

Main Criteria: New Mexico Content Standards

Secondary Criteria: JoVE

Subject: Science

Grade: 9-12

Correlation Options: Show Correlated

Adopted: 2003

STRAND / CONTENT STANDARD	NM.I.	Scientific Thinking and Practice: Understand the processes of scientific investigations and use inquiry and scientific ways of observing, experimenting, predicting, and validating to think critically.
BENCHMARK / STANDARD	I-A.	Use accepted scientific methods to collect, analyze, and interpret data and observations and to design and conduct scientific investigations and communicate results.
PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY	I-A.1a.	<p>Describe the essential components of an investigation, including appropriate methodologies, proper equipment, and safety precautions.</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 • Turbidity and Total Solids in Surface Water • Understanding Concentration and Measuring Volumes

<p>PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY</p>	<p>I-A.2a.</p>	<p>Design and conduct scientific investigations that include: testable hypotheses; controls and variables; methods to collect, analyze, and interpret data; results that address hypotheses being investigated; predictions based on results; re-evaluation of hypotheses and additional experimentation as necessary; error analysis.</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 • Cyclic Voltammetry (CV) • Degassing Liquids with Freeze-Pump-Thaw Cycling • Density Gradient Ultracentrifugation • 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 • Dialysis: Diffusion Based Separation • Electrochemical Measurements of Supported Catalysts Using a Potentiostat/Galvanostat • Electrophoretic Mobility Shift Assay (EMSA) • Enzyme Assays and Kinetics • Ethics in Psychology Research • Experimentation using a Confederate • Fractional Distillation • Freezing-Point Depression to Determine an Unknown Compound • From Theory to Design: The Role of Creativity in Designing Experiments • Förster Resonance Energy Transfer (FRET) • Gas Chromatography (GC) with Flame-Ionization Detection • High-Performance Liquid Chromatography (HPLC) • Internal Standards • Introduction to Mass Spectrometry • Introduction to the Spectrophotometer • Ion-Exchange Chromatography • MALDI-TOF Mass Spectrometry • Making Solutions in the Laboratory • Manipulating an Independent Variable through Embodiment • Measuring Mass in the Laboratory
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		<ul style="list-style-type: none"> • Metabolic Labeling • Method of Standard Addition • Nuclear Magnetic Resonance (NMR) Spectroscopy • Observational Research • Performing 1D Thin Layer Chromatography • Photometric Protein Determination • Pilot Testing • Placebos in Research • Raman Spectroscopy for Chemical Analysis • Realism in Experimentation • Reliability in Psychology Experiments • Rotary Evaporation to Remove Solvent • Schlenk Lines Transfer of Solvents • Separation of Mixtures via Precipitation • Solid-Liquid Extraction • Spectrophotometric Determination of an Equilibrium Constant • Surface Plasmon Resonance (SPR) • Tandem Mass Spectrometry • The Factorial Experiment • The Multi-group Experiment • The Simple Experiment: Two-group Design • 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 a pH Meter • Water Quality Analysis via Indicator Organisms • Within-subjects Repeated-measures Design • X-ray Fluorescence (XRF)
<p>PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY</p>	<p>I-A.3a.</p>	<p>Use appropriate technologies to collect, analyze, and communicate scientific data (e.g., computers, calculators, balances, microscopes).</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 • 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

		<ul style="list-style-type: none"> • Regulating Temperature in the Lab: Preserving Samples Using Cold • Understanding Concentration and Measuring Volumes
<p>PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY</p>	<p>I-A.4a.</p>	<p>Convey results of investigations using scientific concepts, methodologies, and expressions, including: scientific language and symbols; diagrams, charts, and other data displays; mathematical expressions and processes (e.g., mean, median, slope, proportionality); clear, logical, and concise communication; reasoned arguments.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • 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 • 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 • Assembly of a Reflux System for Heated Chemical Reactions • 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
- Co-Immunoprecipitation and Pull-Down Assays
- 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
- Culturing and Enumerating Bacteria from Soil Samples
- Cyclic Voltammetry (CV)
- 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
- 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
- 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**
- **Eye Tracking in Cognitive Experiments**
- **FM Dyes in Vesicle Recycling**
- **Fate Mapping**
- **Fear Conditioning**
- **Fractional Distillation**
- **Freezing-Point Depression to Determine an Unknown Compound**
- **From Theory to Design: The Role of Creativity in Designing Experiments**
- **Förster Resonance Energy Transfer (FRET)**
- **Gas Chromatography (GC) with Flame-Ionization Detection**
- **Gene Silencing with Morpholinos**
- **Genetic Crosses**
- **Genetic Screens**
- **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**
- **Inattentional Blindness**
- **Incidental Encoding**
- **Internal Standards**
- **Introducing Experimental Agents into the Mouse**
- **Introduction to Catalysis**
- **Introduction to Mass Spectrometry**
- **Introduction to Titration**
- **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**
- **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
- Making a Geologic Cross Section
- 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 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
- Observational Research
- 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
- 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
- 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
- Reconstitution of Membrane Proteins
- Reliability in Psychology Experiments
- Removal of Branched and Cyclic Compounds by Urea Adduction for Uk'37 Paleothermometry
- 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
- Separation of Mixtures via Precipitation
- 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
- Surface Plasmon Resonance (SPR)
- Tandem Mass Spectrometry
- Testing For Genetically Modified Foods
- The ATP Bioluminescence Assay
- 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 Morris Water Maze
- The Multi-group Experiment
- 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 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 • 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 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 • Within-subjects Repeated-measures Design • X-ray Fluorescence (XRF) • Yeast Maintenance • fMRI: Functional Magnetic Resonance Imaging
PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY	I-A.5a.	<p>Understand how scientific theories are used to explain and predict natural phenomena (e.g., plate tectonics, ocean currents, structure of atom).</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Calibration Curves
STRAND / CONTENT STANDARD	NM.I.	Scientific Thinking and Practice: Understand the processes of scientific investigations and use inquiry and scientific ways of observing, experimenting, predicting, and validating to think critically.
BENCHMARK / STANDARD	I-B.	<p>Understand that scientific processes produce scientific knowledge that is continually evaluated, validated, revised, or rejected.</p>

PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY	I-B.1a.	<p>Understand how scientific processes produce valid, reliable results, including: consistency of explanations with data and observations; openness to peer review; full disclosure and examination of assumptions; testability of hypotheses; repeatability of experiments and reproducibility of results.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Aseptic Technique in Environmental Science • 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 • Placebos in Research • Preparing Anhydrous Reagents and Equipment • Protein Crystallization • Raman Spectroscopy for Chemical Analysis • Reliability in Psychology Experiments • Sample Preparation for Analytical Preparation • Scanning Electron Microscopy (SEM) • Self-report vs. Behavioral Measures of Recycling • The Factorial Experiment • The Multi-group Experiment • The Simple Experiment: Two-group Design • Two-Dimensional Gel Electrophoresis • Within-subjects Repeated-measures Design • X-ray Fluorescence (XRF)
PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY	I-B.2a.	<p>Use scientific reasoning and valid logic to recognize: faulty logic; cause and effect; the difference between observation and unsubstantiated inferences and conclusions; potential bias.</p>

JoVE

- 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 Developmental Neurobiology
- An Introduction to Drosophila melanogaster
- An Introduction to Learning and Memory
- An Introduction to Modeling Behavioral Disorders and Stress
- An Introduction to Molecular Developmental Biology
- An Introduction to Neuroanatomy
- An Introduction to Neurophysiology
- An Introduction to Reward and Addiction
- An Introduction to Saccharomyces cerevisiae
- An Introduction to Transfection
- Anesthesia Induction and Maintenance
- 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
- Aseptic Technique in Environmental Science
- Assembly of a Reflux System for Heated Chemical Reactions
- Bacterial Transformation: Electroporation
- Bacterial Transformation: The Heat Shock Method
- Basic Care Procedures
- Basic Chick Care and Maintenance
- Basic Mouse Care and Maintenance
- C. elegans Chemotaxis Assay
- C. elegans Development and Reproduction
- C. elegans Maintenance
- Calcium Imaging in Neurons
- Calibration Curves
- Capillary Electrophoresis (CE)
- Cell Cycle Analysis
- Cell-surface Biotinylation Assay
- Chick ex ovo Culture
- Chromatography-Based Biomolecule Purification Methods
- Co-Immunoprecipitation and Pull-Down Assays
- Color Afterimages
- Column Chromatography
- Conducting Reactions Below Room Temperature
- Considerations for Rodent Surgery
- Coordination Chemistry Complexes
- Crowding

- Cyclic Voltammetry (CV)
- DNA Gel Electrophoresis
- DNA Ligation Reactions
- 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 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
- Development and Reproduction of the Laboratory Mouse
- Development of the Chick
- Diagnostic Necropsy and Tissue Harvest
- Dialysis: Diffusion Based Separation
- Drosophila Development and Reproduction
- Drosophila Larval IHC
- Drosophila Maintenance
- Drosophila melanogaster Embryo and Larva Harvesting and Preparation
- 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
- Explant Culture of Neural Tissue
- Eye Tracking in Cognitive Experiments
- FM Dyes in Vesicle Recycling
- Fear Conditioning
- Finding Your Blind Spot and Perceptual Filling-in
- 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

- Growing Crystals for X-ray Diffraction Analysis
- Habituation: Studying Infants Before They Can Talk
- High-Performance Liquid Chromatography (HPLC)
- Histological Staining of Neural Tissue
- How Children Solve Problems Using Causal Reasoning
- In ovo Electroporation of Chicken Embryos
- Inattentive Blindness
- Incidental Encoding
- Internal Standards
- Introduction to Catalysis
- Introduction to Mass Spectrometry
- Introduction to Titration
- Invertebrate Lifespan Quantification
- Ion-Exchange Chromatography
- Isolating Nucleic Acids from Yeast
- Just-noticeable Differences
- Language: The N400 in Semantic Incongruity
- Le Châtelier's Principle
- Learning and Memory: The Remember-Know Task
- Live Cell Imaging of Mitosis
- MALDI-TOF Mass Spectrometry
- Manipulating an Independent Variable through Embodiment
- Measuring Grey Matter Differences with Voxel-based Morphometry: The Musical Brain
- Measuring Reaction Time and Donders' Method of Subtraction
- Measuring Verbal Working Memory Span
- Mental Rotation
- Metabolic Labeling
- Method of Standard Addition
- Modeling Social Stress
- Molecular Cloning
- Motion-induced Blindness
- Motor Learning in Mirror Drawing
- Mouse Genotyping
- Multiple Object Tracking
- Murine In Utero Electroporation
- Neuronal Transfection Methods
- Nuclear Magnetic Resonance (NMR) Spectroscopy
- Object Substitution Masking
- Observational Research
- PCR: The Polymerase Chain Reaction
- Passaging Cells
- Patch Clamp Electrophysiology
- Performing 1D Thin Layer Chromatography
- Photometric Protein Determination
- Physiological Correlates of Emotion Recognition
- Pilot Testing
- Placebos in Research
- Plasmid Purification

- Positive Reinforcement Studies
- Preparing Anhydrous Reagents and Equipment
- Primary Neuronal Cultures
- Prospect Theory
- Protein Crystallization
- Purifying Compounds by Recrystallization
- RNAi in *C. elegans*
- Raman Spectroscopy for Chemical Analysis
- Reconstitution of Membrane Proteins
- Reliability in Psychology Experiments
- Restriction Enzyme Digests
- Rodent Handling and Restraint Techniques
- Rodent Stereotaxic Surgery
- Rotary Evaporation to Remove Solvent
- Sample Preparation for Analytical Preparation
- Scanning Electron Microscopy (SEM)
- Schlenk Lines Transfer of Solvents
- Self-administration Studies
- Self-report vs. Behavioral Measures of Recycling
- Separating Protein with SDS-PAGE
- Separation of Mixtures via Precipitation
- Solid-Liquid Extraction
- Solutions and Concentrations
- Spatial Cueing
- Spatial Memory Testing Using Mazes
- Spectrophotometric Determination of an Equilibrium Constant
- Sterile Tissue Harvest
- Surface Plasmon Resonance (SPR)
- Tandem Mass Spectrometry
- The ATP Bioluminescence Assay
- The Ames Room
- The Attentional Blink
- 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 Rubber Hand Illusion
- The Simple Experiment: Two-group Design
- The Staircase Procedure for Finding a Perceptual Threshold
- 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 Diffusion Tensor Imaging in Traumatic Brain

		<p>Injury</p> <ul style="list-style-type: none"> • 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 • 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 Reproduction and Development • fMRI: Functional Magnetic Resonance Imaging
<p>PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY</p>	<p>I-B.3a.</p>	<p>Understand how new data and observations can result in new scientific knowledge.</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

		<ul style="list-style-type: none"> • 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 • Visualizing Soil Microorganisms via the Contact Slide Assay and Microscopy • Yeast Transformation and Cloning
<p>PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY</p>	<p>I-B.4a.</p>	<p>Critically analyze an accepted explanation by reviewing current scientific knowledge.</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 Endocytosis and Exocytosis • 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
- 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
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- 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)
- Ideal Gas Law
- Internal Standards
- Introduction to Catalysis
- Introduction to Mass Spectrometry
- Introduction to Titration
- Invasion Assay Using 3D Matrices
- 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
- Preparing Anhydrous Reagents and Equipment
- Protein Crystallization

		<ul style="list-style-type: none"> • 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 ELISA Method • The Ideal Gas Law • The TUNEL Assay • The Transwell Migration 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)
<p>PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY</p>	<p>I-B.5a.</p>	<p>Examine investigations of current interest in science (e.g., superconductivity, molecular machines, age of the universe).</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • 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
- 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
- Aseptic Technique in Environmental Science
- Assembly of a Reflux System for Heated Chemical Reactions
- Assessing Dexterity with Reaching Tasks
- 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 Mouse Care and Maintenance
- Binocular Rivalry
- Biofuels: Producing Ethanol from Cellulosic Material
- 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
- Categories and Inductive Inferences
- Cell Cycle Analysis

- Cell-surface Biotinylation Assay
- 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
- Conducting Reactions Below Room Temperature
- Considerations for Rodent Surgery
- Coordination Chemistry Complexes
- 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
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- Detecting Reactive Oxygen Species
- Detection of Bacteriophages in Environmental Samples
- Determination Of Nox in Automobile Exhaust Using UV-VIS Spectroscopy
- 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
- Development and Reproduction of the Laboratory Mouse
- Development of the Chick
- Diagnostic Necropsy and Tissue Harvest
- Dialysis: Diffusion Based Separation
- Dichotic Listening
- Drosophila Development and Reproduction
- Drosophila Larval IHC

- **Drosophila Maintenance**
- **Drosophila melanogaster Embryo and Larva Harvesting and Preparation**
- **Electro-encephalography (EEG)**
- **Electrochemical Measurements of Supported Catalysts Using a Potentiostat/Galvanostat**
- **Electrophoretic Mobility Shift Assay (EMSA)**
- **Embryonic Stem Cell Culture and Differentiation**
- **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**
- **Experimentation using a Confederate**
- **Explant Culture for Developmental Studies**
- **Explant Culture of Neural Tissue**
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- **FM Dyes in Vesicle Recycling**
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- **Fear Conditioning**
- **Filamentous Fungi**
- **Finding Your Blind Spot and Perceptual Filling-in**
- **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**
- **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**
- **High-Performance Liquid Chromatography (HPLC)**
- **Histological Staining of Neural Tissue**
- **How Children Solve Problems Using Causal Reasoning**
- **Ideal Gas Law**
- **In ovo Electroporation of Chicken Embryos**
- **Inattentive Blindness**
- **Incidental Encoding**
- **Induced Pluripotency**
- **Internal Standards**

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- **Introduction to Mass Spectrometry**
- **Introduction to Titration**
- **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**
- **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**
- **MALDI-TOF Mass Spectrometry**
- **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 Tropospheric Ozone**
- **Measuring Verbal Working Memory Span**
- **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 Learning in Mirror Drawing**
- **Motor Maps**
- **Mouse Genotyping**
- **Multiple Object Tracking**
- **Murine In Utero Electroporation**
- **Mutual Exclusivity: How Children Learn the Meanings of Words**
- **Neuronal Transfection Methods**
- **Nuclear Magnetic Resonance (NMR) Spectroscopy**
- **Numerical Cognition: More or Less**
- **Object Substitution Masking**
- **Observational Research**
- **PCR: The Polymerase Chain Reaction**
- **Passaging Cells**

- Patch Clamp Electrophysiology
- Performing 1D Thin Layer Chromatography
- Perspectives on Cognitive Psychology
- Perspectives on Experimental Psychology
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- Perspectives on Sensation and Perception
- Photometric Protein Determination
- 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
- Prospect Theory
- Protein Crystallization
- Proton Exchange Membrane Fuel Cells
- 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
- Reliability in Psychology Experiments
- 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
- Separating Protein with SDS-PAGE
- Separation of Mixtures via Precipitation
- Soil Nutrient Analysis: Nitrogen, Phosphorus, and Potassium
- Solid-Liquid Extraction
- Solutions and Concentrations
- Spatial Cueing
- Spatial Memory Testing Using Mazes
- Spectrophotometric Determination of an Equilibrium

Constant

- Sterile Tissue Harvest
- Surface Plasmon Resonance (SPR)
- 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
- Tissue Regeneration with Somatic Stem Cells
- Transplantation Studies
- Two-Dimensional Gel Electrophoresis
- Ultraviolet-Visible (UV-Vis) Spectroscopy
- Using Differential Scanning Calorimetry to Measure Changes in Enthalpy
- Using Diffusion Tensor Imaging in Traumatic Brain Injury
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- 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)

		<ul style="list-style-type: none"> • 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
PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY	I-B.6a.	<p>Examine the scientific processes and logic used in investigations of past events (e.g., using data from crime scenes, fossils), investigations that can be planned in advance but are only done once (e.g., expensive or time-consuming experiments such as medical clinical trials), and investigations of phenomena that can be repeated easily and frequently.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Determining the Empirical Formula • How Children Solve Problems Using Causal Reasoning • Introduction to Mass Spectrometry • PCR: The Polymerase Chain Reaction • X-ray Fluorescence (XRF)
STRAND / CONTENT STANDARD	NM.I.	Scientific Thinking and Practice: Understand the processes of scientific investigations and use inquiry and scientific ways of observing, experimenting, predicting, and validating to think critically.
BENCHMARK / STANDARD	I-C.	Use mathematical concepts, principles, and expressions to analyze data, develop models, understand patterns and relationships, evaluate findings, and draw conclusions.
PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY	I-C.1a.	<p>Create multiple displays of data to analyze and explain the relationships in scientific investigations.</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
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- Cell Cycle Analysis
- Cell-surface Biotinylation Assay
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- 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
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- Decision-making and the Iowa Gambling Task
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- **RNAi in *C. elegans***
- **Raman Spectroscopy for Chemical Analysis**
- **Removal of Branched and Cyclic Compounds by Urea Adduction for Uk'37 Paleothermometry**
- **SNP Genotyping**
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- **Separation of Mixtures via Precipitation**
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- **Soxhlet Extraction of Lipid Biomarkers from Sediment**
- **Spatial Cueing**

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<p>PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY</p>	<p>I-C.2a.</p>	<p>Use mathematical models to describe, explain, and predict natural phenomena.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • 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

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Adduction for UK'37 Paleothermometry

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- Schlenk Lines Transfer of Solvents
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- 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
- Surface Plasmon Resonance (SPR)
- Tandem Mass Spectrometry
- Testing For Genetically Modified Foods
- The ATP Bioluminescence Assay
- 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 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 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
- 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

		<p>Injury</p> <ul style="list-style-type: none"> • 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 • Within-subjects Repeated-measures Design • X-ray Fluorescence (XRF) • Yeast Maintenance • fMRI: Functional Magnetic Resonance Imaging
<p>PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY</p>	<p>I-C.3a.</p>	<p>Use technologies to quantify relationships in scientific hypotheses (e.g., calculators, computer spreadsheets and databases, graphing software, simulations, modeling).</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 • Community DNA Extraction from Bacterial Colonies • Conducting Reactions Below Room Temperature • Coordination Chemistry Complexes • Determination Of Nox in Automobile Exhaust Using UV-VIS Spectroscopy • Determining the Density of a Solid and Liquid • Determining the Empirical Formula • Electrochemical Measurements of Supported Catalysts Using a Potentiostat/Galvanostat • Freezing-Point Depression to Determine an Unknown Compound • Förster Resonance Energy Transfer (FRET) • Gas Chromatography (GC) with Flame-Ionization Detection • Growing Crystals for X-ray Diffraction Analysis • Histological Sample Preparation for Light Microscopy • Internal Standards • Introduction to Catalysis • Introduction to Fluorescence Microscopy • Introduction to Light Microscopy • Introduction to Mass Spectrometry

		<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 • Lead Analysis of Soil Using Atomic Absorption Spectroscopy • MALDI-TOF Mass Spectrometry • Making Solutions in the Laboratory • Measuring Mass in the Laboratory • Metabolic Labeling • Method of Standard Addition • Nuclear Magnetic Resonance (NMR) Spectroscopy • Nutrients in Aquatic Ecosystems • Photometric Protein Determination • Plasmid Purification • Purifying Compounds by Recrystallization • Raman Spectroscopy for Chemical Analysis • Regulating Temperature in the Lab: Applying Heat • Regulating Temperature in the Lab: Preserving Samples Using Cold • Solid-Liquid Extraction • Spectrophotometric Determination of an Equilibrium Constant • Tandem Mass Spectrometry • Ultraviolet-Visible (UV-Vis) Spectroscopy • Understanding Concentration and Measuring Volumes • X-ray Fluorescence (XRF) • Yeast Maintenance
<p>PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY</p>	<p>I-C.4a.</p>	<p>Identify and apply measurement techniques and consider possible effects of measurement errors.</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

		<ul style="list-style-type: none"> • 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 • The Multi-group Experiment • The Simple Experiment: Two-group Design • Two-Dimensional Gel Electrophoresis • Within-subjects Repeated-measures Design • X-ray Fluorescence (XRF)
<p>PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY</p>	<p>I-C.5a.</p>	<p>Use mathematics to express and establish scientific relationships (e.g., scientific notation, vectors, dimensional analysis).</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • 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 • 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**
- **Assembly of a Reflux System for Heated Chemical Reactions**
- **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**
- **Co-Immunoprecipitation and Pull-Down Assays**
- **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**
- **Culturing and Enumerating Bacteria from Soil Samples**
- **Cyclic Voltammetry (CV)**
- **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**
- **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
- 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
- Eye Tracking in Cognitive Experiments
- FM Dyes in Vesicle Recycling
- Fate Mapping
- Fear Conditioning
- Fractional Distillation
- Freezing-Point Depression to Determine an Unknown Compound
- From Theory to Design: The Role of Creativity in Designing Experiments
- Förster Resonance Energy Transfer (FRET)
- Gas Chromatography (GC) with Flame-Ionization Detection
- Gene Silencing with Morpholinos
- Genetic Crosses
- Genetic Screens
- 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
- Igneous Intrusive Rock
- Igneous Volcanic Rock
- Inattentional Blindness
- Incidental Encoding
- Internal Standards
- Introducing Experimental Agents into the Mouse

- Introduction to Catalysis
- Introduction to Mass Spectrometry
- Introduction to Titration
- 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
- 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
- Making a Geologic Cross Section
- 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 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
- Observational Research
- 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
- 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
- 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
- Reconstitution of Membrane Proteins
- Reliability in Psychology Experiments
- Removal of Branched and Cyclic Compounds by Urea Adduction for Uk'37 Paleothermometry
- 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
- Separation of Mixtures via Precipitation
- Soil Nutrient Analysis: Nitrogen, Phosphorus, and Potassium
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- Spatial Memory Testing Using Mazes
- Spectrophotometric Determination of an Equilibrium

Constant

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- **Tandem Mass Spectrometry**
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- **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**
- **Within-subjects Repeated-measures Design**
- **X-ray Fluorescence (XRF)**

		<ul style="list-style-type: none"> • Yeast Maintenance • fMRI: Functional Magnetic Resonance Imaging
STRAND / CONTENT STANDARD	NM.II.	The Content of Science: Physical Science: Understand the structure and properties of matter, the characteristics of energy, and the interactions between matter and energy.
BENCHMARK / STANDARD	II-A.	Understand the properties, underlying structure, and reactions of matter.
PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY	II-A.1a.	<p>Properties of Matter: Classify matter in a variety of ways (e.g., element, compound, mixture; solid, liquid, gas; acidic, basic, neutral).</p> <p>JoVE</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 • Fractional Distillation • Freezing-Point Depression to Determine an Unknown Compound • Förster Resonance Energy Transfer (FRET) • Gas Chromatography (GC) with Flame-Ionization Detection • 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

		<ul style="list-style-type: none"> • 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 • 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)
<p>PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY</p>	<p>II-A.2a.</p>	<p>Properties of Matter: Identify, measure, and use a variety of physical and chemical properties (e.g., electrical conductivity, density, viscosity, chemical reactivity, pH, melting point).</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Common Lab Glassware and Uses • Cyclic Voltammetry (CV) • Determining the Density of a Solid and Liquid • Determining the Mass Percent Composition in an Aqueous Solution • Freezing-Point Depression to Determine an Unknown Compound • Introduction to Titration • Solid-Liquid Extraction • Using Differential Scanning Calorimetry to Measure Changes in Enthalpy • Using a pH Meter
<p>PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY</p>	<p>II-A.3a.</p>	<p>Properties of Matter: Know how to use properties to separate mixtures into pure substances (e.g., distillation, chromatography, solubility).</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) • Carbon and Nitrogen Analysis of Environmental Samples • Chromatography-Based Biomolecule Purification Methods • Column Chromatography • Fractional Distillation • Gas Chromatography (GC) with Flame-Ionization Detection • High-Performance Liquid Chromatography (HPLC) • Internal Standards • Ion-Exchange Chromatography • MALDI-TOF Mass Spectrometry • Performing 1D Thin Layer Chromatography • Purification of a Total Lipid Extract with Column Chromatography • Rotary Evaporation to Remove Solvent • Separation of Mixtures via Precipitation • Solid-Liquid Extraction • Tandem Mass Spectrometry
<p>PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY</p>	<p>II-A.4a.</p>	<p>Properties of Matter: Describe trends in properties (e.g., ionization energy or reactivity as a function of location on the periodic table, boiling point of organic liquids as a function of molecular weight).</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

		<p>Using a Potentiostat/Galvanostat</p> <ul style="list-style-type: none"> • Electrophoretic Mobility Shift Assay (EMSA) • Enzyme Assays and Kinetics • Fractional Distillation • Freezing-Point Depression to Determine an Unknown Compound • Förster Resonance Energy Transfer (FRET) • Gas Chromatography (GC) with Flame-Ionization Detection • 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 • 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)
<p>PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY</p>	<p>II-A.5a.</p>	<p>Structure of Matter: Understand that matter is made of atoms and that atoms are made of subatomic particles.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Coordination Chemistry Complexes • Nuclear Magnetic Resonance (NMR) Spectroscopy

		<ul style="list-style-type: none"> • Raman Spectroscopy for Chemical Analysis • X-ray Fluorescence (XRF)
PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY	II-A.6a.	<p>Structure of Matter: Understand atomic structure, including: most space occupied by electrons; nucleus made of protons and neutrons; isotopes of an element; masses of proton and neutron 2000 times greater than mass of electron; atom held together by proton-electron electrical forces.</p> <p>JoVE</p> <ul style="list-style-type: none"> • Coordination Chemistry Complexes • Freezing-Point Depression to Determine an Unknown Compound • Introduction to Mass Spectrometry • MALDI-TOF Mass Spectrometry • Metabolic Labeling • Nuclear Magnetic Resonance (NMR) Spectroscopy • Raman Spectroscopy for Chemical Analysis • Tandem Mass Spectrometry • X-ray Fluorescence (XRF)
PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY	II-A.7a.	<p>Structure of Matter: Explain how electrons determine the properties of substances by: interactions between atoms through transferring or sharing valence electrons; ionic and covalent bonds; the ability of carbon to form a diverse array of organic structures.</p> <p>JoVE</p> <ul style="list-style-type: none"> • An Overview of Alkenone Biomarker Analysis for Paleothermometry • An Overview of bGDGT Biomarker Analysis for Paleoclimatology • Chromatography-Based Biomolecule Purification Methods • Column Chromatography • Conducting Reactions Below Room Temperature • Conversion of Fatty Acid Methyl Esters by Saponification for Uk'37 Paleothermometry • Coordination Chemistry Complexes • Density Gradient Ultracentrifugation • Determining the Solubility Rules of Ionic Compounds • Dialysis: Diffusion Based Separation • Electrochemical Measurements of Supported Catalysts Using a Potentiostat/Galvanostat • Extraction of Biomarkers from Sediments - Accelerated Solvent Extraction • Fractional Distillation • Introduction to Catalysis • MALDI-TOF Mass Spectrometry • Nuclear Magnetic Resonance (NMR) Spectroscopy • Performing 1D Thin Layer Chromatography • Preparing Anhydrous Reagents and Equipment

		<ul style="list-style-type: none"> • Purification of a Total Lipid Extract with Column Chromatography • Raman Spectroscopy for Chemical Analysis • 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 • Tandem Mass Spectrometry • Two-Dimensional Gel Electrophoresis • Ultraviolet-Visible (UV-Vis) Spectroscopy
PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY	II-A.8a.	<p>Structure of Matter: Make predictions about elements using the periodic table (e.g., number of valence electrons, metallic character, reactivity, conductivity, type of bond between elements).</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Coordination Chemistry Complexes
PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY	II-A.9a.	<p>Structure of Matter: Understand how the type and arrangement of atoms and their bonds determine macroscopic properties (e.g., boiling point, electrical conductivity, hardness of minerals).</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 • 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 • Conversion of Fatty Acid Methyl Esters by Saponification for Uk'37 Paleothermometry • 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**
- **Extraction of Biomarkers from Sediments - Accelerated Solvent Extraction**
- **Fractional Distillation**
- **Freezing-Point Depression to Determine an Unknown Compound**
- **Förster Resonance Energy Transfer (FRET)**
- **Gas Chromatography (GC) with Flame-Ionization Detection**
- **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 II: Polymineralic Analysis**
- **Preparing Anhydrous Reagents and Equipment**
- **Protein Crystallization**
- **Purification of a Total Lipid Extract with Column Chromatography**
- **Purifying Compounds by Recrystallization**
- **Raman Spectroscopy for Chemical Analysis**
- **Reconstitution of Membrane Proteins**
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- **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**
- **Sonication Extraction of Lipid Biomarkers from Sediment**
- **Soxhlet Extraction of Lipid Biomarkers from Sediment**
- **Spectrophotometric Determination of an Equilibrium Constant**
- **Surface Plasmon Resonance (SPR)**

		<ul style="list-style-type: none"> • Tandem Mass Spectrometry • The Ideal Gas Law • Two-Dimensional Gel Electrophoresis • Ultraviolet-Visible (UV-Vis) Spectroscopy • Using a pH Meter • X-ray Fluorescence (XRF)
PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY	II-A.10a.	<p>Structure of Matter: Know that states of matter (i.e., solid, liquid, gas) depend on the arrangement of atoms and molecules and on their freedom of motion.</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 • 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
PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY	II-A.11a.	<p>Structure of Matter: Know that some atomic nuclei can change, including: spontaneous decay; half-life of isotopes; fission; fusion (e.g., the sun); alpha, beta, and gamma radiation.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Determining Rate Laws and the Order of Reaction
PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY	II-A.12a.	<p>Chemical Reactions: Know that chemical reactions involve the rearrangement of atoms, and that they occur on many timescales (e.g., picoseconds to millennia).</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Conducting Reactions Below Room Temperature • Cyclic Voltammetry (CV) • Determining Rate Laws and the Order of Reaction • Determining the Solubility Rules of Ionic Compounds • Electrochemical Measurements of Supported Catalysts Using a Potentiostat/Galvanostat • Enzyme Assays and Kinetics • Growing Crystals for X-ray Diffraction Analysis • Introduction to Catalysis • Introduction to Titration • Le Châtelier's Principle • Nuclear Magnetic Resonance (NMR) Spectroscopy

		<ul style="list-style-type: none"> • Photometric Protein Determination • Preparing Anhydrous Reagents and Equipment • Proton Exchange Membrane Fuel Cells • Purifying Compounds by Recrystallization • Rotary Evaporation to Remove Solvent • Separation of Mixtures via Precipitation • The ELISA Method • Using Differential Scanning Calorimetry to Measure Changes in Enthalpy • Using a pH Meter
PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY	II-A.13a.	<p>Chemical Reactions: Understand types of chemical reactions (e.g., synthesis, decomposition, combustion, redox, neutralization) and identify them as exothermic or endothermic.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Conducting Reactions Below Room Temperature • Coordination Chemistry Complexes • Cyclic Voltammetry (CV) • Determining Rate Laws and the Order of Reaction • Determining the Solubility Rules of Ionic Compounds • Electrochemical Measurements of Supported Catalysts Using a Potentiostat/Galvanostat • Enzyme Assays and Kinetics • Growing Crystals for X-ray Diffraction Analysis • Introduction to Catalysis • Introduction to Titration • Le Châtelier's Principle • Photometric Protein Determination • Preparing Anhydrous Reagents and Equipment • Proton Exchange Membrane Fuel Cells • Purifying Compounds by Recrystallization • Rotary Evaporation to Remove Solvent • Separation of Mixtures via Precipitation • Spectrophotometric Determination of an Equilibrium Constant • Using Differential Scanning Calorimetry to Measure Changes in Enthalpy • Using a pH Meter
PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY	II-A.14a.	<p>Chemical Reactions: Know how to express chemical reactions with balanced equations that show: conservation of mass; products of common reactions.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Assembly of a Reflux System for Heated Chemical Reactions • Conducting Reactions Below Room Temperature • Coordination Chemistry Complexes • Determining Rate Laws and the Order of Reaction • Determining the Empirical Formula • Determining the Solubility Rules of Ionic Compounds

		<ul style="list-style-type: none"> • Introduction to Catalysis • Introduction to Titration • Le Châtelier's Principle • Preparing Anhydrous Reagents and Equipment • Proton Exchange Membrane Fuel Cells • Solutions and Concentrations • Spectrophotometric Determination of an Equilibrium Constant • Using Differential Scanning Calorimetry to Measure Changes in Enthalpy
PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY	II-A.15a.	<p>Chemical Reactions: Describe how the rate of chemical reactions depends on many factors that include temperature, concentration, and the presence of catalysts.</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
STRAND / CONTENT STANDARD	NM.II.	The Content of Science: Physical Science: Understand the structure and properties of matter, the characteristics of energy, and the interactions between matter and energy.
BENCHMARK / STANDARD	II-B.	Understand the transformation and transmission of energy and how energy and matter interact.
PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY	II-B.1a.	<p>Energy Transformation and Transfer: Identify different forms of energy, including kinetic, gravitational (potential), chemical, thermal, nuclear, and electromagnetic.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Using Differential Scanning Calorimetry to Measure Changes in Enthalpy
PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY	II-B.2a.	<p>Energy Transformation and Transfer: Explain how thermal energy (heat) consists of the random motion and vibrations of atoms and molecules and is measured by temperature.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Using Differential Scanning Calorimetry to Measure Changes in Enthalpy
PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY	II-B.4a.	Energy Transformation and Transfer: Understand how heat can be transferred by conduction, convection, and radiation, and how heat conduction differs in conductors and insulators.

		<p>JoVE</p> <ul style="list-style-type: none"> • Conducting Reactions Below Room Temperature
PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY	II-B.5a.	<p>Energy Transformation and Transfer: Explain how heat flows in terms of the transfer of vibrational motion of atoms and molecules from hotter to colder regions.</p> <p>JoVE</p> <ul style="list-style-type: none"> • Using Differential Scanning Calorimetry to Measure Changes in Enthalpy
PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY	II-B.7a.	<p>Interactions of Energy and Matter: Understand that electromagnetic waves carry energy that can be transferred when they interact with matter.</p> <p>JoVE</p> <ul style="list-style-type: none"> • Ultraviolet-Visible (UV-Vis) Spectroscopy
PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY	II-B.8a.	<p>Interactions of Energy and Matter: Describe the characteristics of electromagnetic waves (e.g., visible light, radio, microwave, X-ray, ultraviolet, gamma) and other waves (e.g., sound, seismic waves, water waves), including: origin and potential hazards of various forms of electromagnetic radiation; energy of electromagnetic waves carried in discrete energy packets (photons) whose energy is inversely proportional to wavelength.</p> <p>JoVE</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 • Inattentive 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

		<ul style="list-style-type: none"> • Turbidity and Total Solids in Surface Water • Ultraviolet-Visible (UV-Vis) Spectroscopy
PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY	II-B.10a.	<p>Interactions of Energy and Matter: Explain how wavelengths of electromagnetic radiation can be used to identify atoms, molecules, and the composition of stars.</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
PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY	II-B.11a.	<p>Interactions of Energy and Matter: Understand the concept of equilibrium (i.e., thermal, mechanical, and chemical).</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Assembly of a Reflux System for Heated Chemical Reactions • Dialysis: Diffusion Based Separation • Le Châtelier's Principle • Separation of Mixtures via Precipitation • Spectrophotometric Determination of an Equilibrium Constant
STRAND / CONTENT STANDARD	NM.II.	The Content of Science: Physical Science: Understand the structure and properties of matter, the characteristics of energy, and the interactions between matter and energy.

BENCHMARK / STANDARD	II-C.	Understand the motion of objects and waves, and the forces that cause them.
PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY	II-C.3a.	<p>Forces: Know that materials containing equal amounts of positive and negative charges are electrically neutral, but that a small excess or deficit of negative charges produces significant electrical forces.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Assembly of a Reflux System for Heated Chemical Reactions • Electro-encephalography (EEG)
PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY	II-C.4a.	<p>Forces: Understand the relationship between force and pressure, and how the pressure of a volume of gas depends on the temperature and the amount of gas.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Determining Rate Laws and the Order of Reaction • Ideal Gas Law • The Ideal Gas Law
PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY	II-C.5a.	<p>Forces: Explain how electric currents cause magnetism and how changing magnetic fields produce electricity (e.g., electric motors, generators).</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Electrochemical Measurements of Supported Catalysts Using a Potentiostat/Galvanostat
PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY	II-C.8a.	<p>Motion: Apply Newton's Laws to describe and analyze the behavior of moving objects, including: displacement, velocity, and acceleration of a moving object; Newton's Second Law, $F = ma$ (e.g., momentum and its conservation, the motion of an object falling under gravity, the independence of a falling object's motion on mass); circular motion and centripetal force.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Introduction to the Centrifuge
PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY	II-C.11a.	<p>Motion: Explain how the interactions of waves can result in interference, reflection, and refraction.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Raman Spectroscopy for Chemical Analysis
PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY	II-C.12a.	<p>Motion: Describe how waves are used for practical purposes (e.g., seismic data, acoustic effects, Doppler effect).</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Peripheral Vascular Exam Using a Continuous Wave Doppler • Raman Spectroscopy for Chemical Analysis

STRAND / CONTENT STANDARD	NM.II.	The Content of Science: Life Science: Understand the properties, structures, and processes of living things and the interdependence of living things and their environments.
BENCHMARK / STANDARD	II-A.	Understand how the survival of species depends on biodiversity and on complex interactions, including the cycling of matter and the flow of energy.
PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY	II-A.1a.	<p>Ecosystems: Know that an ecosystem is complex and may exhibit fluctuations around a steady state or may evolve over time.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Analysis of Earthworm Populations in Soil • Filamentous Fungi • Tree Survey: Point-Centered Quarter Sampling Method • Visualizing Soil Microorganisms via the Contact Slide Assay and Microscopy
PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY	II-A.2a.	<p>Ecosystems: Describe how organisms cooperate and compete in ecosystems (e.g., producers, decomposers, herbivores, carnivores, omnivores, predator-prey, symbiosis, mutualism).</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Analysis of Earthworm Populations in Soil • Bacterial Growth Curve Analysis and its Environmental Applications • Culturing and Enumerating Bacteria from Soil Samples • Filamentous Fungi • Tree Identification: How To Use a Dichotomous Key • Tree Survey: Point-Centered Quarter Sampling Method • Using GIS to Investigate Urban Forestry • Visualizing Soil Microorganisms via the Contact Slide Assay and Microscopy • Zebrafish Maintenance and Husbandry
PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY	II-A.3a.	<p>Ecosystems: Understand and describe how available resources limit the amount of life an ecosystem can support (e.g., energy, water, oxygen, nutrients).</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 Zebrafish: Danio rerio • Basic Care Procedures • Basic Chick Care and Maintenance • Basic Mouse Care and Maintenance • C. elegans Development and Reproduction • C. elegans Maintenance • Chick ex ovo Culture

		<ul style="list-style-type: none"> • Culturing and Enumerating Bacteria from Soil Samples • Determination of Moisture Content in Soil • Development of the Chick • Dissolved Oxygen in Surface Water • Drosophila Development and Reproduction • Drosophila Maintenance • Filamentous Fungi • Fundamentals of Breeding and Weaning • Isolating Nucleic Acids from Yeast • Lead Analysis of Soil Using Atomic Absorption Spectroscopy • Nutrients in Aquatic Ecosystems • Passaging Cells • Soil Nutrient Analysis: Nitrogen, Phosphorus, and Potassium • Visualizing Soil Microorganisms via the Contact Slide Assay and Microscopy • Yeast Maintenance • Yeast Reproduction • Yeast Transformation and Cloning • Zebrafish Breeding and Embryo Handling • Zebrafish Maintenance and Husbandry • Zebrafish Reproduction and Development
<p>PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY</p>	<p>II-A.4a.</p>	<p>Ecosystems: Critically analyze how humans modify and change ecosystems (e.g., harvesting, pollution, population growth, technology).</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 • Introduction to Mass Spectrometry • 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
<p>PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY</p>	<p>II-A.5a.</p>	<p>Energy Flow in the Environment: Explain how matter and energy flow through biological systems (e.g., organisms, communities, ecosystems), and how the total amount of matter and energy is conserved but some energy is always released as heat to the environment.</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

		<ul style="list-style-type: none"> • Analysis of Earthworm Populations in Soil • Bacterial Growth Curve Analysis and its Environmental Applications • C. elegans Maintenance • Carbon and Nitrogen Analysis of Environmental Samples • Culturing and Enumerating Bacteria from Soil Samples • Dissolved Oxygen in Surface Water • Filamentous Fungi • Quantifying Environmental Microorganisms and Viruses Using qPCR • RNA Analysis of Environmental Samples Using RT-PCR • Zebrafish Maintenance and Husbandry • Zebrafish Reproduction and Development
PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY	II-A.7a.	<p>Energy Flow in the Environment: Understand and explain the principles of photosynthesis (i.e., chloroplasts in plants convert light energy, carbon dioxide, and water into chemical energy).</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Introduction to Cell Metabolism
PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY	II-A.8a.	<p>Biodiversity: Understand and explain the hierarchical classification scheme (i.e., domain, kingdom, phylum, class, order, family, genus, species), including: classification of an organism into a category; similarity inferred from molecular structure (DNA) closely matching classification based on anatomical similarities; similarities of organisms reflecting evolutionary relationships.</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 • Tree Identification: How To Use a Dichotomous Key
PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY	II-A.9a.	<p>Biodiversity: Understand variation within and among species, including: mutations and genetic drift; factors affecting the survival of an organism; natural selection.</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 Cognition • An Introduction to Developmental Genetics • An Introduction to Drosophila melanogaster • An Introduction to Learning and Memory • An Introduction to Modeling Behavioral Disorders and Stress • An Introduction to Saccharomyces cerevisiae

		<ul style="list-style-type: none"> • 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 Genetics and Disease • Analysis of Earthworm Populations in Soil • Basic Chick Care and Maintenance • Basic Mouse Care and Maintenance • C. elegans Chemotaxis Assay • C. elegans Development and Reproduction • Development of the Chick • Drosophila Development and Reproduction • Drosophila Maintenance • Fear Conditioning • Genetic Engineering of Model Organisms • Genetic Screens • Isolating Nucleic Acids from Yeast • Passaging Cells • Positive Reinforcement Studies • SNP Genotyping • Spatial Memory Testing Using Mazes • The TUNEL Assay • Tree Identification: How To Use a Dichotomous Key • Tree Survey: Point-Centered Quarter Sampling Method • Yeast Maintenance • Yeast Reproduction • Zebrafish Maintenance and Husbandry
STRAND / CONTENT STANDARD	NM.II.	The Content of Science: Life Science: Understand the properties, structures, and processes of living things and the interdependence of living things and their environments.
BENCHMARK / STANDARD	II-B.	Understand the genetic basis for inheritance and the basic concepts of biological evolution.
PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY	II-B.1a.	<p>Genetics: Know how DNA carries all genetic information in the units of heredity called genes, including: the structure of DNA (e.g., subunits A, G, C, T); information-preserving replication of DNA; alteration of genes by inserting, deleting, or substituting parts of DNA.</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 Cellular and Molecular Neuroscience • 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 *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 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**
- **Method of Standard Addition**
- **Molecular Cloning**
- **Mouse Genotyping**
- **PCR: The Polymerase Chain Reaction**
- **Passaging Cells**
- **Photometric Protein Determination**
- **Plasmid Purification**
- **Protein Crystallization**

		<ul style="list-style-type: none"> • 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 • Yeast Maintenance • Yeast Transformation and Cloning • Zebrafish Breeding and Embryo Handling
<p>PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY</p>	<p>II-B.2a.</p>	<p>Genetics: Use appropriate vocabulary to describe inheritable traits (i.e., genotype, phenotype).</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 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 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 Sample Preparation for Light Microscopy**
- **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**
- **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**
- **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 Mass in the Laboratory**
- **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 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
- Regulating Temperature in the Lab: Applying Heat
- Regulating Temperature in the Lab: Preserving Samples Using Cold
- 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
- 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

PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY	II-B.3a.	<p>Genetics: Explain the concepts of segregation, independent assortment, and dominant/recessive alleles.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Introduction to Developmental Genetics • Genetic Crosses
PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY	II-B.4a.	<p>Genetics: Identify traits that can and cannot be inherited.</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 Developmental Genetics • An Introduction to Drosophila melanogaster • An Introduction to Molecular Developmental Biology • 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 • 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 • Expression Profiling with Microarrays • Fate Mapping • Fundamentals of Breeding and Weaning • Gene Silencing with Morpholinos • Genetic Crosses • Genetic Engineering of Model Organisms • Genetic Screens

		<ul style="list-style-type: none"> • Genome Editing • In ovo Electroporation of Chicken Embryos • Induced Pluripotency • Invertebrate Lifespan Quantification • Isolating Nucleic Acids from Yeast • Mouse Genotyping • Neuronal Transfection Methods • Primary Neuronal Cultures • RNA-Seq • RNAi in <i>C. elegans</i> • Recombineering and Gene Targeting • SNP Genotyping • Testing For Genetically Modified Foods • 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
<p>PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY</p>	<p>II-B.5a.</p>	<p>Genetics: Know how genetic variability results from the recombination and mutation of genes, including: sorting and recombination of genes in sexual reproduction result in a change in DNA that is passed on to offspring; radiation or chemical substances can cause mutations in cells, resulting in a permanent change in DNA.</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 Developmental Genetics • An Introduction to <i>Drosophila melanogaster</i> • An Introduction to Modeling Behavioral Disorders and Stress • An Introduction to <i>Saccharomyces cerevisiae</i> • An Introduction to Transfection • An Introduction to the Zebrafish: <i>Danio rerio</i> • 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

<p>PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY</p>	<p>II-B.6a.</p>	<p>Genetics: Understand the principles of sexual and asexual reproduction, including meiosis and mitosis.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Introduction to <i>Caenorhabditis elegans</i> • An Introduction to Cell Division • An Introduction to Developmental Genetics • An Introduction to <i>Saccharomyces cerevisiae</i> • An Introduction to the Chick: <i>Gallus gallus domesticus</i> • An Introduction to the Zebrafish: <i>Danio rerio</i> • <i>C. elegans</i> Development and Reproduction • Cell Cycle Analysis • Development and Reproduction of the Laboratory Mouse • Development of the Chick • <i>Drosophila</i> Development and Reproduction • <i>Drosophila melanogaster</i> Embryo and Larva Harvesting and Preparation • Fundamentals of Breeding and Weaning • Genetic Crosses • Genetic Screens • Live Cell Imaging of Mitosis • Recombineering and Gene Targeting • Yeast Maintenance • Yeast Reproduction • Yeast Transformation and Cloning • Zebrafish Breeding and Embryo Handling • Zebrafish Reproduction and Development
<p>PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY</p>	<p>II-B.7a.</p>	<p>Genetics: Know that most cells in the human body contain 23 pairs of chromosomes including one pair that determines sex, and that human females have two X chromosomes and human males have an X and a Y chromosome.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Introduction to Cell Division • An Introduction to Cognition • An Introduction to Modeling Behavioral Disorders and Stress • An Introduction to <i>Saccharomyces cerevisiae</i> • An Introduction to Stem Cell Biology • An Overview of Epigenetics • An Overview of Genetic Analysis • An Overview of Genetics and Disease • <i>C. elegans</i> Development and Reproduction • Chromatin Immunoprecipitation • Cytogenetics • DNA Methylation Analysis • Embryonic Stem Cell Culture and Differentiation • Genetic Screens • Genome Editing

		<ul style="list-style-type: none"> • Recombineering and Gene Targeting • SNP Genotyping
PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY	II-B.8a.	<p>Biological Evolution: Describe the evidence for the first appearance of life on Earth as one-celled organisms, over 3.5 billion years ago, and for the later appearance of a diversity of multicellular organisms over millions of years.</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
PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY	II-B.9a.	<p>Biological Evolution: Critically analyze the data and observations supporting the conclusion that the species living on Earth today are related by descent from the ancestral one-celled organisms.</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
PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY	II-B.10a.	<p>Biological Evolution: Understand the data, observations, and logic supporting the conclusion that species today evolved from earlier, distinctly different species, originating from the ancestral one-celled organisms.</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
PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY	II-B.11a.	<p>Biological Evolution: Understand that evolution is a consequence of many factors, including the ability of organisms to reproduce, genetic variability, the effect of limited resources, and natural selection.</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 Saccharomyces cerevisiae • An Introduction to Transfection • An Introduction to the Chick: Gallus gallus domesticus • An Introduction to the Zebrafish: Danio rerio • An Overview of Epigenetics • An Overview of Gene Expression

		<ul style="list-style-type: none"> • 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
PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY	II-B.12a.	<p>Biological Evolution: Explain how natural selection favors individuals who are better able to survive, reproduce, and leave offspring.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Overview of Genetic Analysis
PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY	II-B.13a.	<p>Biological Evolution: Analyze how evolution by natural selection and other mechanisms explains many phenomena including the fossil record of ancient life forms and similarities (both physical and molecular) among different species.</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
STRAND / CONTENT STANDARD	NM.II.	The Content of Science: Life Science: Understand the properties, structures, and processes of living things and the interdependence of living things and their environments.
BENCHMARK / STANDARD	II-C.	Understand the characteristics, structures, and functions of cells.
PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY	II-C.1a.	<p>Structure and Function: Know that cells are made of proteins composed of combinations of amino acids.</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 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 Saccharomyces cerevisiae • An Introduction to Stem Cell Biology • 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 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
- C. elegans Maintenance
- Calcium Imaging in Neurons
- Cell Cycle Analysis
- Cell-surface Biotinylation Assay
- 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
- Detecting Reactive Oxygen Species
- Development and Reproduction of the Laboratory Mouse
- Development of the Chick
- Drosophila melanogaster Embryo and Larva Harvesting and Preparation
- Electro-encephalography (EEG)
- Electrophoretic Mobility Shift Assay (EMSA)
- 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
- Förster Resonance Energy Transfer (FRET)
- Gel Purification
- Gene Silencing with Morpholinos
- Genetic Crosses
- Genetic Engineering of Model Organisms
- Genetic Screens
- Genome Editing
- Histological Staining of Neural Tissue
- In ovo Electroporation of Chicken Embryos
- Induced Pluripotency
- Invasion Assay Using 3D Matrices
- Invertebrate Lifespan Quantification
- Isolating Nucleic Acids from Yeast
- Live Cell Imaging of Mitosis

		<ul style="list-style-type: none"> • Metabolic Labeling • Molecular Cloning • Mouse Genotyping • Murine In Utero Electroporation • Neuronal Transfection Methods • PCR: The Polymerase Chain Reaction • Passaging Cells • Patch Clamp Electrophysiology • Photometric Protein Determination • 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 • SNP Genotyping • Spectrophotometric Determination of an Equilibrium Constant • 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 • Ultraviolet-Visible (UV-Vis) Spectroscopy • 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
<p>PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY</p>	<p>II-C.2a.</p>	<p>Structure and Function: Know that specialized structures inside cells in most organisms carry out different functions, including: parts of a cell and their functions (e.g., nucleus, chromosomes, plasma, and mitochondria); storage of genetic material in DNA; similarities and differences between plant and animal cells; prokaryotic and eukaryotic cells.</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 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 *Saccharomyces cerevisiae*
- An Introduction to Stem Cell Biology
- An Introduction to Transfection
- An Overview of Gene Expression
- An Overview of Genetic Analysis
- An Overview of Genetic Engineering
- 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
- *C. elegans* Development and Reproduction
- Calcium Imaging in Neurons
- Cell Cycle Analysis
- Cell-surface Biotinylation Assay
- Culturing and Enumerating Bacteria from Soil Samples
- Cytogenetics
- DNA Ligation Reactions
- Density Gradient Ultracentrifugation
- Detecting Reactive Oxygen Species
- Electro-encephalography (EEG)
- Electrophoretic Mobility Shift Assay (EMSA)
- Embryonic Stem Cell Culture and Differentiation
- Enzyme Assays and Kinetics
- Explant Culture of Neural Tissue
- FM Dyes in Vesicle Recycling
- Förster Resonance Energy Transfer (FRET)
- Gene Silencing with Morpholinos
- Genetic Crosses
- Histological Staining of Neural Tissue
- In ovo Electroporation of Chicken Embryos
- Induced Pluripotency
- Invasion Assay Using 3D Matrices
- Isolating Nucleic Acids from Yeast
- Live Cell Imaging of Mitosis
- Metabolic Labeling
- Molecular Cloning
- Murine In Utero Electroporation
- Neuronal Transfection Methods
- Passaging Cells
- Patch Clamp Electrophysiology
- Plasmid Purification
- Primary Neuronal Cultures

		<ul style="list-style-type: none"> • Protein Crystallization • Recombineering and Gene Targeting • Reconstitution of Membrane Proteins • Restriction Enzyme Digests • Surface Plasmon Resonance (SPR) • The ATP Bioluminescence Assay • The TUNEL Assay • The Transwell Migration Assay • The Western Blot • Tissue Regeneration with Somatic Stem Cells • Whole-Mount In Situ Hybridization • Yeast Maintenance • Yeast Reproduction • Yeast Transformation and Cloning
<p>PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY</p>	<p>II-C.3a.</p>	<p>Structure and Function: Describe the mechanisms for cellular processes (e.g., energy production and storage, transport of molecules, waste disposal, synthesis of new molecules).</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 Cellular and Molecular Neuroscience • An Introduction to Developmental Neurobiology • An Introduction to Endocytosis and Exocytosis • An Introduction to Molecular Developmental Biology • An Introduction to Neurophysiology • An Introduction to Saccharomyces cerevisiae • An Introduction to Stem Cell Biology • An Introduction to Transfection • Annexin V and Propidium Iodide Labeling • Bacterial Growth Curve Analysis and its Environmental Applications • Bacterial Transformation: Electroporation • Bacterial Transformation: The Heat Shock Method • Biofuels: Producing Ethanol from Cellulosic Material • C. elegans Development and Reproduction • Calcium Imaging in Neurons • Cell Cycle Analysis • Cell-surface Biotinylation Assay • Cytogenetics • DNA Ligation Reactions • Detecting Reactive Oxygen Species • Electrophoretic Mobility Shift Assay (EMSA) • Embryonic Stem Cell Culture and Differentiation • Enzyme Assays and Kinetics • Explant Culture of Neural Tissue • FM Dyes in Vesicle Recycling • Förster Resonance Energy Transfer (FRET)

		<ul style="list-style-type: none"> • Gene Silencing with Morpholinos • Genetic Crosses • Histological Staining of Neural Tissue • In ovo Electroporation of Chicken Embryos • Induced Pluripotency • Invasion Assay Using 3D Matrices • Isolating Nucleic Acids from Yeast • Live Cell Imaging of Mitosis • Metabolic Labeling • Molecular Cloning • Murine In Utero Electroporation • Neuronal Transfection Methods • Passaging Cells • Patch Clamp Electrophysiology • Plasmid Purification • Primary Neuronal Cultures • Recombineering and Gene Targeting • Reconstitution of Membrane Proteins • Restriction Enzyme Digests • Surface Plasmon Resonance (SPR) • The ATP Bioluminescence Assay • The TUNEL Assay • The Transwell Migration Assay • The Western Blot • Tissue Regeneration with Somatic Stem Cells • Whole-Mount In Situ Hybridization • Yeast Maintenance • Yeast Reproduction • Yeast Transformation and Cloning
<p>PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY</p>	<p>II-C.4a.</p>	<p>Structure and Function: Know how the cell membrane controls which ions and molecules enter and leave the cell based on membrane permeability and transport (i.e., osmosis, diffusion, active transport, passive transport).</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 Cellular and Molecular Neuroscience • An Introduction to Developmental Neurobiology • An Introduction to Endocytosis and Exocytosis • An Introduction to Neurophysiology • An Introduction to Transfection • Annexin V and Propidium Iodide Labeling • Bacterial Transformation: Electroporation • Bacterial Transformation: The Heat Shock Method • Calcium Imaging in Neurons • Cell Cycle Analysis • Cell-surface Biotinylation Assay • Detecting Reactive Oxygen Species • Electro-encephalography (EEG) • Explant Culture of Neural Tissue

		<ul style="list-style-type: none"> • FM Dyes in Vesicle Recycling • Histological Staining of Neural Tissue • In ovo Electroporation of Chicken Embryos • Live Cell Imaging of Mitosis • Murine In Utero Electroporation • Neuronal Transfection Methods • Patch Clamp Electrophysiology • Plasmid Purification • Primary Neuronal Cultures • Protein Crystallization • Reconstitution of Membrane Proteins • The TUNEL Assay • The Western Blot • Yeast Maintenance • Yeast Transformation and Cloning
<p>PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY</p>	<p>II-C.5a.</p>	<p>Structure and Function: Explain how cells differentiate and specialize during the growth of an organism, including: differentiation, regulated through the selected expression of different genes; specialized cells, response to stimuli (e.g., nerve cells, sense organs).</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 Motility and Migration • An Introduction to Cellular and Molecular Neuroscience • An Introduction to Developmental Genetics • An Introduction to Developmental Neurobiology • An Introduction to Molecular Developmental Biology • An Introduction to Organogenesis • 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 • C. elegans Development and Reproduction • Chick ex ovo Culture • Chromatin Immunoprecipitation • DNA Methylation Analysis • Development and Reproduction of the Laboratory Mouse • Development of the Chick • Drosophila Development and Reproduction • Drosophila Larval IHC • Drosophila melanogaster Embryo and Larva Harvesting and Preparation

		<ul style="list-style-type: none"> • Embryonic Stem Cell Culture and Differentiation • Explant Culture for Developmental Studies • Explant Culture of Neural Tissue • Expression Profiling with Microarrays • Fate Mapping • Gene Silencing with Morpholinos • 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 • Isolating Nucleic Acids from Yeast • Mouse Genotyping • Murine In Utero Electroporation • PCR: The Polymerase Chain Reaction • 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> • Rodent Stereotaxic Surgery • Testing For Genetically Modified Foods • The TUNEL Assay • Tissue Regeneration with Somatic Stem Cells • Transplantation Studies • Whole-Mount In Situ Hybridization • Yeast Maintenance • Yeast Transformation and Cloning • Zebrafish Breeding and Embryo Handling • Zebrafish Microinjection Techniques • Zebrafish Reproduction and Development
<p>PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY</p>	<p>II-C.6a.</p>	<p>Structure and Function: Know that DNA directs protein building (e.g., role of RNA).</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Overview of Epigenetics • An Overview of Gene Expression • Chromatin Immunoprecipitation • DNA Methylation Analysis • Detecting Reactive Oxygen Species • Electrophoretic Mobility Shift Assay (EMSA) • Expression Profiling with Microarrays • Gene Silencing with Morpholinos • Genome Editing • RNA Analysis of Environmental Samples Using RT-PCR • RNA-Seq • Whole-Mount In Situ Hybridization

<p>PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY</p>	<p>II-C.7a.</p>	<p>Biochemical Mechanisms: Describe how most cell functions involve chemical reactions, including: promotion or inhibition of biochemical reactions by enzymes; processes of respiration (e.g., energy production, ATP); communication from cell to cell by secretion of a variety of chemicals (e.g., hormones).</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Introduction to Cell Death • An Introduction to Cell Metabolism • An Introduction to Cellular and Molecular Neuroscience • Biofuels: Producing Ethanol from Cellulosic Material • Co-Immunoprecipitation and Pull-Down Assays • DNA Ligation Reactions • Detecting Reactive Oxygen Species • Electrophoretic Mobility Shift Assay (EMSA) • Enzyme Assays and Kinetics • Förster Resonance Energy Transfer (FRET) • Histological Staining of Neural Tissue • Introduction to Catalysis • Live Cell Imaging of Mitosis • Metabolic Labeling • Molecular Cloning • PCR: The Polymerase Chain Reaction • Restriction Enzyme Digests • The ATP Bioluminescence Assay • The ELISA Method • The TUNEL Assay
<p>STRAND / CONTENT STANDARD</p>	<p>NM.II.</p>	<p>The Content of Science: Earth and Space Science: Understand the structure of Earth, the solar system, and the universe, the interconnections among them, and the processes and interactions of Earth's systems.</p>
<p>BENCHMARK / STANDARD</p>	<p>II-A.</p>	<p>Examine the scientific theories of the origin, structure, contents, and evolution of the solar system and the universe, and their interconnections.</p>
<p>PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY</p>	<p>II-A.1a.</p>	<p>Understand the scale and contents of the universe, including: range of structures from atoms through astronomical objects to the universe; objects in the universe such as planets, stars, galaxies, and nebulae.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Using Topographic Maps to Generate Topographic Profiles
<p>PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY</p>	<p>II-A.5a.</p>	<p>Explain how objects in the universe emit different electromagnetic radiation and how this information is used.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Color Afterimages • Crowding

		<ul style="list-style-type: none"> • Determination Of Nox in Automobile Exhaust Using UV-VIS Spectroscopy • Finding Your Blind Spot and Perceptual Filling-in • Histological Sample Preparation for Light Microscopy • Inattentive 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
STRAND / CONTENT STANDARD	NM.II.	The Content of Science: Earth and Space Science: Understand the structure of Earth, the solar system, and the universe, the interconnections among them, and the processes and interactions of Earth's systems.
BENCHMARK / STANDARD	II-B.	Examine the scientific theories of the origin, structure, energy, and evolution of Earth and its atmosphere, and their interconnections.
PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY	II-B.1a.	<p>Characteristics and Evolution of Earth: Describe the characteristics and the evolution of Earth in terms of the geosphere, the hydrosphere, the atmosphere, and the biosphere.</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 • Igneous Intrusive Rock • Making a Geologic Cross Section • Removal of Branched and Cyclic Compounds by Urea Adduction for Uk'37 Paleothermometry
PERFORMANCE STANDARD /	II-B.3a.	Characteristics and Evolution of Earth: Describe the internal structure of Earth (e.g., core, mantle, crust) and

BENCHMARK / PROFICIENCY		<p>the structure of Earth's plates.</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
PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY	II-B.4a.	<p>Characteristics and Evolution of Earth: Understand the changes in Earth's past and the investigative methods used to determine geologic time, including: rock sequences, relative dating, fossil correlation, and radiometric dating; geologic time scales, historic changes in life forms, and the evidence for absolute ages (e.g., radiometric methods, tree rings, paleomagnetism).</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 • Igneous Intrusive Rock • Making a Geologic Cross Section • Removal of Branched and Cyclic Compounds by Urea Adduction for Uk'37 Paleothermometry
PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY	II-B.5a.	<p>Characteristics and Evolution of Earth: Explain plate tectonic theory and understand the evidence that supports it.</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
PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY	II-B.7a.	<p>Energy in Earth's System: Describe convection as the mechanism for moving heat energy from deep within Earth to the surface and discuss how this process results in plate tectonics, including: geological manifestations (e.g., earthquakes, volcanoes, mountain building) that occur at plate boundaries; impact of plate motions on societies and the environment (e.g., earthquakes, volcanoes).</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Determining Spatial Orientation of Rock Layers with the Brunton Compass

		<ul style="list-style-type: none"> • Igneous Intrusive Rock • Igneous Volcanic Rock • Making a Geologic Cross Section • Using Topographic Maps to Generate Topographic Profiles
PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY	II-B.9a.	<p>Geochemical Cycles: Know that Earth's system contains a fixed amount of natural resources that cycle among land, water, the atmosphere, and living things (e.g., carbon and nitrogen cycles, rock cycle, water cycle, ground water, aquifers).</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 • 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 • Extraction of Biomarkers from Sediments - Accelerated Solvent Extraction • Filamentous Fungi • 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
PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY	II-B.10a.	<p>Geochemical Cycles: Describe the composition and structure of Earth's materials, including: the major rock types (i.e., sedimentary, igneous, metamorphic) and their formation; natural resources (e.g., minerals, petroleum) and their formation.</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

		<ul style="list-style-type: none"> • Carbon and Nitrogen Analysis of Environmental Samples • Conversion of Fatty Acid Methyl Esters by Saponification for Uk'37 Paleothermometry • Determination Of Nox in Automobile Exhaust Using UV-VIS Spectroscopy • Determination of Moisture Content in Soil • Dissolved Oxygen in Surface Water • Extraction of Biomarkers from Sediments - Accelerated Solvent Extraction • Igneous Intrusive Rock • Igneous Volcanic Rock • Lead Analysis of Soil Using Atomic Absorption Spectroscopy • Measuring Tropospheric Ozone • Nutrients in Aquatic Ecosystems • Physical Properties Of Minerals I: Crystals and Cleavage • Physical Properties Of Minerals II: Polymineralic Analysis • 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 • Turbidity and Total Solids in Surface Water
PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY	II-B.11a.	<p>Geochemical Cycles: Explain how layers of the atmosphere (e.g., ozone, ionosphere) change naturally and artificially.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Determination Of Nox in Automobile Exhaust Using UV-VIS Spectroscopy • Measuring Tropospheric Ozone
PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY	II-B.12a.	<p>Geochemical Cycles: Explain how the availability of ground water through aquifers can fluctuate based on multiple factors (i.e., rate of use, rate of replenishment, surface changes, and changes in temperature).</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Making a Geologic Cross Section
STRAND / CONTENT STANDARD	NM.III.	<p>Science and Society: Understand how scientific discoveries, inventions, practices, and knowledge influence, and are influenced by, individuals and societies.</p>

BENCHMARK / STANDARD	III-A.	Examine and analyze how scientific discoveries and their applications affect the world, and explain how societies influence scientific investigations and applications.
PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY	III-A.1a.	<p>Science and Technology: Know how science enables technology but also constrains it, and recognize the difference between real technology and science fiction (e.g., rockets vs. antigravity machines; nuclear reactors vs. perpetual-motion machines; medical X-rays vs. Star-Trek tricorders).</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 Alkenone Biomarker Analysis for Paleothermometry • An Overview of Epigenetics • An Overview of Genetic Analysis • An Overview of Genetic Engineering • An Overview of Genetics and Disease • An Overview of bGDGT Biomarker Analysis for Paleoclimatology • Anesthesia Induction and Maintenance • Annexin V and Propidium Iodide Labeling • Arterial Line Placement • Assembly of a Reflux System for Heated Chemical Reactions

- 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
- Calibration Curves
- Capillary Electrophoresis (CE)
- Carbon and Nitrogen Analysis of Environmental Samples
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- Cell-surface Biotinylation Assay
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- Central Venous Catheter Insertion: Internal Jugular with Ultrasound Guidance
- Central Venous Catheter Insertion: Subclavian Vein
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- Chromatography-Based Biomolecule Purification Methods
- Co-Immunoprecipitation and Pull-Down Assays
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- Coordination Chemistry Complexes
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- 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**
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- **Enzyme Assays and Kinetics**
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- **Expression Profiling with Microarrays**
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- **Gel Purification**
- **General Approach to the Physical Exam**
- **Genetic Crosses**
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- Genome Editing
- Gram Staining of Bacteria from Environmental Sources
- Growing Crystals for X-ray Diffraction Analysis
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- Histological Sample Preparation for Light Microscopy
- Histological Staining of Neural Tissue
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- Measuring Tropospheric Ozone
- Measuring Vital Signs
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- Method of Standard Addition
- Molecular Cloning
- Motion-induced Blindness
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- Motor Maps
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- 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)**
- **Performing 1D Thin Layer Chromatography**
- **Pericardiocentesis**
- **Peripheral Vascular Exam**
- **Peripheral Vascular Exam Using a Continuous Wave Doppler**
- **Peripheral Venous Cannulation**
- **Photometric Protein Determination**
- **Physical Properties Of Minerals I: Crystals and Cleavage**
- **Physical Properties Of Minerals II: Polymineralic Analysis**
- **Physiological Correlates of Emotion Recognition**
- **Plasmid Purification**
- **Positive Reinforcement Studies**
- **Preparing Anhydrous Reagents and Equipment**
- **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-Seq**
- **Raman Spectroscopy for Chemical Analysis**
- **Recombineering and Gene Targeting**
- **Reconstitution of Membrane Proteins**
- **Regulating Temperature in the Lab: Applying Heat**
- **Regulating Temperature in the Lab: Preserving Samples Using Cold**
- **Removal of Branched and Cyclic Compounds by Urea Adduction for Uk'37 Paleothermometry**
- **Respiratory Exam II: Percussion and Auscultation**
- **Restriction Enzyme Digests**
- **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**
- **Separating Protein with SDS-PAGE**
- **Separation of Mixtures via Precipitation**
- **Soil Nutrient Analysis: Nitrogen, Phosphorus, and Potassium**
- **Solid-Liquid Extraction**
- **Solutions and Concentrations**
- **Sonication Extraction of Lipid Biomarkers from**

		<p>Sediment</p> <ul style="list-style-type: none"> • Soxhlet Extraction of Lipid Biomarkers from Sediment • Spatial Cueing • 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 Attentional Blink • The ELISA Method • The Ideal Gas Law • The Rubber Hand Illusion • The TUNEL Assay • The Transwell Migration Assay • The Western Blot • Tissue Regeneration with Somatic Stem Cells • Transplantation Studies • 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 a pH Meter • Visual Attention: fMRI Investigation of Object-based Attentional Control • X-ray Fluorescence (XRF) • Yeast Transformation and Cloning • fMRI: Functional Magnetic Resonance Imaging
<p>PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY</p>	<p>III-A.2a.</p>	<p>Science and Technology: Understand how advances in technology enable further advances in science (e.g., microscopes and cellular structure; telescopes and understanding of the universe).</p> <p>JoVE</p> <ul style="list-style-type: none"> • Abdominal Exam I: Inspection and Auscultation • Abdominal Exam II: Percussion • 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

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- Blood Withdrawal I
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- **Calcium Imaging in Neurons**
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- **High-Performance Liquid Chromatography (HPLC)**
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- **Ideal Gas Law**
- **Inattentional Blindness**
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- **Live Cell Imaging of Mitosis**
- **MALDI-TOF Mass Spectrometry**
- **Making Solutions in the Laboratory**
- **Making a Geologic Cross Section**
- **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 Vital Signs**
- **Metabolic Labeling**
- **Method of Standard Addition**
- **Molecular Cloning**
- **Motion-induced Blindness**
- **Motor Exam II**
- **Motor Maps**
- **Murine In Utero Electroporation**
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- Piaget's Conservation Task and the Influence of Task Demands
- Plasmid Purification
- Positive Reinforcement Studies
- Preparing Anhydrous Reagents and Equipment
- 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-Seq
- Raman Spectroscopy for Chemical Analysis
- Recombineering and Gene Targeting
- Reconstitution of Membrane Proteins
- Regulating Temperature in the Lab: Applying Heat
- Regulating Temperature in the Lab: Preserving Samples Using Cold
- Removal of Branched and Cyclic Compounds by Urea Adduction for Uk'37 Paleothermometry
- Respiratory Exam II: Percussion and Auscultation
- Restriction Enzyme Digests
- 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
- Separating Protein with SDS-PAGE
- Separation of Mixtures via Precipitation
- Soil Nutrient Analysis: Nitrogen, Phosphorus, and Potassium
- Solid-Liquid Extraction

		<ul style="list-style-type: none"> • Solutions and Concentrations • Sonication Extraction of Lipid Biomarkers from Sediment • Soxhlet Extraction of Lipid Biomarkers from Sediment • Spatial Cueing • 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 Attentional Blink • The ELISA Method • The Ideal Gas Law • The Rubber Hand Illusion • The Split Brain • The TUNEL Assay • The Transwell Migration Assay • The Western Blot • Tissue Regeneration with Somatic Stem Cells • Transplantation Studies • 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 a pH Meter • Visual Attention: fMRI Investigation of Object-based Attentional Control • Visualizing Soil Microorganisms via the Contact Slide Assay and Microscopy • X-ray Fluorescence (XRF) • Yeast Transformation and Cloning • fMRI: Functional Magnetic Resonance Imaging
<p>PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY</p>	<p>III-A.3a.</p>	<p>Science and Technology: Evaluate the influences of technology on society (e.g., communications, petroleum, transportation, nuclear energy, computers, medicine, genetic engineering) including both desired and undesired effects, and including some historical examples (e.g., the wheel, the plow, the printing press, the lightning rod).</p> <p><u>JoVE</u></p>

- **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 Alkenone Biomarker Analysis for Paleothermometry**
- **An Overview of Epigenetics**
- **An Overview of Genetic Analysis**
- **An Overview of Genetic Engineering**
- **An Overview of Genetics and Disease**
- **An Overview of bGDGT Biomarker Analysis for Paleoclimatology**
- **Anesthesia Induction and Maintenance**
- **Annexin V and Propidium Iodide Labeling**
- **Arterial Line Placement**
- **Assembly of a Reflux System for Heated Chemical Reactions**
- **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
- Calibration Curves
- Capillary Electrophoresis (CE)
- Carbon and Nitrogen Analysis of Environmental Samples
- 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
- 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
- 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

- 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
- Diagnostic Necropsy and Tissue Harvest
- Dialysis: Diffusion Based Separation
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- Event-related Potentials and the Oddball Task
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- FM Dyes in Vesicle Recycling
- Fate Mapping
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- Finding Your Blind Spot and Perceptual Filling-in
- Fractional Distillation
- Freezing-Point Depression to Determine an Unknown Compound
- Förster Resonance Energy Transfer (FRET)
- Gas Chromatography (GC) with Flame-Ionization Detection
- 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
- Growing Crystals for X-ray Diffraction Analysis
- High-Performance Liquid Chromatography (HPLC)
- Histological Sample Preparation for Light Microscopy
- Histological Staining of Neural Tissue
- Ideal Gas Law
- Induced Pluripotency

- Internal Standards
- Intra-articular Shoulder Injection for Reduction Following Anterior Shoulder Dislocation
- Intraosseous Needle Placement
- Introduction to Catalysis
- Introduction to Fluorescence Microscopy
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- Introduction to Mass Spectrometry
- Introduction to Serological Pipettes and Pipettors
- Introduction to Titration
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- Invasion Assay Using 3D Matrices
- Ion-Exchange Chromatography
- Isolation of Fecal Bacteria from Water Samples by Filtration
- Language: The N400 in Semantic Incongruity
- Le Châtelier's Principle
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- Live Cell Imaging of Mitosis
- MALDI-TOF Mass Spectrometry
- Making Solutions in the Laboratory
- Measuring Grey Matter Differences with Voxel-based Morphometry: The Musical Brain
- Measuring Mass in the Laboratory
- Measuring Tropospheric Ozone
- Measuring Vital Signs
- Metabolic Labeling
- Method of Standard Addition
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- 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
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- Nutrients in Aquatic Ecosystems
- 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)
- Performing 1D Thin Layer Chromatography
- Pericardiocentesis

- Peripheral Vascular Exam
- Peripheral Vascular Exam Using a Continuous Wave Doppler
- Peripheral Venous Cannulation
- Photometric Protein Determination
- Physical Properties Of Minerals I: Crystals and Cleavage
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<p>PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY</p>	<p>III-A.4a.</p>	<p>Science and Technology: Understand the scientific foundations of common technologies (e.g., kitchen appliances, radio, television, aircraft, rockets, computers, medical X-rays, selective breeding, fertilizers and pesticides, agricultural equipment).</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

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- **Cranial Nerves Exam I (I-VI)**
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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

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- Diagnostic Necropsy and Tissue Harvest
- Dialysis: Diffusion Based Separation
- Dissolved Oxygen in Surface Water
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- Electrochemical Measurements of Supported Catalysts Using a Potentiostat/Galvanostat
- Electrophoretic Mobility Shift Assay (EMSA)
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- Emergency Tube Thoracostomy (Chest Tube Placement)
- Emergent Lateral Canthotomy and Inferior Catholysis
- Enzyme Assays and Kinetics
- Event-related Potentials and the Oddball Task
- 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
- Finding Your Blind Spot and Perceptual Filling-in
- Fractional Distillation
- Freezing-Point Depression to Determine an Unknown Compound
- Fundamentals of Breeding and Weaning
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- Gas Chromatography (GC) with Flame-Ionization Detection
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- Genetic Engineering of Model Organisms
- Genetic Screens
- Genome Editing
- Gram Staining of Bacteria from Environmental Sources
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- Measuring Vital Signs
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- Mouse Genotyping
- Murine In Utero Electroporation
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- Neuronal Transfection Methods
- Nose, Sinuses, Oral Cavity and Pharynx Exam
- Nuclear Magnetic Resonance (NMR) Spectroscopy
- Nutrients in Aquatic Ecosystems
- Object Substitution Masking
- Ophthalmoscopic Examination
- PCR: The Polymerase Chain Reaction
- Passaging Cells
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- 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
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- Physical Properties Of Minerals I: Crystals and Cleavage
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- Purification of a Total Lipid Extract with Column Chromatography
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<p>PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY</p>	<p>III-A.5a.</p>	<p>Science and Technology: Understand that applications of genetics can meet human needs and can create new problems (e.g., agriculture, medicine, cloning).</p> <p>JoVE</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 Cognition • An Introduction to Developmental Genetics • An Introduction to Developmental Neurobiology • An Introduction to Drosophila melanogaster

- An Introduction to Molecular Developmental Biology
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- An Introduction to the Chick: *Gallus gallus domesticus*
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- *C. elegans* Development and Reproduction
- *C. elegans* Maintenance
- Cell Cycle Analysis
- Chick ex ovo Culture
- Chromatin Immunoprecipitation
- Cytogenetics
- DNA Gel Electrophoresis
- DNA Ligation Reactions
- 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
- Electrophoretic Mobility Shift Assay (EMSA)
- Embryonic Stem Cell Culture and Differentiation
- Explant Culture for Developmental Studies
- Explant Culture of Neural Tissue
- Expression Profiling with Microarrays
- Fate Mapping
- Fundamentals of Breeding and Weaning
- Gel Purification
- Gene Silencing with Morpholinos
- Genetic Crosses
- Genetic Engineering of Model Organisms
- Genetic Screens

		<ul style="list-style-type: none"> • Genome Editing • In ovo Electroporation of Chicken Embryos • Induced Pluripotency • Introduction to the Microplate Reader • Invertebrate Lifespan Quantification • 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 • 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 C. elegans • Recombineering and Gene Targeting • Restriction Enzyme Digests • Rodent Stereotaxic Surgery • SNP Genotyping • Separating Protein with SDS-PAGE • Solid-Liquid Extraction • Spatial Memory Testing Using Mazes • Spectrophotometric Determination of an Equilibrium Constant • Testing For Genetically Modified Foods • The ELISA Method • The TUNEL Assay • The Western Blot • Tissue Regeneration with Somatic Stem Cells • Transplantation Studies • Two-Dimensional Gel Electrophoresis • 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
<p>PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY</p>	<p>III-A.6a.</p>	<p>Science and Technology: Analyze the impact of digital technologies on the availability, creation, and dissemination of information.</p> <p>JoVE</p> <ul style="list-style-type: none"> • Using GIS to Investigate Urban Forestry

<p>PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY</p>	<p>III-A.7a.</p>	<p>Science and Technology: Describe how human activities have affected ozone in the upper atmosphere and how it affects health and the environment.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Determination Of Nox in Automobile Exhaust Using UV-VIS Spectroscopy • Dissolved Oxygen in Surface Water • Gas Chromatography (GC) with Flame-Ionization Detection • Introduction to Mass Spectrometry • Lead Analysis of Soil Using Atomic Absorption Spectroscopy • Measuring Tropospheric Ozone • Nutrients in Aquatic Ecosystems • Turbidity and Total Solids in Surface Water • Using GIS to Investigate Urban Forestry • Water Quality Analysis via Indicator Organisms
<p>PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY</p>	<p>III-A.8a.</p>	<p>Science and Technology: Describe uses of radioactivity (e.g., nuclear power, nuclear medicine, radiometric dating).</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Nuclear Magnetic Resonance (NMR) Spectroscopy
<p>PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY</p>	<p>III-A.9a.</p>	<p>Science and Society: Describe how scientific knowledge helps decision makers with local, national, and global challenges (e.g., Waste Isolation Pilot Project [WIPP], mining, drought, population growth, alternative energy, climate change).</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • An Introduction to Organogenesis • An Introduction to Saccharomyces cerevisiae • Biofuels: Producing Ethanol from Cellulosic Material • 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 • Embryonic Stem Cell Culture and Differentiation • Ethics in Psychology Research • Freezing-Point Depression to Determine an Unknown Compound • Introduction to Mass Spectrometry • Le Châtelier's Principle • Lead Analysis of Soil Using Atomic Absorption Spectroscopy • Measuring Tropospheric Ozone • Nutrients in Aquatic Ecosystems • Passaging Cells

		<ul style="list-style-type: none"> • Raman Spectroscopy for Chemical Analysis • Realism in Experimentation • Reliability in Psychology Experiments • Self-administration Studies • Self-report vs. Behavioral Measures of Recycling • Solid-Liquid Extraction • Testing For Genetically Modified Foods • Turbidity and Total Solids in Surface Water • Using a pH Meter
<p>PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY</p>	<p>III-A.10a.</p>	<p>Science and Society: Describe major historical changes in scientific perspectives (e.g., atomic theory, germs, cosmology, relativity, plate tectonics, evolution) and the experimental observations that triggered them.</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 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 • Color Afterimages • Degassing Liquids with Freeze-Pump-Thaw Cycling • Determining Spatial Orientation of Rock Layers with the Brunton Compass • Development of the Chick • General Approach to the Physical Exam

		<ul style="list-style-type: none"> • Genetic Crosses • Ideal Gas Law • Inattentive Blindness • Invasion Assay Using 3D Matrices • Le Châtelier's Principle • Making a Geologic Cross Section • Measuring Reaction Time and Donders' Method of Subtraction • Motion-induced Blindness • Object Substitution Masking • Passaging Cells • Percussion • Perspectives on Experimental Psychology • Perspectives on Neuropsychology • Perspectives on Sensation and Perception • Piaget's Conservation Task and the Influence of Task Demands • Rotary Evaporation to Remove Solvent • Schlenk Lines Transfer of Solvents • Spatial Cueing • The Attentional Blink • The Ideal Gas Law • The Rubber Hand Illusion • The Split Brain • The Transwell Migration Assay • Visualizing Soil Microorganisms via the Contact Slide Assay and Microscopy
<p>PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY</p>	<p>III-A.11a.</p>	<p>Science and Society: Know that societal factors can promote or constrain scientific discovery (e.g., government funding, laws and regulations about human cloning and genetically modified organisms, gender and ethnic bias, AIDS research, alternative-energy research).</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 the Chick: *Gallus gallus domesticus*
- An Introduction to the Laboratory Mouse: *Mus musculus*
- 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**
- **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 Confedrate
- 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 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 Mass Spectrometry**
- **Introduction to Titration**
- **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 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 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 Cognitive Psychology
- Perspectives on Experimental Psychology
- Perspectives on Neuropsychology
- 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
- 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
- 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)

		<ul style="list-style-type: none"> • 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
PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY	III-A.12a.	<p>Science and Society: Explain how societies can change ecosystems and how these changes can be reversible or irreversible.</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 • 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
PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY	III-A.13a.	<p>Science and Society: Describe how environmental, economic, and political interests impact resource management and use in New Mexico.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • Self-report vs. Behavioral Measures of Recycling
PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY	III-A.18a.	<p>Science and Individuals: Understand that scientists have characteristics in common with other individuals (e.g., employment and career needs, curiosity, desire to perform public service, greed, preconceptions and biases, temptation to be unethical, core values including honesty and openness).</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 Saccharomyces cerevisiae • An Introduction to Stem Cell Biology • An Introduction to the Chick: Gallus gallus domesticus

		<ul style="list-style-type: none"> • An Introduction to the Laboratory Mouse: <i>Mus musculus</i> • An Introduction to the Zebrafish: <i>Danio rerio</i> • 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 • Biofuels: Producing Ethanol from Cellulosic Material • 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 • Embryonic Stem Cell Culture and Differentiation • Ethics in Psychology Research • Freezing-Point Depression to Determine an Unknown Compound • Genetic Crosses • Ideal Gas Law • Introduction to Mass Spectrometry • Le Châtelier's Principle • Lead Analysis of Soil Using Atomic Absorption Spectroscopy • Measuring Tropospheric Ozone • Nutrients in Aquatic Ecosystems • Passaging Cells • Piaget's Conservation Task and the Influence of Task Demands • Raman Spectroscopy for Chemical Analysis • Realism in Experimentation • Reliability in Psychology Experiments • Rotary Evaporation to Remove Solvent • Self-administration Studies • Self-report vs. Behavioral Measures of Recycling • Solid-Liquid Extraction • Testing For Genetically Modified Foods • The Ideal Gas Law • Turbidity and Total Solids in Surface Water • Using a pH Meter
<p>PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY</p>	<p>III-A.19a.</p>	<p>Science and Individuals: Know that science plays a role in many different kinds of careers and activities (e.g., public service, volunteers, public office holders, researchers, teachers, doctors, nurses, technicians, farmers, ranchers).</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**
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- **An Introduction to Caenorhabditis elegans**
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- **An Introduction to Cell Division**
- **An Introduction to Cell Metabolism**
- **An Introduction to Cell Motility and Migration**
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- **Auscultation**
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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**
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- **Blood Pressure Measurement**
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- **Calcium Imaging in Neurons**
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- **Cardiac Exam II: Auscultation**
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- **Cell-surface Biotinylation Assay**
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- **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**
- **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
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- DNA Ligation Reactions
- DNA Methylation Analysis
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- Decoding Auditory Imagery with Multivoxel Pattern Analysis
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- 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
- 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
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- **Percutaneous Cricothyrotomy (Seldinger Technique)**
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- **Peripheral Vascular Exam**
- **Peripheral Vascular Exam Using a Continuous Wave Doppler**
- **Peripheral Venous Cannulation**
- **Perspectives on Cognitive Psychology**
- **Perspectives on Experimental Psychology**
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- **Perspectives on Sensation and Perception**
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- **Physical Properties Of Minerals I: Crystals and Cleavage**
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- **Physiological Correlates of Emotion Recognition**
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- Rodent Identification I
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- 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
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Grade: 9 - Adopted: 2012

STRAND / CONTENT STANDARD	NM.RST.9-10.	Reading Standards for Literacy in Science and Technical Subjects
BENCHMARK / STANDARD		Craft and Structure
PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY	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><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

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- 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**
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- An Overview of Alkenone Biomarker Analysis for Paleothermometry
- An Overview of Epigenetics
- An Overview of Gene Expression
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- An Overview of bGDGT Biomarker Analysis for Paleoclimatology
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- 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
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- Determining the Solubility Rules of Ionic Compounds
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- 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
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- Event-related Potentials and the Oddball Task
- Executive Function and the Dimensional Change Card Sort Task
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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
- 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
- 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
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- Motor Learning in Mirror Drawing
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- 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
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- 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
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- The Western Blot
- Thyroid Exam
- Tissue Regeneration with Somatic Stem Cells
- Transplantation Studies
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- Tree Survey: Point-Centered Quarter Sampling Method
- Turbidity and Total Solids in Surface Water
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- Understanding Concentration and Measuring Volumes
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- X-ray Fluorescence (XRF)
- Yeast Maintenance
- Yeast Reproduction

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STRAND / CONTENT STANDARD	NM.RST.9-10.	Reading Standards for Literacy in Science and Technical Subjects
BENCHMARK / STANDARD		Integration of Knowledge and Ideas
PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY	RST.9-10.7.	<p>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.</p> <p><u>JoVE</u></p> <ul style="list-style-type: none"> • 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 • 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 • Assembly of a Reflux System for Heated Chemical Reactions • Assessing Dexterity with Reaching Tasks • Bacterial Growth Curve Analysis and its Environmental Applications • Balance and Coordination Testing

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STRAND / CONTENT STANDARD	NM.WHST.9-10.	Writing Standards for Literacy in Science and Technical Subjects
BENCHMARK / STANDARD		Text Types and Purposes
PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY	WHST.9-10.1.	Write arguments focused on discipline-specific content.

PERFORMANCE STANDARD / INDICATOR	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
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PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY	WHST.9-10.2.	Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.
PERFORMANCE STANDARD / INDICATOR	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 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
PERFORMANCE STANDARD / INDICATOR	WHST.9-10.2(d)	<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

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- 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*
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- Basic Chick Care and Maintenance
- Basic Life Support Part II: Airway/Breathing and

		<p>Continued Cardiopulmonary Resuscitation</p> <ul style="list-style-type: none"> • 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)
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- **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
- 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

		<ul style="list-style-type: none"> • 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 / CONTENT STANDARD	NM.WHST.9-10.	Writing Standards for Literacy in Science and Technical Subjects
BENCHMARK / STANDARD		Text Types and Purposes
PERFORMANCE STANDARD / BENCHMARK / PROFICIENCY	WHST.9-10.3.	(See note; not applicable as a separate requirement)
PERFORMANCE STANDARD / INDICATOR	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

		<ul style="list-style-type: none">• The Multi-group Experiment• The Simple Experiment: Two-group Design• Within-subjects Repeated-measures Design
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