experimentation • Reliability in Psychology Experiments • The Factorial Experiment • The Multi-group Experiment • The Simple Experiment: Two-group Design • Within-subjects Repeated-measures Design
STANDARD / GLE	S:SPS2:11:1.4.	<p>Nature of Science: Students will apply skills from previous grades and show how hypotheses are widely used in science for choosing what data to pay attention to and what additional data to seek, and for guiding the interpretation of the data (both new and previously available).</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • The Multi-group Experiment • The Simple Experiment: Two-group Design
STANDARD / GLE	S:SPS2:11:1.6.	<p>Nature of Science: Students will apply skills from previous grades and show how the usefulness of a model can be tested by comparing its predictions to actual observations in the real world; but a close match does not mean that the model is the only 'true' model or the one that would work.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Determining Spatial Orientation of Rock Layers with the Brunton Compass • Igneous Intrusive Rock • Igneous Volcanic Rock • Making a Geologic Cross Section • Using Topographic Maps to Generate Topographic Profiles
STANDARD / GLE	S:SPS2:11:1.7.	<p>Nature of Science: Students will apply skills from previous grades and realize that in science, the testing, revising, and occasional discarding of theories, new and old, never ends; this ongoing process leads to an increasingly better understanding of how things work in the world but not to absolute truth.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Abdominal Exam II: Percussion • An Introduction to Aging and Regeneration • An Introduction to Behavioral Neuroscience

- An Introduction to *Caenorhabditis elegans*
- An Introduction to Cell Death
- An Introduction to Cell Division
- An Introduction to Cell Metabolism
- An Introduction to Cell Motility and Migration
- An Introduction to Developmental Genetics
- An Introduction to Developmental Neurobiology
- An Introduction to *Drosophila melanogaster*
- An Introduction to Endocytosis and Exocytosis
- An Introduction to Learning and Memory
- An Introduction to Molecular Developmental Biology
- An Introduction to Neuroanatomy
- An Introduction to Neurophysiology
- An Introduction to Organogenesis
- An Introduction to *Saccharomyces cerevisiae*
- An Introduction to Stem Cell Biology
- An Introduction to the Chick: *Gallus gallus domesticus*
- An Introduction to the Laboratory Mouse: *Mus musculus*
- An Introduction to the Zebrafish: *Danio rerio*
- An Overview of Epigenetics
- An Overview of Gene Expression
- An Overview of Genetic Analysis
- An Overview of Genetic Engineering
- An Overview of Genetics and Disease
- Anterograde Amnesia
- Auscultation
- *C. elegans* Maintenance
- Cell Cycle Analysis
- Color Afterimages
- Determining Spatial Orientation of Rock Layers with the Brunton Compass
- Development of the Chick
- *Drosophila* Maintenance
- General Approach to the Physical Exam
- Genetic Crosses
- Inattentional Blindness
- Le Châtelier's Principle
- Making a Geologic Cross Section
- Measuring Reaction Time and Donders' Method of Subtraction
- Motion-induced Blindness
- Object Substitution Masking
- Percussion
- Piaget's Conservation Task and the Influence of Task Demands
- Rotary Evaporation to Remove Solvent
- Spatial Cueing
- The Attentional Blink
- The Rubber Hand Illusion
- The Split Brain

		<ul style="list-style-type: none"> • Visualizing Soil Microorganisms via the Contact Slide Assay and Microscopy • Yeast Transformation and Cloning
STANDARD / GLE	S:SPS2:11:2.1.	<p>Systems and Energy: Students will apply skills from previous grades and realize that systems may be so closely related that there is no way to draw boundaries that separate all parts of one from all parts of the others.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Introduction to Neurophysiology • Cyclic Voltammetry (CV)
STANDARD / GLE	S:SPS2:11:2.2.	<p>Systems and Energy: Students will apply skills from previous grades and give examples to show that a system usually has some properties that are different from those of its parts, but appear because of the interaction of those parts.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Introduction to Neurophysiology • Cyclic Voltammetry (CV)
STANDARD / GLE	S:SPS2:11:2.3.	<p>Systems and Energy: Students will apply skills from previous grades and demonstrate that even in some very simple systems, it may not always be possible to predict accurately the result of changing some part or connection.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Introduction to Neurophysiology • Cyclic Voltammetry (CV)
STANDARD / GLE	S:SPS2:11:4.1.	<p>Patterns of Change: Students will apply skills from previous grades and recognize that things can change in detail, but remain the same in general (e.g., the players change but the team remains, the cells are replaced but the organism remains); sometimes counterbalancing changes are necessary for a thing to retain its essential constancy in the presence of changing conditions.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Introduction to Cell Death • An Introduction to Cell Division • An Introduction to Cell Metabolism • An Introduction to Transfection • Annexin V and Propidium Iodide Labeling • Assembly of a Reflux System for Heated Chemical Reactions • Bacterial Transformation: Electroporation • Bacterial Transformation: The Heat Shock Method • Calibration Curves • Capillary Electrophoresis (CE) • Cell Cycle Analysis

- Cell-surface Biotinylation Assay
- Chromatography-Based Biomolecule Purification Methods
- Co-Immunoprecipitation and Pull-Down Assays
- Column Chromatography
- Conducting Reactions Below Room Temperature
- Coordination Chemistry Complexes
- Cyclic Voltammetry (CV)
- DNA Gel Electrophoresis
- DNA Ligation Reactions
- Degassing Liquids with Freeze-Pump-Thaw Cycling
- Density Gradient Ultracentrifugation
- Detecting Reactive Oxygen Species
- Determining Rate Laws and the Order of Reaction
- Determining the Density of a Solid and Liquid
- Determining the Empirical Formula
- Determining the Mass Percent Composition in an Aqueous Solution
- Determining the Solubility Rules of Ionic Compounds
- Dialysis: Diffusion Based Separation
- Electrochemical Measurements of Supported Catalysts Using a Potentiostat/Galvanostat
- Electrophoretic Mobility Shift Assay (EMSA)
- Enzyme Assays and Kinetics
- FM Dyes in Vesicle Recycling
- Fractional Distillation
- Freezing-Point Depression to Determine an Unknown Compound
- Förster Resonance Energy Transfer (FRET)
- Gas Chromatography (GC) with Flame-Ionization Detection
- Gel Purification
- Growing Crystals for X-ray Diffraction Analysis
- High-Performance Liquid Chromatography (HPLC)
- Internal Standards
- Introduction to Catalysis
- Introduction to Mass Spectrometry
- Introduction to Titration
- Ion-Exchange Chromatography
- Le Châtelier's Principle
- Live Cell Imaging of Mitosis
- MALDI-TOF Mass Spectrometry
- Metabolic Labeling
- Method of Standard Addition
- Molecular Cloning
- Nuclear Magnetic Resonance (NMR) Spectroscopy
- PCR: The Polymerase Chain Reaction
- Passaging Cells
- Performing 1D Thin Layer Chromatography
- Photometric Protein Determination
- Plasmid Purification

		<ul style="list-style-type: none"> • Preparing Anhydrous Reagents and Equipment • Protein Crystallization • Purifying Compounds by Recrystallization • Raman Spectroscopy for Chemical Analysis • Reconstitution of Membrane Proteins • Restriction Enzyme Digests • Rotary Evaporation to Remove Solvent • Sample Preparation for Analytical Preparation • Scanning Electron Microscopy (SEM) • Schlenk Lines Transfer of Solvents • Separating Protein with SDS-PAGE • Separation of Mixtures via Precipitation • Solid-Liquid Extraction • Solutions and Concentrations • Spectrophotometric Determination of an Equilibrium Constant • Surface Plasmon Resonance (SPR) • Tandem Mass Spectrometry • The ATP Bioluminescence Assay • The TUNEL Assay • The Western Blot • Two-Dimensional Gel Electrophoresis • Ultraviolet-Visible (UV-Vis) Spectroscopy • Using Differential Scanning Calorimetry to Measure Changes in Enthalpy • Using a pH Meter • X-ray Fluorescence (XRF)
STANDARD / GLE	S:SPS2:11:4.2.	<p>Patterns of Change: Students will apply skills from previous grades and describe how graphs and equations are useful (and often equivalent) ways for depicting and analyzing patterns of change.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Introduction to Behavioral Neuroscience • An Introduction to Caenorhabditis elegans • An Introduction to Cell Division • An Introduction to Cell Metabolism • An Introduction to Cognition • An Introduction to Developmental Neurobiology • An Introduction to Drosophila melanogaster • An Introduction to Endocytosis and Exocytosis • An Introduction to Learning and Memory • An Introduction to Modeling Behavioral Disorders and Stress • An Introduction to Motor Control • An Introduction to Neurophysiology • An Introduction to Reward and Addiction • An Overview of Alkenone Biomarker Analysis for Paleothermometry • An Overview of Genetic Analysis • An Overview of Genetics and Disease

- **An Overview of bGDGT Biomarker Analysis for Paleoclimatology**
- **Analysis of Earthworm Populations in Soil**
- **Annexin V and Propidium Iodide Labeling**
- **Anterograde Amnesia**
- **Anxiety Testing**
- **Approximate Number Sense Test**
- **Are You Smart or Hardworking? How Praise Influences Children's Motivation**
- **Assessing Dexterity with Reaching Tasks**
- **Bacterial Growth Curve Analysis and its Environmental Applications**
- **Balance and Coordination Testing**
- **Basic Mouse Care and Maintenance**
- **Binocular Rivalry**
- **Biofuels: Producing Ethanol from Cellulosic Material**
- **Blood Pressure Measurement**
- **C. elegans Chemotaxis Assay**
- **Calcium Imaging in Neurons**
- **Calibration Curves**
- **Capillary Electrophoresis (CE)**
- **Carbon and Nitrogen Analysis of Environmental Samples**
- **Categories and Inductive Inferences**
- **Cell Cycle Analysis**
- **Cell-surface Biotinylation Assay**
- **Children's Reliance on Artist Intentions When Identifying Pictures**
- **Chromatin Immunoprecipitation**
- **Chromatography-Based Biomolecule Purification Methods**
- **Column Chromatography**
- **Community DNA Extraction from Bacterial Colonies**
- **Conducting Reactions Below Room Temperature**
- **Conversion of Fatty Acid Methyl Esters by Saponification for Uk'37 Paleothermometry**
- **Coordination Chemistry Complexes**
- **Crowding**
- **Cyclic Voltammetry (CV)**
- **DNA Methylation Analysis**
- **Decision-making and the Iowa Gambling Task**
- **Decoding Auditory Imagery with Multivoxel Pattern Analysis**
- **Detecting Environmental Microorganisms with the Polymerase Chain Reaction and Gel Electrophoresis**
- **Detecting Reactive Oxygen Species**
- **Determination Of Nox in Automobile Exhaust Using UV-VIS Spectroscopy**
- **Determination of Moisture Content in Soil**
- **Determining Rate Laws and the Order of Reaction**
- **Determining the Density of a Solid and Liquid**

- Determining the Empirical Formula
- Determining the Mass Percent Composition in an Aqueous Solution
- Dichotic Listening
- Electro-encephalography (EEG)
- Electrochemical Measurements of Supported Catalysts Using a Potentiostat/Galvanostat
- Enzyme Assays and Kinetics
- Event-related Potentials and the Oddball Task
- Executive Function and the Dimensional Change Card Sort Task
- Executive Function in Autism Spectrum Disorder
- Expression Profiling with Microarrays
- Extraction of Biomarkers from Sediments - Accelerated Solvent Extraction
- Eye Tracking in Cognitive Experiments
- FM Dyes in Vesicle Recycling
- Fate Mapping
- Fear Conditioning
- Fractional Distillation
- Freezing-Point Depression to Determine an Unknown Compound
- Förster Resonance Energy Transfer (FRET)
- Gas Chromatography (GC) with Flame-Ionization Detection
- Gene Silencing with Morpholinos
- Genetic Crosses
- Growing Crystals for X-ray Diffraction Analysis
- Habituation: Studying Infants Before They Can Talk
- High-Performance Liquid Chromatography (HPLC)
- How Children Solve Problems Using Causal Reasoning
- Ideal Gas Law
- Inattentive Blindness
- Incidental Encoding
- Internal Standards
- Introduction to Catalysis
- Introduction to Mass Spectrometry
- Introduction to Titration
- Introduction to the Microplate Reader
- Invasion Assay Using 3D Matrices
- Ion-Exchange Chromatography
- Isolating Nucleic Acids from Yeast
- Just-noticeable Differences
- Language: The N400 in Semantic Incongruity
- Le Châtelier's Principle
- Lead Analysis of Soil Using Atomic Absorption Spectroscopy
- Learning and Memory: The Remember-Know Task
- MALDI-TOF Mass Spectrometry
- Making Solutions in the Laboratory
- Measuring Children's Trust in Testimony

- Measuring Grey Matter Differences with Voxel-based Morphometry: The Musical Brain
- Measuring Reaction Time and Donders' Method of Subtraction
- Measuring Tropospheric Ozone
- Measuring Verbal Working Memory Span
- Measuring Vital Signs
- Memory Development: Demonstrating How Repeated Questioning Leads to False Memories
- Mental Rotation
- Metabolic Labeling
- Metacognitive Development: How Children Estimate Their Memory
- Method of Standard Addition
- Modeling Social Stress
- Motion-induced Blindness
- Motor Learning in Mirror Drawing
- Motor Maps
- Multiple Object Tracking
- Mutual Exclusivity: How Children Learn the Meanings of Words
- Nuclear Magnetic Resonance (NMR) Spectroscopy
- Numerical Cognition: More or Less
- Nutrients in Aquatic Ecosystems
- Object Substitution Masking
- PCR: The Polymerase Chain Reaction
- Patch Clamp Electrophysiology
- Performing 1D Thin Layer Chromatography
- Pericardiocentesis
- Peripheral Vascular Exam Using a Continuous Wave Doppler
- Perspectives on Cognitive Psychology
- Perspectives on Neuropsychology
- Photometric Protein Determination
- Physiological Correlates of Emotion Recognition
- Piaget's Conservation Task and the Influence of Task Demands
- Plasmid Purification
- Positive Reinforcement Studies
- Prospect Theory
- Protein Crystallization
- Purification of a Total Lipid Extract with Column Chromatography
- Purifying Compounds by Recrystallization
- Quantifying Environmental Microorganisms and Viruses Using qPCR
- RNA Analysis of Environmental Samples Using RT-PCR
- RNAi in *C. elegans*
- Raman Spectroscopy for Chemical Analysis
- Removal of Branched and Cyclic Compounds by Urea Adduction for Uk'37 Paleothermometry

		<ul style="list-style-type: none"> • SNP Genotyping • Self-administration Studies • Separation of Mixtures via Precipitation • Solid-Liquid Extraction • Solutions and Concentrations • Soxhlet Extraction of Lipid Biomarkers from Sediment • Spatial Cueing • Spatial Memory Testing Using Mazes • Spectrophotometric Determination of an Equilibrium Constant • Surface Plasmon Resonance (SPR) • Tandem Mass Spectrometry • The ATP Bioluminescence Assay • The Attentional Blink • The Costs and Benefits of Natural Pedagogy • The ELISA Method • The Ideal Gas Law • The Inverted-face Effect • The Morris Water Maze • The Precision of Visual Working Memory with Delayed Estimation • The Rouge Test: Searching for a Sense of Self • The Split Brain • The Staircase Procedure for Finding a Perceptual Threshold • The TUNEL Assay • The Transwell Migration Assay • The Western Blot • Ultraviolet-Visible (UV-Vis) Spectroscopy • Understanding Concentration and Measuring Volumes • Using Differential Scanning Calorimetry to Measure Changes in Enthalpy • Using Diffusion Tensor Imaging in Traumatic Brain Injury • Using TMS to Measure Motor Excitability During Action Observation • Using Your Head: Measuring Infants' Rational Imitation of Actions • Using a pH Meter • Verbal Priming • Visual Attention: fMRI Investigation of Object-based Attentional Control • Visual Search for Features and Conjunctions • Visual Statistical Learning • Visualizing Soil Microorganisms via the Contact Slide Assay and Microscopy • Water Quality Analysis via Indicator Organisms • Yeast Maintenance • fMRI: Functional Magnetic Resonance Imaging
STANDARD / GLE	S:SPS2:11:4.3.	Patterns of Change: Students will apply skills from previous grades and give examples of how a system in

		<p>equilibrium may return to the same state of equilibrium if the disturbances it experiences are small; but large disturbances may cause it to escape that equilibrium and eventually settle into some other state of equilibrium.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Introduction to Cell Death • An Introduction to Cell Division • An Introduction to Cell Metabolism • An Introduction to Endocytosis and Exocytosis • Annexin V and Propidium Iodide Labeling • Assembly of a Reflux System for Heated Chemical Reactions • Cell-surface Biotinylation Assay • Detecting Reactive Oxygen Species • Dialysis: Diffusion Based Separation • FM Dyes in Vesicle Recycling • Le Châtelier's Principle • Reconstitution of Membrane Proteins • Separation of Mixtures via Precipitation • Spectrophotometric Determination of an Equilibrium Constant • The ATP Bioluminescence Assay • The TUNEL Assay
STANDARD / GLE	S:SPS2:11:4.4.	<p>Patterns of Change: Students will apply skills from previous grades and describe how in evolutionary change, the present arises from the materials and forms of the past, more or less gradually, and in ways that can be explained.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Introduction to the Chick: Gallus gallus domesticus • An Overview of Alkenone Biomarker Analysis for Paleothermometry • An Overview of Genetic Analysis • An Overview of bGDGT Biomarker Analysis for Paleoclimatology • Conversion of Fatty Acid Methyl Esters by Saponification for Uk'37 Paleothermometry • Purification of a Total Lipid Extract with Column Chromatography • Removal of Branched and Cyclic Compounds by Urea Adduction for Uk'37 Paleothermometry
STANDARD / GLE	S:SPS2:11:5.1.	<p>Form and Function: Students will apply skills from previous grades and explore how the movement of ocean floor plates under continental plates or two continental plates moving against each other can deform the earth's surface.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Determining Spatial Orientation of Rock Layers with

		<p>the Brunton Compass</p> <ul style="list-style-type: none"> • Igneous Intrusive Rock • Igneous Volcanic Rock • Making a Geologic Cross Section • Using Topographic Maps to Generate Topographic Profiles
STANDARD / GLE	S:SPS2:11:5.3.	<p>Form and Function: Students will apply skills from previous grades and understand that an atom's electron configuration determines how the atom can interact with other atoms.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Coordination Chemistry Complexes
STANDARD / GLE	S:SPS2:11:5.4.	<p>Form and Function: Students will apply skills from previous grades and provide examples of how configuration of atoms in a molecule determines a molecule's properties.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Assembly of a Reflux System for Heated Chemical Reactions • Calibration Curves • Capillary Electrophoresis (CE) • Chromatography-Based Biomolecule Purification Methods • Co-Immunoprecipitation and Pull-Down Assays • Column Chromatography • Common Lab Glassware and Uses • Conducting Reactions Below Room Temperature • Coordination Chemistry Complexes • Cyclic Voltammetry (CV) • Degassing Liquids with Freeze-Pump-Thaw Cycling • Density Gradient Ultracentrifugation • Determining Rate Laws and the Order of Reaction • Determining the Density of a Solid and Liquid • Determining the Empirical Formula • Determining the Mass Percent Composition in an Aqueous Solution • Determining the Solubility Rules of Ionic Compounds • Dialysis: Diffusion Based Separation • Electrochemical Measurements of Supported Catalysts Using a Potentiostat/Galvanostat • Electrophoretic Mobility Shift Assay (EMSA) • Enzyme Assays and Kinetics • FM Dyes in Vesicle Recycling • Fractional Distillation • Freezing-Point Depression to Determine an Unknown Compound • Förster Resonance Energy Transfer (FRET) • Gas Chromatography (GC) with Flame-Ionization Detection

		<ul style="list-style-type: none"> • Growing Crystals for X-ray Diffraction Analysis • High-Performance Liquid Chromatography (HPLC) • Ideal Gas Law • Internal Standards • Introduction to Catalysis • Introduction to Mass Spectrometry • Introduction to Titration • Ion-Exchange Chromatography • Le Châtelier's Principle • MALDI-TOF Mass Spectrometry • Metabolic Labeling • Method of Standard Addition • Nuclear Magnetic Resonance (NMR) Spectroscopy • Performing 1D Thin Layer Chromatography • Photometric Protein Determination • Physical Properties Of Minerals I: Crystals and Cleavage • Physical Properties Of Minerals II: Polymineralic Analysis • Preparing Anhydrous Reagents and Equipment • Protein Crystallization • Purifying Compounds by Recrystallization • Raman Spectroscopy for Chemical Analysis • Reconstitution of Membrane Proteins • Rotary Evaporation to Remove Solvent • Sample Preparation for Analytical Preparation • Scanning Electron Microscopy (SEM) • Schlenk Lines Transfer of Solvents • Separation of Mixtures via Precipitation • Solid-Liquid Extraction • Solutions and Concentrations • Spectrophotometric Determination of an Equilibrium Constant • Surface Plasmon Resonance (SPR) • Tandem Mass Spectrometry • The Ideal Gas Law • Two-Dimensional Gel Electrophoresis • Ultraviolet-Visible (UV-Vis) Spectroscopy • Using a pH Meter • X-ray Fluorescence (XRF)
STANDARD / GLE	S:SPS2:11:5.5.	<p>Form and Function: Students will apply skills from previous grades and discover how the shape of large molecules affects the interaction with other molecules.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Introduction to Caenorhabditis elegans • An Introduction to Cell Death • An Introduction to Cell Division • An Introduction to Cell Metabolism • An Introduction to Cell Motility and Migration • An Introduction to Developmental Genetics • An Introduction to Molecular Developmental Biology

- An Introduction to *Saccharomyces cerevisiae*
- An Introduction to Transfection
- An Overview of Alkenone Biomarker Analysis for Paleothermometry
- An Overview of Epigenetics
- An Overview of Gene Expression
- An Overview of Genetic Analysis
- An Overview of Genetic Engineering
- An Overview of Genetics and Disease
- An Overview of bGDGT Biomarker Analysis for Paleoclimatology
- Annexin V and Propidium Iodide Labeling
- Bacterial Transformation: Electroporation
- Bacterial Transformation: The Heat Shock Method
- Biofuels: Producing Ethanol from Cellulosic Material
- *C. elegans* Maintenance
- Capillary Electrophoresis (CE)
- Cell Cycle Analysis
- Cell-surface Biotinylation Assay
- Chromatin Immunoprecipitation
- Chromatography-Based Biomolecule Purification Methods
- Co-Immunoprecipitation and Pull-Down Assays
- Column Chromatography
- Community DNA Extraction from Bacterial Colonies
- Conversion of Fatty Acid Methyl Esters by Saponification for Uk'37 Paleothermometry
- Cytogenetics
- DNA Gel Electrophoresis
- DNA Ligation Reactions
- DNA Methylation Analysis
- Density Gradient Ultracentrifugation
- Detecting Environmental Microorganisms with the Polymerase Chain Reaction and Gel Electrophoresis
- Detecting Reactive Oxygen Species
- Development and Reproduction of the Laboratory Mouse
- Development of the Chick
- Dialysis: Diffusion Based Separation
- *Drosophila* Larval IHC
- *Drosophila melanogaster* Embryo and Larva Harvesting and Preparation
- Electrophoretic Mobility Shift Assay (EMSA)
- Embryonic Stem Cell Culture and Differentiation
- Enzyme Assays and Kinetics
- Explant Culture for Developmental Studies
- Expression Profiling with Microarrays
- Extraction of Biomarkers from Sediments - Accelerated Solvent Extraction
- FM Dyes in Vesicle Recycling
- Gel Purification

- Gene Silencing with Morpholinos
- Genetic Crosses
- Genetic Engineering of Model Organisms
- Genetic Screens
- Genome Editing
- In ovo Electroporation of Chicken Embryos
- Induced Pluripotency
- Introduction to Catalysis
- Introduction to Mass Spectrometry
- Invasion Assay Using 3D Matrices
- Invertebrate Lifespan Quantification
- Ion-Exchange Chromatography
- Isolating Nucleic Acids from Yeast
- Live Cell Imaging of Mitosis
- MALDI-TOF Mass Spectrometry
- Metabolic Labeling
- Molecular Cloning
- Mouse Genotyping
- PCR: The Polymerase Chain Reaction
- Photometric Protein Determination
- Plasmid Purification
- Protein Crystallization
- Purification of a Total Lipid Extract with Column Chromatography
- Quantifying Environmental Microorganisms and Viruses Using qPCR
- RNA Analysis of Environmental Samples Using RT-PCR
- RNA-Seq
- RNAi in *C. elegans*
- Recombineering and Gene Targeting
- Reconstitution of Membrane Proteins
- Removal of Branched and Cyclic Compounds by Urea Adduction for Uk'37 Paleothermometry
- Restriction Enzyme Digests
- SNP Genotyping
- Separating Protein with SDS-PAGE
- Separation of Mixtures via Precipitation
- Sonication Extraction of Lipid Biomarkers from Sediment
- Soxhlet Extraction of Lipid Biomarkers from Sediment
- Tandem Mass Spectrometry
- Testing For Genetically Modified Foods
- The ATP Bioluminescence Assay
- The ELISA Method
- The TUNEL Assay
- The Transwell Migration Assay
- The Western Blot
- Two-Dimensional Gel Electrophoresis
- Whole-Mount In Situ Hybridization
- Yeast Maintenance
- Yeast Transformation and Cloning

		<ul style="list-style-type: none"> • Zebrafish Breeding and Embryo Handling • Zebrafish Microinjection Techniques • Zebrafish Reproduction and Development
STRAND / STANDARD	NH.SPS3.	Science Process Skills: Personal, Social, and Technological Perspectives
STANDARD / GLE	S:SPS3:11:1.2.	<p>Collaboration in Scientific Endeavors: Students will apply skills from previous grades and identify global researchers in a field of interest.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Introduction to Aging and Regeneration • An Introduction to Behavioral Neuroscience • An Introduction to Developmental Genetics • An Introduction to Drosophila melanogaster • An Introduction to Molecular Developmental Biology • An Introduction to Neuroanatomy • An Introduction to Neurophysiology • An Introduction to Organogenesis • An Introduction to Stem Cell Biology • An Introduction to the Chick: Gallus gallus domesticus • An Introduction to the Laboratory Mouse: Mus musculus • An Introduction to the Zebrafish: Danio rerio • An Overview of Epigenetics • An Overview of Gene Expression • An Overview of Genetic Analysis • An Overview of Genetic Engineering • An Overview of Genetics and Disease • Genetic Crosses • Ideal Gas Law • Piaget's Conservation Task and the Influence of Task Demands • Rotary Evaporation to Remove Solvent • The Ideal Gas Law
STANDARD / GLE	S:SPS3:11:2.4.	<p>Common Environmental Issues, Natural Resources Management and Conservation: Students will apply skills from previous grades and apply basic logic and reasoning skills to evaluate completeness and reliability in a variety of information sources.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Aseptic Technique in Environmental Science
STANDARD / GLE	S:SPS3:11:2.8.	<p>Common Environmental Issues, Natural Resources Management and Conservation: Students will apply skills from previous grades and analyze global, social, cultural, political, economic and environmental linkages.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Biofuels: Producing Ethanol from Cellulosic Material • Determining the Mass Percent Composition in an

		<p>Aqueous Solution</p> <ul style="list-style-type: none"> • Determining the Solubility Rules of Ionic Compounds • Dissolved Oxygen in Surface Water • Le Châtelier's Principle • Lead Analysis of Soil Using Atomic Absorption Spectroscopy <p>Spectroscopy</p> <ul style="list-style-type: none"> • Nutrients in Aquatic Ecosystems • Solid-Liquid Extraction • Testing For Genetically Modified Foods • Turbidity and Total Solids in Surface Water
<p>STANDARD / GLE</p>	<p>S:SPS3:11:3.1.</p>	<p>Science and Technology, Technological Design and Application: Students will apply skills from previous grades and analyze environmental issues such as water quality, air quality, hazardous waste, and depletion of natural resources.</p> <p>JoVE</p> <ul style="list-style-type: none"> • Algae Enumeration via Culturable Methodology • Biofuels: Producing Ethanol from Cellulosic Material • Detection of Bacteriophages in Environmental Samples • Determination Of Nox in Automobile Exhaust Using UV-VIS Spectroscopy • Determining the Mass Percent Composition in an Aqueous Solution • Determining the Solubility Rules of Ionic Compounds • Dissolved Oxygen in Surface Water • Gas Chromatography (GC) with Flame-Ionization Detection • Isolation of Fecal Bacteria from Water Samples by Filtration • Le Châtelier's Principle • Lead Analysis of Soil Using Atomic Absorption Spectroscopy • Measuring Tropospheric Ozone • Nutrients in Aquatic Ecosystems • Quantifying Environmental Microorganisms and Viruses Using qPCR • RNA Analysis of Environmental Samples Using RT-PCR • Solid-Liquid Extraction • Testing For Genetically Modified Foods • Tree Identification: How To Use a Dichotomous Key • Tree Survey: Point-Centered Quarter Sampling Method • Turbidity and Total Solids in Surface Water • Using GIS to Investigate Urban Forestry • Visualizing Soil Microorganisms via the Contact Slide Assay and Microscopy • Water Quality Analysis via Indicator Organisms • Zebrafish Maintenance and Husbandry
<p>STRAND / STANDARD</p>	<p>NH.SPS4.</p>	<p>Science Process Skills: Science Skills for Information, Communication and Media Literacy</p>

STANDARD / GLE	S:SPS4:11:1.1.	<p>Information and Media Literacy: Students will apply skills from previous grades and select and analyze information from various sources (including electronic resources, print resources, community resources) and personally collected data to answer questions being investigated.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Igneous Intrusive Rock • Igneous Volcanic Rock
STANDARD / GLE	S:SPS4:11:1.2.	<p>Information and Media Literacy: Students will apply skills from previous grades and collect and use qualitative and quantitative data and information, seek evidence and sources of information to identify flaws such as errors and bias, and explain how the evidence supports or refutes an initial hypothesis.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Calibration Curves • Capillary Electrophoresis (CE) • Chromatography-Based Biomolecule Purification Methods • Cyclic Voltammetry (CV) • Density Gradient Ultracentrifugation • Dialysis: Diffusion Based Separation • Electrochemical Measurements of Supported Catalysts Using a Potentiostat/Galvanostat • Ethics in Psychology Research • Experimentation using a Confederate • From Theory to Design: The Role of Creativity in Designing Experiments • Gas Chromatography (GC) with Flame-Ionization Detection • High-Performance Liquid Chromatography (HPLC) • Internal Standards • Introduction to Mass Spectrometry • Ion-Exchange Chromatography • Manipulating an Independent Variable through Embodiment • Method of Standard Addition • Observational Research • Pilot Testing • Preparing Anhydrous Reagents and Equipment • Protein Crystallization • Raman Spectroscopy for Chemical Analysis • Realism in Experimentation • Reliability in Psychology Experiments • Sample Preparation for Analytical Preparation • Scanning Electron Microscopy (SEM) • Self-report vs. Behavioral Measures of Recycling • The Factorial Experiment

		<ul style="list-style-type: none"> • The Multi-group Experiment • The Simple Experiment: Two-group Design • Two-Dimensional Gel Electrophoresis • Within-subjects Repeated-measures Design • X-ray Fluorescence (XRF)
STANDARD / GLE	S:SPS4:11:1.3.	<p>Information and Media Literacy: Students will apply skills from previous grades and analyze data and information gathered to clarify problems or issues identifying costs and benefits from a social, cultural, and/or environmental perspective; predict the consequences of action or inaction; and propose possible solutions.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Biofuels: Producing Ethanol from Cellulosic Material • Determination Of Nox in Automobile Exhaust Using UV-VIS Spectroscopy • Dissolved Oxygen in Surface Water • Lead Analysis of Soil Using Atomic Absorption Spectroscopy • Measuring Tropospheric Ozone • Nutrients in Aquatic Ecosystems • Proton Exchange Membrane Fuel Cells • Turbidity and Total Solids in Surface Water
STANDARD / GLE	S:SPS4:11:2.1.	<p>Communication Skills: Students will apply skills from previous grades and Select and use appropriate scientific vocabulary to orally share and communicate scientific ideas, plans, results, and conclusions resulting from investigations.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Abdominal Exam I: Inspection and Auscultation • Abdominal Exam II: Percussion • Abdominal Exam III: Palpation • Abdominal Exam IV: Acute Abdominal Pain Assessment • Algae Enumeration via Culturable Methodology • An Introduction to Aging and Regeneration • An Introduction to Behavioral Neuroscience • An Introduction to Caenorhabditis elegans • An Introduction to Cell Death • An Introduction to Cell Division • An Introduction to Cell Metabolism • An Introduction to Cell Motility and Migration • An Introduction to Cellular and Molecular Neuroscience • An Introduction to Cognition • An Introduction to Developmental Genetics • An Introduction to Developmental Neurobiology • An Introduction to Drosophila melanogaster • An Introduction to Endocytosis and Exocytosis • An Introduction to Learning and Memory

- **An Introduction to Modeling Behavioral Disorders and Stress**
- **An Introduction to Molecular Developmental Biology**
- **An Introduction to Motor Control**
- **An Introduction to Neuroanatomy**
- **An Introduction to Neurophysiology**
- **An Introduction to Organogenesis**
- **An Introduction to Reward and Addiction**
- **An Introduction to *Saccharomyces cerevisiae***
- **An Introduction to Stem Cell Biology**
- **An Introduction to Transfection**
- **An Introduction to Working in the Hood**
- **An Introduction to the Centrifuge**
- **An Introduction to the Chick: *Gallus gallus domesticus***
- **An Introduction to the Laboratory Mouse: *Mus musculus***
- **An Introduction to the Micropipettor**
- **An Introduction to the Zebrafish: *Danio rerio***
- **An Overview of Alkenone Biomarker Analysis for Paleothermometry**
- **An Overview of Epigenetics**
- **An Overview of Gene Expression**
- **An Overview of Genetic Analysis**
- **An Overview of Genetic Engineering**
- **An Overview of Genetics and Disease**
- **An Overview of bGDGT Biomarker Analysis for Paleoclimatology**
- **Analysis of Earthworm Populations in Soil**
- **Anesthesia Induction and Maintenance**
- **Ankle Exam**
- **Annexin V and Propidium Iodide Labeling**
- **Anterograde Amnesia**
- **Anxiety Testing**
- **Approximate Number Sense Test**
- **Are You Smart or Hardworking? How Praise Influences Children's Motivation**
- **Arterial Line Placement**
- **Aseptic Technique in Environmental Science**
- **Assembly of a Reflux System for Heated Chemical Reactions**
- **Assessing Dexterity with Reaching Tasks**
- **Auscultation**
- **Bacterial Growth Curve Analysis and its Environmental Applications**
- **Bacterial Transformation: Electroporation**
- **Bacterial Transformation: The Heat Shock Method**
- **Balance and Coordination Testing**
- **Basic Care Procedures**
- **Basic Chick Care and Maintenance**
- **Basic Life Support Part II: Airway/Breathing and Continued Cardiopulmonary Resuscitation**

- **Basic Life Support: Cardiopulmonary Resuscitation and Defibrillation**
- **Basic Mouse Care and Maintenance**
- **Binocular Rivalry**
- **Biofuels: Producing Ethanol from Cellulosic Material**
- **Blood Pressure Measurement**
- **Blood Withdrawal I**
- **Blood Withdrawal II**
- **C. elegans Chemotaxis Assay**
- **C. elegans Development and Reproduction**
- **C. elegans Maintenance**
- **Calcium Imaging in Neurons**
- **Calibration Curves**
- **Capillary Electrophoresis (CE)**
- **Carbon and Nitrogen Analysis of Environmental Samples**
- **Cardiac Exam I: Inspection and Palpation**
- **Cardiac Exam II: Auscultation**
- **Cardiac Exam III: Abnormal Heart Sounds**
- **Categories and Inductive Inferences**
- **Cell Cycle Analysis**
- **Cell-surface Biotinylation Assay**
- **Central Venous Catheter Insertion: Femoral Vein with Ultrasound Guidance**
- **Central Venous Catheter Insertion: Internal Jugular with Ultrasound Guidance**
- **Central Venous Catheter Insertion: Subclavian Vein**
- **Chick ex ovo Culture**
- **Children's Reliance on Artist Intentions When Identifying Pictures**
- **Chromatin Immunoprecipitation**
- **Chromatography-Based Biomolecule Purification Methods**
- **Co-Immunoprecipitation and Pull-Down Assays**
- **Color Afterimages**
- **Column Chromatography**
- **Common Lab Glassware and Uses**
- **Community DNA Extraction from Bacterial Colonies**
- **Compound Administration I**
- **Compound Administration II**
- **Compound Administration III**
- **Compound Administration IV**
- **Comprehensive Breast Exam**
- **Conducting Reactions Below Room Temperature**
- **Considerations for Rodent Surgery**
- **Conversion of Fatty Acid Methyl Esters by Saponification for Uk'37 Paleothermometry**
- **Coordination Chemistry Complexes**
- **Cranial Nerves Exam I (I-VI)**
- **Cranial Nerves Exam II (VII-XII)**
- **Crowding**

- **Culturing and Enumerating Bacteria from Soil Samples**
- **Cyclic Voltammetry (CV)**
- **Cytogenetics**
- **DNA Gel Electrophoresis**
- **DNA Ligation Reactions**
- **DNA Methylation Analysis**
- **Decision-making and the Iowa Gambling Task**
- **Decoding Auditory Imagery with Multivoxel Pattern Analysis**
- **Degassing Liquids with Freeze-Pump-Thaw Cycling**
- **Density Gradient Ultracentrifugation**
- **Detecting Environmental Microorganisms with the Polymerase Chain Reaction and Gel Electrophoresis**
- **Detecting Reactive Oxygen Species**
- **Detection of Bacteriophages in Environmental Samples**
- **Determination Of Nox in Automobile Exhaust Using UV-VIS Spectroscopy**
- **Determination of Moisture Content in Soil**
- **Determining Rate Laws and the Order of Reaction**
- **Determining Spatial Orientation of Rock Layers with the Brunton Compass**
- **Determining the Density of a Solid and Liquid**
- **Determining the Empirical Formula**
- **Determining the Mass Percent Composition in an Aqueous Solution**
- **Determining the Solubility Rules of Ionic Compounds**
- **Development and Reproduction of the Laboratory Mouse**
- **Development of the Chick**
- **Diagnostic Necropsy and Tissue Harvest**
- **Dialysis: Diffusion Based Separation**
- **Dichotic Listening**
- **Dissolved Oxygen in Surface Water**
- **Drosophila Development and Reproduction**
- **Drosophila Larval IHC**
- **Drosophila Maintenance**
- **Drosophila melanogaster Embryo and Larva Harvesting and Preparation**
- **Ear Exam**
- **Elbow Exam**
- **Electro-encephalography (EEG)**
- **Electrochemical Measurements of Supported Catalysts Using a Potentiostat/Galvanostat**
- **Electrophoretic Mobility Shift Assay (EMSA)**
- **Embryonic Stem Cell Culture and Differentiation**
- **Emergency Tube Thoracostomy (Chest Tube Placement)**
- **Emergent Lateral Canthotomy and Inferior Catholysis**
- **Enzyme Assays and Kinetics**
- **Ethics in Psychology Research**
- **Event-related Potentials and the Oddball Task**

- Executive Function and the Dimensional Change Card Sort Task
- Executive Function in Autism Spectrum Disorder
- Experimentation using a Confederate
- Explant Culture for Developmental Studies
- Explant Culture of Neural Tissue
- Expression Profiling with Microarrays
- Extraction of Biomarkers from Sediments - Accelerated Solvent Extraction
- Eye Exam
- Eye Tracking in Cognitive Experiments
- FM Dyes in Vesicle Recycling
- Fate Mapping
- Fear Conditioning
- Filamentous Fungi
- Finding Your Blind Spot and Perceptual Filling-in
- Foot Exam
- Fractional Distillation
- Freezing-Point Depression to Determine an Unknown Compound
- From Theory to Design: The Role of Creativity in Designing Experiments
- Fundamentals of Breeding and Weaning
- Förster Resonance Energy Transfer (FRET)
- Gas Chromatography (GC) with Flame-Ionization Detection
- Gel Purification
- Gene Silencing with Morpholinos
- General Approach to the Physical Exam
- Genetic Crosses
- Genetic Engineering of Model Organisms
- Genetic Screens
- Genome Editing
- Gram Staining of Bacteria from Environmental Sources
- Growing Crystals for X-ray Diffraction Analysis
- Habituation: Studying Infants Before They Can Talk
- Hand and Wrist Exam
- High-Performance Liquid Chromatography (HPLC)
- Hip Exam
- Histological Sample Preparation for Light Microscopy
- Histological Staining of Neural Tissue
- How Children Solve Problems Using Causal Reasoning
- Ideal Gas Law
- Igneous Intrusive Rock
- Igneous Volcanic Rock
- In ovo Electroporation of Chicken Embryos
- Inattentional Blindness
- Incidental Encoding
- Induced Pluripotency
- Internal Standards
- Intra-articular Shoulder Injection for Reduction

Following Anterior Shoulder Dislocation

- **Intraosseous Needle Placement**
- **Introducing Experimental Agents into the Mouse**
- **Introduction to Catalysis**
- **Introduction to Fluorescence Microscopy**
- **Introduction to Light Microscopy**
- **Introduction to Mass Spectrometry**
- **Introduction to Serological Pipettes and Pipettors**
- **Introduction to Titration**
- **Introduction to the Bunsen Burner**
- **Introduction to the Microplate Reader**
- **Introduction to the Spectrophotometer**
- **Invasion Assay Using 3D Matrices**
- **Invertebrate Lifespan Quantification**
- **Ion-Exchange Chromatography**
- **Isolating Nucleic Acids from Yeast**
- **Isolation of Fecal Bacteria from Water Samples by**

Filtration

- **Just-noticeable Differences**
- **Knee Exam**
- **Language: The N400 in Semantic Incongruity**
- **Le Châtelier's Principle**
- **Lead Analysis of Soil Using Atomic Absorption**

Spectroscopy

- **Learning and Memory: The Remember-Know Task**
- **Live Cell Imaging of Mitosis**
- **Lower Back Exam**
- **Lymph Node Exam**
- **MALDI-TOF Mass Spectrometry**
- **Making Solutions in the Laboratory**
- **Making a Geologic Cross Section**
- **Male Rectal Exam**
- **Manipulating an Independent Variable through**

Embodiment

- **Measuring Children's Trust in Testimony**
- **Measuring Grey Matter Differences with Voxel-based**

Morphometry: The Musical Brain

- **Measuring Mass in the Laboratory**
- **Measuring Reaction Time and Donders' Method of**

Subtraction

- **Measuring Tropospheric Ozone**
- **Measuring Verbal Working Memory Span**
- **Measuring Vital Signs**
- **Memory Development: Demonstrating How Repeated**
- **Questioning Leads to False Memories**

Mental Rotation

- **Metabolic Labeling**
- **Metacognitive Development: How Children Estimate**

Their Memory

- **Method of Standard Addition**

- **Modeling Social Stress**

- Molecular Cloning
- Motion-induced Blindness
- Motor Exam I
- Motor Exam II
- Motor Learning in Mirror Drawing
- Motor Maps
- Mouse Genotyping
- Multiple Object Tracking
- Murine In Utero Electroporation
- Mutual Exclusivity: How Children Learn the Meanings of Words
- Neck Exam
- Needle Thoracostomy (needle Decompression) for Temporizing Tension Pneumothorax Treatment
- Neuronal Transfection Methods
- Nose, Sinuses, Oral Cavity and Pharynx Exam
- Nuclear Magnetic Resonance (NMR) Spectroscopy
- Numerical Cognition: More or Less
- Nutrients in Aquatic Ecosystems
- Object Substitution Masking
- Observation and Inspection
- Observational Research
- Ophthalmoscopic Examination
- PCR: The Polymerase Chain Reaction
- Palpation
- Passaging Cells
- Patch Clamp Electrophysiology
- Pelvic Exam I: Assessment of the External Genitalia
- Pelvic Exam II: Speculum Exam
- Pelvic Exam III: Bimanual and Rectovaginal Exam
- Percussion
- Percutaneous Cricothyrotomy (Seldinger Technique)
- Performing 1D Thin Layer Chromatography
- Pericardiocentesis
- Peripheral Vascular Exam
- Peripheral Vascular Exam Using a Continuous Wave Doppler
- Peripheral Venous Cannulation
- Perspectives on Sensation and Perception
- Photometric Protein Determination
- Physical Properties Of Minerals I: Crystals and Cleavage
- Physical Properties Of Minerals II: Polymineralic Analysis
- Physiological Correlates of Emotion Recognition
- Piaget's Conservation Task and the Influence of Task Demands
- Pilot Testing
- Placebos in Research
- Plasmid Purification
- Positive Reinforcement Studies
- Preparing Anhydrous Reagents and Equipment

- Primary Neuronal Cultures
- Proper Adjustment of Patient Attire during the Physical Exam
- Prospect Theory
- Protein Crystallization
- Proton Exchange Membrane Fuel Cells
- Purification of a Total Lipid Extract with Column Chromatography
- Purifying Compounds by Recrystallization
- Quantifying Environmental Microorganisms and Viruses Using qPCR
- RNA Analysis of Environmental Samples Using RT-PCR
- RNA-Seq
- RNAi in *C. elegans*
- Raman Spectroscopy for Chemical Analysis
- Realism in Experimentation
- Recombineering and Gene Targeting
- Reconstitution of Membrane Proteins
- Regulating Temperature in the Lab: Applying Heat
- Regulating Temperature in the Lab: Preserving Samples Using Cold
- Reliability in Psychology Experiments
- Removal of Branched and Cyclic Compounds by Urea Adduction for Uk'37 Paleothermometry
- Respiratory Exam I: Inspection and Palpation
- Respiratory Exam II: Percussion and Auscultation
- Restriction Enzyme Digests
- Rodent Handling and Restraint Techniques
- Rodent Identification I
- Rodent Identification II
- Rodent Stereotaxic Surgery
- Rotary Evaporation to Remove Solvent
- SNP Genotyping
- Sample Preparation for Analytical Preparation
- Scanning Electron Microscopy (SEM)
- Schlenk Lines Transfer of Solvents
- Self-administration Studies
- Self-report vs. Behavioral Measures of Recycling
- Sensory Exam
- Separating Protein with SDS-PAGE
- Separation of Mixtures via Precipitation
- Shoulder Exam I
- Shoulder Exam II
- Soil Nutrient Analysis: Nitrogen, Phosphorus, and Potassium
- Solid-Liquid Extraction
- Solutions and Concentrations
- Sonication Extraction of Lipid Biomarkers from Sediment
- Soxhlet Extraction of Lipid Biomarkers from Sediment
- Spatial Cueing

- Spatial Memory Testing Using Mazes
- Spectrophotometric Determination of an Equilibrium Constant
- Sterile Tissue Harvest
- Surface Plasmon Resonance (SPR)
- Surgical Cricothyrotomy
- Tandem Mass Spectrometry
- Testing For Genetically Modified Foods
- The ATP Bioluminescence Assay
- The Ames Room
- The Attentional Blink
- The Costs and Benefits of Natural Pedagogy
- The ELISA Method
- The Factorial Experiment
- The Ideal Gas Law
- The Inverted-face Effect
- The McGurk Effect
- The Morris Water Maze
- The Multi-group Experiment
- The Precision of Visual Working Memory with Delayed Estimation
- The Rouge Test: Searching for a Sense of Self
- The Rubber Hand Illusion
- The Simple Experiment: Two-group Design
- The Split Brain
- The Staircase Procedure for Finding a Perceptual Threshold
- The TUNEL Assay
- The Transwell Migration Assay
- The Western Blot
- Thyroid Exam
- Tissue Regeneration with Somatic Stem Cells
- Transplantation Studies
- Tree Identification: How To Use a Dichotomous Key
- Tree Survey: Point-Centered Quarter Sampling Method
- Turbidity and Total Solids in Surface Water
- Two-Dimensional Gel Electrophoresis
- Ultraviolet-Visible (UV-Vis) Spectroscopy
- Understanding Concentration and Measuring Volumes
- Using Differential Scanning Calorimetry to Measure Changes in Enthalpy
- Using Diffusion Tensor Imaging in Traumatic Brain Injury
- Using GIS to Investigate Urban Forestry
- Using TMS to Measure Motor Excitability During Action Observation
- Using Topographic Maps to Generate Topographic Profiles
- Using Your Head: Measuring Infants' Rational Imitation of Actions
- Using a pH Meter

		<ul style="list-style-type: none"> • Verbal Priming • Visual Attention: fMRI Investigation of Object-based Attentional Control • Visual Search for Features and Conjunctions • Visual Statistical Learning • Visualizing Soil Microorganisms via the Contact Slide Assay and Microscopy • Water Quality Analysis via Indicator Organisms • Whole-Mount In Situ Hybridization • Within-subjects Repeated-measures Design • X-ray Fluorescence (XRF) • Yeast Maintenance • Yeast Reproduction • Yeast Transformation and Cloning • Zebrafish Breeding and Embryo Handling • Zebrafish Maintenance and Husbandry • Zebrafish Microinjection Techniques • Zebrafish Reproduction and Development • fMRI: Functional Magnetic Resonance Imaging
STANDARD / GLE	S:SPS4:11:3.1.	<p>Critical Thinking and Systems Thinking: Students will apply skills from previous grades and pursue scientific inquiry such as observation, measurement, hypothesis formation and analysis, and value 'habits of mind' such as persistence, accuracy, and collaboration.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Introduction to Working in the Hood • An Introduction to the Centrifuge • An Introduction to the Micropipettor • Histological Sample Preparation for Light Microscopy • Introduction to Fluorescence Microscopy • Introduction to Light Microscopy • Introduction to Serological Pipettes and Pipettors • Introduction to the Bunsen Burner • Introduction to the Microplate Reader • Measuring Mass in the Laboratory • Regulating Temperature in the Lab: Applying Heat • Regulating Temperature in the Lab: Preserving Samples Using Cold • The Costs and Benefits of Natural Pedagogy
STANDARD / GLE	S:SPS4:11:3.2.	<p>Critical Thinking and Systems Thinking: Students will apply skills from previous grades and generate solutions to scientific questions and challenges through developing, modeling and revising investigations.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Ethics in Psychology Research • Experimentation using a Confederate • From Theory to Design: The Role of Creativity in Designing Experiments • Manipulating an Independent Variable through

		<p>Embodiment</p> <ul style="list-style-type: none"> • Observational Research • Pilot Testing • Placebos in Research • Realism in Experimentation • Reliability in Psychology Experiments • The Factorial Experiment • The Multi-group Experiment • The Simple Experiment: Two-group Design • Within-subjects Repeated-measures Design
STANDARD / GLE	S:SPS4:11:3.3.	<p>Critical Thinking and Systems Thinking: Students will apply skills from previous grades and apply scientific knowledge and skills to make reasoned decisions about the use of science and scientific innovations.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Are You Smart or Hardworking? How Praise Influences Children's Motivation • Categories and Inductive Inferences • Children's Reliance on Artist Intentions When Identifying Pictures • Executive Function and the Dimensional Change Card Sort Task • How Children Solve Problems Using Causal Reasoning • Metacognitive Development: How Children Estimate Their Memory • Mutual Exclusivity: How Children Learn the Meanings of Words • Numerical Cognition: More or Less • Piaget's Conservation Task and the Influence of Task Demands • The Costs and Benefits of Natural Pedagogy • The Rouge Test: Searching for a Sense of Self
STANDARD / GLE	S:SPS4:11:4.1.	<p>Problem Identification, Formulation, and Solution: Students will apply skills from previous grades and formulate scientific questions about an issue and define experimental procedures for finding answers.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Ethics in Psychology Research • Experimentation using a Confederate • From Theory to Design: The Role of Creativity in Designing Experiments • Manipulating an Independent Variable through Embodiment • Observational Research • Pilot Testing • Placebos in Research • Realism in Experimentation • Reliability in Psychology Experiments • The Factorial Experiment

		<ul style="list-style-type: none"> • The Multi-group Experiment • The Simple Experiment: Two-group Design • Within-subjects Repeated-measures Design
STANDARD / GLE	S:SPS4:11:4.2.	<p>Problem Identification, Formulation, and Solution: Students will apply skills from previous grades and plan and conduct practical tests to solve problems or answer a question, collect and analyze data using appropriate instruments and techniques safely and accurately.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Ethics in Psychology Research • Experimentation using a Confederate • From Theory to Design: The Role of Creativity in Designing Experiments • Manipulating an Independent Variable through Embodiment • Observational Research • Pilot Testing • Placebos in Research • Realism in Experimentation • Reliability in Psychology Experiments • The Factorial Experiment • The Multi-group Experiment • The Simple Experiment: Two-group Design • Within-subjects Repeated-measures Design
STANDARD / GLE	S:SPS4:11:4.3.	<p>Problem Identification, Formulation, and Solution: Students will apply skills from previous grades and develop models and explanations to fit evidence obtained through investigations.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Determining Spatial Orientation of Rock Layers with the Brunton Compass • Igneous Intrusive Rock • Igneous Volcanic Rock • Making a Geologic Cross Section • Using Topographic Maps to Generate Topographic Profiles
STANDARD / GLE	S:SPS4:11:7.1.	<p>Self Direction: Students will apply skills from previous grades and use key ideas of science to document and explain through an investigation the relationship between science and concepts.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Turbidity and Total Solids in Surface Water
STRAND / STANDARD	NH.ESS1.	Earth Space Science: The Earth and Earth materials, as we know them today, have developed over long periods of time, through constant change processes.
STANDARD / GLE	S:ESS1:11:2.1.	Composition and Features: Students will recognize that elements exist in fixed amounts and describe how they

		<p>move through the solid Earth, oceans, atmosphere, and living things as part of geochemical cycles, such as the water, carbon and nitrogen cycles.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Overview of Alkenone Biomarker Analysis for Paleothermometry • An Overview of bGDGT Biomarker Analysis for Paleoclimatology • Conversion of Fatty Acid Methyl Esters by Saponification for Uk'37 Paleothermometry • Determination Of Nox in Automobile Exhaust Using UV-VIS Spectroscopy • Dissolved Oxygen in Surface Water • Extraction of Biomarkers from Sediments - Accelerated Solvent Extraction • Purification of a Total Lipid Extract with Column Chromatography • Removal of Branched and Cyclic Compounds by Urea Adduction for Uk'37 Paleothermometry • Sonication Extraction of Lipid Biomarkers from Sediment • Soxhlet Extraction of Lipid Biomarkers from Sediment • Using GIS to Investigate Urban Forestry
STANDARD / GLE	S:ESS1:11:2.2.	<p>Composition and Features: Students will describe the conditions that enable the Earth to support life, such as the availability of water, the gravitational force, the electromagnetic field and the intensity of radiation from the Sun.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Overview of Alkenone Biomarker Analysis for Paleothermometry • An Overview of bGDGT Biomarker Analysis for Paleoclimatology • Conversion of Fatty Acid Methyl Esters by Saponification for Uk'37 Paleothermometry • Extraction of Biomarkers from Sediments - Accelerated Solvent Extraction • Purification of a Total Lipid Extract with Column Chromatography • Removal of Branched and Cyclic Compounds by Urea Adduction for Uk'37 Paleothermometry • Sonication Extraction of Lipid Biomarkers from Sediment • Soxhlet Extraction of Lipid Biomarkers from Sediment
STANDARD / GLE	S:ESS1:11:2.3.	<p>Composition and Features: Students will explain the theory of plate tectonics.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Determining Spatial Orientation of Rock Layers with

		<p>the Brunton Compass</p> <ul style="list-style-type: none"> • Igneous Intrusive Rock • Igneous Volcanic Rock • Making a Geologic Cross Section • Using Topographic Maps to Generate Topographic Profiles
STANDARD / GLE	S:ESS1:11:2.4.	<p>Composition and Features: Students will describe the movement of crustal plates and explain how the effects have altered the Earth's features.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Determining Spatial Orientation of Rock Layers with the Brunton Compass • Igneous Intrusive Rock • Igneous Volcanic Rock • Making a Geologic Cross Section • Using Topographic Maps to Generate Topographic Profiles
STANDARD / GLE	S:ESS1:11:3.1.	<p>Fossils and Geologic Time: Students will identify and describe the methods used to measure geologic time, such as fossil identification, radioactive dating, and rock sequences.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Making a Geologic Cross Section
STANDARD / GLE	S:ESS1:11:3.2.	<p>Fossils and Geologic Time: Students will relate how geologic time is determined using various dating methods (e.g., radioactive decay, rock sequences, fossil records).</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Making a Geologic Cross Section
STANDARD / GLE	S:ESS1:11:4.1.	<p>Observation of the Earth from Space: Provided with geologic data (including movement of plates) on a given locale, students will predict the likelihood for an earth event (e.g. volcanoes mountain ranges, islands, earthquakes, tides, tsunamis).</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Igneous Intrusive Rock • Igneous Volcanic Rock • Making a Geologic Cross Section • Using Topographic Maps to Generate Topographic Profiles
STANDARD / GLE	S:ESS1:11:5.1.	<p>Processes and Rates of Change: Students will explain that the Earth is composed of interactive layers, which have distinct compositions, physical properties and processes.</p> <p><u>JoVE</u></p>

		<ul style="list-style-type: none"> • Determining Spatial Orientation of Rock Layers with the Brunton Compass • Igneous Intrusive Rock • Igneous Volcanic Rock • Using Topographic Maps to Generate Topographic Profiles
STANDARD / GLE	S:ESS1:11:5.2.	<p>Processes and Rates of Change: Students will relate plate movement to earthquakes and volcanic activity, and explain how it results in tectonic uplift and mountain building.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Igneous Volcanic Rock
STANDARD / GLE	S:ESS1:11:5.3.	<p>Processes and Rates of Change: Students will identify and describe the major external and internal sources of energy on Earth.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Bacterial Growth Curve Analysis and its Environmental Applications • Biofuels: Producing Ethanol from Cellulosic Material • Determination Of Nox in Automobile Exhaust Using UV-VIS Spectroscopy • Proton Exchange Membrane Fuel Cells • Raman Spectroscopy for Chemical Analysis • Turbidity and Total Solids in Surface Water
STANDARD / GLE	S:ESS1:11:5.4.	<p>Processes and Rates of Change: Students will provide supporting geologic/geographic evidence that supports the validity of the theory of plate tectonics.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Igneous Intrusive Rock • Igneous Volcanic Rock • Using Topographic Maps to Generate Topographic Profiles
STANDARD / GLE	S:ESS1:11:5.5.	<p>Processes and Rates of Change: Students will trace the development of the theory of plate tectonics.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Determining Spatial Orientation of Rock Layers with the Brunton Compass • Igneous Intrusive Rock • Igneous Volcanic Rock • Making a Geologic Cross Section • Using Topographic Maps to Generate Topographic Profiles
STANDARD / GLE	S:ESS1:11:5.6.	<p>Processes and Rates of Change: Students will explain how internal and external sources of heat (energy) fuel geologic processes (e.g., rock cycle, plate tectonics, sea floor spreading).</p>

		<u>JoVE</u> • Igneous Volcanic Rock
STANDARD / GLE	S:ESS1:11:7.1.	Water: Students will explain that water quality can be affected positively or negatively by outside sources <u>JoVE</u> • Dissolved Oxygen in Surface Water • Introduction to Mass Spectrometry • Making a Geologic Cross Section • Nutrients in Aquatic Ecosystems • Turbidity and Total Solids in Surface Water • Water Quality Analysis via Indicator Organisms
STRAND / STANDARD	NH.ESS2.	Earth Space Science: The Earth is part of a solar system, made up of distinct parts, which have temporal and spatial interrelationships.
STANDARD / GLE	S:ESS2:11:2.1.	Energy: Students will identify the Earth's major external source of energy as solar energy. <u>JoVE</u> • Turbidity and Total Solids in Surface Water
STANDARD / GLE	S:ESS2:11:2.3.	Energy: Students will explain how internal and external sources of heat (energy) fuel geologic processes (e.g., rock cycle, plate tectonics, sea floor spreading). <u>JoVE</u> • Igneous Volcanic Rock
STRAND / STANDARD	NH.ESS4.	Earth Space Science: The growth of scientific knowledge in Earth Space Science has been advanced through the development of technology and is used (alone or in combination with other sciences) to identify, understand and solve local and global issues.
STANDARD / GLE	S:ESS4:11:2.2.	Tools: Students will explain how scientists study the Earth using computer-generated models and observations from both land-based sites and satellites; and describe the value of using these tools in unison. <u>JoVE</u> • Using GIS to Investigate Urban Forestry
STANDARD / GLE	S:ESS4:11:3.1.	Local and Global Environmental Issues: Students will differentiate between and provide examples of renewable and nonrenewable sources of energy; and explain the advantages and limitations of each. <u>JoVE</u> • Bacterial Growth Curve Analysis and its Environmental Applications • Biofuels: Producing Ethanol from Cellulosic Material • Determination Of Nox in Automobile Exhaust Using

		UV-VIS Spectroscopy <ul style="list-style-type: none"> • Proton Exchange Membrane Fuel Cells • Raman Spectroscopy for Chemical Analysis
STANDARD / GLE	S:ESS4:11:3.2.	Local and Global Environmental Issues: Students will describe the means for transforming a natural material, such as iron ore, into useful products during different historical periods, such as the Stone Age, Iron Age, Renaissance, the Industrial Period and the current Age of Information. <p>JoVE</p> <ul style="list-style-type: none"> • An Introduction to Cell Division • An Introduction to Neurophysiology
STRAND / STANDARD	NH.LS1.	Life Science: All living organisms have identifiable structures and characteristics that allow for survival (organisms, populations, and species).
STANDARD / GLE	S:LS1:11:1.1.	Classification: Students will describe how organisms are classified into a hierarchy of groups and subgroups, which are based on similarities that reflect their evolutionary relationships. <p>JoVE</p> <ul style="list-style-type: none"> • An Introduction to Caenorhabditis elegans • An Introduction to Drosophila melanogaster • An Introduction to Saccharomyces cerevisiae • An Introduction to the Chick: Gallus gallus domesticus • An Introduction to the Laboratory Mouse: Mus musculus • An Introduction to the Zebrafish: Danio rerio • Basic Chick Care and Maintenance • Basic Mouse Care and Maintenance • C. elegans Chemotaxis Assay • C. elegans Development and Reproduction • C. elegans Maintenance • Chick ex ovo Culture • Culturing and Enumerating Bacteria from Soil Samples • Detection of Bacteriophages in Environmental Samples • Development and Reproduction of the Laboratory Mouse • Development of the Chick • Drosophila Development and Reproduction • Drosophila Larval IHC • Drosophila Maintenance • Drosophila melanogaster Embryo and Larva Harvesting and Preparation • Filamentous Fungi • In ovo Electroporation of Chicken Embryos • Introducing Experimental Agents into the Mouse • Isolating Nucleic Acids from Yeast • Mouse Genotyping

		<ul style="list-style-type: none"> • RNAi in <i>C. elegans</i> • Tree Identification: How To Use a Dichotomous Key • Tree Survey: Point-Centered Quarter Sampling Method • Using GIS to Investigate Urban Forestry • Yeast Maintenance • Yeast Reproduction • Yeast Transformation and Cloning • Zebrafish Breeding and Embryo Handling • Zebrafish Maintenance and Husbandry • Zebrafish Microinjection Techniques • Zebrafish Reproduction and Development
STANDARD / GLE	S:LS1:11:1.2.	<p>Classification: Students will explain that organisms that possess similar DNA code are more closely related than those in which DNA varies greatly.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Introduction to <i>Caenorhabditis elegans</i> • An Introduction to <i>Drosophila melanogaster</i> • An Introduction to <i>Saccharomyces cerevisiae</i> • An Introduction to the Chick: <i>Gallus gallus domesticus</i> • An Introduction to the Laboratory Mouse: <i>Mus musculus</i> • An Introduction to the Zebrafish: <i>Danio rerio</i> • An Overview of Genetic Analysis • Basic Chick Care and Maintenance • Basic Mouse Care and Maintenance • <i>C. elegans</i> Chemotaxis Assay • <i>C. elegans</i> Development and Reproduction • <i>C. elegans</i> Maintenance • Chick ex ovo Culture • Culturing and Enumerating Bacteria from Soil Samples • Detection of Bacteriophages in Environmental Samples • Development and Reproduction of the Laboratory Mouse • Development of the Chick • <i>Drosophila</i> Development and Reproduction • <i>Drosophila</i> Larval IHC • <i>Drosophila</i> Maintenance • <i>Drosophila melanogaster</i> Embryo and Larva Harvesting and Preparation • Filamentous Fungi • In ovo Electroporation of Chicken Embryos • Introducing Experimental Agents into the Mouse • Isolating Nucleic Acids from Yeast • Mouse Genotyping • RNAi in <i>C. elegans</i> • SNP Genotyping • Tree Identification: How To Use a Dichotomous Key • Tree Survey: Point-Centered Quarter Sampling Method • Using GIS to Investigate Urban Forestry • Yeast Maintenance

		<ul style="list-style-type: none"> • Yeast Reproduction • Yeast Transformation and Cloning • Zebrafish Breeding and Embryo Handling • Zebrafish Maintenance and Husbandry • Zebrafish Microinjection Techniques • Zebrafish Reproduction and Development
<p>STANDARD / GLE</p>	<p>S:LS1:11:1.3.</p>	<p>Classification: Students will identify plants and animals according to binomial nomenclature.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Introduction to <i>Caenorhabditis elegans</i> • An Introduction to <i>Drosophila melanogaster</i> • An Introduction to <i>Saccharomyces cerevisiae</i> • An Introduction to the Chick: <i>Gallus gallus domesticus</i> • An Introduction to the Laboratory Mouse: <i>Mus musculus</i> • An Introduction to the Zebrafish: <i>Danio rerio</i> • Analysis of Earthworm Populations in Soil • Basic Chick Care and Maintenance • Basic Mouse Care and Maintenance • <i>C. elegans</i> Chemotaxis Assay • <i>C. elegans</i> Development and Reproduction • <i>C. elegans</i> Maintenance • Chick ex ovo Culture • Culturing and Enumerating Bacteria from Soil Samples • Detection of Bacteriophages in Environmental Samples • Development and Reproduction of the Laboratory Mouse • Development of the Chick • <i>Drosophila</i> Development and Reproduction • <i>Drosophila</i> Larval IHC • <i>Drosophila</i> Maintenance • <i>Drosophila melanogaster</i> Embryo and Larva Harvesting and Preparation • Filamentous Fungi • In ovo Electroporation of Chicken Embryos • Introducing Experimental Agents into the Mouse • Isolating Nucleic Acids from Yeast • Mouse Genotyping • RNAi in <i>C. elegans</i> • Tree Identification: How To Use a Dichotomous Key • Tree Survey: Point-Centered Quarter Sampling Method • Using GIS to Investigate Urban Forestry • Yeast Maintenance • Yeast Reproduction • Yeast Transformation and Cloning • Zebrafish Breeding and Embryo Handling • Zebrafish Maintenance and Husbandry • Zebrafish Microinjection Techniques • Zebrafish Reproduction and Development

STANDARD / GLE	S:LS1:11:1.4.	<p>Classification: Students will differentiate between prokaryotic and eukaryotic cells according to general structure and degrees of complexity.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Introduction to <i>Saccharomyces cerevisiae</i> • An Introduction to Transfection • Bacterial Growth Curve Analysis and its Environmental Applications • Bacterial Transformation: Electroporation • Bacterial Transformation: The Heat Shock Method • Culturing and Enumerating Bacteria from Soil Samples • Electrophoretic Mobility Shift Assay (EMSA) • Plasmid Purification • Yeast Maintenance • Yeast Reproduction • Yeast Transformation and Cloning
STANDARD / GLE	S:LS1:11:2.1.	<p>Living Things and Organization: Students will identify the structures of different types of cell parts/organelles and explain the functions they perform.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Introduction to Aging and Regeneration • An Introduction to Cell Death • An Introduction to Cell Division • An Introduction to Cell Metabolism • An Introduction to Transfection • Annexin V and Propidium Iodide Labeling • Cell Cycle Analysis • Density Gradient Ultracentrifugation • Detecting Reactive Oxygen Species • Enzyme Assays and Kinetics • Isolating Nucleic Acids from Yeast • Live Cell Imaging of Mitosis • Metabolic Labeling • The ATP Bioluminescence Assay • The TUNEL Assay
STANDARD / GLE	S:LS1:11:2.2.	<p>Living Things and Organization: Students will recognize how cell functions are regulated through changes in the activity of the functions performed by proteins, and through the selective expression of individual genes; and explain how this regulation allows cells to respond to their environment and to control and coordinate cell growth and division.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Introduction to Aging and Regeneration • An Introduction to <i>Caenorhabditis elegans</i> • An Introduction to Cell Death • An Introduction to Cell Division • An Introduction to Cell Metabolism

- An Introduction to Cell Motility and Migration
- An Introduction to Cellular and Molecular Neuroscience
- An Introduction to Developmental Genetics
- An Introduction to Developmental Neurobiology
- An Introduction to Endocytosis and Exocytosis
- An Introduction to Molecular Developmental Biology
- An Introduction to Neurophysiology
- An Introduction to Organogenesis
- An Introduction to *Saccharomyces cerevisiae*
- An Introduction to Stem Cell Biology
- An Introduction to Transfection
- An Introduction to the Zebrafish: *Danio rerio*
- An Overview of Epigenetics
- An Overview of Gene Expression
- An Overview of Genetic Analysis
- An Overview of Genetic Engineering
- An Overview of Genetics and Disease
- Annexin V and Propidium Iodide Labeling
- Bacterial Growth Curve Analysis and its Environmental Applications
- Bacterial Transformation: Electroporation
- Bacterial Transformation: The Heat Shock Method
- Balance and Coordination Testing
- Biofuels: Producing Ethanol from Cellulosic Material
- *C. elegans* Development and Reproduction
- Calcium Imaging in Neurons
- Cell Cycle Analysis
- Cell-surface Biotinylation Assay
- Chick ex ovo Culture
- Chromatin Immunoprecipitation
- Cytogenetics
- DNA Ligation Reactions
- DNA Methylation Analysis
- Density Gradient Ultracentrifugation
- Detecting Reactive Oxygen Species
- Development and Reproduction of the Laboratory Mouse
- Development of the Chick
- *Drosophila* Development and Reproduction
- *Drosophila melanogaster* Embryo and Larva Harvesting and Preparation
- Electro-encephalography (EEG)
- Embryonic Stem Cell Culture and Differentiation
- Enzyme Assays and Kinetics
- Explant Culture for Developmental Studies
- Explant Culture of Neural Tissue
- Expression Profiling with Microarrays
- FM Dyes in Vesicle Recycling
- Fate Mapping
- Förster Resonance Energy Transfer (FRET)
- Gene Silencing with Morpholinos

		<ul style="list-style-type: none"> • Genetic Crosses • Genetic Engineering of Model Organisms • Genetic Screens • Histological Staining of Neural Tissue • In ovo Electroporation of Chicken Embryos • Induced Pluripotency • Introduction to the Microplate Reader • Invasion Assay Using 3D Matrices • Isolating Nucleic Acids from Yeast • Live Cell Imaging of Mitosis • Metabolic Labeling • Molecular Cloning • Mouse Genotyping • Murine In Utero Electroporation • Neuronal Transfection Methods • PCR: The Polymerase Chain Reaction • Passaging Cells • Patch Clamp Electrophysiology • Plasmid Purification • Primary Neuronal Cultures • Protein Crystallization • Quantifying Environmental Microorganisms and Viruses Using qPCR • RNA Analysis of Environmental Samples Using RT-PCR • RNA-Seq • RNAi in <i>C. elegans</i> • Recombineering and Gene Targeting • Reconstitution of Membrane Proteins • Restriction Enzyme Digests • Rodent Stereotaxic Surgery • Surface Plasmon Resonance (SPR) • Testing For Genetically Modified Foods • The ATP Bioluminescence Assay • The TUNEL Assay • The Transwell Migration Assay • The Western Blot • Tissue Regeneration with Somatic Stem Cells • Transplantation Studies • Whole-Mount In Situ Hybridization • Yeast Maintenance • Yeast Reproduction • Yeast Transformation and Cloning • Zebrafish Breeding and Embryo Handling • Zebrafish Microinjection Techniques • Zebrafish Reproduction and Development
STANDARD / GLE	S:LS1:11:2.3.	<p>Living Things and Organization: Students will recognize how an organism's organization and complexity accommodate its need for obtaining, transforming, transporting, releasing, and eliminating the matter and energy used to sustain it.</p>

JoVE

- **Abdominal Exam I: Inspection and Auscultation**
- **Abdominal Exam II: Percussion**
- **Abdominal Exam III: Palpation**
- **Abdominal Exam IV: Acute Abdominal Pain Assessment**
- **An Introduction to Behavioral Neuroscience**
- **An Introduction to Caenorhabditis elegans**
- **An Introduction to Cell Division**
- **An Introduction to Cell Motility and Migration**
- **An Introduction to Cellular and Molecular Neuroscience**
- **An Introduction to Cognition**
- **An Introduction to Developmental Neurobiology**
- **An Introduction to Drosophila melanogaster**
- **An Introduction to Learning and Memory**
- **An Introduction to Modeling Behavioral Disorders and Stress**
- **An Introduction to Motor Control**
- **An Introduction to Neuroanatomy**
- **An Introduction to Neurophysiology**
- **An Introduction to Reward and Addiction**
- **An Introduction to Saccharomyces cerevisiae**
- **An Introduction to the Chick: Gallus gallus domesticus**
- **An Introduction to the Laboratory Mouse: Mus musculus**
- **An Introduction to the Zebrafish: Danio rerio**
- **Anesthesia Induction and Maintenance**
- **Ankle Exam**
- **Anterograde Amnesia**
- **Anxiety Testing**
- **Approximate Number Sense Test**
- **Arterial Line Placement**
- **Assessing Dexterity with Reaching Tasks**
- **Auscultation**
- **Balance and Coordination Testing**
- **Basic Chick Care and Maintenance**
- **Basic Life Support Part II: Airway/Breathing and Continued Cardiopulmonary Resuscitation**
- **Basic Life Support: Cardiopulmonary Resuscitation and Defibrillation**
- **Basic Mouse Care and Maintenance**
- **Binocular Rivalry**
- **Blood Pressure Measurement**
- **Blood Withdrawal I**
- **Blood Withdrawal II**
- **C. elegans Chemotaxis Assay**
- **C. elegans Development and Reproduction**
- **C. elegans Maintenance**
- **Calcium Imaging in Neurons**
- **Cardiac Exam I: Inspection and Palpation**
- **Cardiac Exam II: Auscultation**

- Cardiac Exam III: Abnormal Heart Sounds
- Cell Cycle Analysis
- Central Venous Catheter Insertion: Femoral Vein with Ultrasound Guidance
- Central Venous Catheter Insertion: Internal Jugular with Ultrasound Guidance
- Central Venous Catheter Insertion: Subclavian Vein
- Chick ex ovo Culture
- Co-Immunoprecipitation and Pull-Down Assays
- Color Afterimages
- Compound Administration I
- Compound Administration II
- Compound Administration III
- Compound Administration IV
- Comprehensive Breast Exam
- Considerations for Rodent Surgery
- Cranial Nerves Exam I (I-VI)
- Cranial Nerves Exam II (VII-XII)
- Crowding
- Decision-making and the Iowa Gambling Task
- Decoding Auditory Imagery with Multivoxel Pattern Analysis
- Development and Reproduction of the Laboratory Mouse
- Development of the Chick
- Diagnostic Necropsy and Tissue Harvest
- Dichotic Listening
- Drosophila Development and Reproduction
- Drosophila Larval IHC
- Drosophila Maintenance
- Drosophila melanogaster Embryo and Larva Harvesting and Preparation
- Ear Exam
- Elbow Exam
- Electro-encephalography (EEG)
- Emergency Tube Thoracostomy (Chest Tube Placement)
- Emergent Lateral Canthotomy and Inferior Catholysis
- Event-related Potentials and the Oddball Task
- Executive Function and the Dimensional Change Card Sort Task
- Executive Function in Autism Spectrum Disorder
- Explant Culture for Developmental Studies
- Explant Culture of Neural Tissue
- Eye Exam
- Eye Tracking in Cognitive Experiments
- Fear Conditioning
- Finding Your Blind Spot and Perceptual Filling-in
- Foot Exam
- Fundamentals of Breeding and Weaning
- Gene Silencing with Morpholinos

- General Approach to the Physical Exam
- Genetic Engineering of Model Organisms
- Habituation: Studying Infants Before They Can Talk
- Hand and Wrist Exam
- Hip Exam
- Histological Staining of Neural Tissue
- In ovo Electroporation of Chicken Embryos
- Inattentional Blindness
- Incidental Encoding
- Intra-articular Shoulder Injection for Reduction Following Anterior Shoulder Dislocation
- Intraosseous Needle Placement
- Introducing Experimental Agents into the Mouse
- Invasion Assay Using 3D Matrices
- Invertebrate Lifespan Quantification
- Isolating Nucleic Acids from Yeast
- Just-noticeable Differences
- Knee Exam
- Language: The N400 in Semantic Incongruity
- Learning and Memory: The Remember-Know Task
- Live Cell Imaging of Mitosis
- Lower Back Exam
- Lymph Node Exam
- Male Rectal Exam
- Measuring Grey Matter Differences with Voxel-based Morphometry: The Musical Brain
- Measuring Reaction Time and Donders' Method of Subtraction
- Measuring Verbal Working Memory Span
- Measuring Vital Signs
- Mental Rotation
- Modeling Social Stress
- Motion-induced Blindness
- Motor Exam I
- Motor Exam II
- Motor Learning in Mirror Drawing
- Motor Maps
- Mouse Genotyping
- Multiple Object Tracking
- Murine In Utero Electroporation
- Mutual Exclusivity: How Children Learn the Meanings of Words
- Neck Exam
- Needle Thoracostomy (needle Decompression) for Temporizing Tension Pneumothorax Treatment
- Neuronal Transfection Methods
- Nose, Sinuses, Oral Cavity and Pharynx Exam
- Object Substitution Masking
- Observation and Inspection
- Ophthalmoscopic Examination
- Palpation

- Patch Clamp Electrophysiology
- Pelvic Exam I: Assessment of the External Genitalia
- Pelvic Exam II: Speculum Exam
- Pelvic Exam III: Bimanual and Rectovaginal Exam
- Percussion
- Percutaneous Cricothyrotomy (Seldinger Technique)
- Pericardiocentesis
- Peripheral Vascular Exam
- Peripheral Vascular Exam Using a Continuous Wave Doppler
- Peripheral Venous Cannulation
- Physiological Correlates of Emotion Recognition
- Primary Neuronal Cultures
- Proper Adjustment of Patient Attire during the Physical Exam
- Prospect Theory
- RNAi in *C. elegans*
- Respiratory Exam I: Inspection and Palpation
- Respiratory Exam II: Percussion and Auscultation
- Rodent Handling and Restraint Techniques
- Rodent Identification I
- Rodent Identification II
- Rodent Stereotaxic Surgery
- Self-administration Studies
- Sensory Exam
- Shoulder Exam I
- Shoulder Exam II
- Spatial Cueing
- Spatial Memory Testing Using Mazes
- Sterile Tissue Harvest
- Surgical Cricothyrotomy
- The Ames Room
- The Attentional Blink
- The Inverted-face Effect
- The McGurk Effect
- The Morris Water Maze
- The Precision of Visual Working Memory with Delayed Estimation
- The Rubber Hand Illusion
- The Split Brain
- The Staircase Procedure for Finding a Perceptual Threshold
- The Transwell Migration Assay
- Thyroid Exam
- Tree Identification: How To Use a Dichotomous Key
- Tree Survey: Point-Centered Quarter Sampling Method
- Using Diffusion Tensor Imaging in Traumatic Brain Injury
- Using GIS to Investigate Urban Forestry
- Using TMS to Measure Motor Excitability During Action Observation

		<ul style="list-style-type: none"> • Verbal Priming • Visual Attention: fMRI Investigation of Object-based Attentional Control • Visual Search for Features and Conjunctions • Visual Statistical Learning • Whole-Mount In Situ Hybridization • Within-subjects Repeated-measures Design • Yeast Maintenance • Yeast Reproduction • Yeast Transformation and Cloning • Zebrafish Breeding and Embryo Handling • Zebrafish Maintenance and Husbandry • Zebrafish Microinjection Techniques • Zebrafish Reproduction and Development • fMRI: Functional Magnetic Resonance Imaging
STANDARD / GLE	S:LS1:11:2.4.	<p>Living Things and Organization: Students will explain how the processes of photosynthesis and cellular respiration are interrelated and contribute to biogeochemical cycles.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Introduction to Cell Metabolism • Biofuels: Producing Ethanol from Cellulosic Material • Detecting Reactive Oxygen Species • The ATP Bioluminescence Assay
STANDARD / GLE	S:LS1:11:2.5.	<p>Living Things and Organization: Students will describe the structures of proteins and their role in cell function.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Introduction to Cell Death • An Introduction to Cell Motility and Migration • An Introduction to Saccharomyces cerevisiae • An Overview of Epigenetics • An Overview of Gene Expression • Biofuels: Producing Ethanol from Cellulosic Material • Cell-surface Biotinylation Assay • Chromatin Immunoprecipitation • Co-Immunoprecipitation and Pull-Down Assays • DNA Ligation Reactions • Density Gradient Ultracentrifugation • Dialysis: Diffusion Based Separation • Drosophila Larval IHC • Electrophoretic Mobility Shift Assay (EMSA) • Enzyme Assays and Kinetics • FM Dyes in Vesicle Recycling • Förster Resonance Energy Transfer (FRET) • Genetic Engineering of Model Organisms • Introduction to Catalysis • Introduction to Mass Spectrometry • Invasion Assay Using 3D Matrices • Ion-Exchange Chromatography

		<ul style="list-style-type: none"> • Live Cell Imaging of Mitosis • MALDI-TOF Mass Spectrometry • Metabolic Labeling • Molecular Cloning • PCR: The Polymerase Chain Reaction • Photometric Protein Determination • Protein Crystallization • Reconstitution of Membrane Proteins • Restriction Enzyme Digests • Separating Protein with SDS-PAGE • Separation of Mixtures via Precipitation • Surface Plasmon Resonance (SPR) • Tandem Mass Spectrometry • The ELISA Method • The TUNEL Assay • The Transwell Migration Assay • The Western Blot • Two-Dimensional Gel Electrophoresis • Yeast Transformation and Cloning
STANDARD / GLE	S:LS1:11:2.6.	<p>Living Things and Organization: Students will describe the chemical reactions involved in cell functions using examples from the nervous, immune and endocrine systems in multicellular animals.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Introduction to Caenorhabditis elegans • An Introduction to Cell Death • An Introduction to Cell Division • An Introduction to Cell Metabolism • An Introduction to Cell Motility and Migration • An Introduction to Cellular and Molecular Neuroscience • An Introduction to Developmental Genetics • An Introduction to Modeling Behavioral Disorders and Stress • An Introduction to Molecular Developmental Biology • An Introduction to Reward and Addiction • An Introduction to Saccharomyces cerevisiae • An Introduction to Transfection • An Overview of Epigenetics • An Overview of Gene Expression • An Overview of Genetic Analysis • An Overview of Genetic Engineering • An Overview of Genetics and Disease • Annexin V and Propidium Iodide Labeling • Bacterial Transformation: Electroporation • Bacterial Transformation: The Heat Shock Method • Biofuels: Producing Ethanol from Cellulosic Material • C. elegans Maintenance • Cell Cycle Analysis • Cell-surface Biotinylation Assay • Chromatin Immunoprecipitation

- **Chromatography-Based Biomolecule Purification Methods**
- **Co-Immunoprecipitation and Pull-Down Assays**
- **Column Chromatography**
- **Community DNA Extraction from Bacterial Colonies**
- **Cyclic Voltammetry (CV)**
- **Cytogenetics**
- **DNA Gel Electrophoresis**
- **DNA Ligation Reactions**
- **DNA Methylation Analysis**
- **Density Gradient Ultracentrifugation**
- **Detecting Environmental Microorganisms with the Polymerase Chain Reaction and Gel Electrophoresis**
- **Detecting Reactive Oxygen Species**
- **Development and Reproduction of the Laboratory Mouse**
- **Development of the Chick**
- **Dialysis: Diffusion Based Separation**
- **Drosophila Larval IHC**
- **Drosophila melanogaster Embryo and Larva Harvesting and Preparation**
- **Electrophoretic Mobility Shift Assay (EMSA)**
- **Embryonic Stem Cell Culture and Differentiation**
- **Enzyme Assays and Kinetics**
- **Explant Culture for Developmental Studies**
- **Expression Profiling with Microarrays**
- **FM Dyes in Vesicle Recycling**
- **Förster Resonance Energy Transfer (FRET)**
- **Gel Purification**
- **Gene Silencing with Morpholinos**
- **Genetic Crosses**
- **Genetic Engineering of Model Organisms**
- **Genetic Screens**
- **Genome Editing**
- **In ovo Electroporation of Chicken Embryos**
- **Induced Pluripotency**
- **Introduction to Catalysis**
- **Introduction to Mass Spectrometry**
- **Invasion Assay Using 3D Matrices**
- **Invertebrate Lifespan Quantification**
- **Ion-Exchange Chromatography**
- **Isolating Nucleic Acids from Yeast**
- **Live Cell Imaging of Mitosis**
- **MALDI-TOF Mass Spectrometry**
- **Metabolic Labeling**
- **Method of Standard Addition**
- **Molecular Cloning**
- **Mouse Genotyping**
- **Nuclear Magnetic Resonance (NMR) Spectroscopy**
- **PCR: The Polymerase Chain Reaction**
- **Passaging Cells**

		<ul style="list-style-type: none"> • Photometric Protein Determination • Plasmid Purification • Protein Crystallization • Quantifying Environmental Microorganisms and Viruses Using qPCR • RNA Analysis of Environmental Samples Using RT-PCR • RNA-Seq • RNAi in C. elegans • Recombineering and Gene Targeting • Reconstitution of Membrane Proteins • Restriction Enzyme Digests • SNP Genotyping • Sample Preparation for Analytical Preparation • Self-administration Studies • Separating Protein with SDS-PAGE • Surface Plasmon Resonance (SPR) • Tandem Mass Spectrometry • Testing For Genetically Modified Foods • The ATP Bioluminescence Assay • The ELISA Method • The TUNEL Assay • The Transwell Migration Assay • The Western Blot • Two-Dimensional Gel Electrophoresis • Ultraviolet-Visible (UV-Vis) Spectroscopy • Whole-Mount In Situ Hybridization • Yeast Maintenance • Yeast Transformation and Cloning • Zebrafish Breeding and Embryo Handling • Zebrafish Microinjection Techniques • Zebrafish Reproduction and Development
<p>STANDARD / GLE</p>	<p>S:LS1:11:2.7.</p>	<p>Living Things and Organization: Students will recognize that because all matter tends toward more disorganized states, living systems need a continuous input of energy to maintain their chemical and physical organizations.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Abdominal Exam I: Inspection and Auscultation • Abdominal Exam II: Percussion • Abdominal Exam III: Palpation • Abdominal Exam IV: Acute Abdominal Pain Assessment • An Introduction to Cell Division • An Introduction to Cognition • An Introduction to Learning and Memory • An Introduction to Reward and Addiction • Anesthesia Induction and Maintenance • Ankle Exam • Arterial Line Placement • Assessing Dexterity with Reaching Tasks • Auscultation

- **Balance and Coordination Testing**
- **Basic Care Procedures**
- **Basic Life Support Part II: Airway/Breathing and Continued Cardiopulmonary Resuscitation**
- **Basic Life Support: Cardiopulmonary Resuscitation and Defibrillation**
- **Basic Mouse Care and Maintenance**
- **Blood Pressure Measurement**
- **Blood Withdrawal I**
- **Blood Withdrawal II**
- **Cardiac Exam I: Inspection and Palpation**
- **Cardiac Exam II: Auscultation**
- **Cardiac Exam III: Abnormal Heart Sounds**
- **Central Venous Catheter Insertion: Femoral Vein with Ultrasound Guidance**
- **Central Venous Catheter Insertion: Internal Jugular with Ultrasound Guidance**
- **Central Venous Catheter Insertion: Subclavian Vein**
- **Compound Administration I**
- **Compound Administration II**
- **Compound Administration III**
- **Compound Administration IV**
- **Comprehensive Breast Exam**
- **Considerations for Rodent Surgery**
- **Cranial Nerves Exam I (I-VI)**
- **Cranial Nerves Exam II (VII-XII)**
- **Diagnostic Necropsy and Tissue Harvest**
- **Ear Exam**
- **Elbow Exam**
- **Emergency Tube Thoracostomy (Chest Tube Placement)**
- **Emergent Lateral Canthotomy and Inferior Catholysis**
- **Eye Exam**
- **Fear Conditioning**
- **Foot Exam**
- **General Approach to the Physical Exam**
- **Hand and Wrist Exam**
- **Hip Exam**
- **Intra-articular Shoulder Injection for Reduction Following Anterior Shoulder Dislocation**
- **Intraosseous Needle Placement**
- **Knee Exam**
- **Lower Back Exam**
- **Lymph Node Exam**
- **Male Rectal Exam**
- **Measuring Vital Signs**
- **Motor Exam I**
- **Motor Exam II**
- **Neck Exam**
- **Needle Thoracostomy (needle Decompression) for Temporizing Tension Pneumothorax Treatment**

		<ul style="list-style-type: none"> • Nose, Sinuses, Oral Cavity and Pharynx Exam • Observation and Inspection • Ophthalmoscopic Examination • Palpation • Pelvic Exam I: Assessment of the External Genitalia • Pelvic Exam II: Speculum Exam • Pelvic Exam III: Bimanual and Rectovaginal Exam • Percussion • Percutaneous Cricothyrotomy (Seldinger Technique) • Pericardiocentesis • Peripheral Vascular Exam • Peripheral Vascular Exam Using a Continuous Wave Doppler • Peripheral Venous Cannulation • Physiological Correlates of Emotion Recognition • Proper Adjustment of Patient Attire during the Physical Exam • Respiratory Exam I: Inspection and Palpation • Respiratory Exam II: Percussion and Auscultation • Self-administration Studies • Sensory Exam • Shoulder Exam I • Shoulder Exam II • Spatial Memory Testing Using Mazes • Sterile Tissue Harvest • Surgical Cricothyrotomy • Thyroid Exam • Tree Identification: How To Use a Dichotomous Key • Using a pH Meter • Zebrafish Maintenance and Husbandry
<p>STANDARD / GLE</p>	<p>S:LS1:11:2.8.</p>	<p>Living Things and Organization: Students will use data and observation to make connections between, to explain, or to justify how specific cell organelles produce/regulate what the cell needs or what a unicellular or multi-cellular organism needs for survival (e.g., protein synthesis, DNA transport, nerve cells).</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Introduction to Aging and Regeneration • An Introduction to Behavioral Neuroscience • An Introduction to Cell Death • An Introduction to Cell Division • An Introduction to Cell Metabolism • An Introduction to Cellular and Molecular Neuroscience • An Introduction to Cognition • An Introduction to Developmental Neurobiology • An Introduction to Modeling Behavioral Disorders and Stress • An Introduction to Motor Control • An Introduction to Neuroanatomy • An Introduction to Neurophysiology

- **An Introduction to Reward and Addiction**
- **An Introduction to Transfection**
- **An Overview of Epigenetics**
- **An Overview of Gene Expression**
- **Ankle Exam**
- **Annexin V and Propidium Iodide Labeling**
- **Anterograde Amnesia**
- **Balance and Coordination Testing**
- **Calcium Imaging in Neurons**
- **Cell Cycle Analysis**
- **Chromatin Immunoprecipitation**
- **Color Afterimages**
- **Cranial Nerves Exam I (I-VI)**
- **Cranial Nerves Exam II (VII-XII)**
- **Crowding**
- **DNA Methylation Analysis**
- **Density Gradient Ultracentrifugation**
- **Detecting Reactive Oxygen Species**
- **Ear Exam**
- **Elbow Exam**
- **Electro-encephalography (EEG)**
- **Electrophoretic Mobility Shift Assay (EMSA)**
- **Embryonic Stem Cell Culture and Differentiation**
- **Emergent Lateral Canthotomy and Inferior Catholysis**
- **Enzyme Assays and Kinetics**
- **Event-related Potentials and the Oddball Task**
- **Explant Culture of Neural Tissue**
- **Expression Profiling with Microarrays**
- **Eye Exam**
- **FM Dyes in Vesicle Recycling**
- **Finding Your Blind Spot and Perceptual Filling-in**
- **Foot Exam**
- **Förster Resonance Energy Transfer (FRET)**
- **Gene Silencing with Morpholinos**
- **Genome Editing**
- **Hand and Wrist Exam**
- **Hip Exam**
- **Histological Staining of Neural Tissue**
- **Inattentional Blindness**
- **Isolating Nucleic Acids from Yeast**
- **Just-noticeable Differences**
- **Knee Exam**
- **Live Cell Imaging of Mitosis**
- **Lower Back Exam**
- **Measuring Grey Matter Differences with Voxel-based Morphometry: The Musical Brain**
- **Metabolic Labeling**
- **Molecular Cloning**
- **Motion-induced Blindness**
- **Motor Exam I**
- **Motor Exam II**

		<ul style="list-style-type: none"> • Murine In Utero Electroporation • Neck Exam • Neuronal Transfection Methods • Object Substitution Masking • Ophthalmoscopic Examination • Patch Clamp Electrophysiology • Physiological Correlates of Emotion Recognition • Primary Neuronal Cultures • Quantifying Environmental Microorganisms and Viruses Using qPCR • RNA Analysis of Environmental Samples Using RT-PCR • RNA-Seq • Rodent Stereotaxic Surgery • Self-administration Studies • Sensory Exam • Shoulder Exam I • Shoulder Exam II • Spatial Cueing • The ATP Bioluminescence Assay • The Ames Room • The Attentional Blink • The Inverted-face Effect • The McGurk Effect • The Rubber Hand Illusion • The Split Brain • The Staircase Procedure for Finding a Perceptual Threshold • The TUNEL Assay • Using Diffusion Tensor Imaging in Traumatic Brain Injury • Using TMS to Measure Motor Excitability During Action Observation • Whole-Mount In Situ Hybridization • fMRI: Functional Magnetic Resonance Imaging
STANDARD / GLE	S:LS1:11:3.1.	<p>Reproduction: Students will describe the chemical and structural properties of DNA and explain its role in identifying the characteristics of an organism.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Introduction to Caenorhabditis elegans • An Introduction to Cell Death • An Introduction to Cell Division • An Introduction to Cellular and Molecular Neuroscience • An Introduction to Developmental Genetics • An Introduction to Molecular Developmental Biology • An Introduction to Saccharomyces cerevisiae • An Introduction to Transfection • An Overview of Epigenetics • An Overview of Gene Expression • An Overview of Genetic Analysis • An Overview of Genetic Engineering

- An Overview of Genetics and Disease
- Annexin V and Propidium Iodide Labeling
- Bacterial Transformation: Electroporation
- Bacterial Transformation: The Heat Shock Method
- Cell Cycle Analysis
- Chromatin Immunoprecipitation
- Community DNA Extraction from Bacterial Colonies
- Cytogenetics
- DNA Gel Electrophoresis
- DNA Ligation Reactions
- DNA Methylation Analysis
- Density Gradient Ultracentrifugation
- Detecting Environmental Microorganisms with the Polymerase Chain Reaction and Gel Electrophoresis
- Development and Reproduction of the Laboratory Mouse
- Drosophila melanogaster Embryo and Larva Harvesting and Preparation
- Electrophoretic Mobility Shift Assay (EMSA)
- Embryonic Stem Cell Culture and Differentiation
- Enzyme Assays and Kinetics
- Explant Culture for Developmental Studies
- Expression Profiling with Microarrays
- Förster Resonance Energy Transfer (FRET)
- Gel Purification
- Gene Silencing with Morpholinos
- Genetic Crosses
- Genetic Engineering of Model Organisms
- Genetic Screens
- Genome Editing
- In ovo Electroporation of Chicken Embryos
- Induced Pluripotency
- Isolating Nucleic Acids from Yeast
- Live Cell Imaging of Mitosis
- Molecular Cloning
- Mouse Genotyping
- PCR: The Polymerase Chain Reaction
- Photometric Protein Determination
- Plasmid Purification
- Protein Crystallization
- Quantifying Environmental Microorganisms and Viruses Using qPCR
- RNA Analysis of Environmental Samples Using RT-PCR
- RNA-Seq
- Recombineering and Gene Targeting
- Restriction Enzyme Digests
- SNP Genotyping
- Testing For Genetically Modified Foods
- The TUNEL Assay
- Two-Dimensional Gel Electrophoresis
- Whole-Mount In Situ Hybridization

		<ul style="list-style-type: none"> • Yeast Maintenance • Yeast Transformation and Cloning • Zebrafish Breeding and Embryo Handling
STANDARD / GLE	S:LS1:11:3.2.	<p>Reproduction: Students will recognize that new heritable characteristics can only result from new combinations of existing genes or from mutations of genes in an organism's sex cells; and explain why other changes in an organism cannot be passed on.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Introduction to Aging and Regeneration • An Introduction to Caenorhabditis elegans • An Introduction to Cell Death • An Introduction to Cell Division • An Introduction to Developmental Genetics • An Introduction to Drosophila melanogaster • An Introduction to Modeling Behavioral Disorders and Stress • An Introduction to Molecular Developmental Biology • An Introduction to Organogenesis • An Introduction to Saccharomyces cerevisiae • An Introduction to Stem Cell Biology • An Introduction to Transfection • An Introduction to the Chick: Gallus gallus domesticus • An Introduction to the Laboratory Mouse: Mus musculus • An Introduction to the Zebrafish: Danio rerio • An Overview of Epigenetics • An Overview of Gene Expression • An Overview of Genetic Analysis • An Overview of Genetic Engineering • An Overview of Genetics and Disease • Basic Chick Care and Maintenance • C. elegans Development and Reproduction • C. elegans Maintenance • Chick ex ovo Culture • Chromatin Immunoprecipitation • Cytogenetics • DNA Methylation Analysis • Detecting Environmental Microorganisms with the Polymerase Chain Reaction and Gel Electrophoresis • Development and Reproduction of the Laboratory Mouse • Development of the Chick • Drosophila Development and Reproduction • Drosophila Larval IHC • Drosophila Maintenance • Drosophila melanogaster Embryo and Larva Harvesting and Preparation • Embryonic Stem Cell Culture and Differentiation • Explant Culture for Developmental Studies

		<ul style="list-style-type: none"> • Expression Profiling with Microarrays • Fate Mapping • Fundamentals of Breeding and Weaning • Gene Silencing with Morpholinos • Genetic Crosses • Genetic Engineering of Model Organisms • Genetic Screens • Genome Editing • In ovo Electroporation of Chicken Embryos • Induced Pluripotency • Invertebrate Lifespan Quantification • Isolating Nucleic Acids from Yeast • Mouse Genotyping • Neuronal Transfection Methods • Passaging Cells • Primary Neuronal Cultures • RNA-Seq • RNAi in C. elegans • Recombineering and Gene Targeting • SNP Genotyping • Testing For Genetically Modified Foods • The TUNEL Assay • Tissue Regeneration with Somatic Stem Cells • Transplantation Studies • Whole-Mount In Situ Hybridization • Yeast Maintenance • Yeast Reproduction • Yeast Transformation and Cloning • Zebrafish Breeding and Embryo Handling • Zebrafish Maintenance and Husbandry • Zebrafish Microinjection Techniques • Zebrafish Reproduction and Development
STANDARD / GLE	S:LS1:11:3.3.	<p>Reproduction: Students will describe the alternation of generations, life cycles with haploid and diploid phases in living organisms, such as bacteria, plants and animals.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Yeast Reproduction
STANDARD / GLE	S:LS1:11:3.4.	<p>Reproduction: Students will explain or justify with evidence how the alteration of the DNA sequence may produce new gene combinations that make little difference, enhance capabilities, or can be harmful to the organism (e.g., selective breeding, genetic engineering, mutations).</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Introduction to Aging and Regeneration • An Introduction to Caenorhabditis elegans • An Introduction to Cell Death • An Introduction to Cell Division • An Introduction to Developmental Genetics

- An Introduction to *Drosophila melanogaster*
- An Introduction to Modeling Behavioral Disorders and Stress
- An Introduction to Molecular Developmental Biology
- An Introduction to Neurophysiology
- An Introduction to Organogenesis
- An Introduction to *Saccharomyces cerevisiae*
- An Introduction to Stem Cell Biology
- An Introduction to Transfection
- An Introduction to the Chick: *Gallus gallus domesticus*
- An Introduction to the Laboratory Mouse: *Mus musculus*
- An Introduction to the Zebrafish: *Danio rerio*
- An Overview of Epigenetics
- An Overview of Gene Expression
- An Overview of Genetic Analysis
- An Overview of Genetic Engineering
- An Overview of Genetics and Disease
- Bacterial Transformation: Electroporation
- Bacterial Transformation: The Heat Shock Method
- *C. elegans* Development and Reproduction
- Chick ex ovo Culture
- DNA Ligation Reactions
- Development and Reproduction of the Laboratory Mouse
- Development of the Chick
- Embryonic Stem Cell Culture and Differentiation
- Explant Culture for Developmental Studies
- Explant Culture of Neural Tissue
- Fate Mapping
- Fundamentals of Breeding and Weaning
- Gene Silencing with Morpholinos
- Genetic Crosses
- Genetic Engineering of Model Organisms
- Genetic Screens
- Genome Editing
- In ovo Electroporation of Chicken Embryos
- Induced Pluripotency
- Invertebrate Lifespan Quantification
- Isolating Nucleic Acids from Yeast
- Molecular Cloning
- Mouse Genotyping
- Murine In Utero Electroporation
- Neuronal Transfection Methods
- Passaging Cells
- Plasmid Purification
- Primary Neuronal Cultures
- RNAi in *C. elegans*
- Recombineering and Gene Targeting
- Restriction Enzyme Digests
- Rodent Stereotaxic Surgery

		<ul style="list-style-type: none"> • Solid-Liquid Extraction • Testing For Genetically Modified Foods • The TUNEL Assay • Tissue Regeneration with Somatic Stem Cells • Transplantation Studies • Whole-Mount In Situ Hybridization • Yeast Transformation and Cloning • Zebrafish Breeding and Embryo Handling • Zebrafish Maintenance and Husbandry • Zebrafish Microinjection Techniques • Zebrafish Reproduction and Development
STRAND / STANDARD	NH.LS2.	Life Science: Energy flows and matter recycles through an ecosystem.
STANDARD / GLE	S:LS2:11:1.4.	<p>Environment: Students will analyze and describe how environmental disturbances, such as climate changes, natural events, human activity and the introduction of invasive species, can affect the flow of energy or matter in an ecosystem.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Analysis of Earthworm Populations in Soil • Biofuels: Producing Ethanol from Cellulosic Material • Determination of Moisture Content in Soil • Dissolved Oxygen in Surface Water • Nutrients in Aquatic Ecosystems • Tree Survey: Point-Centered Quarter Sampling Method • Turbidity and Total Solids in Surface Water
STANDARD / GLE	S:LS2:11:1.5.	<p>Environment: Using data from a specific ecosystem, students will explain relationships or make predictions about how environmental disturbance (human impact or natural events) affects the flow of energy or cycling of matter in an ecosystem.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Analysis of Earthworm Populations in Soil • Biofuels: Producing Ethanol from Cellulosic Material • Determination Of Nox in Automobile Exhaust Using UV-VIS Spectroscopy • Dissolved Oxygen in Surface Water • Lead Analysis of Soil Using Atomic Absorption Spectroscopy • Measuring Tropospheric Ozone • Nutrients in Aquatic Ecosystems • Tree Identification: How To Use a Dichotomous Key • Tree Survey: Point-Centered Quarter Sampling Method • Turbidity and Total Solids in Surface Water • Water Quality Analysis via Indicator Organisms
STANDARD / GLE	S:LS2:11:1.6.	<p>Environment: Students will explain or evaluate potential bias in how evidence is interpreted in reports concerning a particular environmental factor that impacts the</p>

biology of humans.

JoVE

- **Abdominal Exam I: Inspection and Auscultation**
- **Abdominal Exam II: Percussion**
- **Abdominal Exam III: Palpation**
- **Abdominal Exam IV: Acute Abdominal Pain**

Assessment

- **Algae Enumeration via Culturable Methodology**
- **An Introduction to Aging and Regeneration**
- **An Introduction to Behavioral Neuroscience**
- **An Introduction to Caenorhabditis elegans**
- **An Introduction to Cell Death**
- **An Introduction to Cell Division**
- **An Introduction to Cell Metabolism**
- **An Introduction to Cell Motility and Migration**
- **An Introduction to Cellular and Molecular Neuroscience**
- **An Introduction to Cognition**
- **An Introduction to Developmental Genetics**
- **An Introduction to Developmental Neurobiology**
- **An Introduction to Drosophila melanogaster**
- **An Introduction to Endocytosis and Exocytosis**
- **An Introduction to Learning and Memory**
- **An Introduction to Modeling Behavioral Disorders and**

Stress

- **An Introduction to Molecular Developmental Biology**
- **An Introduction to Motor Control**
- **An Introduction to Neuroanatomy**
- **An Introduction to Neurophysiology**
- **An Introduction to Organogenesis**
- **An Introduction to Reward and Addiction**
- **An Introduction to Saccharomyces cerevisiae**
- **An Introduction to Stem Cell Biology**
- **An Introduction to Transfection**
- **An Introduction to the Chick: Gallus gallus domesticus**
- **An Introduction to the Laboratory Mouse: Mus**

musculus

- **An Introduction to the Zebrafish: Danio rerio**
- **An Overview of Epigenetics**
- **An Overview of Gene Expression**
- **An Overview of Genetic Analysis**
- **An Overview of Genetic Engineering**
- **An Overview of Genetics and Disease**
- **Analysis of Earthworm Populations in Soil**
- **Anesthesia Induction and Maintenance**
- **Ankle Exam**
- **Annexin V and Propidium Iodide Labeling**
- **Anterograde Amnesia**
- **Anxiety Testing**
- **Approximate Number Sense Test**
- **Are You Smart or Hardworking? How Praise Influences**

Children's Motivation

- Arterial Line Placement
- Aseptic Technique in Environmental Science
- Assessing Dexterity with Reaching Tasks
- Auscultation
- Bacterial Growth Curve Analysis and its Environmental Applications
- Bacterial Transformation: Electroporation
- Bacterial Transformation: The Heat Shock Method
- Balance and Coordination Testing
- Basic Care Procedures
- Basic Chick Care and Maintenance
- Basic Life Support Part II: Airway/Breathing and Continued Cardiopulmonary Resuscitation
- Basic Life Support: Cardiopulmonary Resuscitation and Defibrillation
- Basic Mouse Care and Maintenance
- Binocular Rivalry
- Biofuels: Producing Ethanol from Cellulosic Material
- Blood Pressure Measurement
- Blood Withdrawal I
- Blood Withdrawal II
- C. elegans Chemotaxis Assay
- C. elegans Development and Reproduction
- C. elegans Maintenance
- Calcium Imaging in Neurons
- Cardiac Exam I: Inspection and Palpation
- Cardiac Exam II: Auscultation
- Cardiac Exam III: Abnormal Heart Sounds
- Categories and Inductive Inferences
- Cell Cycle Analysis
- Cell-surface Biotinylation Assay
- Central Venous Catheter Insertion: Femoral Vein with Ultrasound Guidance
- Central Venous Catheter Insertion: Internal Jugular with Ultrasound Guidance
- Central Venous Catheter Insertion: Subclavian Vein
- Chick ex ovo Culture
- Children's Reliance on Artist Intentions When Identifying Pictures
- Chromatin Immunoprecipitation
- Color Afterimages
- Community DNA Extraction from Bacterial Colonies
- Compound Administration I
- Compound Administration II
- Compound Administration III
- Compound Administration IV
- Comprehensive Breast Exam
- Considerations for Rodent Surgery
- Cranial Nerves Exam I (I-VI)
- Cranial Nerves Exam II (VII-XII)

- Crowding
- Culturing and Enumerating Bacteria from Soil Samples
- Cytogenetics
- DNA Gel Electrophoresis
- DNA Ligation Reactions
- DNA Methylation Analysis
- Decision-making and the Iowa Gambling Task
- Decoding Auditory Imagery with Multivoxel Pattern Analysis
- Detecting Environmental Microorganisms with the Polymerase Chain Reaction and Gel Electrophoresis
- Detecting Reactive Oxygen Species
- Detection of Bacteriophages in Environmental Samples
- Development and Reproduction of the Laboratory Mouse
- Development of the Chick
- Diagnostic Necropsy and Tissue Harvest
- Dichotic Listening
- Dissolved Oxygen in Surface Water
- Drosophila Development and Reproduction
- Drosophila Larval IHC
- Drosophila Maintenance
- Drosophila melanogaster Embryo and Larva Harvesting and Preparation
- Ear Exam
- Elbow Exam
- Electro-encephalography (EEG)
- Embryonic Stem Cell Culture and Differentiation
- Emergency Tube Thoracostomy (Chest Tube Placement)
- Emergent Lateral Canthotomy and Inferior Catholysis
- Ethics in Psychology Research
- Event-related Potentials and the Oddball Task
- Executive Function and the Dimensional Change Card Sort Task
- Executive Function in Autism Spectrum Disorder
- Experimentation using a Confederate
- Explant Culture for Developmental Studies
- Explant Culture of Neural Tissue
- Expression Profiling with Microarrays
- Eye Exam
- Eye Tracking in Cognitive Experiments
- FM Dyes in Vesicle Recycling
- Fate Mapping
- Fear Conditioning
- Filamentous Fungi
- Finding Your Blind Spot and Perceptual Filling-in
- Foot Exam
- From Theory to Design: The Role of Creativity in Designing Experiments
- Fundamentals of Breeding and Weaning

- Gel Purification
- Gene Silencing with Morpholinos
- General Approach to the Physical Exam
- Genetic Crosses
- Genetic Engineering of Model Organisms
- Genetic Screens
- Genome Editing
- Gram Staining of Bacteria from Environmental Sources
- Habituation: Studying Infants Before They Can Talk
- Hand and Wrist Exam
- Hip Exam
- Histological Staining of Neural Tissue
- How Children Solve Problems Using Causal Reasoning
- In ovo Electroporation of Chicken Embryos
- Inattentive Blindness
- Incidental Encoding
- Induced Pluripotency
- Intra-articular Shoulder Injection for Reduction Following Anterior Shoulder Dislocation
- Intraosseous Needle Placement
- Introducing Experimental Agents into the Mouse
- Invasion Assay Using 3D Matrices
- Invertebrate Lifespan Quantification
- Isolating Nucleic Acids from Yeast
- Isolation of Fecal Bacteria from Water Samples by Filtration
- Just-noticeable Differences
- Knee Exam
- Language: The N400 in Semantic Incongruity
- Learning and Memory: The Remember-Know Task
- Live Cell Imaging of Mitosis
- Lower Back Exam
- Lymph Node Exam
- Male Rectal Exam
- Manipulating an Independent Variable through Embodiment
- Measuring Children's Trust in Testimony
- Measuring Grey Matter Differences with Voxel-based Morphometry: The Musical Brain
- Measuring Reaction Time and Donders' Method of Subtraction
- Measuring Verbal Working Memory Span
- Measuring Vital Signs
- Memory Development: Demonstrating How Repeated Questioning Leads to False Memories
- Mental Rotation
- Metacognitive Development: How Children Estimate Their Memory
- Modeling Social Stress
- Molecular Cloning
- Motion-induced Blindness

- **Motor Exam I**
- **Motor Exam II**
- **Motor Learning in Mirror Drawing**
- **Motor Maps**
- **Mouse Genotyping**
- **Multiple Object Tracking**
- **Murine In Utero Electroporation**
- **Mutual Exclusivity: How Children Learn the Meanings of Words**
- **Neck Exam**
- **Needle Thoracostomy (needle Decompression) for Temporizing Tension Pneumothorax Treatment**
- **Neuronal Transfection Methods**
- **Nose, Sinuses, Oral Cavity and Pharynx Exam**
- **Numerical Cognition: More or Less**
- **Nutrients in Aquatic Ecosystems**
- **Object Substitution Masking**
- **Observation and Inspection**
- **Observational Research**
- **Ophthalmoscopic Examination**
- **PCR: The Polymerase Chain Reaction**
- **Palpation**
- **Passaging Cells**
- **Patch Clamp Electrophysiology**
- **Pelvic Exam I: Assessment of the External Genitalia**
- **Pelvic Exam II: Speculum Exam**
- **Pelvic Exam III: Bimanual and Rectovaginal Exam**
- **Percussion**
- **Percutaneous Cricothyrotomy (Seldinger Technique)**
- **Pericardiocentesis**
- **Peripheral Vascular Exam**
- **Peripheral Vascular Exam Using a Continuous Wave Doppler**
- **Peripheral Venous Cannulation**
- **Perspectives on Cognitive Psychology**
- **Perspectives on Experimental Psychology**
- **Perspectives on Neuropsychology**
- **Perspectives on Sensation and Perception**
- **Physiological Correlates of Emotion Recognition**
- **Piaget's Conservation Task and the Influence of Task Demands**
- **Pilot Testing**
- **Placebos in Research**
- **Plasmid Purification**
- **Positive Reinforcement Studies**
- **Primary Neuronal Cultures**
- **Proper Adjustment of Patient Attire during the Physical Exam**
- **Prospect Theory**
- **Proton Exchange Membrane Fuel Cells**
- **Quantifying Environmental Microorganisms and**

Viruses Using qPCR

- RNA Analysis of Environmental Samples Using RT-PCR
- RNA-Seq
- RNAi in *C. elegans*
- Realism in Experimentation
- Recombineering and Gene Targeting
- Reliability in Psychology Experiments
- Respiratory Exam I: Inspection and Palpation
- Respiratory Exam II: Percussion and Auscultation
- Restriction Enzyme Digests
- Rodent Handling and Restraint Techniques
- Rodent Identification I
- Rodent Identification II
- Rodent Stereotaxic Surgery
- SNP Genotyping
- Self-administration Studies
- Self-report vs. Behavioral Measures of Recycling
- Sensory Exam
- Separating Protein with SDS-PAGE
- Shoulder Exam I
- Shoulder Exam II
- Spatial Cueing
- Spatial Memory Testing Using Mazes
- Sterile Tissue Harvest
- Surgical Cricothyrotomy
- Testing For Genetically Modified Foods
- The ATP Bioluminescence Assay
- The Ames Room
- The Attentional Blink
- The Costs and Benefits of Natural Pedagogy
- The ELISA Method
- The Factorial Experiment
- The Inverted-face Effect
- The McGurk Effect
- The Morris Water Maze
- The Multi-group Experiment
- The Precision of Visual Working Memory with Delayed Estimation
- The Rouge Test: Searching for a Sense of Self
- The Rubber Hand Illusion
- The Simple Experiment: Two-group Design
- The Split Brain
- The Staircase Procedure for Finding a Perceptual Threshold
- The TUNEL Assay
- The Transwell Migration Assay
- The Western Blot
- Thyroid Exam
- Tissue Regeneration with Somatic Stem Cells
- Transplantation Studies
- Tree Identification: How To Use a Dichotomous Key

		<ul style="list-style-type: none"> • Tree Survey: Point-Centered Quarter Sampling Method • Turbidity and Total Solids in Surface Water • Using Diffusion Tensor Imaging in Traumatic Brain Injury • Using GIS to Investigate Urban Forestry • Using TMS to Measure Motor Excitability During Action Observation • Using Your Head: Measuring Infants' Rational Imitation of Actions • Verbal Priming • Visual Attention: fMRI Investigation of Object-based Attentional Control • Visual Search for Features and Conjunctions • Visual Statistical Learning • Visualizing Soil Microorganisms via the Contact Slide Assay and Microscopy • Water Quality Analysis via Indicator Organisms • Whole-Mount In Situ Hybridization • Within-subjects Repeated-measures Design • Yeast Maintenance • Yeast Reproduction • Yeast Transformation and Cloning • Zebrafish Breeding and Embryo Handling • Zebrafish Maintenance and Husbandry • Zebrafish Microinjection Techniques • Zebrafish Reproduction and Development • fMRI: Functional Magnetic Resonance Imaging
STANDARD / GLE	S:LS2:11:2.1.	<p>Flow of Energy: Students will use examples from local ecosystems to describe the relationships among organisms at the different trophic levels.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Algae Enumeration via Culturable Methodology • An Introduction to Drosophila melanogaster • An Introduction to the Chick: Gallus gallus domesticus • Analysis of Earthworm Populations in Soil • Bacterial Growth Curve Analysis and its Environmental Applications • Basic Care Procedures • Basic Mouse Care and Maintenance • C. elegans Maintenance • Carbon and Nitrogen Analysis of Environmental Samples • Culturing and Enumerating Bacteria from Soil Samples • Dissolved Oxygen in Surface Water • Drosophila Development and Reproduction • Drosophila Maintenance • Filamentous Fungi • Quantifying Environmental Microorganisms and Viruses Using qPCR • RNA Analysis of Environmental Samples Using RT-PCR

		<ul style="list-style-type: none"> • Zebrafish Maintenance and Husbandry • Zebrafish Reproduction and Development
STANDARD / GLE	S:LS2:11:3.1.	<p>Recycling of Materials: Students will explain that as matter and energy flow through different levels of organization in living systems and between living systems and the environment, elements, such as carbon and nitrogen, are recombined in different ways.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Algae Enumeration via Culturable Methodology • An Overview of Alkenone Biomarker Analysis for Paleothermometry • An Overview of bGDGT Biomarker Analysis for Paleoclimatology • Analysis of Earthworm Populations in Soil • Bacterial Growth Curve Analysis and its Environmental Applications • Carbon and Nitrogen Analysis of Environmental Samples • Conversion of Fatty Acid Methyl Esters by Saponification for Uk'37 Paleothermometry • Culturing and Enumerating Bacteria from Soil Samples • Determination Of Nox in Automobile Exhaust Using UV-VIS Spectroscopy • Dissolved Oxygen in Surface Water • Extraction of Biomarkers from Sediments - Accelerated Solvent Extraction • Filamentous Fungi • Fundamentals of Breeding and Weaning • Metabolic Labeling • Nutrients in Aquatic Ecosystems • Purification of a Total Lipid Extract with Column Chromatography • Removal of Branched and Cyclic Compounds by Urea Adduction for Uk'37 Paleothermometry • Soil Nutrient Analysis: Nitrogen, Phosphorus, and Potassium • Sonication Extraction of Lipid Biomarkers from Sediment • Soxhlet Extraction of Lipid Biomarkers from Sediment • Using GIS to Investigate Urban Forestry
STANDARD / GLE	S:LS2:11:3.2.	<p>Recycling of Materials: Students will trace the cycling of matter (e.g., carbon cycle) and the flow of energy in a living system from its source through its transformation in cellular, biochemical processes (e.g., photosynthesis, cellular respiration, fermentation).</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Algae Enumeration via Culturable Methodology • An Introduction to Cell Metabolism • An Overview of Alkenone Biomarker Analysis for

		<p>Paleothermometry</p> <ul style="list-style-type: none"> • An Overview of bGDGT Biomarker Analysis for Paleoclimatology • Analysis of Earthworm Populations in Soil • Bacterial Growth Curve Analysis and its Environmental Applications • Biofuels: Producing Ethanol from Cellulosic Material • Carbon and Nitrogen Analysis of Environmental Samples • Conversion of Fatty Acid Methyl Esters by Saponification for Uk'37 Paleothermometry • Detecting Reactive Oxygen Species • Determination Of Nox in Automobile Exhaust Using UV-VIS Spectroscopy • Dissolved Oxygen in Surface Water • Extraction of Biomarkers from Sediments - Accelerated Solvent Extraction • Filamentous Fungi • Fundamentals of Breeding and Weaning • Metabolic Labeling • Nutrients in Aquatic Ecosystems • Purification of a Total Lipid Extract with Column Chromatography • Removal of Branched and Cyclic Compounds by Urea Adduction for Uk'37 Paleothermometry • Soil Nutrient Analysis: Nitrogen, Phosphorus, and Potassium • Sonication Extraction of Lipid Biomarkers from Sediment • Soxhlet Extraction of Lipid Biomarkers from Sediment • The ATP Bioluminescence Assay • Using GIS to Investigate Urban Forestry
STRAND / STANDARD	NH.LS3.	Life Science: Groups of organisms show evidence of change over time (e.g. evolution, natural selection, structures, behaviors, and biochemistry).
STANDARD / GLE	S:LS3:11:1.1.	<p>Change: Students will identify ways humans can impact and alter the stability of ecosystems, such as habitat destruction, pollution, and consumption of resources; and describe the potentially irreversible effects these changes can cause.</p> <p>JoVE</p> <ul style="list-style-type: none"> • Biofuels: Producing Ethanol from Cellulosic Material • Determination Of Nox in Automobile Exhaust Using UV-VIS Spectroscopy • Dissolved Oxygen in Surface Water • Introduction to Mass Spectrometry • Lead Analysis of Soil Using Atomic Absorption Spectroscopy • Measuring Tropospheric Ozone • Nutrients in Aquatic Ecosystems

		<ul style="list-style-type: none"> • Tree Identification: How To Use a Dichotomous Key • Tree Survey: Point-Centered Quarter Sampling Method • Turbidity and Total Solids in Surface Water • Water Quality Analysis via Indicator Organisms
STANDARD / GLE	S:LS3:11:1.2.	<p>Change: Students will identify ways of detecting, and limiting or reversing environmental damage.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Electrophoretic Mobility Shift Assay (EMSA) • Self-report vs. Behavioral Measures of Recycling
STANDARD / GLE	S:LS3:11:1.3.	<p>Change: Students will analyze the aspects of environmental protection, such as ecosystem protection, habitat management, species conservation and environmental agencies and regulations; and evaluate and justify the need for public policy in guiding the use and management of the environment.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Determination Of Nox in Automobile Exhaust Using UV-VIS Spectroscopy • Electrophoretic Mobility Shift Assay (EMSA) • Lead Analysis of Soil Using Atomic Absorption Spectroscopy • Self-report vs. Behavioral Measures of Recycling • Tree Identification: How To Use a Dichotomous Key • Tree Survey: Point-Centered Quarter Sampling Method • Using GIS to Investigate Urban Forestry
STANDARD / GLE	S:LS3:11:2.1.	<p>Evolution: Students will explain the currently accepted theory for the development of life on Earth, including the history of its origin and the evolutionary process.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Introduction to the Chick: Gallus gallus domesticus • An Overview of Genetic Analysis
STANDARD / GLE	S:LS3:11:2.2.	<p>Evolution: Students will recognize that the abilities and behaviors an organism has, and likelihood of its survival strongly depend on its heritable characteristics, which can be biochemical and anatomical.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Overview of Genetic Analysis
STANDARD / GLE	S:LS3:11:2.3.	<p>Evolution: Students will explain the contributions of Darwin, Malthus, Wallace and Russell to the advancement of life science.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Overview of Genetic Analysis
STANDARD / GLE	S:LS3:11:2.4.	<p>Evolution: Students will explain evolution in terms of how the Earth's present-day life forms evolved from</p>

		<p>earlier, distinctly different species as a consequence of the interactions of (1) the potential for a species to increase its numbers, (2) the genetic variability of offspring due to mutation and recombination of genes, (3) a finite supply of the resources required for life, and (4) the ensuing selection.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Introduction to the Chick: Gallus gallus domesticus • An Overview of Genetic Analysis • Tree Identification: How To Use a Dichotomous Key
STANDARD / GLE	S:LS3:11:2.5.	<p>Evolution: Students will explain how evidence from technological advances supports or refutes the genetic relationships among groups of organisms (e.g., DNA analysis, protein analysis).</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Overview of Genetic Analysis
STANDARD / GLE	S:LS3:11:2.6.	<p>Evolution: Given information about living or extinct organisms, students will cite evidence to explain the frequency of inherited characteristics of organisms in a population; or explain the evolution of varied structures (with defined functions) that affected the organisms' survival in a specific environment (e.g., giraffe, wind pollination of flowers).</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Overview of Genetic Analysis • C. elegans Development and Reproduction • SNP Genotyping • Yeast Reproduction • Zebrafish Maintenance and Husbandry
STANDARD / GLE	S:LS3:11:3.1.	<p>Natural Selection: Students will explain the concept of natural selection.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Overview of Genetic Analysis
STANDARD / GLE	S:LS3:11:3.2.	<p>Natural Selection: Students will explain the diversity and unity of past and present life forms on Earth using currently accepted theories.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Introduction to the Chick: Gallus gallus domesticus • An Introduction to the Zebrafish: Danio rerio • An Overview of Genetic Analysis
STANDARD / GLE	S:LS3:11:3.3.	<p>Natural Selection: Students will recognize how a species' chance of survival increases with each variation of an organism within the species; and explain how, in the event of a major global change, the greater the diversity of species on Earth, the greater the chance for survival of</p>

		<p>life.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Overview of Genetic Analysis • Analysis of Earthworm Populations in Soil • C. elegans Development and Reproduction • SNP Genotyping • Tree Identification: How To Use a Dichotomous Key • Tree Survey: Point-Centered Quarter Sampling Method • Yeast Reproduction • Zebrafish Maintenance and Husbandry
STANDARD / GLE	S:LS3:11:3.4.	<p>Natural Selection: Students will analyze present day data and research in areas, including antibiotic resistance in bacteria, changes in viral genomes, such as bird flu, and DNA sequencing; and relate it to the concepts of natural selection.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Overview of Genetic Analysis • High-Performance Liquid Chromatography (HPLC)
STANDARD / GLE	S:LS3:11:3.5.	<p>Natural Selection: Students will identify and describe ways genes may be changed and combined to create genetic variation within a species.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Introduction to Aging and Regeneration • An Introduction to Caenorhabditis elegans • An Introduction to Cell Death • An Introduction to Cell Division • An Introduction to Developmental Genetics • An Introduction to Drosophila melanogaster • An Introduction to Modeling Behavioral Disorders and Stress • An Introduction to Molecular Developmental Biology • An Introduction to Neurophysiology • An Introduction to Organogenesis • An Introduction to Saccharomyces cerevisiae • An Introduction to Stem Cell Biology • An Introduction to Transfection • An Introduction to the Chick: Gallus gallus domesticus • An Introduction to the Laboratory Mouse: Mus musculus • An Introduction to the Zebrafish: Danio rerio • An Overview of Epigenetics • An Overview of Gene Expression • An Overview of Genetic Analysis • An Overview of Genetic Engineering • An Overview of Genetics and Disease • Bacterial Transformation: Electroporation • Bacterial Transformation: The Heat Shock Method • C. elegans Development and Reproduction

		<ul style="list-style-type: none"> • Chick ex ovo Culture • DNA Ligation Reactions • Development and Reproduction of the Laboratory Mouse • Development of the Chick • Embryonic Stem Cell Culture and Differentiation • Explant Culture for Developmental Studies • Explant Culture of Neural Tissue • Fate Mapping • Fundamentals of Breeding and Weaning • Gene Silencing with Morpholinos • Genetic Crosses • Genetic Engineering of Model Organisms • Genetic Screens • Genome Editing • In ovo Electroporation of Chicken Embryos • Induced Pluripotency • Invertebrate Lifespan Quantification • Isolating Nucleic Acids from Yeast • Molecular Cloning • Mouse Genotyping • Murine In Utero Electroporation • Neuronal Transfection Methods • Passaging Cells • Plasmid Purification • Primary Neuronal Cultures • RNAi in C. elegans • Recombineering and Gene Targeting • Restriction Enzyme Digests • Rodent Stereotaxic Surgery • SNP Genotyping • Solid-Liquid Extraction • Testing For Genetically Modified Foods • The TUNEL Assay • Tissue Regeneration with Somatic Stem Cells • Transplantation Studies • Whole-Mount In Situ Hybridization • Yeast Reproduction • Yeast Transformation and Cloning • Zebrafish Breeding and Embryo Handling • Zebrafish Maintenance and Husbandry • Zebrafish Microinjection Techniques • Zebrafish Reproduction and Development
STANDARD / GLE	S:LS3:11:3.6.	<p>Natural Selection: Students will explain that gene mutations and new combinations may have a variety of effects on the organism, including positive and negative ones, or none at all.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Introduction to Aging and Regeneration • An Introduction to Caenorhabditis elegans

		<ul style="list-style-type: none"> • An Introduction to Cell Death • An Introduction to Cell Division • An Introduction to Developmental Genetics • An Introduction to Drosophila melanogaster • An Introduction to Modeling Behavioral Disorders and Stress • An Introduction to Saccharomyces cerevisiae • An Introduction to Transfection • An Introduction to the Zebrafish: Danio rerio • An Overview of Epigenetics • An Overview of Gene Expression • An Overview of Genetic Analysis • An Overview of Genetics and Disease • Genetic Engineering of Model Organisms • Genetic Screens • Isolating Nucleic Acids from Yeast • Passaging Cells • The TUNEL Assay
STANDARD / GLE	S:LS3:11:3.7.	<p>Natural Selection: Students will explain the concepts of Mendelian genetics.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Introduction to Developmental Genetics • Genetic Crosses
STANDARD / GLE	S:LS3:11:3.8.	<p>Natural Selection: Students will use pedigree charts and Punnet Squares to determine patterns of inheritance.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Overview of Genetics and Disease • Fundamentals of Breeding and Weaning • Genetic Crosses
STANDARD / GLE	S:LS3:11:3.9.	<p>Natural Selection: Given a scenario, students will provide evidence that demonstrates how sexual reproduction results in a great variety of possible gene combinations and contributes to natural selection (e.g., Darwin's finches, isolation of a species, Tay Sach's disease).</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Introduction to Caenorhabditis elegans • An Introduction to Saccharomyces cerevisiae • An Introduction to the Chick: Gallus gallus domesticus • An Introduction to the Zebrafish: Danio rerio • C. elegans Development and Reproduction • Development and Reproduction of the Laboratory Mouse • Development of the Chick • Drosophila Development and Reproduction • Drosophila melanogaster Embryo and Larva Harvesting and Preparation • Fundamentals of Breeding and Weaning

		<ul style="list-style-type: none"> • Genetic Crosses • Genetic Screens • Yeast Maintenance • Yeast Reproduction • Zebrafish Breeding and Embryo Handling • Zebrafish Reproduction and Development
STRAND / STANDARD	NH.LS4.	Life Science: Humans are similar to other species in many ways, and yet are unique among Earth's life forms.
STANDARD / GLE	S:LS4:11:1.1.	<p>Behavior: Students will recognize that the immune system, endocrine system, and nervous system can affect the homeostasis of an organism.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Abdominal Exam I: Inspection and Auscultation • Abdominal Exam II: Percussion • Abdominal Exam III: Palpation • Abdominal Exam IV: Acute Abdominal Pain <p>Assessment</p> <ul style="list-style-type: none"> • An Introduction to Behavioral Neuroscience • An Introduction to Cellular and Molecular Neuroscience • An Introduction to Cognition • An Introduction to Developmental Neurobiology • An Introduction to Learning and Memory • An Introduction to Modeling Behavioral Disorders and Stress • An Introduction to Motor Control • An Introduction to Neuroanatomy • An Introduction to Neurophysiology • An Introduction to Reward and Addiction • An Introduction to the Laboratory Mouse: Mus musculus • Ankle Exam • Anterograde Amnesia • Anxiety Testing • Arterial Line Placement • Assessing Dexterity with Reaching Tasks • Auscultation • Balance and Coordination Testing • Basic Life Support Part II: Airway/Breathing and Continued Cardiopulmonary Resuscitation • Basic Life Support: Cardiopulmonary Resuscitation and Defibrillation • Blood Pressure Measurement • Calcium Imaging in Neurons • Cardiac Exam I: Inspection and Palpation • Cardiac Exam II: Auscultation • Cardiac Exam III: Abnormal Heart Sounds • Central Venous Catheter Insertion: Femoral Vein with Ultrasound Guidance • Central Venous Catheter Insertion: Internal Jugular with Ultrasound Guidance

- **Central Venous Catheter Insertion: Subclavian Vein**
- **Co-Immunoprecipitation and Pull-Down Assays**
- **Color Afterimages**
- **Comprehensive Breast Exam**
- **Cranial Nerves Exam I (I-VI)**
- **Cranial Nerves Exam II (VII-XII)**
- **Crowding**
- **Decision-making and the Iowa Gambling Task**
- **Decoding Auditory Imagery with Multivoxel Pattern Analysis**
- **Ear Exam**
- **Elbow Exam**
- **Electro-encephalography (EEG)**
- **Emergency Tube Thoracostomy (Chest Tube Placement)**
- **Emergent Lateral Canthotomy and Inferior Catholysis**
- **Event-related Potentials and the Oddball Task**
- **Executive Function and the Dimensional Change Card Sort Task**
- **Executive Function in Autism Spectrum Disorder**
- **Explant Culture of Neural Tissue**
- **Eye Exam**
- **Fear Conditioning**
- **Finding Your Blind Spot and Perceptual Filling-in**
- **Foot Exam**
- **General Approach to the Physical Exam**
- **Hand and Wrist Exam**
- **Hip Exam**
- **Histological Staining of Neural Tissue**
- **Inattentive Blindness**
- **Intra-articular Shoulder Injection for Reduction Following Anterior Shoulder Dislocation**
- **Intraosseous Needle Placement**
- **Just-noticeable Differences**
- **Knee Exam**
- **Language: The N400 in Semantic Incongruity**
- **Learning and Memory: The Remember-Know Task**
- **Lower Back Exam**
- **Lymph Node Exam**
- **MALDI-TOF Mass Spectrometry**
- **Male Rectal Exam**
- **Measuring Grey Matter Differences with Voxel-based Morphometry: The Musical Brain**
- **Measuring Vital Signs**
- **Modeling Social Stress**
- **Motion-induced Blindness**
- **Motor Exam I**
- **Motor Exam II**
- **Motor Maps**
- **Murine In Utero Electroporation**
- **Mutual Exclusivity: How Children Learn the Meanings of Words**

- Neck Exam
- Needle Thoracostomy (needle Decompression) for Temporizing Tension Pneumothorax Treatment
- Nose, Sinuses, Oral Cavity and Pharynx Exam
- Object Substitution Masking
- Observation and Inspection
- Ophthalmoscopic Examination
- Palpation
- Patch Clamp Electrophysiology
- Pelvic Exam I: Assessment of the External Genitalia
- Pelvic Exam II: Speculum Exam
- Pelvic Exam III: Bimanual and Rectovaginal Exam
- Percussion
- Percutaneous Cricothyrotomy (Seldinger Technique)
- Pericardiocentesis
- Peripheral Vascular Exam
- Peripheral Vascular Exam Using a Continuous Wave Doppler
- Peripheral Venous Cannulation
- Perspectives on Sensation and Perception
- Physiological Correlates of Emotion Recognition
- Proper Adjustment of Patient Attire during the Physical Exam
- Respiratory Exam I: Inspection and Palpation
- Respiratory Exam II: Percussion and Auscultation
- Rodent Stereotaxic Surgery
- Self-administration Studies
- Sensory Exam
- Shoulder Exam I
- Shoulder Exam II
- Spatial Cueing
- Spatial Memory Testing Using Mazes
- Surgical Cricothyrotomy
- The Ames Room
- The Attentional Blink
- The Inverted-face Effect
- The McGurk Effect
- The Rubber Hand Illusion
- The Split Brain
- The Staircase Procedure for Finding a Perceptual Threshold
- The TUNEL Assay
- Thyroid Exam
- Tissue Regeneration with Somatic Stem Cells
- Using Diffusion Tensor Imaging in Traumatic Brain Injury
- Using TMS to Measure Motor Excitability During Action Observation
- Using a pH Meter
- Verbal Priming
- Visual Attention: fMRI Investigation of Object-based Attentional Control

		<ul style="list-style-type: none"> • Within-subjects Repeated-measures Design • fMRI: Functional Magnetic Resonance Imaging
STANDARD / GLE	S:LS4:11:1.2.	<p>Behavior: Students will describe how the functions of all the human body systems are interrelated at a chemical level and how they maintain homeostasis.</p> <p>JoVE</p> <ul style="list-style-type: none"> • Abdominal Exam I: Inspection and Auscultation • Abdominal Exam II: Percussion • Abdominal Exam III: Palpation • Abdominal Exam IV: Acute Abdominal Pain <p>Assessment</p> <ul style="list-style-type: none"> • An Introduction to Cognition • An Introduction to Learning and Memory • An Introduction to Modeling Behavioral Disorders and Stress • An Introduction to Reward and Addiction • Ankle Exam • Anxiety Testing • Arterial Line Placement • Assessing Dexterity with Reaching Tasks • Auscultation • Balance and Coordination Testing • Basic Life Support Part II: Airway/Breathing and Continued Cardiopulmonary Resuscitation • Basic Life Support: Cardiopulmonary Resuscitation and Defibrillation • Blood Pressure Measurement • Cardiac Exam I: Inspection and Palpation • Cardiac Exam II: Auscultation • Cardiac Exam III: Abnormal Heart Sounds • Central Venous Catheter Insertion: Femoral Vein with Ultrasound Guidance • Central Venous Catheter Insertion: Internal Jugular with Ultrasound Guidance • Central Venous Catheter Insertion: Subclavian Vein • Comprehensive Breast Exam • Cranial Nerves Exam I (I-VI) • Cranial Nerves Exam II (VII-XII) • Ear Exam • Elbow Exam • Emergency Tube Thoracostomy (Chest Tube Placement) • Emergent Lateral Canthotomy and Inferior Catholysis • Eye Exam • Fear Conditioning • Foot Exam • General Approach to the Physical Exam • Hand and Wrist Exam • Hip Exam • Intra-articular Shoulder Injection for Reduction

		<p>Following Anterior Shoulder Dislocation</p> <ul style="list-style-type: none"> • Intraosseous Needle Placement • Knee Exam • Lower Back Exam • Lymph Node Exam • Male Rectal Exam • Measuring Vital Signs • Modeling Social Stress • Motor Exam I • Motor Exam II • Neck Exam • Needle Thoracostomy (needle Decompression) for Temporizing Tension Pneumothorax Treatment • Nose, Sinuses, Oral Cavity and Pharynx Exam • Observation and Inspection • Ophthalmoscopic Examination • Palpation • Pelvic Exam I: Assessment of the External Genitalia • Pelvic Exam II: Speculum Exam • Pelvic Exam III: Bimanual and Rectovaginal Exam • Percussion • Percutaneous Cricothyrotomy (Seldinger Technique) • Pericardiocentesis • Peripheral Vascular Exam • Peripheral Vascular Exam Using a Continuous Wave Doppler • Peripheral Venous Cannulation • Physiological Correlates of Emotion Recognition • Pilot Testing • Proper Adjustment of Patient Attire during the Physical Exam • Respiratory Exam I: Inspection and Palpation • Respiratory Exam II: Percussion and Auscultation • Self-administration Studies • Sensory Exam • Shoulder Exam I • Shoulder Exam II • Spatial Memory Testing Using Mazes • Surgical Cricothyrotomy • Thyroid Exam • Using a pH Meter
<p>STANDARD / GLE</p>	<p>S:LS4:11:2.1.</p>	<p>Disease: Students will explain that disease in organisms can be caused by intrinsic failures of the system or infection by other organisms, and describe as well as provide examples of how some diseases are caused by: the breakdown in cellular function, congenital conditions, genetic disorders, malnutrition, and emotional health, including stress.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Abdominal Exam I: Inspection and Auscultation

- **Abdominal Exam IV: Acute Abdominal Pain Assessment**
- **An Introduction to Aging and Regeneration**
- **An Introduction to Behavioral Neuroscience**
- **An Introduction to Cell Division**
- **An Introduction to Cell Metabolism**
- **An Introduction to Cognition**
- **An Introduction to Drosophila melanogaster**
- **An Introduction to Endocytosis and Exocytosis**
- **An Introduction to Learning and Memory**
- **An Introduction to Modeling Behavioral Disorders and Stress**
- **An Introduction to Motor Control**
- **An Introduction to Organogenesis**
- **An Introduction to Reward and Addiction**
- **An Introduction to Saccharomyces cerevisiae**
- **An Introduction to Stem Cell Biology**
- **An Introduction to the Chick: Gallus gallus domesticus**
- **An Introduction to the Laboratory Mouse: Mus musculus**
- **An Introduction to the Zebrafish: Danio rerio**
- **An Overview of Gene Expression**
- **An Overview of Genetic Analysis**
- **An Overview of Genetic Engineering**
- **An Overview of Genetics and Disease**
- **Anterograde Amnesia**
- **Anxiety Testing**
- **Approximate Number Sense Test**
- **Are You Smart or Hardworking? How Praise Influences Children's Motivation**
- **Assessing Dexterity with Reaching Tasks**
- **Balance and Coordination Testing**
- **Blood Pressure Measurement**
- **C. elegans Chemotaxis Assay**
- **C. elegans Development and Reproduction**
- **Categories and Inductive Inferences**
- **Chick ex ovo Culture**
- **Children's Reliance on Artist Intentions When Identifying Pictures**
- **Chromatography-Based Biomolecule Purification Methods**
- **Co-Immunoprecipitation and Pull-Down Assays**
- **Color Afterimages**
- **Crowding**
- **Culturing and Enumerating Bacteria from Soil Samples**
- **Cytogenetics**
- **Decision-making and the Iowa Gambling Task**
- **Decoding Auditory Imagery with Multivoxel Pattern Analysis**
- **Detecting Reactive Oxygen Species**
- **Detection of Bacteriophages in Environmental Samples**

- Dichotic Listening
- Electro-encephalography (EEG)
- Embryonic Stem Cell Culture and Differentiation
- Ethics in Psychology Research
- Event-related Potentials and the Oddball Task
- Executive Function and the Dimensional Change Card Sort Task
- Executive Function in Autism Spectrum Disorder
- Experimentation using a Confederate
- Eye Exam
- Eye Tracking in Cognitive Experiments
- Fear Conditioning
- Finding Your Blind Spot and Perceptual Filling-in
- From Theory to Design: The Role of Creativity in Designing Experiments
- Fundamentals of Breeding and Weaning
- Gene Silencing with Morpholinos
- Genetic Crosses
- Genetic Screens
- Gram Staining of Bacteria from Environmental Sources
- Habituation: Studying Infants Before They Can Talk
- How Children Solve Problems Using Causal Reasoning
- Inattentional Blindness
- Incidental Encoding
- Isolation of Fecal Bacteria from Water Samples by Filtration
- Just-noticeable Differences
- Language: The N400 in Semantic Incongruity
- Learning and Memory: The Remember-Know Task
- Lymph Node Exam
- Male Rectal Exam
- Manipulating an Independent Variable through Embodiment
- Measuring Children's Trust in Testimony
- Measuring Grey Matter Differences with Voxel-based Morphometry: The Musical Brain
- Measuring Reaction Time and Donders' Method of Subtraction
- Measuring Verbal Working Memory Span
- Memory Development: Demonstrating How Repeated Questioning Leads to False Memories
- Mental Rotation
- Metacognitive Development: How Children Estimate Their Memory
- Modeling Social Stress
- Motion-induced Blindness
- Motor Exam I
- Motor Exam II
- Motor Learning in Mirror Drawing
- Motor Maps
- Mouse Genotyping

- **Multiple Object Tracking**
- **Mutual Exclusivity: How Children Learn the Meanings of Words**
- **Numerical Cognition: More or Less**
- **Object Substitution Masking**
- **Observational Research**
- **Ophthalmoscopic Examination**
- **Pelvic Exam II: Speculum Exam**
- **Pelvic Exam III: Bimanual and Rectovaginal Exam**
- **Peripheral Vascular Exam**
- **Peripheral Vascular Exam Using a Continuous Wave Doppler**
- **Perspectives on Cognitive Psychology**
- **Perspectives on Experimental Psychology**
- **Perspectives on Neuropsychology**
- **Perspectives on Sensation and Perception**
- **Physiological Correlates of Emotion Recognition**
- **Piaget's Conservation Task and the Influence of Task Demands**
- **Pilot Testing**
- **Placebos in Research**
- **Positive Reinforcement Studies**
- **Prospect Theory**
- **Protein Crystallization**
- **RNA Analysis of Environmental Samples Using RT-PCR**
- **RNA-Seq**
- **Realism in Experimentation**
- **Recombineering and Gene Targeting**
- **Reliability in Psychology Experiments**
- **Respiratory Exam I: Inspection and Palpation**
- **SNP Genotyping**
- **Self-administration Studies**
- **Self-report vs. Behavioral Measures of Recycling**
- **Spatial Cueing**
- **Spatial Memory Testing Using Mazes**
- **The Ames Room**
- **The Attentional Blink**
- **The Costs and Benefits of Natural Pedagogy**
- **The Factorial Experiment**
- **The Inverted-face Effect**
- **The McGurk Effect**
- **The Multi-group Experiment**
- **The Precision of Visual Working Memory with Delayed Estimation**
- **The Rouge Test: Searching for a Sense of Self**
- **The Rubber Hand Illusion**
- **The Simple Experiment: Two-group Design**
- **The Split Brain**
- **The Staircase Procedure for Finding a Perceptual Threshold**
- **Thyroid Exam**

		<ul style="list-style-type: none"> • Tissue Regeneration with Somatic Stem Cells • Using Diffusion Tensor Imaging in Traumatic Brain Injury • Using TMS to Measure Motor Excitability During Action Observation • Using Your Head: Measuring Infants' Rational Imitation of Actions • Using a pH Meter • Verbal Priming • Visual Attention: fMRI Investigation of Object-based Attentional Control • Visual Search for Features and Conjunctions • Visual Statistical Learning • Whole-Mount In Situ Hybridization • Within-subjects Repeated-measures Design • fMRI: Functional Magnetic Resonance Imaging
<p>STANDARD / GLE</p>	<p>S:LS4:11:2.3.</p>	<p>Disease: Students will describe and provide examples of how new medical techniques, efficient health care delivery systems, improved sanitation, and a more complete understanding of the nature of disease provides today's humans a better chance of staying healthier than their forebears.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Abdominal Exam I: Inspection and Auscultation • Abdominal Exam II: Percussion • Abdominal Exam III: Palpation • Abdominal Exam IV: Acute Abdominal Pain Assessment • Algae Enumeration via Culturable Methodology • An Introduction to Aging and Regeneration • An Introduction to Behavioral Neuroscience • An Introduction to Caenorhabditis elegans • An Introduction to Cell Death • An Introduction to Cell Division • An Introduction to Cell Metabolism • An Introduction to Cell Motility and Migration • An Introduction to Cognition • An Introduction to Endocytosis and Exocytosis • An Introduction to Learning and Memory • An Introduction to Modeling Behavioral Disorders and Stress • An Introduction to Motor Control • An Introduction to Neuroanatomy • An Introduction to Neurophysiology • An Introduction to Organogenesis • An Introduction to Saccharomyces cerevisiae • An Introduction to Stem Cell Biology • An Introduction to the Chick: Gallus gallus domesticus • An Introduction to the Laboratory Mouse: Mus musculus

- **An Introduction to the Zebrafish: Danio rerio**
- **An Overview of Genetic Analysis**
- **An Overview of Genetic Engineering**
- **An Overview of Genetics and Disease**
- **Ankle Exam**
- **Anterograde Amnesia**
- **Arterial Line Placement**
- **Assembly of a Reflux System for Heated Chemical Reactions**
- **Auscultation**
- **Bacterial Growth Curve Analysis and its Environmental Applications**
- **Basic Life Support Part II: Airway/Breathing and Continued Cardiopulmonary Resuscitation**
- **Basic Life Support: Cardiopulmonary Resuscitation and Defibrillation**
- **Binocular Rivalry**
- **Blood Pressure Measurement**
- **Calcium Imaging in Neurons**
- **Capillary Electrophoresis (CE)**
- **Cardiac Exam I: Inspection and Palpation**
- **Cardiac Exam II: Auscultation**
- **Cardiac Exam III: Abnormal Heart Sounds**
- **Cell Cycle Analysis**
- **Cell-surface Biotinylation Assay**
- **Central Venous Catheter Insertion: Femoral Vein with Ultrasound Guidance**
- **Central Venous Catheter Insertion: Internal Jugular with Ultrasound Guidance**
- **Central Venous Catheter Insertion: Subclavian Vein**
- **Chick ex ovo Culture**
- **Chromatin Immunoprecipitation**
- **Chromatography-Based Biomolecule Purification Methods**
- **Co-Immunoprecipitation and Pull-Down Assays**
- **Column Chromatography**
- **Community DNA Extraction from Bacterial Colonies**
- **Comprehensive Breast Exam**
- **Coordination Chemistry Complexes**
- **Cranial Nerves Exam I (I-VI)**
- **Cranial Nerves Exam II (VII-XII)**
- **Culturing and Enumerating Bacteria from Soil Samples**
- **Cyclic Voltammetry (CV)**
- **Cytogenetics**
- **DNA Ligation Reactions**
- **DNA Methylation Analysis**
- **Decision-making and the Iowa Gambling Task**
- **Decoding Auditory Imagery with Multivoxel Pattern Analysis**
- **Detecting Reactive Oxygen Species**
- **Detection of Bacteriophages in Environmental Samples**

- Dichotic Listening
- Ear Exam
- Elbow Exam
- Electro-encephalography (EEG)
- Electrochemical Measurements of Supported Catalysts Using a Potentiostat/Galvanostat
- Embryonic Stem Cell Culture and Differentiation
- Emergency Tube Thoracostomy (Chest Tube Placement)
- Emergent Lateral Canthotomy and Inferior Catholysis
- Enzyme Assays and Kinetics
- Event-related Potentials and the Oddball Task
- Executive Function and the Dimensional Change Card Sort Task
- Executive Function in Autism Spectrum Disorder
- Expression Profiling with Microarrays
- Eye Exam
- Eye Tracking in Cognitive Experiments
- FM Dyes in Vesicle Recycling
- Fate Mapping
- Fear Conditioning
- Foot Exam
- General Approach to the Physical Exam
- Genetic Crosses
- Genetic Screens
- Genome Editing
- Gram Staining of Bacteria from Environmental Sources
- Growing Crystals for X-ray Diffraction Analysis
- Hand and Wrist Exam
- Hip Exam
- Incidental Encoding
- Induced Pluripotency
- Intra-articular Shoulder Injection for Reduction Following Anterior Shoulder Dislocation
- Intraosseous Needle Placement
- Introducing Experimental Agents into the Mouse
- Introduction to Mass Spectrometry
- Introduction to Titration
- Invasion Assay Using 3D Matrices
- Isolation of Fecal Bacteria from Water Samples by Filtration
- Knee Exam
- Language: The N400 in Semantic Incongruity
- Learning and Memory: The Remember-Know Task
- Live Cell Imaging of Mitosis
- Lower Back Exam
- Lymph Node Exam
- MALDI-TOF Mass Spectrometry
- Male Rectal Exam
- Measuring Grey Matter Differences with Voxel-based Morphometry: The Musical Brain

- Measuring Verbal Working Memory Span
- Measuring Vital Signs
- Metabolic Labeling
- Molecular Cloning
- Motor Exam I
- Motor Exam II
- Motor Learning in Mirror Drawing
- Motor Maps
- Multiple Object Tracking
- Neck Exam
- Needle Thoracostomy (needle Decompression) for Temporizing Tension Pneumothorax Treatment
- Nose, Sinuses, Oral Cavity and Pharynx Exam
- Nuclear Magnetic Resonance (NMR) Spectroscopy
- Observation and Inspection
- Ophthalmoscopic Examination
- Palpation
- Patch Clamp Electrophysiology
- Pelvic Exam I: Assessment of the External Genitalia
- Pelvic Exam II: Speculum Exam
- Pelvic Exam III: Bimanual and Rectovaginal Exam
- Percussion
- Percutaneous Cricothyrotomy (Seldinger Technique)
- Performing 1D Thin Layer Chromatography
- Pericardiocentesis
- Peripheral Vascular Exam
- Peripheral Vascular Exam Using a Continuous Wave Doppler
- Peripheral Venous Cannulation
- Physiological Correlates of Emotion Recognition
- Proper Adjustment of Patient Attire during the Physical Exam
- Prospect Theory
- Protein Crystallization
- Purifying Compounds by Recrystallization
- Quantifying Environmental Microorganisms and Viruses Using qPCR
- RNA-Seq
- Recombineering and Gene Targeting
- Respiratory Exam I: Inspection and Palpation
- Respiratory Exam II: Percussion and Auscultation
- SNP Genotyping
- Scanning Electron Microscopy (SEM)
- Sensory Exam
- Shoulder Exam I
- Shoulder Exam II
- Solutions and Concentrations
- Surface Plasmon Resonance (SPR)
- Surgical Cricothyrotomy
- Tandem Mass Spectrometry
- The ATP Bioluminescence Assay

		<ul style="list-style-type: none"> • The ELISA Method • The Precision of Visual Working Memory with Delayed Estimation • The Split Brain • The TUNEL Assay • The Transwell Migration Assay • Thyroid Exam • Tissue Regeneration with Somatic Stem Cells • Two-Dimensional Gel Electrophoresis • Using Diffusion Tensor Imaging in Traumatic Brain Injury • Using TMS to Measure Motor Excitability During Action Observation • Using a pH Meter • Verbal Priming • Visual Attention: fMRI Investigation of Object-based Attentional Control • Visual Search for Features and Conjunctions • Whole-Mount In Situ Hybridization • fMRI: Functional Magnetic Resonance Imaging
STANDARD / GLE	S:LS4:11:2.4.	<p>Disease: Students will describe how some drugs mimic or block the molecules involved in transmitting nerve or hormone signals and explain how this disturbs the normal operations of the brain and body.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Introduction to Reward and Addiction • Self-administration Studies • Verbal Priming
STANDARD / GLE	S:LS4:11:2.5.	<p>Disease: Students will explain that gene mutation in a cell can result in uncontrolled division, which is called cancer; and describe how exposure of cells to certain chemicals and radiation increase mutation, and thus the chance for cancer.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Introduction to Cell Death • An Introduction to Cell Division • An Introduction to Cell Metabolism • An Introduction to Cell Motility and Migration • An Introduction to Drosophila melanogaster • An Introduction to Organogenesis • An Introduction to the Chick: Gallus gallus domesticus • An Introduction to the Zebrafish: Danio rerio • An Overview of Genetic Engineering • An Overview of Genetics and Disease • Cell Cycle Analysis • Chick ex ovo Culture • Coordination Chemistry Complexes • DNA Methylation Analysis • Detecting Reactive Oxygen Species

		<ul style="list-style-type: none"> • Ear Exam • Expression Profiling with Microarrays • Genome Editing • Introducing Experimental Agents into the Mouse • Invasion Assay Using 3D Matrices • Live Cell Imaging of Mitosis • Lymph Node Exam • Male Rectal Exam • Mouse Genotyping • Pelvic Exam II: Speculum Exam • Pelvic Exam III: Bimanual and Rectovaginal Exam • The TUNEL Assay • The Transwell Migration Assay
STANDARD / GLE	S:LS4:11:2.6.	<p>Disease: Students will use evidence to make and support conclusions about the ways that humans or other organisms are affected by environmental factors or heredity (e.g., pathogens, diseases, medical advances, pollution, mutations).</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Abdominal Exam I: Inspection and Auscultation • Abdominal Exam IV: Acute Abdominal Pain Assessment • Algae Enumeration via Culturable Methodology • An Introduction to Aging and Regeneration • An Introduction to Behavioral Neuroscience • An Introduction to Cell Death • An Introduction to Cell Division • An Introduction to Cell Metabolism • An Introduction to Cell Motility and Migration • An Introduction to Cognition • An Introduction to Drosophila melanogaster • An Introduction to Endocytosis and Exocytosis • An Introduction to Learning and Memory • An Introduction to Modeling Behavioral Disorders and Stress • An Introduction to Motor Control • An Introduction to Neuroanatomy • An Introduction to Neurophysiology • An Introduction to Organogenesis • An Introduction to Saccharomyces cerevisiae • An Introduction to Stem Cell Biology • An Introduction to the Chick: Gallus gallus domesticus • An Introduction to the Laboratory Mouse: Mus musculus • An Introduction to the Zebrafish: Danio rerio • An Overview of Gene Expression • An Overview of Genetic Analysis • An Overview of Genetic Engineering • An Overview of Genetics and Disease • Arterial Line Placement

- Aseptic Technique in Environmental Science
- Assembly of a Reflux System for Heated Chemical Reactions
- Auscultation
- Bacterial Growth Curve Analysis and its Environmental Applications
- Basic Chick Care and Maintenance
- Basic Life Support: Cardiopulmonary Resuscitation and Defibrillation
- Biofuels: Producing Ethanol from Cellulosic Material
- Blood Pressure Measurement
- C. elegans Chemotaxis Assay
- C. elegans Development and Reproduction
- C. elegans Maintenance
- Calcium Imaging in Neurons
- Capillary Electrophoresis (CE)
- Cardiac Exam II: Auscultation
- Cardiac Exam III: Abnormal Heart Sounds
- Cell Cycle Analysis
- Central Venous Catheter Insertion: Femoral Vein with Ultrasound Guidance
- Central Venous Catheter Insertion: Internal Jugular with Ultrasound Guidance
- Central Venous Catheter Insertion: Subclavian Vein
- Chick ex ovo Culture
- Chromatin Immunoprecipitation
- Chromatography-Based Biomolecule Purification Methods
- Co-Immunoprecipitation and Pull-Down Assays
- Column Chromatography
- Community DNA Extraction from Bacterial Colonies
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- Cytogenetics
- DNA Ligation Reactions
- DNA Methylation Analysis
- Decision-making and the Iowa Gambling Task
- Decoding Auditory Imagery with Multivoxel Pattern Analysis
- Detecting Reactive Oxygen Species
- Detection of Bacteriophages in Environmental Samples
- Determination Of Nox in Automobile Exhaust Using UV-VIS Spectroscopy
- Dissolved Oxygen in Surface Water
- Drosophila Development and Reproduction
- Drosophila melanogaster Embryo and Larva Harvesting and Preparation
- Ear Exam

- **Electro-encephalography (EEG)**
- **Electrochemical Measurements of Supported Catalysts Using a Potentiostat/Galvanostat**
- **Embryonic Stem Cell Culture and Differentiation**
- **Emergency Tube Thoracostomy (Chest Tube Placement)**
- **Emergent Lateral Canthotomy and Inferior Catholysis**
- **Enzyme Assays and Kinetics**
- **Event-related Potentials and the Oddball Task**
- **Expression Profiling with Microarrays**
- **Eye Exam**
- **Eye Tracking in Cognitive Experiments**
- **Fate Mapping**
- **Fear Conditioning**
- **Gene Silencing with Morpholinos**
- **General Approach to the Physical Exam**
- **Genetic Crosses**
- **Genetic Screens**
- **Genome Editing**
- **Gram Staining of Bacteria from Environmental Sources**
- **Growing Crystals for X-ray Diffraction Analysis**
- **Induced Pluripotency**
- **Intra-articular Shoulder Injection for Reduction Following Anterior Shoulder Dislocation**
- **Intraosseous Needle Placement**
- **Introducing Experimental Agents into the Mouse**
- **Introduction to Mass Spectrometry**
- **Introduction to Titration**
- **Invasion Assay Using 3D Matrices**
- **Invertebrate Lifespan Quantification**
- **Isolation of Fecal Bacteria from Water Samples by Filtration**
- **Language: The N400 in Semantic Incongruity**
- **Lead Analysis of Soil Using Atomic Absorption Spectroscopy**
- **Learning and Memory: The Remember-Know Task**
- **Live Cell Imaging of Mitosis**
- **Lymph Node Exam**
- **MALDI-TOF Mass Spectrometry**
- **Male Rectal Exam**
- **Measuring Grey Matter Differences with Voxel-based Morphometry: The Musical Brain**
- **Measuring Tropospheric Ozone**
- **Measuring Vital Signs**
- **Metabolic Labeling**
- **Molecular Cloning**
- **Motor Exam I**
- **Motor Exam II**
- **Motor Maps**
- **Mouse Genotyping**
- **Needle Thoracostomy (needle Decompression) for**

- Temporizing Tension Pneumothorax Treatment
- Nose, Sinuses, Oral Cavity and Pharynx Exam
- Nuclear Magnetic Resonance (NMR) Spectroscopy
- Nutrients in Aquatic Ecosystems
- Ophthalmoscopic Examination
- Patch Clamp Electrophysiology
- Pelvic Exam II: Speculum Exam
- Pelvic Exam III: Bimanual and Rectovaginal Exam
- Percussion
- Percutaneous Cricothyrotomy (Seldinger Technique)
- Performing 1D Thin Layer Chromatography
- Pericardiocentesis
- Peripheral Vascular Exam
- Peripheral Vascular Exam Using a Continuous Wave Doppler
- Peripheral Venous Cannulation
- Physiological Correlates of Emotion Recognition
- Protein Crystallization
- Purifying Compounds by Recrystallization
- Quantifying Environmental Microorganisms and Viruses Using qPCR
- RNA Analysis of Environmental Samples Using RT-PCR
- RNA-Seq
- RNAi in *C. elegans*
- Recombineering and Gene Targeting
- Respiratory Exam I: Inspection and Palpation
- Respiratory Exam II: Percussion and Auscultation
- SNP Genotyping
- Scanning Electron Microscopy (SEM)
- Solutions and Concentrations
- Surface Plasmon Resonance (SPR)
- Surgical Cricothyrotomy
- Tandem Mass Spectrometry
- The ATP Bioluminescence Assay
- The ELISA Method
- The TUNEL Assay
- The Transwell Migration Assay
- Thyroid Exam
- Tissue Regeneration with Somatic Stem Cells
- Tree Identification: How To Use a Dichotomous Key
- Tree Survey: Point-Centered Quarter Sampling Method
- Turbidity and Total Solids in Surface Water
- Two-Dimensional Gel Electrophoresis
- Using Diffusion Tensor Imaging in Traumatic Brain Injury
- Using TMS to Measure Motor Excitability During Action Observation
- Using a pH Meter
- Visual Attention: fMRI Investigation of Object-based Attentional Control
- Water Quality Analysis via Indicator Organisms

		<ul style="list-style-type: none"> • Whole-Mount In Situ Hybridization • Yeast Maintenance • Yeast Reproduction • Zebrafish Maintenance and Husbandry • Zebrafish Reproduction and Development • fMRI: Functional Magnetic Resonance Imaging
STANDARD / GLE	S:LS4:11:3.1.	<p>Human Identity: Students will describe how the length and quality of human life are influenced by many factors, including sanitation, diet, medical care, gender, genes, and environmental conditions and personal health behaviors.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Abdominal Exam I: Inspection and Auscultation • Abdominal Exam II: Percussion • Abdominal Exam III: Palpation • Abdominal Exam IV: Acute Abdominal Pain <p>Assessment</p> <ul style="list-style-type: none"> • An Introduction to Cognition • An Introduction to Learning and Memory • Ankle Exam • Are You Smart or Hardworking? How Praise Influences Children's Motivation • Arterial Line Placement • Auscultation • Balance and Coordination Testing • Basic Life Support Part II: Airway/Breathing and Continued Cardiopulmonary Resuscitation • Basic Life Support: Cardiopulmonary Resuscitation and Defibrillation • Blood Pressure Measurement • Cardiac Exam I: Inspection and Palpation • Cardiac Exam II: Auscultation • Cardiac Exam III: Abnormal Heart Sounds • Categories and Inductive Inferences • Central Venous Catheter Insertion: Femoral Vein with Ultrasound Guidance • Central Venous Catheter Insertion: Internal Jugular with Ultrasound Guidance • Central Venous Catheter Insertion: Subclavian Vein • Children's Reliance on Artist Intentions When Identifying Pictures • Comprehensive Breast Exam • Cranial Nerves Exam I (I-VI) • Cranial Nerves Exam II (VII-XII) • Determination Of Nox in Automobile Exhaust Using UV-VIS Spectroscopy • Ear Exam • Elbow Exam • Emergency Tube Thoracostomy (Chest Tube Placement)

- Emergent Lateral Canthotomy and Inferior Catholysis
- Executive Function and the Dimensional Change Card Sort Task
- Eye Exam
- Eye Tracking in Cognitive Experiments
- Foot Exam
- General Approach to the Physical Exam
- Habituation: Studying Infants Before They Can Talk
- Hand and Wrist Exam
- Hip Exam
- How Children Solve Problems Using Causal Reasoning
- Intra-articular Shoulder Injection for Reduction Following Anterior Shoulder Dislocation
- Intraosseous Needle Placement
- Knee Exam
- Language: The N400 in Semantic Incongruity
- Lead Analysis of Soil Using Atomic Absorption Spectroscopy
- Lower Back Exam
- Lymph Node Exam
- Male Rectal Exam
- Measuring Children's Trust in Testimony
- Measuring Tropospheric Ozone
- Measuring Vital Signs
- Memory Development: Demonstrating How Repeated Questioning Leads to False Memories
- Metacognitive Development: How Children Estimate Their Memory
- Motor Exam I
- Motor Exam II
- Mutual Exclusivity: How Children Learn the Meanings of Words
- Neck Exam
- Needle Thoracostomy (needle Decompression) for Temporizing Tension Pneumothorax Treatment
- Nose, Sinuses, Oral Cavity and Pharynx Exam
- Numerical Cognition: More or Less
- Observation and Inspection
- Ophthalmoscopic Examination
- Palpation
- Pelvic Exam I: Assessment of the External Genitalia
- Pelvic Exam II: Speculum Exam
- Pelvic Exam III: Bimanual and Rectovaginal Exam
- Percussion
- Percutaneous Cricothyrotomy (Seldinger Technique)
- Pericardiocentesis
- Peripheral Vascular Exam
- Peripheral Vascular Exam Using a Continuous Wave Doppler
- Peripheral Venous Cannulation
- Piaget's Conservation Task and the Influence of Task

		<p>Demands</p> <ul style="list-style-type: none"> • Proper Adjustment of Patient Attire during the Physical Exam • Respiratory Exam I: Inspection and Palpation • Respiratory Exam II: Percussion and Auscultation • Sensory Exam • Shoulder Exam I • Shoulder Exam II • Surgical Cricothyrotomy • The Costs and Benefits of Natural Pedagogy • The Rouge Test: Searching for a Sense of Self • Thyroid Exam • Using Your Head: Measuring Infants' Rational Imitation of Actions
STANDARD / GLE	S:LS4:11:3.2.	<p>Human Identity: Students will explain how the immune system functions to prevent and fight disease.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Introduction to the Laboratory Mouse: Mus musculus • Co-Immunoprecipitation and Pull-Down Assays • MALDI-TOF Mass Spectrometry • The TUNEL Assay
STANDARD / GLE	S:LS4:11:3.3.	<p>Human Identity: Students will explain how the immune system, endocrine system, or nervous system works and draw conclusions about how systems interact to maintain homeostasis in the human body.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Abdominal Exam I: Inspection and Auscultation • Abdominal Exam II: Percussion • Abdominal Exam III: Palpation • Abdominal Exam IV: Acute Abdominal Pain Assessment • An Introduction to Behavioral Neuroscience • An Introduction to Cellular and Molecular Neuroscience • An Introduction to Cognition • An Introduction to Developmental Neurobiology • An Introduction to Learning and Memory • An Introduction to Modeling Behavioral Disorders and Stress • An Introduction to Motor Control • An Introduction to Neuroanatomy • An Introduction to Neurophysiology • An Introduction to Reward and Addiction • An Introduction to the Laboratory Mouse: Mus musculus • Ankle Exam • Anterograde Amnesia • Anxiety Testing • Arterial Line Placement

- **Assessing Dexterity with Reaching Tasks**
- **Auscultation**
- **Balance and Coordination Testing**
- **Basic Life Support Part II: Airway/Breathing and Continued Cardiopulmonary Resuscitation**
- **Basic Life Support: Cardiopulmonary Resuscitation and Defibrillation**
- **Blood Pressure Measurement**
- **Calcium Imaging in Neurons**
- **Cardiac Exam I: Inspection and Palpation**
- **Cardiac Exam II: Auscultation**
- **Cardiac Exam III: Abnormal Heart Sounds**
- **Central Venous Catheter Insertion: Femoral Vein with Ultrasound Guidance**
- **Central Venous Catheter Insertion: Internal Jugular with Ultrasound Guidance**
- **Central Venous Catheter Insertion: Subclavian Vein**
- **Co-Immunoprecipitation and Pull-Down Assays**
- **Color Afterimages**
- **Comprehensive Breast Exam**
- **Cranial Nerves Exam I (I-VI)**
- **Cranial Nerves Exam II (VII-XII)**
- **Crowding**
- **Decision-making and the Iowa Gambling Task**
- **Decoding Auditory Imagery with Multivoxel Pattern Analysis**
- **Ear Exam**
- **Elbow Exam**
- **Electro-encephalography (EEG)**
- **Emergency Tube Thoracostomy (Chest Tube Placement)**
- **Emergent Lateral Canthotomy and Inferior Catholysis**
- **Event-related Potentials and the Oddball Task**
- **Executive Function and the Dimensional Change Card Sort Task**
- **Executive Function in Autism Spectrum Disorder**
- **Explant Culture of Neural Tissue**
- **Eye Exam**
- **Fear Conditioning**
- **Finding Your Blind Spot and Perceptual Filling-in**
- **Foot Exam**
- **General Approach to the Physical Exam**
- **Hand and Wrist Exam**
- **Hip Exam**
- **Histological Staining of Neural Tissue**
- **Inattentive Blindness**
- **Intra-articular Shoulder Injection for Reduction Following Anterior Shoulder Dislocation**
- **Intraosseous Needle Placement**
- **Just-noticeable Differences**
- **Knee Exam**

- **Language: The N400 in Semantic Incongruity**
- **Learning and Memory: The Remember-Know Task**
- **Lower Back Exam**
- **Lymph Node Exam**
- **MALDI-TOF Mass Spectrometry**
- **Male Rectal Exam**
- **Measuring Grey Matter Differences with Voxel-based Morphometry: The Musical Brain**
- **Measuring Vital Signs**
- **Modeling Social Stress**
- **Motion-induced Blindness**
- **Motor Exam I**
- **Motor Exam II**
- **Motor Maps**
- **Murine In Utero Electroporation**
- **Mutual Exclusivity: How Children Learn the Meanings of Words**
- **Neck Exam**
- **Needle Thoracostomy (needle Decompression) for Temporizing Tension Pneumothorax Treatment**
- **Nose, Sinuses, Oral Cavity and Pharynx Exam**
- **Object Substitution Masking**
- **Observation and Inspection**
- **Ophthalmoscopic Examination**
- **Palpation**
- **Patch Clamp Electrophysiology**
- **Pelvic Exam I: Assessment of the External Genitalia**
- **Pelvic Exam II: Speculum Exam**
- **Pelvic Exam III: Bimanual and Rectovaginal Exam**
- **Percussion**
- **Percutaneous Cricothyrotomy (Seldinger Technique)**
- **Pericardiocentesis**
- **Peripheral Vascular Exam**
- **Peripheral Vascular Exam Using a Continuous Wave Doppler**
- **Peripheral Venous Cannulation**
- **Perspectives on Sensation and Perception**
- **Physiological Correlates of Emotion Recognition**
- **Pilot Testing**
- **Proper Adjustment of Patient Attire during the Physical Exam**
- **Respiratory Exam I: Inspection and Palpation**
- **Respiratory Exam II: Percussion and Auscultation**
- **Rodent Stereotaxic Surgery**
- **Self-administration Studies**
- **Sensory Exam**
- **Shoulder Exam I**
- **Shoulder Exam II**
- **Spatial Cueing**
- **Spatial Memory Testing Using Mazes**
- **Surgical Cricothyrotomy**

		<ul style="list-style-type: none"> • The Ames Room • The Attentional Blink • The Inverted-face Effect • The McGurk Effect • The Rubber Hand Illusion • The Split Brain • The Staircase Procedure for Finding a Perceptual Threshold • The TUNEL Assay • Thyroid Exam • Tissue Regeneration with Somatic Stem Cells • Using Diffusion Tensor Imaging in Traumatic Brain Injury • Using TMS to Measure Motor Excitability During Action Observation • Using a pH Meter • Verbal Priming • Visual Attention: fMRI Investigation of Object-based Attentional Control • Within-subjects Repeated-measures Design • fMRI: Functional Magnetic Resonance Imaging
STRAND / STANDARD	NH.LS5.	Life Science: The growth of scientific knowledge in Life Science has been advanced through the development of technology and is used (alone or in combination with other sciences) to identify, understand and solve local and global issues.
STANDARD / GLE	S:LS5:11:1.1.	<p>Design Technology: Students will describe ways in which technology has increased our understanding of the life sciences.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Abdominal Exam I: Inspection and Auscultation • Abdominal Exam IV: Acute Abdominal Pain Assessment • Algae Enumeration via Culturable Methodology • An Introduction to Aging and Regeneration • An Introduction to Behavioral Neuroscience • An Introduction to Cell Death • An Introduction to Cell Division • An Introduction to Cell Metabolism • An Introduction to Cell Motility and Migration • An Introduction to Cognition • An Introduction to Developmental Neurobiology • An Introduction to Drosophila melanogaster • An Introduction to Endocytosis and Exocytosis • An Introduction to Learning and Memory • An Introduction to Motor Control • An Introduction to Neuroanatomy • An Introduction to Neurophysiology • An Introduction to Organogenesis • An Introduction to Reward and Addiction

- An Introduction to *Saccharomyces cerevisiae*
- An Introduction to Stem Cell Biology
- An Introduction to Transfection
- An Introduction to the Centrifuge
- An Introduction to the Laboratory Mouse: *Mus musculus*
- An Introduction to the Micropipettor
- An Overview of Epigenetics
- An Overview of Genetic Analysis
- An Overview of Genetic Engineering
- An Overview of Genetics and Disease
- Anesthesia Induction and Maintenance
- Annexin V and Propidium Iodide Labeling
- Arterial Line Placement
- Auscultation
- Bacterial Growth Curve Analysis and its Environmental Applications
- Bacterial Transformation: Electroporation
- Bacterial Transformation: The Heat Shock Method
- Basic Life Support: Cardiopulmonary Resuscitation and Defibrillation
- Biofuels: Producing Ethanol from Cellulosic Material
- Blood Pressure Measurement
- Blood Withdrawal I
- Blood Withdrawal II
- Calcium Imaging in Neurons
- Cardiac Exam II: Auscultation
- Cardiac Exam III: Abnormal Heart Sounds
- Cell Cycle Analysis
- Cell-surface Biotinylation Assay
- Central Venous Catheter Insertion: Femoral Vein with Ultrasound Guidance
- Central Venous Catheter Insertion: Internal Jugular with Ultrasound Guidance
- Central Venous Catheter Insertion: Subclavian Vein
- Chromatin Immunoprecipitation
- Color Afterimages
- Community DNA Extraction from Bacterial Colonies
- Compound Administration I
- Compound Administration II
- Compound Administration III
- Compound Administration IV
- Considerations for Rodent Surgery
- Cranial Nerves Exam I (I-VI)
- Cranial Nerves Exam II (VII-XII)
- Crowding
- Culturing and Enumerating Bacteria from Soil Samples
- Cytogenetics
- DNA Gel Electrophoresis
- DNA Ligation Reactions
- DNA Methylation Analysis
- Decision-making and the Iowa Gambling Task

- **Decoding Auditory Imagery with Multivoxel Pattern Analysis**
- **Detecting Environmental Microorganisms with the Polymerase Chain Reaction and Gel Electrophoresis**
- **Detecting Reactive Oxygen Species**
- **Detection of Bacteriophages in Environmental Samples**
- **Diagnostic Necropsy and Tissue Harvest**
- **Ear Exam**
- **Electro-encephalography (EEG)**
- **Embryonic Stem Cell Culture and Differentiation**
- **Emergency Tube Thoracostomy (Chest Tube Placement)**
- **Emergent Lateral Canthotomy and Inferior Catholysis**
- **Event-related Potentials and the Oddball Task**
- **Explant Culture of Neural Tissue**
- **Expression Profiling with Microarrays**
- **Eye Exam**
- **Eye Tracking in Cognitive Experiments**
- **FM Dyes in Vesicle Recycling**
- **Fate Mapping**
- **Fear Conditioning**
- **Finding Your Blind Spot and Perceptual Filling-in**
- **Gel Purification**
- **General Approach to the Physical Exam**
- **Genetic Crosses**
- **Genetic Engineering of Model Organisms**
- **Genetic Screens**
- **Genome Editing**
- **Gram Staining of Bacteria from Environmental Sources**
- **Histological Sample Preparation for Light Microscopy**
- **Histological Staining of Neural Tissue**
- **Induced Pluripotency**
- **Intra-articular Shoulder Injection for Reduction Following Anterior Shoulder Dislocation**
- **Intraosseous Needle Placement**
- **Introduction to Fluorescence Microscopy**
- **Introduction to Light Microscopy**
- **Introduction to Serological Pipettes and Pipettors**
- **Introduction to the Microplate Reader**
- **Introduction to the Spectrophotometer**
- **Invasion Assay Using 3D Matrices**
- **Isolation of Fecal Bacteria from Water Samples by Filtration**
- **Language: The N400 in Semantic Incongruity**
- **Learning and Memory: The Remember-Know Task**
- **Live Cell Imaging of Mitosis**
- **Making Solutions in the Laboratory**
- **Measuring Grey Matter Differences with Voxel-based Morphometry: The Musical Brain**
- **Measuring Mass in the Laboratory**
- **Measuring Vital Signs**
- **Molecular Cloning**

- **Motion-induced Blindness**
- **Motor Exam II**
- **Motor Maps**
- **Murine In Utero Electroporation**
- **Needle Thoracostomy (needle Decompression) for Temporizing Tension Pneumothorax Treatment**
- **Nose, Sinuses, Oral Cavity and Pharynx Exam**
- **Object Substitution Masking**
- **Ophthalmoscopic Examination**
- **PCR: The Polymerase Chain Reaction**
- **Passaging Cells**
- **Patch Clamp Electrophysiology**
- **Pelvic Exam II: Speculum Exam**
- **Pelvic Exam III: Bimanual and Rectovaginal Exam**
- **Percussion**
- **Percutaneous Cricothyrotomy (Seldinger Technique)**
- **Pericardiocentesis**
- **Peripheral Vascular Exam**
- **Peripheral Vascular Exam Using a Continuous Wave Doppler**
- **Peripheral Venous Cannulation**
- **Physiological Correlates of Emotion Recognition**
- **Plasmid Purification**
- **Positive Reinforcement Studies**
- **Proton Exchange Membrane Fuel Cells**
- **Quantifying Environmental Microorganisms and Viruses Using qPCR**
- **RNA-Seq**
- **Recombineering and Gene Targeting**
- **Regulating Temperature in the Lab: Applying Heat**
- **Regulating Temperature in the Lab: Preserving Samples Using Cold**
- **Respiratory Exam II: Percussion and Auscultation**
- **Restriction Enzyme Digests**
- **Rodent Stereotaxic Surgery**
- **SNP Genotyping**
- **Self-administration Studies**
- **Separating Protein with SDS-PAGE**
- **Spatial Cueing**
- **Sterile Tissue Harvest**
- **Surgical Cricothyrotomy**
- **Testing For Genetically Modified Foods**
- **The ATP Bioluminescence Assay**
- **The Attentional Blink**
- **The ELISA Method**
- **The Rubber Hand Illusion**
- **The TUNEL Assay**
- **The Transwell Migration Assay**
- **The Western Blot**
- **Tissue Regeneration with Somatic Stem Cells**
- **Transplantation Studies**
- **Understanding Concentration and Measuring Volumes**

		<ul style="list-style-type: none"> • Using Diffusion Tensor Imaging in Traumatic Brain Injury • Using GIS to Investigate Urban Forestry • Using TMS to Measure Motor Excitability During Action Observation • Visual Attention: fMRI Investigation of Object-based Attentional Control • X-ray Fluorescence (XRF) • Yeast Transformation and Cloning • fMRI: Functional Magnetic Resonance Imaging
<p>STANDARD / GLE</p>	<p>S:LS5:11:1.2.</p>	<p>Design Technology: Students will understand that technology is designed with a particular function in mind, and principles of life science are useful in creating technology for the life sciences.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Abdominal Exam I: Inspection and Auscultation • Abdominal Exam IV: Acute Abdominal Pain Assessment • Algae Enumeration via Culturable Methodology • An Introduction to Aging and Regeneration • An Introduction to Behavioral Neuroscience • An Introduction to Cell Death • An Introduction to Cell Division • An Introduction to Cell Metabolism • An Introduction to Cell Motility and Migration • An Introduction to Cognition • An Introduction to Developmental Neurobiology • An Introduction to Drosophila melanogaster • An Introduction to Endocytosis and Exocytosis • An Introduction to Learning and Memory • An Introduction to Motor Control • An Introduction to Neuroanatomy • An Introduction to Neurophysiology • An Introduction to Organogenesis • An Introduction to Reward and Addiction • An Introduction to Saccharomyces cerevisiae • An Introduction to Stem Cell Biology • An Introduction to Transfection • An Introduction to the Centrifuge • An Introduction to the Laboratory Mouse: Mus musculus • An Introduction to the Micropipettor • An Overview of Epigenetics • An Overview of Genetic Analysis • An Overview of Genetic Engineering • An Overview of Genetics and Disease • Anesthesia Induction and Maintenance • Annexin V and Propidium Iodide Labeling • Arterial Line Placement • Auscultation

- **Bacterial Growth Curve Analysis and its Environmental Applications**
- **Bacterial Transformation: Electroporation**
- **Bacterial Transformation: The Heat Shock Method**
- **Basic Life Support: Cardiopulmonary Resuscitation and Defibrillation**
- **Biofuels: Producing Ethanol from Cellulosic Material**
- **Blood Pressure Measurement**
- **Blood Withdrawal I**
- **Blood Withdrawal II**
- **Calcium Imaging in Neurons**
- **Cardiac Exam II: Auscultation**
- **Cardiac Exam III: Abnormal Heart Sounds**
- **Cell Cycle Analysis**
- **Cell-surface Biotinylation Assay**
- **Central Venous Catheter Insertion: Femoral Vein with Ultrasound Guidance**
- **Central Venous Catheter Insertion: Internal Jugular with Ultrasound Guidance**
- **Central Venous Catheter Insertion: Subclavian Vein**
- **Chromatin Immunoprecipitation**
- **Color Afterimages**
- **Community DNA Extraction from Bacterial Colonies**
- **Compound Administration I**
- **Compound Administration II**
- **Compound Administration III**
- **Compound Administration IV**
- **Considerations for Rodent Surgery**
- **Cranial Nerves Exam I (I-VI)**
- **Cranial Nerves Exam II (VII-XII)**
- **Crowding**
- **Culturing and Enumerating Bacteria from Soil Samples**
- **Cytogenetics**
- **DNA Gel Electrophoresis**
- **DNA Ligation Reactions**
- **DNA Methylation Analysis**
- **Decision-making and the Iowa Gambling Task**
- **Decoding Auditory Imagery with Multivoxel Pattern Analysis**
- **Detecting Environmental Microorganisms with the Polymerase Chain Reaction and Gel Electrophoresis**
- **Detecting Reactive Oxygen Species**
- **Detection of Bacteriophages in Environmental Samples**
- **Diagnostic Necropsy and Tissue Harvest**
- **Ear Exam**
- **Electro-encephalography (EEG)**
- **Embryonic Stem Cell Culture and Differentiation**
- **Emergency Tube Thoracostomy (Chest Tube Placement)**
- **Emergent Lateral Canthotomy and Inferior Catholysis**
- **Event-related Potentials and the Oddball Task**

- Explant Culture of Neural Tissue
- Expression Profiling with Microarrays
- Eye Exam
- Eye Tracking in Cognitive Experiments
- FM Dyes in Vesicle Recycling
- Fate Mapping
- Fear Conditioning
- Finding Your Blind Spot and Perceptual Filling-in
- Gel Purification
- General Approach to the Physical Exam
- Genetic Crosses
- Genetic Engineering of Model Organisms
- Genetic Screens
- Genome Editing
- Gram Staining of Bacteria from Environmental Sources
- Histological Sample Preparation for Light Microscopy
- Histological Staining of Neural Tissue
- Induced Pluripotency
- Intra-articular Shoulder Injection for Reduction Following Anterior Shoulder Dislocation
- Intraosseous Needle Placement
- Introduction to Fluorescence Microscopy
- Introduction to Light Microscopy
- Introduction to Serological Pipettes and Pipettors
- Introduction to the Microplate Reader
- Introduction to the Spectrophotometer
- Invasion Assay Using 3D Matrices
- Isolation of Fecal Bacteria from Water Samples by Filtration
- Language: The N400 in Semantic Incongruity
- Learning and Memory: The Remember-Know Task
- Live Cell Imaging of Mitosis
- Making Solutions in the Laboratory
- Measuring Grey Matter Differences with Voxel-based Morphometry: The Musical Brain
- Measuring Mass in the Laboratory
- Measuring Vital Signs
- Molecular Cloning
- Motion-induced Blindness
- Motor Exam II
- Motor Maps
- Murine In Utero Electroporation
- Needle Thoracostomy (needle Decompression) for Temporizing Tension Pneumothorax Treatment
- Nose, Sinuses, Oral Cavity and Pharynx Exam
- Object Substitution Masking
- Ophthalmoscopic Examination
- PCR: The Polymerase Chain Reaction
- Passaging Cells
- Patch Clamp Electrophysiology
- Pelvic Exam II: Speculum Exam

		<ul style="list-style-type: none"> • Pelvic Exam III: Bimanual and Rectovaginal Exam • Percussion • Percutaneous Cricothyrotomy (Seldinger Technique) • Pericardiocentesis • Peripheral Vascular Exam • Peripheral Vascular Exam Using a Continuous Wave Doppler • Peripheral Venous Cannulation • Physiological Correlates of Emotion Recognition • Plasmid Purification • Positive Reinforcement Studies • Proton Exchange Membrane Fuel Cells • Quantifying Environmental Microorganisms and Viruses Using qPCR • RNA-Seq • Recombineering and Gene Targeting • Regulating Temperature in the Lab: Applying Heat • Regulating Temperature in the Lab: Preserving Samples Using Cold • Respiratory Exam II: Percussion and Auscultation • Restriction Enzyme Digests • Rodent Stereotaxic Surgery • SNP Genotyping • Self-administration Studies • Separating Protein with SDS-PAGE • Spatial Cueing • Sterile Tissue Harvest • Surgical Cricothyrotomy • Testing For Genetically Modified Foods • The ATP Bioluminescence Assay • The Attentional Blink • The ELISA Method • The Rubber Hand Illusion • The TUNEL Assay • The Transwell Migration Assay • The Western Blot • Tissue Regeneration with Somatic Stem Cells • Transplantation Studies • Understanding Concentration and Measuring Volumes • Using Diffusion Tensor Imaging in Traumatic Brain Injury • Using GIS to Investigate Urban Forestry • Using TMS to Measure Motor Excitability During Action Observation • Visual Attention: fMRI Investigation of Object-based Attentional Control • X-ray Fluorescence (XRF) • Yeast Transformation and Cloning • fMRI: Functional Magnetic Resonance Imaging
STANDARD / GLE	S:LS5:11:2.1.	Tools: Students will describe the use and benefits of equipment such as light microscopes, transmission

		<p>electron microscopes, scanning electron microscopes, spectrophotometers, probes, and robotics to the study of the life sciences.</p> <p>JoVE</p> <ul style="list-style-type: none"> • An Introduction to Cell Division • An Introduction to the Centrifuge • An Introduction to the Micropipettor • Bacterial Growth Curve Analysis and its Environmental Applications • Culturing and Enumerating Bacteria from Soil Samples • Detecting Environmental Microorganisms with the Polymerase Chain Reaction and Gel Electrophoresis • Gram Staining of Bacteria from Environmental Sources • Histological Sample Preparation for Light Microscopy • Introduction to Fluorescence Microscopy • Introduction to Light Microscopy • Introduction to Serological Pipettes and Pipettors • Introduction to the Microplate Reader • Introduction to the Spectrophotometer • Live Cell Imaging of Mitosis • Regulating Temperature in the Lab: Applying Heat • Regulating Temperature in the Lab: Preserving Samples Using Cold • X-ray Fluorescence (XRF)
STANDARD / GLE	S:LS5:11:3.1.	<p>Social Issues (Local And Global): Medical Technology and Biotechnology: Students will describe ways technology can support and improve our understanding of environmental issues.</p> <p>JoVE</p> <ul style="list-style-type: none"> • Abdominal Exam I: Inspection and Auscultation • Abdominal Exam IV: Acute Abdominal Pain Assessment • Algae Enumeration via Culturable Methodology • An Introduction to Aging and Regeneration • An Introduction to Behavioral Neuroscience • An Introduction to Cell Metabolism • An Introduction to Cognition • An Introduction to Endocytosis and Exocytosis • An Introduction to Learning and Memory • An Introduction to Motor Control • An Introduction to Neuroanatomy • An Introduction to Neurophysiology • An Introduction to Organogenesis • An Introduction to Saccharomyces cerevisiae • An Introduction to Stem Cell Biology • An Introduction to the Laboratory Mouse: Mus musculus • An Overview of Genetic Analysis • An Overview of Genetic Engineering

- An Overview of Genetics and Disease
- Arterial Line Placement
- Assembly of a Reflux System for Heated Chemical Reactions
- Auscultation
- Bacterial Growth Curve Analysis and its Environmental Applications
- Basic Life Support: Cardiopulmonary Resuscitation and Defibrillation
- Biofuels: Producing Ethanol from Cellulosic Material
- Blood Pressure Measurement
- Calcium Imaging in Neurons
- Capillary Electrophoresis (CE)
- Cardiac Exam II: Auscultation
- Cardiac Exam III: Abnormal Heart Sounds
- Central Venous Catheter Insertion: Femoral Vein with Ultrasound Guidance
- Central Venous Catheter Insertion: Internal Jugular with Ultrasound Guidance
- Central Venous Catheter Insertion: Subclavian Vein
- Chromatin Immunoprecipitation
- Chromatography-Based Biomolecule Purification Methods
- Co-Immunoprecipitation and Pull-Down Assays
- Column Chromatography
- Community DNA Extraction from Bacterial Colonies
- Coordination Chemistry Complexes
- Cranial Nerves Exam I (I-VI)
- Cranial Nerves Exam II (VII-XII)
- Culturing and Enumerating Bacteria from Soil Samples
- Cyclic Voltammetry (CV)
- Cytogenetics
- DNA Ligation Reactions
- DNA Methylation Analysis
- Decision-making and the Iowa Gambling Task
- Decoding Auditory Imagery with Multivoxel Pattern Analysis
- Detecting Reactive Oxygen Species
- Detection of Bacteriophages in Environmental Samples
- Ear Exam
- Electro-encephalography (EEG)
- Electrochemical Measurements of Supported Catalysts Using a Potentiostat/Galvanostat
- Embryonic Stem Cell Culture and Differentiation
- Emergency Tube Thoracostomy (Chest Tube Placement)
- Emergent Lateral Canthotomy and Inferior Catholysis
- Enzyme Assays and Kinetics
- Event-related Potentials and the Oddball Task
- Expression Profiling with Microarrays
- Eye Exam

- Eye Tracking in Cognitive Experiments
- Fate Mapping
- Fear Conditioning
- General Approach to the Physical Exam
- Genetic Crosses
- Genetic Screens
- Genome Editing
- Gram Staining of Bacteria from Environmental Sources
- Growing Crystals for X-ray Diffraction Analysis
- Induced Pluripotency
- Intra-articular Shoulder Injection for Reduction Following Anterior Shoulder Dislocation
- Intraosseous Needle Placement
- Introducing Experimental Agents into the Mouse
- Introduction to Mass Spectrometry
- Introduction to Titration
- Isolation of Fecal Bacteria from Water Samples by Filtration
- Language: The N400 in Semantic Incongruity
- Learning and Memory: The Remember-Know Task
- Live Cell Imaging of Mitosis
- MALDI-TOF Mass Spectrometry
- Measuring Grey Matter Differences with Voxel-based Morphometry: The Musical Brain
- Measuring Vital Signs
- Metabolic Labeling
- Molecular Cloning
- Motor Exam II
- Motor Maps
- Needle Thoracostomy (needle Decompression) for Temporizing Tension Pneumothorax Treatment
- Nose, Sinuses, Oral Cavity and Pharynx Exam
- Nuclear Magnetic Resonance (NMR) Spectroscopy
- Ophthalmoscopic Examination
- Patch Clamp Electrophysiology
- Pelvic Exam II: Speculum Exam
- Pelvic Exam III: Bimanual and Rectovaginal Exam
- Percussion
- Percutaneous Cricothyrotomy (Seldinger Technique)
- Performing 1D Thin Layer Chromatography
- Pericardiocentesis
- Peripheral Vascular Exam
- Peripheral Vascular Exam Using a Continuous Wave Doppler
- Peripheral Venous Cannulation
- Physiological Correlates of Emotion Recognition
- Protein Crystallization
- Purifying Compounds by Recrystallization
- Quantifying Environmental Microorganisms and Viruses Using qPCR
- RNA Analysis of Environmental Samples Using RT-PCR

		<ul style="list-style-type: none"> • RNA-Seq • Recombineering and Gene Targeting • Respiratory Exam II: Percussion and Auscultation • SNP Genotyping • Scanning Electron Microscopy (SEM) • Solid-Liquid Extraction • Solutions and Concentrations • Surface Plasmon Resonance (SPR) • Surgical Cricothyrotomy • Tandem Mass Spectrometry • Testing For Genetically Modified Foods • The ATP Bioluminescence Assay • The ELISA Method • Tissue Regeneration with Somatic Stem Cells • Two-Dimensional Gel Electrophoresis • Using Diffusion Tensor Imaging in Traumatic Brain Injury • Using TMS to Measure Motor Excitability During Action Observation • Using a pH Meter • Visual Attention: fMRI Investigation of Object-based Attentional Control • fMRI: Functional Magnetic Resonance Imaging
STANDARD / GLE	S:LS5:11:3.2.	<p>Social Issues (Local And Global): Medical Technology and Biotechnology: Students will describe aspects of the medical system available to help people in New Hampshire, including: prevention programs, vaccines and pharmaceuticals, hospitals and rehabilitation facilities.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Abdominal Exam I: Inspection and Auscultation • Abdominal Exam IV: Acute Abdominal Pain Assessment • Algae Enumeration via Culturable Methodology • An Introduction to Aging and Regeneration • An Introduction to Behavioral Neuroscience • An Introduction to Cell Metabolism • An Introduction to Cognition • An Introduction to Endocytosis and Exocytosis • An Introduction to Learning and Memory • An Introduction to Motor Control • An Introduction to Neuroanatomy • An Introduction to Neurophysiology • An Introduction to Organogenesis • An Introduction to Reward and Addiction • An Introduction to Saccharomyces cerevisiae • An Introduction to Stem Cell Biology • An Introduction to the Laboratory Mouse: Mus musculus • An Overview of Genetic Analysis • An Overview of Genetic Engineering

- An Overview of Genetics and Disease
- Arterial Line Placement
- Assembly of a Reflux System for Heated Chemical Reactions
- Auscultation
- Bacterial Growth Curve Analysis and its Environmental Applications
- Basic Life Support: Cardiopulmonary Resuscitation and Defibrillation
- Blood Pressure Measurement
- Calcium Imaging in Neurons
- Capillary Electrophoresis (CE)
- Cardiac Exam II: Auscultation
- Cardiac Exam III: Abnormal Heart Sounds
- Cell-surface Biotinylation Assay
- Central Venous Catheter Insertion: Femoral Vein with Ultrasound Guidance
- Central Venous Catheter Insertion: Internal Jugular with Ultrasound Guidance
- Central Venous Catheter Insertion: Subclavian Vein
- Chick ex ovo Culture
- Chromatin Immunoprecipitation
- Chromatography-Based Biomolecule Purification Methods
- Co-Immunoprecipitation and Pull-Down Assays
- Column Chromatography
- Community DNA Extraction from Bacterial Colonies
- Coordination Chemistry Complexes
- Cranial Nerves Exam I (I-VI)
- Cranial Nerves Exam II (VII-XII)
- Culturing and Enumerating Bacteria from Soil Samples
- Cyclic Voltammetry (CV)
- Cytogenetics
- DNA Ligation Reactions
- DNA Methylation Analysis
- Decision-making and the Iowa Gambling Task
- Decoding Auditory Imagery with Multivoxel Pattern Analysis
- Detecting Reactive Oxygen Species
- Detection of Bacteriophages in Environmental Samples
- Ear Exam
- Electro-encephalography (EEG)
- Electrochemical Measurements of Supported Catalysts Using a Potentiostat/Galvanostat
- Embryonic Stem Cell Culture and Differentiation
- Emergency Tube Thoracostomy (Chest Tube Placement)
- Emergent Lateral Canthotomy and Inferior Catholysis
- Enzyme Assays and Kinetics
- Event-related Potentials and the Oddball Task
- Expression Profiling with Microarrays

- Eye Exam
- Eye Tracking in Cognitive Experiments
- FM Dyes in Vesicle Recycling
- Fate Mapping
- Fear Conditioning
- General Approach to the Physical Exam
- Genetic Crosses
- Genetic Screens
- Genome Editing
- Gram Staining of Bacteria from Environmental Sources
- Growing Crystals for X-ray Diffraction Analysis
- Induced Pluripotency
- Intra-articular Shoulder Injection for Reduction Following Anterior Shoulder Dislocation
- Intraosseous Needle Placement
- Introducing Experimental Agents into the Mouse
- Introduction to Mass Spectrometry
- Introduction to Titration
- Isolation of Fecal Bacteria from Water Samples by Filtration
- Language: The N400 in Semantic Incongruity
- Lead Analysis of Soil Using Atomic Absorption Spectroscopy
- Learning and Memory: The Remember-Know Task
- Live Cell Imaging of Mitosis
- MALDI-TOF Mass Spectrometry
- Measuring Grey Matter Differences with Voxel-based Morphometry: The Musical Brain
- Measuring Tropospheric Ozone
- Measuring Vital Signs
- Metabolic Labeling
- Molecular Cloning
- Motor Exam II
- Motor Maps
- Needle Thoracostomy (needle Decompression) for Temporizing Tension Pneumothorax Treatment
- Nose, Sinuses, Oral Cavity and Pharynx Exam
- Nuclear Magnetic Resonance (NMR) Spectroscopy
- Ophthalmoscopic Examination
- Patch Clamp Electrophysiology
- Pelvic Exam II: Speculum Exam
- Pelvic Exam III: Bimanual and Rectovaginal Exam
- Percussion
- Percutaneous Cricothyrotomy (Seldinger Technique)
- Performing 1D Thin Layer Chromatography
- Pericardiocentesis
- Peripheral Vascular Exam
- Peripheral Vascular Exam Using a Continuous Wave Doppler
- Peripheral Venous Cannulation
- Physiological Correlates of Emotion Recognition

		<ul style="list-style-type: none"> • Protein Crystallization • Purifying Compounds by Recrystallization • Quantifying Environmental Microorganisms and Viruses Using qPCR • RNA-Seq • Recombineering and Gene Targeting • Respiratory Exam II: Percussion and Auscultation • SNP Genotyping • Scanning Electron Microscopy (SEM) • Self-administration Studies • Solutions and Concentrations • Surface Plasmon Resonance (SPR) • Surgical Cricothyrotomy • Tandem Mass Spectrometry • The ATP Bioluminescence Assay • The ELISA Method • Tissue Regeneration with Somatic Stem Cells • Two-Dimensional Gel Electrophoresis • Using Diffusion Tensor Imaging in Traumatic Brain Injury • Using TMS to Measure Motor Excitability During Action Observation • Using a pH Meter • Visual Attention: fMRI Investigation of Object-based Attentional Control • fMRI: Functional Magnetic Resonance Imaging
STANDARD / GLE	S:LS5:11:3.3.	<p>Social Issues (Local And Global): Medical Technology and Biotechnology: Students will recognize that biotechnology is used in many areas, such as agriculture, pharmaceuticals, the environment, and genetic engineering; and understand that it requires extensive knowledge of the systems being changed.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Introduction to Aging and Regeneration • An Introduction to Drosophila melanogaster • An Introduction to Molecular Developmental Biology • An Introduction to Neurophysiology • An Introduction to Organogenesis • An Introduction to Saccharomyces cerevisiae • An Introduction to Stem Cell Biology • An Introduction to Transfection • An Introduction to the Chick: Gallus gallus domesticus • An Introduction to the Laboratory Mouse: Mus musculus • An Introduction to the Zebrafish: Danio rerio • An Overview of Gene Expression • An Overview of Genetic Engineering • Bacterial Growth Curve Analysis and its Environmental Applications • Bacterial Transformation: Electroporation

		<ul style="list-style-type: none"> • Bacterial Transformation: The Heat Shock Method • Biofuels: Producing Ethanol from Cellulosic Material • C. elegans Development and Reproduction • Chick ex ovo Culture • Cyclic Voltammetry (CV) • DNA Ligation Reactions • Development and Reproduction of the Laboratory Mouse • Development of the Chick • Embryonic Stem Cell Culture and Differentiation • Explant Culture for Developmental Studies • Explant Culture of Neural Tissue • Fate Mapping • Fundamentals of Breeding and Weaning • Gene Silencing with Morpholinos • Genetic Crosses • Genetic Engineering of Model Organisms • Genetic Screens • Genome Editing • In ovo Electroporation of Chicken Embryos • Induced Pluripotency • Invertebrate Lifespan Quantification • Molecular Cloning • Mouse Genotyping • Murine In Utero Electroporation • Neuronal Transfection Methods • PCR: The Polymerase Chain Reaction • Plasmid Purification • Primary Neuronal Cultures • RNA Analysis of Environmental Samples Using RT-PCR • RNAi in C. elegans • Recombineering and Gene Targeting • Restriction Enzyme Digests • Rodent Stereotaxic Surgery • Solid-Liquid Extraction • Testing For Genetically Modified Foods • The TUNEL Assay • Tissue Regeneration with Somatic Stem Cells • Transplantation Studies • Whole-Mount In Situ Hybridization • X-ray Fluorescence (XRF) • Yeast Transformation and Cloning • Zebrafish Breeding and Embryo Handling • Zebrafish Maintenance and Husbandry • Zebrafish Microinjection Techniques • Zebrafish Reproduction and Development
STANDARD / GLE	S:LS5:11:3.4.	<p>Social Issues (Local And Global): Medical Technology and Biotechnology: Students will explain how advances in agriculture made using biotechnology have directly affected the food production over the past 100 years; and that this change has profoundly affected societies all over</p>

		<p>the globe, making larger populations and urban centers a possibility.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Overview of Genetic Engineering • Solid-Liquid Extraction • Testing For Genetically Modified Foods
STRAND / STANDARD	NH.PS1.	Physical Science: All living and nonliving things are composed of matter having characteristic properties that distinguish one substance from another (independent of size/amount of substance).
STANDARD / GLE	S:PS1:11:1.1.	<p>Composition: Students will recognize and describe the structure of an atom and explain how the major components interact with one another.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Coordination Chemistry Complexes • Nuclear Magnetic Resonance (NMR) Spectroscopy • Raman Spectroscopy for Chemical Analysis • Scanning Electron Microscopy (SEM) • X-ray Fluorescence (XRF)
STANDARD / GLE	S:PS1:11:1.4.	<p>Composition: Students will define isotopes; recognize that most elements have two or more isotopes; and explain that although the number of neutrons has little affect on how the atom interacts with others, they do affect the mass and stability of the nucleus.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Metabolic Labeling
STANDARD / GLE	S:PS1:11:1.6.	<p>Composition: Students will model and explain the structure of an atom or explain how an atom's electron configuration, particularly the outermost electron(s), determines how that atom can interact with other atoms.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Coordination Chemistry Complexes
STANDARD / GLE	S:PS1:11:2.1.	<p>Properties: Students will explain that the physical properties of a compound are determined by its molecular structure and the interactions among the molecules.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Chromatography-Based Biomolecule Purification Methods • Column Chromatography • Determining the Empirical Formula • Determining the Solubility Rules of Ionic Compounds • Dialysis: Diffusion Based Separation • Electrochemical Measurements of Supported Catalysts Using a Potentiostat/Galvanostat

		<ul style="list-style-type: none"> • Freezing-Point Depression to Determine an Unknown Compound • Growing Crystals for X-ray Diffraction Analysis • Performing 1D Thin Layer Chromatography • Purifying Compounds by Recrystallization
STANDARD / GLE	S:PS1:11:2.2.	<p>Properties: Students will determine whether an atom is either electrically neutral or an ion by referring to its number of electrons.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Capillary Electrophoresis (CE) • Chromatography-Based Biomolecule Purification Methods • Determining the Solubility Rules of Ionic Compounds • Electrochemical Measurements of Supported Catalysts Using a Potentiostat/Galvanostat • Electrophoretic Mobility Shift Assay (EMSA) • Introduction to Mass Spectrometry • Ion-Exchange Chromatography • MALDI-TOF Mass Spectrometry • Tandem Mass Spectrometry • Two-Dimensional Gel Electrophoresis
STANDARD / GLE	S:PS1:11:2.3.	<p>Properties: Students will explain how the chemical properties of an element are governed by the electron configuration of atoms, and describe how atoms interact with one another by transferring or sharing the outermost electrons.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Coordination Chemistry Complexes
STANDARD / GLE	S:PS1:11:2.4.	<p>Properties: Students will explain that radioactive materials are unstable and undergo spontaneous nuclear reactions, which emit particles and/or wavelike radiation.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Column Chromatography • Determining Rate Laws and the Order of Reaction
STANDARD / GLE	S:PS1:11:2.5.	<p>Properties: Students will explain that states of matter rely on the arrangement and motion of molecules; and differentiate between the structures of solids, liquids, and gases.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Degassing Liquids with Freeze-Pump-Thaw Cycling • Fractional Distillation • Gas Chromatography (GC) with Flame-Ionization Detection • Growing Crystals for X-ray Diffraction Analysis • Ideal Gas Law • Physical Properties Of Minerals I: Crystals and Cleavage

		<ul style="list-style-type: none"> • Physical Properties Of Minerals II: Polymineralic Analysis • Protein Crystallization • Purifying Compounds by Recrystallization • Schlenk Lines Transfer of Solvents • Separation of Mixtures via Precipitation • Solid-Liquid Extraction • The Ideal Gas Law
STANDARD / GLE	S:PS1:11:2.6.	<p>Properties: Students will use physical and chemical properties as determined through an investigation to identify a substance.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Calibration Curves • Capillary Electrophoresis (CE) • Co-Immunoprecipitation and Pull-Down Assays • Column Chromatography • Common Lab Glassware and Uses • Cyclic Voltammetry (CV) • Determining the Density of a Solid and Liquid • Determining the Empirical Formula • Determining the Mass Percent Composition in an Aqueous Solution • Electrochemical Measurements of Supported Catalysts Using a Potentiostat/Galvanostat • Electrophoretic Mobility Shift Assay (EMSA) • Enzyme Assays and Kinetics • Freezing-Point Depression to Determine an Unknown Compound • Förster Resonance Energy Transfer (FRET) • Gas Chromatography (GC) with Flame-Ionization Detection • High-Performance Liquid Chromatography (HPLC) • Introduction to Mass Spectrometry • Introduction to Titration • Ion-Exchange Chromatography • MALDI-TOF Mass Spectrometry • Method of Standard Addition • Nuclear Magnetic Resonance (NMR) Spectroscopy • Performing 1D Thin Layer Chromatography • Photometric Protein Determination • Raman Spectroscopy for Chemical Analysis • Reconstitution of Membrane Proteins • Sample Preparation for Analytical Preparation • Scanning Electron Microscopy (SEM) • Solid-Liquid Extraction • Surface Plasmon Resonance (SPR) • Tandem Mass Spectrometry • The ELISA Method • Ultraviolet-Visible (UV-Vis) Spectroscopy

		<ul style="list-style-type: none"> • Using a pH Meter • X-ray Fluorescence (XRF)
STANDARD / GLE	S:PS1:11:2.7.	<p>Properties: Students will explain how properties of elements and the location of elements on the periodic table are related.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Coordination Chemistry Complexes
STRAND / STANDARD	NH.PS2.	Physical Science: Energy is necessary for change to occur in matter. Energy can be stored, transferred and transformed, but cannot be destroyed.
STANDARD / GLE	S:PS2:11:1.1.	<p>Change: Students will recognize and explain that atoms may be bonded together into molecules or formula units (crystalline solids).</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Chromatography-Based Biomolecule Purification Methods • Co-Immunoprecipitation and Pull-Down Assays • Density Gradient Ultracentrifugation • Dialysis: Diffusion Based Separation • Electrophoretic Mobility Shift Assay (EMSA) • Enzyme Assays and Kinetics • FM Dyes in Vesicle Recycling • Förster Resonance Energy Transfer (FRET) • Introduction to Mass Spectrometry • MALDI-TOF Mass Spectrometry • Metabolic Labeling • Nuclear Magnetic Resonance (NMR) Spectroscopy • Photometric Protein Determination • Protein Crystallization • Raman Spectroscopy for Chemical Analysis • Reconstitution of Membrane Proteins • Surface Plasmon Resonance (SPR) • Tandem Mass Spectrometry • Two-Dimensional Gel Electrophoresis
STANDARD / GLE	S:PS2:11:1.2.	<p>Change: Students will recognize that atoms interact with one another by transferring or sharing electrons that are furthest from the nucleus; and explain that the outer electrons govern the chemical properties of an element.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Overview of Alkenone Biomarker Analysis for Paleothermometry • An Overview of bGDGT Biomarker Analysis for Paleoclimatology • Conversion of Fatty Acid Methyl Esters by Saponification for Uk'37 Paleothermometry • Coordination Chemistry Complexes • Determining the Solubility Rules of Ionic Compounds

		<ul style="list-style-type: none"> • Extraction of Biomarkers from Sediments - Accelerated Solvent Extraction • Purification of a Total Lipid Extract with Column Chromatography • Removal of Branched and Cyclic Compounds by Urea Adduction for Uk'37 Paleothermometry • Sonication Extraction of Lipid Biomarkers from Sediment • Soxhlet Extraction of Lipid Biomarkers from Sediment • Ultraviolet-Visible (UV-Vis) Spectroscopy
STANDARD / GLE	S:PS2:11:1.3.	<p>Change: Students will explain that compounds are formed through both ionic and covalent bonding.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Overview of Alkenone Biomarker Analysis for Paleothermometry • An Overview of bGDGT Biomarker Analysis for Paleoclimatology • Conversion of Fatty Acid Methyl Esters by Saponification for Uk'37 Paleothermometry • Determining the Solubility Rules of Ionic Compounds • Extraction of Biomarkers from Sediments - Accelerated Solvent Extraction • Purification of a Total Lipid Extract with Column Chromatography • Removal of Branched and Cyclic Compounds by Urea Adduction for Uk'37 Paleothermometry • Sonication Extraction of Lipid Biomarkers from Sediment • Soxhlet Extraction of Lipid Biomarkers from Sediment • Ultraviolet-Visible (UV-Vis) Spectroscopy
STANDARD / GLE	S:PS2:11:1.4.	<p>Change: Students will recognize that the rates of chemical reactions can vary greatly; and identify the factors that influence these reaction rates, such as how often the reacting atoms and molecules encounter one another, the temperature, and the properties of the reacting species, including shape.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Conducting Reactions Below Room Temperature • Coordination Chemistry Complexes • Determining Rate Laws and the Order of Reaction • Electrochemical Measurements of Supported Catalysts Using a Potentiostat/Galvanostat • Enzyme Assays and Kinetics • Introduction to Catalysis
STANDARD / GLE	S:PS2:11:1.5.	<p>Change: Students will explain relationships between and among electric charges, magnetic fields, electromagnetic forces, and atomic particles.</p>

		<p>JoVE</p> <ul style="list-style-type: none"> • Introduction to Mass Spectrometry • Nuclear Magnetic Resonance (NMR) Spectroscopy
STANDARD / GLE	S:PS2:11:2.1.	<p>Conservation: Students will explain that chemical reactions either release or consume energy.</p> <p>JoVE</p> <ul style="list-style-type: none"> • Conducting Reactions Below Room Temperature • Determining Rate Laws and the Order of Reaction • Le Châtelier's Principle • Using Differential Scanning Calorimetry to Measure Changes in Enthalpy
STANDARD / GLE	S:PS2:11:2.2.	<p>Conservation: Students will explain that chemical reactions can be accelerated by catalysts, such as enzymes.</p> <p>JoVE</p> <ul style="list-style-type: none"> • Coordination Chemistry Complexes • Determining Rate Laws and the Order of Reaction • Electrochemical Measurements of Supported Catalysts Using a Potentiostat/Galvanostat • Enzyme Assays and Kinetics • Introduction to Catalysis
STANDARD / GLE	S:PS2:11:2.3.	<p>Conservation: Students will recognize that a large number of important reactions involve the transfer of either electrons or hydrogen ions between reacting ions, molecules, or atoms.</p> <p>JoVE</p> <ul style="list-style-type: none"> • Determining the Solubility Rules of Ionic Compounds
STANDARD / GLE	S:PS2:11:2.4.	<p>Conservation: Students will identify the variety of structures that may be formed from the bonding of carbon atoms, and describe their roles in various chemical reactions, including those required for life processes.</p> <p>JoVE</p> <ul style="list-style-type: none"> • An Introduction to Cell Division • An Introduction to Cell Metabolism • An Introduction to <i>Saccharomyces cerevisiae</i> • An Introduction to Transfection • An Overview of Alkenone Biomarker Analysis for Paleothermometry • An Overview of bGDGT Biomarker Analysis for Paleoclimatology • Assembly of a Reflux System for Heated Chemical Reactions • Bacterial Transformation: Electroporation • Bacterial Transformation: The Heat Shock Method • Cell Cycle Analysis

- Cell-surface Biotinylation Assay
- Chromatography-Based Biomolecule Purification Methods
- Co-Immunoprecipitation and Pull-Down Assays
- Column Chromatography
- Conducting Reactions Below Room Temperature
- Conversion of Fatty Acid Methyl Esters by Saponification for Uk'37 Paleothermometry
- Coordination Chemistry Complexes
- Cyclic Voltammetry (CV)
- DNA Gel Electrophoresis
- DNA Ligation Reactions
- Degassing Liquids with Freeze-Pump-Thaw Cycling
- Density Gradient Ultracentrifugation
- Detecting Reactive Oxygen Species
- Dialysis: Diffusion Based Separation
- Drosophila Larval IHC
- Electrophoretic Mobility Shift Assay (EMSA)
- Enzyme Assays and Kinetics
- Extraction of Biomarkers from Sediments - Accelerated Solvent Extraction
- FM Dyes in Vesicle Recycling
- Fractional Distillation
- Förster Resonance Energy Transfer (FRET)
- Gel Purification
- Growing Crystals for X-ray Diffraction Analysis
- Introduction to Catalysis
- Introduction to Mass Spectrometry
- Ion-Exchange Chromatography
- MALDI-TOF Mass Spectrometry
- Metabolic Labeling
- Method of Standard Addition
- Molecular Cloning
- Nuclear Magnetic Resonance (NMR) Spectroscopy
- PCR: The Polymerase Chain Reaction
- Passaging Cells
- Performing 1D Thin Layer Chromatography
- Photometric Protein Determination
- Plasmid Purification
- Preparing Anhydrous Reagents and Equipment
- Protein Crystallization
- Purification of a Total Lipid Extract with Column Chromatography
- Purifying Compounds by Recrystallization
- Reconstitution of Membrane Proteins
- Removal of Branched and Cyclic Compounds by Urea Adduction for Uk'37 Paleothermometry
- Restriction Enzyme Digests
- Rotary Evaporation to Remove Solvent
- Sample Preparation for Analytical Preparation
- Schlenk Lines Transfer of Solvents

		<ul style="list-style-type: none"> • Separating Protein with SDS-PAGE • Separation of Mixtures via Precipitation • Solid-Liquid Extraction • Sonication Extraction of Lipid Biomarkers from Sediment • Soxhlet Extraction of Lipid Biomarkers from Sediment • Surface Plasmon Resonance (SPR) • Tandem Mass Spectrometry • The ATP Bioluminescence Assay • The ELISA Method • The Western Blot • Two-Dimensional Gel Electrophoresis • Ultraviolet-Visible (UV-Vis) Spectroscopy
STANDARD / GLE	S:PS2:11:3.1.	<p>Energy: Students will explain that all energy can be considered to be either kinetic energy, potential energy, or energy contained by a field.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Introduction to Mass Spectrometry • Nuclear Magnetic Resonance (NMR) Spectroscopy
STANDARD / GLE	S:PS2:11:3.3.	<p>Energy: Students will describe how the energy associated with individual atoms and molecules can be used to identify the substances they comprise; and explain that each kind of atom or molecule can gain or lose energy only in particular discrete amounts, absorbing and emitting light only at wavelengths corresponding to these amounts.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Coordination Chemistry Complexes • Förster Resonance Energy Transfer (FRET) • Gas Chromatography (GC) with Flame-Ionization Detection • Introduction to Fluorescence Microscopy • Introduction to Mass Spectrometry • Introduction to the Microplate Reader • Lead Analysis of Soil Using Atomic Absorption Spectroscopy • MALDI-TOF Mass Spectrometry • Method of Standard Addition • Nuclear Magnetic Resonance (NMR) Spectroscopy • Raman Spectroscopy for Chemical Analysis • Tandem Mass Spectrometry • Ultraviolet-Visible (UV-Vis) Spectroscopy • X-ray Fluorescence (XRF)
STANDARD / GLE	S:PS2:11:3.4.	<p>Energy: Students will explain the range of the electromagnetic spectrum as it relates to both wavelength and energy; and provide examples of practical applications of the different wavelengths in the spectrum.</p>

JoVE

- **An Overview of Alkenone Biomarker Analysis for Paleothermometry**
- **An Overview of bGDGT Biomarker Analysis for Paleoclimatology**
- **Auscultation**
- **Central Venous Catheter Insertion: Femoral Vein with Ultrasound Guidance**
- **Central Venous Catheter Insertion: Internal Jugular with Ultrasound Guidance**
- **Community DNA Extraction from Bacterial Colonies**
- **Conducting Reactions Below Room Temperature**
- **Conversion of Fatty Acid Methyl Esters by Saponification for Uk'37 Paleothermometry**
- **Coordination Chemistry Complexes**
- **Determination Of Nox in Automobile Exhaust Using UV-VIS Spectroscopy**
- **Determining the Empirical Formula**
- **Extraction of Biomarkers from Sediments - Accelerated Solvent Extraction**
- **Förster Resonance Energy Transfer (FRET)**
- **Gas Chromatography (GC) with Flame-Ionization Detection**
- **Growing Crystals for X-ray Diffraction Analysis**
- **Internal Standards**
- **Intra-articular Shoulder Injection for Reduction Following Anterior Shoulder Dislocation**
- **Introduction to Catalysis**
- **Introduction to Fluorescence Microscopy**
- **Introduction to Mass Spectrometry**
- **Introduction to the Microplate Reader**
- **Introduction to the Spectrophotometer**
- **Lead Analysis of Soil Using Atomic Absorption Spectroscopy**
- **MALDI-TOF Mass Spectrometry**
- **Metabolic Labeling**
- **Method of Standard Addition**
- **Nuclear Magnetic Resonance (NMR) Spectroscopy**
- **Nutrients in Aquatic Ecosystems**
- **Pericardiocentesis**
- **Peripheral Vascular Exam**
- **Peripheral Vascular Exam Using a Continuous Wave Doppler**
- **Photometric Protein Determination**
- **Physical Properties Of Minerals I: Crystals and Cleavage**
- **Plasmid Purification**
- **Protein Crystallization**
- **Purifying Compounds by Recrystallization**
- **Raman Spectroscopy for Chemical Analysis**
- **Removal of Branched and Cyclic Compounds by Urea**

		<p>Adduction for Uk'37 Paleothermometry</p> <ul style="list-style-type: none"> • Solid-Liquid Extraction • Sonication Extraction of Lipid Biomarkers from Sediment • Soxhlet Extraction of Lipid Biomarkers from Sediment • Spectrophotometric Determination of an Equilibrium Constant • Tandem Mass Spectrometry • Ultraviolet-Visible (UV-Vis) Spectroscopy • X-ray Fluorescence (XRF) • Yeast Maintenance
<p>STANDARD / GLE</p>	<p>S:PS2:11:3.5.</p>	<p>Energy: Students will recognize that the human eye can only see a narrow range of wavelengths within the electromagnetic spectrum; and explain how the variations of wavelength within that range of visible light are perceived as differences in color.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Color Afterimages • Crowding • Determination Of Nox in Automobile Exhaust Using UV-VIS Spectroscopy • Finding Your Blind Spot and Perceptual Filling-in • Histological Sample Preparation for Light Microscopy • Inattentional Blindness • Introduction to Fluorescence Microscopy • Introduction to Light Microscopy • Introduction to the Spectrophotometer • Just-noticeable Differences • Lead Analysis of Soil Using Atomic Absorption Spectroscopy • Motion-induced Blindness • Nutrients in Aquatic Ecosystems • Object Substitution Masking • Photometric Protein Determination • Raman Spectroscopy for Chemical Analysis • Spatial Cueing • Spectrophotometric Determination of an Equilibrium Constant • Surface Plasmon Resonance (SPR) • The Ames Room • The Attentional Blink • The Inverted-face Effect • Turbidity and Total Solids in Surface Water • Ultraviolet-Visible (UV-Vis) Spectroscopy
<p>STANDARD / GLE</p>	<p>S:PS2:11:3.6.</p>	<p>Energy: Students will describe the relationship between heat and temperature, explaining that heat energy consists of the random motion and vibrations of atoms, molecules, and ions; and that the higher the temperature, the greater the atomic or molecular motion.</p>

		<p>JoVE</p> <ul style="list-style-type: none"> • Conducting Reactions Below Room Temperature • Fractional Distillation • Freezing-Point Depression to Determine an Unknown Compound • Ideal Gas Law • Regulating Temperature in the Lab: Applying Heat • Regulating Temperature in the Lab: Preserving Samples Using Cold • The Ideal Gas Law • Using Differential Scanning Calorimetry to Measure Changes in Enthalpy
STANDARD / GLE	S:PS2:11:3.7.	<p>Energy: Students will explain that waves, such as light, seismic, sound waves, have energy and can transfer energy when they interact with matter.</p> <p>JoVE</p> <ul style="list-style-type: none"> • Raman Spectroscopy for Chemical Analysis
STANDARD / GLE	S:PS2:11:3.9.	<p>Energy: Students will describe how electrons flow easily in some materials, such as metals, whereas in insulating materials, such as glass, they can hardly flow at all.</p> <p>JoVE</p> <ul style="list-style-type: none"> • Assembly of a Reflux System for Heated Chemical Reactions
STANDARD / GLE	S:PS2:11:3.10.	<p>Energy: Students will using information provided about chemical changes, draw conclusions about the energy flow in a given chemical reaction (e.g., exothermic reactions, endothermic reactions).</p> <p>JoVE</p> <ul style="list-style-type: none"> • Conducting Reactions Below Room Temperature • Determining Rate Laws and the Order of Reaction • Le Châtelier's Principle • Using Differential Scanning Calorimetry to Measure Changes in Enthalpy
STRAND / STANDARD	NH.PS3.	Physical Science: The motion of an object is affected by force.
STANDARD / GLE	S:PS3:11:1.1.	<p>Forces: Students will explain that magnetic forces are related to the action of electrons and can be thought of as different aspects of a single electromagnetic force; and describe how the interplay of these forces is the basis for electric motors, generators, radio, television, and many other modern technologies.</p> <p>JoVE</p> <ul style="list-style-type: none"> • Using GIS to Investigate Urban Forestry
STANDARD / GLE	S:PS3:11:1.6.	Forces: Students will recognize that different kinds of materials respond to electric forces in various ways; and

		<p>differentiate between insulators, semiconductors, conductors and superconductors.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Assembly of a Reflux System for Heated Chemical Reactions • Electrochemical Measurements of Supported Catalysts Using a Potentiostat/Galvanostat • Surface Plasmon Resonance (SPR) • Testing For Genetically Modified Foods
STANDARD / GLE	S:PS3:11:2.2.	<p>Motion: Students will recognize that apparent changes in wavelength can provide information about changes in motion; explain that the observed wavelength of a wave depends upon the relative motion of the source and the observer; and relate these to the differences between shorter and longer wavelengths.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Peripheral Vascular Exam Using a Continuous Wave Doppler
STANDARD / GLE	S:PS3:11:2.3.	<p>Motion: Students will apply the concepts of inertia, motion, and momentum to predict and explain situations involving forces and motion, including stationary objects and collisions.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Raman Spectroscopy for Chemical Analysis
STANDARD / GLE	S:PS3:11:2.4.	<p>Motion: Students will explain the effects on wavelength and frequency as electromagnetic waves interact with matter (e.g., light diffraction, blue sky).</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Color Afterimages • Crowding • Determination Of Nox in Automobile Exhaust Using UV-VIS Spectroscopy • Finding Your Blind Spot and Perceptual Filling-in • Histological Sample Preparation for Light Microscopy • Inattentional Blindness • Introduction to Fluorescence Microscopy • Introduction to Light Microscopy • Introduction to the Spectrophotometer • Just-noticeable Differences • Motion-induced Blindness • Nuclear Magnetic Resonance (NMR) Spectroscopy • Nutrients in Aquatic Ecosystems • Object Substitution Masking • Photometric Protein Determination • Raman Spectroscopy for Chemical Analysis • Spatial Cueing

		<ul style="list-style-type: none"> • Spectrophotometric Determination of an Equilibrium Constant • Surface Plasmon Resonance (SPR) • The Ames Room • The Attentional Blink • The Inverted-face Effect • Turbidity and Total Solids in Surface Water • Ultraviolet-Visible (UV-Vis) Spectroscopy
STRAND / STANDARD	NH.PS4.	Physical Science: The growth of scientific knowledge in Physical Science has been advanced through the development of technology and is used (alone or in combination with other sciences) to identify, understand and solve local and global issues.
STANDARD / GLE	S:PS4:11:2.1.	<p>Tools: Students will identify tools, such as thermostats and thermal sensors, and explain their use in environmental control systems.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Regulating Temperature in the Lab: Applying Heat • Regulating Temperature in the Lab: Preserving Samples Using Cold
STANDARD / GLE	S:PS4:11:3.1.	<p>Social Issues (Local and Global): Energy, Power, and Transportation Manufacturing: Students will explain that power systems have a source of energy, a process, loads, and some have a feedback system.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Biofuels: Producing Ethanol from Cellulosic Material • Determination Of Nox in Automobile Exhaust Using UV-VIS Spectroscopy • Proton Exchange Membrane Fuel Cells • Raman Spectroscopy for Chemical Analysis
STANDARD / GLE	S:PS4:11:3.2.	<p>Social Issues (Local and Global): Energy, Power, and Transportation Manufacturing: Students will demonstrate and explain how an engine converts chemical energy in the form of fuel, into mechanical energy in the form of motion.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Calibration Curves • Cyclic Voltammetry (CV) • Electrochemical Measurements of Supported Catalysts Using a Potentiostat/Galvanostat • MALDI-TOF Mass Spectrometry • Method of Standard Addition • Preparing Anhydrous Reagents and Equipment • Proton Exchange Membrane Fuel Cells • Raman Spectroscopy for Chemical Analysis • Tandem Mass Spectrometry • Using a pH Meter

STANDARD / GLE	S:PS4:11:3.4.	<p>Social Issues (Local and Global): Energy, Power, and Transportation Manufacturing: Students will explain the relationship between energy and power.</p> <p>JoVE</p> <ul style="list-style-type: none"> • Biofuels: Producing Ethanol from Cellulosic Material • Proton Exchange Membrane Fuel Cells • Raman Spectroscopy for Chemical Analysis
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Grade: 9 - Adopted: 2010

STRAND / STANDARD	NH.CC.RST.9-10.	Reading Standards for Literacy in Science and Technical Subjects
STANDARD / GLE	Craft and Structure	
GRADE LEVEL EXPECTATION	RST.9-10.4.	<p>Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics.</p> <p>JoVE</p> <ul style="list-style-type: none"> • Abdominal Exam I: Inspection and Auscultation • Abdominal Exam II: Percussion • Abdominal Exam III: Palpation • Abdominal Exam IV: Acute Abdominal Pain Assessment • Algae Enumeration via Culturable Methodology • An Introduction to Aging and Regeneration • An Introduction to Behavioral Neuroscience • An Introduction to Caenorhabditis elegans • An Introduction to Cell Death • An Introduction to Cell Division • An Introduction to Cell Metabolism • An Introduction to Cell Motility and Migration • An Introduction to Cellular and Molecular Neuroscience • An Introduction to Cognition • An Introduction to Developmental Genetics • An Introduction to Developmental Neurobiology • An Introduction to Drosophila melanogaster • An Introduction to Endocytosis and Exocytosis • An Introduction to Learning and Memory • An Introduction to Modeling Behavioral Disorders and Stress • An Introduction to Molecular Developmental Biology • An Introduction to Motor Control • An Introduction to Neuroanatomy • An Introduction to Neurophysiology • An Introduction to Organogenesis • An Introduction to Reward and Addiction • An Introduction to Saccharomyces cerevisiae • An Introduction to Stem Cell Biology • An Introduction to Transfection • An Introduction to Working in the Hood

- An Introduction to the Centrifuge
- An Introduction to the Chick: Gallus gallus domesticus
- An Introduction to the Laboratory Mouse: Mus musculus
- An Introduction to the Micropipettor
- An Introduction to the Zebrafish: Danio rerio
- An Overview of Alkenone Biomarker Analysis for Paleothermometry
- An Overview of Epigenetics
- An Overview of Gene Expression
- An Overview of Genetic Analysis
- An Overview of Genetic Engineering
- An Overview of Genetics and Disease
- An Overview of bGDGT Biomarker Analysis for Paleoclimatology
- Analysis of Earthworm Populations in Soil
- Anesthesia Induction and Maintenance
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- Bacterial Transformation: The Heat Shock Method
- Balance and Coordination Testing
- Basic Care Procedures
- Basic Chick Care and Maintenance
- Basic Life Support Part II: Airway/Breathing and Continued Cardiopulmonary Resuscitation
- Basic Life Support: Cardiopulmonary Resuscitation and Defibrillation
- Basic Mouse Care and Maintenance
- Binocular Rivalry
- Biofuels: Producing Ethanol from Cellulosic Material
- Blood Pressure Measurement
- Blood Withdrawal I
- Blood Withdrawal II
- C. elegans Chemotaxis Assay
- C. elegans Development and Reproduction
- C. elegans Maintenance
- Calcium Imaging in Neurons
- Calibration Curves

- **Capillary Electrophoresis (CE)**
- **Carbon and Nitrogen Analysis of Environmental Samples**
- **Cardiac Exam I: Inspection and Palpation**
- **Cardiac Exam II: Auscultation**
- **Cardiac Exam III: Abnormal Heart Sounds**
- **Categories and Inductive Inferences**
- **Cell Cycle Analysis**
- **Cell-surface Biotinylation Assay**
- **Central Venous Catheter Insertion: Femoral Vein with Ultrasound Guidance**
- **Central Venous Catheter Insertion: Internal Jugular with Ultrasound Guidance**
- **Central Venous Catheter Insertion: Subclavian Vein**
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- **Children's Reliance on Artist Intentions When Identifying Pictures**
- **Chromatin Immunoprecipitation**
- **Chromatography-Based Biomolecule Purification Methods**
- **Co-Immunoprecipitation and Pull-Down Assays**
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- **Considerations for Rodent Surgery**
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- **Coordination Chemistry Complexes**
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- **Cranial Nerves Exam II (VII-XII)**
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- **Cytogenetics**
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- **DNA Ligation Reactions**
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- **Density Gradient Ultracentrifugation**
- **Detecting Environmental Microorganisms with the Polymerase Chain Reaction and Gel Electrophoresis**
- **Detecting Reactive Oxygen Species**

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- Determining the Density of a Solid and Liquid
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- Determining the Solubility Rules of Ionic Compounds
- Development and Reproduction of the Laboratory Mouse
- Development of the Chick
- Diagnostic Necropsy and Tissue Harvest
- Dialysis: Diffusion Based Separation
- Dichotic Listening
- Dissolved Oxygen in Surface Water
- Drosophila Development and Reproduction
- Drosophila Larval IHC
- Drosophila Maintenance
- Drosophila melanogaster Embryo and Larva Harvesting and Preparation
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- Electrochemical Measurements of Supported Catalysts Using a Potentiostat/Galvanostat
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- Embryonic Stem Cell Culture and Differentiation
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- Enzyme Assays and Kinetics
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- Event-related Potentials and the Oddball Task
- Executive Function and the Dimensional Change Card Sort Task
- Executive Function in Autism Spectrum Disorder
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- Explant Culture for Developmental Studies
- Explant Culture of Neural Tissue
- Expression Profiling with Microarrays
- Extraction of Biomarkers from Sediments - Accelerated Solvent Extraction
- Eye Exam
- Eye Tracking in Cognitive Experiments
- FM Dyes in Vesicle Recycling
- Fate Mapping
- Fear Conditioning
- Filamentous Fungi

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- Foot Exam
- Fractional Distillation
- Freezing-Point Depression to Determine an Unknown Compound
- From Theory to Design: The Role of Creativity in Designing Experiments
- Fundamentals of Breeding and Weaning
- Förster Resonance Energy Transfer (FRET)
- Gas Chromatography (GC) with Flame-Ionization Detection
- Gel Purification
- Gene Silencing with Morpholinos
- General Approach to the Physical Exam
- Genetic Crosses
- Genetic Engineering of Model Organisms
- Genetic Screens
- Genome Editing
- Gram Staining of Bacteria from Environmental Sources
- Growing Crystals for X-ray Diffraction Analysis
- Habituation: Studying Infants Before They Can Talk
- Hand and Wrist Exam
- High-Performance Liquid Chromatography (HPLC)
- Hip Exam
- Histological Sample Preparation for Light Microscopy
- Histological Staining of Neural Tissue
- How Children Solve Problems Using Causal Reasoning
- Ideal Gas Law
- Igneous Intrusive Rock
- Igneous Volcanic Rock
- In ovo Electroporation of Chicken Embryos
- Inattentive Blindness
- Incidental Encoding
- Induced Pluripotency
- Internal Standards
- Intra-articular Shoulder Injection for Reduction Following Anterior Shoulder Dislocation
- Intraosseous Needle Placement
- Introducing Experimental Agents into the Mouse
- Introduction to Catalysis
- Introduction to Fluorescence Microscopy
- Introduction to Light Microscopy
- Introduction to Mass Spectrometry
- Introduction to Serological Pipettes and Pipettors
- Introduction to Titration
- Introduction to the Bunsen Burner
- Introduction to the Microplate Reader
- Introduction to the Spectrophotometer
- Invasion Assay Using 3D Matrices
- Invertebrate Lifespan Quantification
- Ion-Exchange Chromatography
- Isolating Nucleic Acids from Yeast

- Isolation of Fecal Bacteria from Water Samples by Filtration
- Just-noticeable Differences
- Knee Exam
- Language: The N400 in Semantic Incongruity
- Le Châtelier's Principle
- Lead Analysis of Soil Using Atomic Absorption Spectroscopy
- Learning and Memory: The Remember-Know Task
- Live Cell Imaging of Mitosis
- Lower Back Exam
- Lymph Node Exam
- MALDI-TOF Mass Spectrometry
- Making Solutions in the Laboratory
- Making a Geologic Cross Section
- Male Rectal Exam
- Manipulating an Independent Variable through Embodiment
- Measuring Children's Trust in Testimony
- Measuring Grey Matter Differences with Voxel-based Morphometry: The Musical Brain
- Measuring Mass in the Laboratory
- Measuring Reaction Time and Donders' Method of Subtraction
- Measuring Tropospheric Ozone
- Measuring Verbal Working Memory Span
- Measuring Vital Signs
- Memory Development: Demonstrating How Repeated Questioning Leads to False Memories
- Mental Rotation
- Metabolic Labeling
- Metacognitive Development: How Children Estimate Their Memory
- Method of Standard Addition
- Modeling Social Stress
- Molecular Cloning
- Motion-induced Blindness
- Motor Exam I
- Motor Exam II
- Motor Learning in Mirror Drawing
- Motor Maps
- Mouse Genotyping
- Multiple Object Tracking
- Murine In Utero Electroporation
- Mutual Exclusivity: How Children Learn the Meanings of Words
- Neck Exam
- Needle Thoracostomy (needle Decompression) for Temporizing Tension Pneumothorax Treatment
- Neuronal Transfection Methods
- Nose, Sinuses, Oral Cavity and Pharynx Exam
- Nuclear Magnetic Resonance (NMR) Spectroscopy

- Numerical Cognition: More or Less
- Nutrients in Aquatic Ecosystems
- Object Substitution Masking
- Observation and Inspection
- Observational Research
- Ophthalmoscopic Examination
- PCR: The Polymerase Chain Reaction
- Palpation
- Passaging Cells
- Patch Clamp Electrophysiology
- Pelvic Exam I: Assessment of the External Genitalia
- Pelvic Exam II: Speculum Exam
- Pelvic Exam III: Bimanual and Rectovaginal Exam
- Percussion
- Percutaneous Cricothyrotomy (Seldinger Technique)
- Performing 1D Thin Layer Chromatography
- Pericardiocentesis
- Peripheral Vascular Exam
- Peripheral Vascular Exam Using a Continuous Wave Doppler
- Peripheral Venous Cannulation
- Perspectives on Sensation and Perception
- Photometric Protein Determination
- Physical Properties Of Minerals I: Crystals and Cleavage
- Physical Properties Of Minerals II: Polymineralic Analysis
- Physiological Correlates of Emotion Recognition
- Piaget's Conservation Task and the Influence of Task Demands
- Pilot Testing
- Placebos in Research
- Plasmid Purification
- Positive Reinforcement Studies
- Preparing Anhydrous Reagents and Equipment
- Primary Neuronal Cultures
- Proper Adjustment of Patient Attire during the Physical Exam
- Prospect Theory
- Protein Crystallization
- Proton Exchange Membrane Fuel Cells
- Purification of a Total Lipid Extract with Column Chromatography
- Purifying Compounds by Recrystallization
- Quantifying Environmental Microorganisms and Viruses Using qPCR
- RNA Analysis of Environmental Samples Using RT-PCR
- RNA-Seq
- RNAi in *C. elegans*
- Raman Spectroscopy for Chemical Analysis
- Realism in Experimentation
- Recombineering and Gene Targeting
- Reconstitution of Membrane Proteins

- Regulating Temperature in the Lab: Applying Heat
- Regulating Temperature in the Lab: Preserving Samples Using Cold
- Reliability in Psychology Experiments
- Removal of Branched and Cyclic Compounds by Urea Adduction for Uk'37 Paleothermometry
- Respiratory Exam I: Inspection and Palpation
- Respiratory Exam II: Percussion and Auscultation
- Restriction Enzyme Digests
- Rodent Handling and Restraint Techniques
- Rodent Identification I
- Rodent Identification II
- Rodent Stereotaxic Surgery
- Rotary Evaporation to Remove Solvent
- SNP Genotyping
- Sample Preparation for Analytical Preparation
- Scanning Electron Microscopy (SEM)
- Schlenk Lines Transfer of Solvents
- Self-administration Studies
- Self-report vs. Behavioral Measures of Recycling
- Sensory Exam
- Separating Protein with SDS-PAGE
- Separation of Mixtures via Precipitation
- Shoulder Exam I
- Shoulder Exam II
- Soil Nutrient Analysis: Nitrogen, Phosphorus, and Potassium
- Solid-Liquid Extraction
- Solutions and Concentrations
- Sonication Extraction of Lipid Biomarkers from Sediment
- Soxhlet Extraction of Lipid Biomarkers from Sediment
- Spatial Cueing
- Spatial Memory Testing Using Mazes
- Spectrophotometric Determination of an Equilibrium Constant
- Sterile Tissue Harvest
- Surface Plasmon Resonance (SPR)
- Surgical Cricothyrotomy
- Tandem Mass Spectrometry
- Testing For Genetically Modified Foods
- The ATP Bioluminescence Assay
- The Ames Room
- The Attentional Blink
- The Costs and Benefits of Natural Pedagogy
- The ELISA Method
- The Factorial Experiment
- The Ideal Gas Law
- The Inverted-face Effect
- The McGurk Effect
- The Morris Water Maze
- The Multi-group Experiment

- **The Precision of Visual Working Memory with Delayed Estimation**
- **The Rouge Test: Searching for a Sense of Self**
- **The Rubber Hand Illusion**
- **The Simple Experiment: Two-group Design**
- **The Split Brain**
- **The Staircase Procedure for Finding a Perceptual Threshold**
- **The TUNEL Assay**
- **The Transwell Migration Assay**
- **The Western Blot**
- **Thyroid Exam**
- **Tissue Regeneration with Somatic Stem Cells**
- **Transplantation Studies**
- **Tree Identification: How To Use a Dichotomous Key**
- **Tree Survey: Point-Centered Quarter Sampling Method**
- **Turbidity and Total Solids in Surface Water**
- **Two-Dimensional Gel Electrophoresis**
- **Ultraviolet-Visible (UV-Vis) Spectroscopy**
- **Understanding Concentration and Measuring Volumes**
- **Using Differential Scanning Calorimetry to Measure Changes in Enthalpy**
- **Using Diffusion Tensor Imaging in Traumatic Brain Injury**
- **Using GIS to Investigate Urban Forestry**
- **Using TMS to Measure Motor Excitability During Action Observation**
- **Using Topographic Maps to Generate Topographic Profiles**
- **Using Your Head: Measuring Infants' Rational Imitation of Actions**
- **Using a pH Meter**
- **Verbal Priming**
- **Visual Attention: fMRI Investigation of Object-based Attentional Control**
- **Visual Search for Features and Conjunctions**
- **Visual Statistical Learning**
- **Visualizing Soil Microorganisms via the Contact Slide Assay and Microscopy**
- **Water Quality Analysis via Indicator Organisms**
- **Whole-Mount In Situ Hybridization**
- **Within-subjects Repeated-measures Design**
- **X-ray Fluorescence (XRF)**
- **Yeast Maintenance**
- **Yeast Reproduction**
- **Yeast Transformation and Cloning**
- **Zebrafish Breeding and Embryo Handling**
- **Zebrafish Maintenance and Husbandry**
- **Zebrafish Microinjection Techniques**
- **Zebrafish Reproduction and Development**
- **fMRI: Functional Magnetic Resonance Imaging**

<p>GRADE LEVEL EXPECTATION</p>	<p>RST.9-10.5.</p>	<p>Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Abdominal Exam I: Inspection and Auscultation • Abdominal Exam II: Percussion • Abdominal Exam III: Palpation • Abdominal Exam IV: Acute Abdominal Pain Assessment • Algae Enumeration via Culturable Methodology • An Introduction to Aging and Regeneration • An Introduction to Behavioral Neuroscience • An Introduction to Caenorhabditis elegans • An Introduction to Cell Death • An Introduction to Cell Division • An Introduction to Cell Metabolism • An Introduction to Cell Motility and Migration • An Introduction to Cellular and Molecular Neuroscience • An Introduction to Cognition • An Introduction to Developmental Genetics • An Introduction to Developmental Neurobiology • An Introduction to Drosophila melanogaster • An Introduction to Endocytosis and Exocytosis • An Introduction to Learning and Memory • An Introduction to Modeling Behavioral Disorders and Stress • An Introduction to Molecular Developmental Biology • An Introduction to Motor Control • An Introduction to Neuroanatomy • An Introduction to Neurophysiology • An Introduction to Organogenesis • An Introduction to Reward and Addiction • An Introduction to Saccharomyces cerevisiae • An Introduction to Stem Cell Biology • An Introduction to Transfection • An Introduction to Working in the Hood • An Introduction to the Centrifuge • An Introduction to the Chick: Gallus gallus domesticus • An Introduction to the Laboratory Mouse: Mus musculus • An Introduction to the Micropipettor • An Introduction to the Zebrafish: Danio rerio • An Overview of Alkenone Biomarker Analysis for Paleothermometry • An Overview of Epigenetics • An Overview of Gene Expression • An Overview of Genetic Analysis • An Overview of Genetic Engineering • An Overview of Genetics and Disease • An Overview of bGDGT Biomarker Analysis for
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Paleoclimatology

- Analysis of Earthworm Populations in Soil
- Anesthesia Induction and Maintenance
- Ankle Exam
- Annexin V and Propidium Iodide Labeling
- Anterograde Amnesia
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- Determining the Mass Percent Composition in an Aqueous Solution
- Determining the Solubility Rules of Ionic Compounds

- **Development and Reproduction of the Laboratory Mouse**
- **Development of the Chick**
- **Diagnostic Necropsy and Tissue Harvest**
- **Dialysis: Diffusion Based Separation**
- **Dichotic Listening**
- **Dissolved Oxygen in Surface Water**
- **Drosophila Development and Reproduction**
- **Drosophila Larval IHC**
- **Drosophila Maintenance**
- **Drosophila melanogaster Embryo and Larva Harvesting and Preparation**
- **Ear Exam**
- **Elbow Exam**
- **Electro-encephalography (EEG)**
- **Electrochemical Measurements of Supported Catalysts Using a Potentiostat/Galvanostat**
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- **FM Dyes in Vesicle Recycling**
- **Fate Mapping**
- **Fear Conditioning**
- **Filamentous Fungi**
- **Finding Your Blind Spot and Perceptual Filling-in**
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- Intra-articular Shoulder Injection for Reduction Following Anterior Shoulder Dislocation
- Intraosseous Needle Placement
- Introducing Experimental Agents into the Mouse
- Introduction to Catalysis
- Introduction to Fluorescence Microscopy
- Introduction to Light Microscopy
- Introduction to Mass Spectrometry
- Introduction to Serological Pipettes and Pipettors
- Introduction to Titration
- Introduction to the Bunsen Burner
- Introduction to the Microplate Reader
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- Isolation of Fecal Bacteria from Water Samples by Filtration
- Just-noticeable Differences
- Knee Exam
- Language: The N400 in Semantic Incongruity
- Le Châtelier's Principle
- Lead Analysis of Soil Using Atomic Absorption Spectroscopy
- Learning and Memory: The Remember-Know Task
- Live Cell Imaging of Mitosis

- Lower Back Exam
- Lymph Node Exam
- MALDI-TOF Mass Spectrometry
- Making Solutions in the Laboratory
- Making a Geologic Cross Section
- Male Rectal Exam
- Manipulating an Independent Variable through Embodiment
- Measuring Children's Trust in Testimony
- Measuring Grey Matter Differences with Voxel-based Morphometry: The Musical Brain
- Measuring Mass in the Laboratory
- Measuring Reaction Time and Donders' Method of Subtraction
- Measuring Tropospheric Ozone
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- Modeling Social Stress
- Molecular Cloning
- Motion-induced Blindness
- Motor Exam I
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- Motor Learning in Mirror Drawing
- Motor Maps
- Mouse Genotyping
- Multiple Object Tracking
- Murine In Utero Electroporation
- Mutual Exclusivity: How Children Learn the Meanings of Words
- Neck Exam
- Needle Thoracostomy (needle Decompression) for Temporizing Tension Pneumothorax Treatment
- Neuronal Transfection Methods
- Nose, Sinuses, Oral Cavity and Pharynx Exam
- Nuclear Magnetic Resonance (NMR) Spectroscopy
- Numerical Cognition: More or Less
- Nutrients in Aquatic Ecosystems
- Object Substitution Masking
- Observation and Inspection
- Observational Research
- Ophthalmoscopic Examination
- PCR: The Polymerase Chain Reaction
- Palpation
- Passaging Cells

- Patch Clamp Electrophysiology
- Pelvic Exam I: Assessment of the External Genitalia
- Pelvic Exam II: Speculum Exam
- Pelvic Exam III: Bimanual and Rectovaginal Exam
- Percussion
- Percutaneous Cricothyrotomy (Seldinger Technique)
- Performing 1D Thin Layer Chromatography
- Pericardiocentesis
- Peripheral Vascular Exam
- Peripheral Vascular Exam Using a Continuous Wave Doppler
- Peripheral Venous Cannulation
- Perspectives on Sensation and Perception
- Photometric Protein Determination
- Physical Properties Of Minerals I: Crystals and Cleavage
- Physical Properties Of Minerals II: Polymineralic Analysis
- Physiological Correlates of Emotion Recognition
- Piaget's Conservation Task and the Influence of Task Demands
- Pilot Testing
- Placebos in Research
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- Positive Reinforcement Studies
- Preparing Anhydrous Reagents and Equipment
- Primary Neuronal Cultures
- Proper Adjustment of Patient Attire during the Physical Exam
- Prospect Theory
- Protein Crystallization
- Proton Exchange Membrane Fuel Cells
- Purification of a Total Lipid Extract with Column Chromatography
- Purifying Compounds by Recrystallization
- Quantifying Environmental Microorganisms and Viruses Using qPCR
- RNA Analysis of Environmental Samples Using RT-PCR
- RNA-Seq
- RNAi in *C. elegans*
- Raman Spectroscopy for Chemical Analysis
- Realism in Experimentation
- Recombineering and Gene Targeting
- Reconstitution of Membrane Proteins
- Regulating Temperature in the Lab: Applying Heat
- Regulating Temperature in the Lab: Preserving Samples Using Cold
- Reliability in Psychology Experiments
- Removal of Branched and Cyclic Compounds by Urea Adduction for Uk'37 Paleothermometry
- Respiratory Exam I: Inspection and Palpation
- Respiratory Exam II: Percussion and Auscultation

- Restriction Enzyme Digests
- Rodent Handling and Restraint Techniques
- Rodent Identification I
- Rodent Identification II
- Rodent Stereotaxic Surgery
- Rotary Evaporation to Remove Solvent
- SNP Genotyping
- Sample Preparation for Analytical Preparation
- Scanning Electron Microscopy (SEM)
- Schlenk Lines Transfer of Solvents
- Self-administration Studies
- Self-report vs. Behavioral Measures of Recycling
- Sensory Exam
- Separating Protein with SDS-PAGE
- Separation of Mixtures via Precipitation
- Shoulder Exam I
- Shoulder Exam II
- Soil Nutrient Analysis: Nitrogen, Phosphorus, and Potassium
- Solid-Liquid Extraction
- Solutions and Concentrations
- Sonication Extraction of Lipid Biomarkers from Sediment
- Soxhlet Extraction of Lipid Biomarkers from Sediment
- Spatial Cueing
- Spatial Memory Testing Using Mazes
- Spectrophotometric Determination of an Equilibrium Constant
- Sterile Tissue Harvest
- Surface Plasmon Resonance (SPR)
- Surgical Cricothyrotomy
- Tandem Mass Spectrometry
- Testing For Genetically Modified Foods
- The ATP Bioluminescence Assay
- The Ames Room
- The Attentional Blink
- The Costs and Benefits of Natural Pedagogy
- The ELISA Method
- The Factorial Experiment
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		<p>Threshold</p> <ul style="list-style-type: none"> • The TUNEL Assay • The Transwell Migration Assay • The Western Blot • Thyroid Exam • Tissue Regeneration with Somatic Stem Cells • Transplantation Studies • Tree Identification: How To Use a Dichotomous Key • Tree Survey: Point-Centered Quarter Sampling Method • Turbidity and Total Solids in Surface Water • Two-Dimensional Gel Electrophoresis • Ultraviolet-Visible (UV-Vis) Spectroscopy • Understanding Concentration and Measuring Volumes • Using Differential Scanning Calorimetry to Measure Changes in Enthalpy • Using Diffusion Tensor Imaging in Traumatic Brain Injury • Using GIS to Investigate Urban Forestry • Using TMS to Measure Motor Excitability During Action Observation • Using Topographic Maps to Generate Topographic Profiles • Using Your Head: Measuring Infants' Rational Imitation of Actions • Using a pH Meter • Verbal Priming • Visual Attention: fMRI Investigation of Object-based Attentional Control • Visual Search for Features and Conjunctions • Visual Statistical Learning • Visualizing Soil Microorganisms via the Contact Slide Assay and Microscopy • Water Quality Analysis via Indicator Organisms • Whole-Mount In Situ Hybridization • Within-subjects Repeated-measures Design • X-ray Fluorescence (XRF) • Yeast Maintenance • Yeast Reproduction • Yeast Transformation and Cloning • Zebrafish Breeding and Embryo Handling • Zebrafish Maintenance and Husbandry • Zebrafish Microinjection Techniques • Zebrafish Reproduction and Development • fMRI: Functional Magnetic Resonance Imaging
STRAND / STANDARD	NH.CC.RST.9-10.	Reading Standards for Literacy in Science and Technical Subjects
STANDARD / GLE		Integration of Knowledge and Ideas
GRADE LEVEL EXPECTATION	RST.9-10.7.	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.

JoVE

- **Algae Enumeration via Culturable Methodology**
- **An Introduction to Aging and Regeneration**
- **An Introduction to Behavioral Neuroscience**
- **An Introduction to Caenorhabditis elegans**
- **An Introduction to Cell Division**
- **An Introduction to Cell Metabolism**
- **An Introduction to Cognition**
- **An Introduction to Developmental Neurobiology**
- **An Introduction to Drosophila melanogaster**
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- **Blood Pressure Measurement**
- **C. elegans Chemotaxis Assay**
- **Calcium Imaging in Neurons**
- **Calibration Curves**
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- **Carbon and Nitrogen Analysis of Environmental Samples**
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- Determining the Empirical Formula
- Determining the Mass Percent Composition in an Aqueous Solution
- Determining the Solubility Rules of Ionic Compounds
- Development and Reproduction of the Laboratory Mouse
- Dialysis: Diffusion Based Separation
- Dichotic Listening
- Dissolved Oxygen in Surface Water
- Drosophila Development and Reproduction
- Electro-encephalography (EEG)
- Electrochemical Measurements of Supported Catalysts Using a Potentiostat/Galvanostat
- Electrophoretic Mobility Shift Assay (EMSA)
- Enzyme Assays and Kinetics
- Ethics in Psychology Research
- Event-related Potentials and the Oddball Task
- Executive Function and the Dimensional Change Card Sort Task
- Executive Function in Autism Spectrum Disorder
- Experimentation using a Confederate
- Expression Profiling with Microarrays
- Extraction of Biomarkers from Sediments - Accelerated

Solvent Extraction

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STANDARD / GLE		Text Types and Purposes
GRADE LEVEL EXPECTATION	WHST.9-10.1.	Write arguments focused on discipline-specific content.
EXPECTATION	WHST.9-10.1(a)	<p>Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • The Multi-group Experiment • The Simple Experiment: Two-group Design
STRAND / STANDARD	NH.CC.WHST.9-10.	Writing Standards for Literacy in Science and Technical Subjects
STANDARD / GLE		Text Types and Purposes
GRADE LEVEL EXPECTATION	WHST.9-10.2.	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.
EXPECTATION	WHST.9-10.2(a)	<p>Introduce a topic and organize ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when</p>

		<p>useful to aiding comprehension.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • The Multi-group Experiment • The Simple Experiment: Two-group Design
<p>EXPECTATION</p>	<p>WHST.9-10.2(d)</p>	<p>Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Abdominal Exam I: Inspection and Auscultation • Abdominal Exam II: Percussion • Abdominal Exam III: Palpation • Abdominal Exam IV: Acute Abdominal Pain Assessment • Algae Enumeration via Culturable Methodology • An Introduction to Aging and Regeneration • An Introduction to Behavioral Neuroscience • An Introduction to Caenorhabditis elegans • An Introduction to Cell Death • An Introduction to Cell Division • An Introduction to Cell Metabolism • An Introduction to Cell Motility and Migration • An Introduction to Cellular and Molecular Neuroscience • An Introduction to Cognition • An Introduction to Developmental Genetics • An Introduction to Developmental Neurobiology • An Introduction to Drosophila melanogaster • An Introduction to Endocytosis and Exocytosis • An Introduction to Learning and Memory • An Introduction to Modeling Behavioral Disorders and Stress • An Introduction to Molecular Developmental Biology • An Introduction to Motor Control • An Introduction to Neuroanatomy • An Introduction to Neurophysiology • An Introduction to Organogenesis • An Introduction to Reward and Addiction • An Introduction to Saccharomyces cerevisiae • An Introduction to Stem Cell Biology • An Introduction to Transfection • An Introduction to Working in the Hood • An Introduction to the Centrifuge • An Introduction to the Chick: Gallus gallus domesticus • An Introduction to the Laboratory Mouse: Mus musculus • An Introduction to the Micropipettor • An Introduction to the Zebrafish: Danio rerio • An Overview of Alkenone Biomarker Analysis for Paleothermometry

- An Overview of Epigenetics
- An Overview of Gene Expression
- An Overview of Genetic Analysis
- An Overview of Genetic Engineering
- An Overview of Genetics and Disease
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- Bacterial Growth Curve Analysis and its Environmental Applications
- Bacterial Transformation: Electroporation
- Bacterial Transformation: The Heat Shock Method
- Balance and Coordination Testing
- Basic Care Procedures
- Basic Chick Care and Maintenance
- Basic Life Support Part II: Airway/Breathing and Continued Cardiopulmonary Resuscitation
- Basic Life Support: Cardiopulmonary Resuscitation and Defibrillation
- Basic Mouse Care and Maintenance
- Binocular Rivalry
- Biofuels: Producing Ethanol from Cellulosic Material
- Blood Pressure Measurement
- Blood Withdrawal I
- Blood Withdrawal II
- C. elegans Chemotaxis Assay
- C. elegans Development and Reproduction
- C. elegans Maintenance
- Calcium Imaging in Neurons
- Calibration Curves
- Capillary Electrophoresis (CE)
- Carbon and Nitrogen Analysis of Environmental Samples
- Cardiac Exam I: Inspection and Palpation
- Cardiac Exam II: Auscultation
- Cardiac Exam III: Abnormal Heart Sounds
- Categories and Inductive Inferences

- Cell Cycle Analysis
- Cell-surface Biotinylation Assay
- Central Venous Catheter Insertion: Femoral Vein with Ultrasound Guidance
- Central Venous Catheter Insertion: Internal Jugular with Ultrasound Guidance
- Central Venous Catheter Insertion: Subclavian Vein
- Chick ex ovo Culture
- Children's Reliance on Artist Intentions When Identifying Pictures
- Chromatin Immunoprecipitation
- Chromatography-Based Biomolecule Purification Methods
- Co-Immunoprecipitation and Pull-Down Assays
- Color Afterimages
- Column Chromatography
- Common Lab Glassware and Uses
- Community DNA Extraction from Bacterial Colonies
- Compound Administration I
- Compound Administration II
- Compound Administration III
- Compound Administration IV
- Comprehensive Breast Exam
- Conducting Reactions Below Room Temperature
- Considerations for Rodent Surgery
- Conversion of Fatty Acid Methyl Esters by Saponification for Uk'37 Paleothermometry
- Coordination Chemistry Complexes
- Cranial Nerves Exam I (I-VI)
- Cranial Nerves Exam II (VII-XII)
- Crowding
- Culturing and Enumerating Bacteria from Soil Samples
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- Fundamentals of Breeding and Weaning
- Förster Resonance Energy Transfer (FRET)
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- General Approach to the Physical Exam
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- Genetic Engineering of Model Organisms
- Genetic Screens
- Genome Editing
- Gram Staining of Bacteria from Environmental Sources
- Growing Crystals for X-ray Diffraction Analysis
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- Hand and Wrist Exam
- High-Performance Liquid Chromatography (HPLC)
- Hip Exam
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- Histological Staining of Neural Tissue
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- **Neuronal Transfection Methods**
- **Nose, Sinuses, Oral Cavity and Pharynx Exam**
- **Nuclear Magnetic Resonance (NMR) Spectroscopy**
- **Numerical Cognition: More or Less**
- **Nutrients in Aquatic Ecosystems**
- **Object Substitution Masking**

- Observation and Inspection
- Observational Research
- Ophthalmoscopic Examination
- PCR: The Polymerase Chain Reaction
- Palpation
- Passaging Cells
- Patch Clamp Electrophysiology
- Pelvic Exam I: Assessment of the External Genitalia
- Pelvic Exam II: Speculum Exam
- Pelvic Exam III: Bimanual and Rectovaginal Exam
- Percussion
- Percutaneous Cricothyrotomy (Seldinger Technique)
- Performing 1D Thin Layer Chromatography
- Pericardiocentesis
- Peripheral Vascular Exam
- Peripheral Vascular Exam Using a Continuous Wave Doppler
- Peripheral Venous Cannulation
- Perspectives on Sensation and Perception
- Photometric Protein Determination
- Physical Properties Of Minerals I: Crystals and Cleavage
- Physical Properties Of Minerals II: Polymineralic Analysis
- Physiological Correlates of Emotion Recognition
- Piaget's Conservation Task and the Influence of Task Demands
- Pilot Testing
- Placebos in Research
- Plasmid Purification
- Positive Reinforcement Studies
- Preparing Anhydrous Reagents and Equipment
- Primary Neuronal Cultures
- Proper Adjustment of Patient Attire during the Physical Exam
- Prospect Theory
- Protein Crystallization
- Proton Exchange Membrane Fuel Cells
- Purification of a Total Lipid Extract with Column Chromatography
- Purifying Compounds by Recrystallization
- Quantifying Environmental Microorganisms and Viruses Using qPCR
- RNA Analysis of Environmental Samples Using RT-PCR
- RNA-Seq
- RNAi in *C. elegans*
- Raman Spectroscopy for Chemical Analysis
- Realism in Experimentation
- Recombineering and Gene Targeting
- Reconstitution of Membrane Proteins
- Regulating Temperature in the Lab: Applying Heat
- Regulating Temperature in the Lab: Preserving

Samples Using Cold

- Reliability in Psychology Experiments
- Removal of Branched and Cyclic Compounds by Urea Adduction for Uk'37 Paleothermometry
- Respiratory Exam I: Inspection and Palpation
- Respiratory Exam II: Percussion and Auscultation
- Restriction Enzyme Digests
- Rodent Handling and Restraint Techniques
- Rodent Identification I
- Rodent Identification II
- Rodent Stereotaxic Surgery
- Rotary Evaporation to Remove Solvent
- SNP Genotyping
- Sample Preparation for Analytical Preparation
- Scanning Electron Microscopy (SEM)
- Schlenk Lines Transfer of Solvents
- Self-administration Studies
- Self-report vs. Behavioral Measures of Recycling
- Sensory Exam
- Separating Protein with SDS-PAGE
- Separation of Mixtures via Precipitation
- Shoulder Exam I
- Shoulder Exam II
- Soil Nutrient Analysis: Nitrogen, Phosphorus, and Potassium
- Solid-Liquid Extraction
- Solutions and Concentrations
- Sonication Extraction of Lipid Biomarkers from Sediment
- Soxhlet Extraction of Lipid Biomarkers from Sediment
- Spatial Cueing
- Spatial Memory Testing Using Mazes
- Spectrophotometric Determination of an Equilibrium Constant
- Sterile Tissue Harvest
- Surface Plasmon Resonance (SPR)
- Surgical Cricothyrotomy
- Tandem Mass Spectrometry
- Testing For Genetically Modified Foods
- The ATP Bioluminescence Assay
- The Ames Room
- The Attentional Blink
- The Costs and Benefits of Natural Pedagogy
- The ELISA Method
- The Factorial Experiment
- The Ideal Gas Law
- The Inverted-face Effect
- The McGurk Effect
- The Morris Water Maze
- The Multi-group Experiment
- The Precision of Visual Working Memory with Delayed

Estimation

- **The Rouge Test: Searching for a Sense of Self**
- **The Rubber Hand Illusion**
- **The Simple Experiment: Two-group Design**
- **The Split Brain**
- **The Staircase Procedure for Finding a Perceptual Threshold**
- **The TUNEL Assay**
- **The Transwell Migration Assay**
- **The Western Blot**
- **Thyroid Exam**
- **Tissue Regeneration with Somatic Stem Cells**
- **Transplantation Studies**
- **Tree Identification: How To Use a Dichotomous Key**
- **Tree Survey: Point-Centered Quarter Sampling Method**
- **Turbidity and Total Solids in Surface Water**
- **Two-Dimensional Gel Electrophoresis**
- **Ultraviolet-Visible (UV-Vis) Spectroscopy**
- **Understanding Concentration and Measuring Volumes**
- **Using Differential Scanning Calorimetry to Measure Changes in Enthalpy**
- **Using Diffusion Tensor Imaging in Traumatic Brain Injury**
- **Using GIS to Investigate Urban Forestry**
- **Using TMS to Measure Motor Excitability During Action Observation**
- **Using Topographic Maps to Generate Topographic Profiles**
- **Using Your Head: Measuring Infants' Rational Imitation of Actions**
- **Using a pH Meter**
- **Verbal Priming**
- **Visual Attention: fMRI Investigation of Object-based Attentional Control**
- **Visual Search for Features and Conjunctions**
- **Visual Statistical Learning**
- **Visualizing Soil Microorganisms via the Contact Slide Assay and Microscopy**
- **Water Quality Analysis via Indicator Organisms**
- **Whole-Mount In Situ Hybridization**
- **Within-subjects Repeated-measures Design**
- **X-ray Fluorescence (XRF)**
- **Yeast Maintenance**
- **Yeast Reproduction**
- **Yeast Transformation and Cloning**
- **Zebrafish Breeding and Embryo Handling**
- **Zebrafish Maintenance and Husbandry**
- **Zebrafish Microinjection Techniques**
- **Zebrafish Reproduction and Development**
- **fMRI: Functional Magnetic Resonance Imaging**

STRAND / STANDARD	NH.CC.WHST.9-10.	Writing Standards for Literacy in Science and Technical Subjects
STANDARD / GLE		Text Types and Purposes
GRADE LEVEL EXPECTATION	WHST.9-10.3.	(See note; not applicable as a separate requirement)
EXPECTATION	WHST.9-10.3(a)	<p>Note: Students' narrative skills continue to grow in these grades. The Standards require that students be able to incorporate narrative elements effectively into arguments and informative/explanatory texts. In science and technical subjects, students must be able to write precise enough descriptions of the step-by-step procedures they use in their investigations or technical work that others can replicate them and (possibly) reach the same results.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Ethics in Psychology Research • Experimentation using a Confederate • From Theory to Design: The Role of Creativity in Designing Experiments • Manipulating an Independent Variable through Embodiment • Observational Research • Pilot Testing • Placebos in Research • Realism in Experimentation • Reliability in Psychology Experiments • The Factorial Experiment • The Multi-group Experiment • The Simple Experiment: Two-group Design • Within-subjects Repeated-measures Design