JOVE SCIENCE EDUCATION

Main Criteria: Hawaii Content and Performance Standards Secondary Criteria: JoVE Subject: Science Grade: 9-12 Correlation Options: Show Correlated Adopted: 2007

CONTENT STANDARD / COURSE	HI.SC.PS.	PHYSICAL SCIENCE
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.PS.2.	The Scientific Process: NATURE OF SCIENCE: Understand that science, technology, and society are interrelated
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Science, Technology, and Society
BENCHMARK EXPECTATION / TOPIC	SC.PS.2.1.	Explain how scientific advancements and emerging technologies have influenced society <u>JoVE</u> • Abdominal Exam I: Inspection and Auscultation • Abdominal Exam IV: Acute Abdominal Pain Assessment • An Overview of Alkenone Biomarker Analysis for Paleothermometry • An Overview of bGDGT Biomarker Analysis for Paleoclimatology • Auscultation • Biofuels: Producing Ethanol from Cellulosic Material • Conversion of Fatty Acid Methyl Esters by Saponification for Uk'37 Paleothermometry
		 Cranial Nerves Exam I (I-VI) Determination Of Nox in Automobile Exhaust Using UV-VIS Spectroscopy Determining Spatial Orientation of Rock Layers with the Brunton Compass Ear Exam Emergent Lateral Canthotomy and Inferior Catholysis Extraction of Biomarkers from Sediments - Accelerated Solvent Extraction Eye Exam Histological Sample Preparation for Light Microscopy

		 Introduction to Fluorescence Microscopy Introduction to Light Microscopy Introduction to Mass Spectrometry Lead Analysis of Soil Using Atomic Absorption Spectroscopy MALDI-TOF Mass Spectrometry Nuclear Magnetic Resonance (NMR) Spectroscopy Nutrients in Aquatic Ecosystems Object Substitution Masking Ophthalmoscopic Examination Percussion Peripheral Vascular Exam Using a Continuous Wave Doppler Proton Exchange Membrane Fuel Cells 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 Surface Plasmon Resonance (SPR) Tandem Mass Spectrometry The Staircase Procedure for Finding a Perceptual Threshold Turbidity and Total Solids in Surface Water X-ray Fluorescence (XRF)
EXPECTATION / TOPIC	SC.PS.2.2.	Compare the risks and benefits of potential solutions to technological issues
		Raman Spectroscopy for Chemical Analysis
CONTENT STANDARD / COURSE	HI.SC.PS.	PHYSICAL SCIENCE
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.PS.6.	Physical, Earth and Space Science: NATURE OF MATTER AND ENERGY: Understand the nature of matter and energy, forms of energy (including waves) and energy transformations, and their significance in understanding the structure of the universe
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Energy and its Transformation
EXPECTATION / TOPIC	SC.PS.6.1.	Describe endothermic and exothermic chemical reactions <u>JoVE</u> • Conducting Reactions Below Room Temperature • Determining Rate Laws and the Order of Reaction • Le Châtelier's Principle • Using Differential Scanning Calorimetry to Measure Changes in Enthalpy

EXPECTATION / TOPIC	SC.PS.6.4.	 Explain that changes in thermal energy can lead to a phase change of matter JoVE Assembly of a Reflux System for Heated Chemical Reactions Degassing Liquids with Freeze-Pump-Thaw Cycling Fractional Distillation Freezing-Point Depression to Determine an Unknown Compound Growing Crystals for X-ray Diffraction Analysis Preparing Anhydrous Reagents and Equipment Purifying Compounds by Recrystallization Rotary Evaporation to Remove Solvent Schlenk Lines Transfer of Solvents
		 Solid-Liquid Extraction Solutions and Concentrations Using Differential Scanning Calorimetry to Measure Changes in Enthalpy
CONTENT STANDARD / COURSE	HI.SC.PS.	PHYSICAL SCIENCE
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.PS.6.	Physical, Earth and Space Science: NATURE OF MATTER AND ENERGY: Understand the nature of matter and energy, forms of energy (including waves) and energy transformations, and their significance in understanding the structure of the universe
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Waves
EXPECTATION / TOPIC	SC.PS.6.6.	Explain and provide examples of electromagnetic radiation and sound using a wave model JoVE • Abdominal Exam II: Percussion • Auscultation • Ear Exam • Nuclear Magnetic Resonance (NMR) Spectroscopy • Percussion • Raman Spectroscopy for Chemical Analysis • The Staircase Procedure for Finding a Perceptual Threshold
CONTENT STANDARD / COURSE	HI.SC.PS.	PHYSICAL SCIENCE
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.PS.6.	Physical, Earth and Space Science: NATURE OF MATTER AND ENERGY: Understand the nature of matter and energy, forms of energy (including waves) and energy transformations, and their significance in understanding the structure of the universe

INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Nature of Matter
EXPECTATION / TOPIC	SC.PS.6.7.	Explain how elements are arranged in the periodic table and describe trends among elemental properties JoVE
		 Coordination Chemistry Complexes
EXPECTATION / TOPIC	SC.PS.6.8.	 Coordination Chemistry Complexes Describe interactions among molecules JoVE An Overview of Alkenone Biomarker Analysis for Paleothermometry An Overview of bGDGT Biomarker Analysis for Paleoclimatology Conducting Reactions Below Room Temperature Conversion of Fatty Acid Methyl Esters by Saponification for Uk'37 Paleothermometry Cyclic Voltammetry (CV) Determining the Solubility Rules of Ionic Compounds Electrochemical Measurements of Supported Catalysts Using a Potentiostat/Galvanostat Enzyme Assays and Kinetics Extraction of Biomarkers from Sediments - Accelerated Solvent Extraction Growing Crystals for X-ray Diffraction Analysis Introduction to Titration Le Châtelier's Principle Nuclear Magnetic Resonance (NMR) Spectroscopy Photometric Protein Determination Preparing Anhydrous Reagents and Equipment Proton Exchange Membrane Fuel Cells Purification of a Total Lipid Extract with Column Chromatography Purifying Compounds by Recrystallization Raman Spectroscopy for Chemical Analysis Removal of Branched and Cyclic Compounds by Urea Adduction for Uk'37 Paleothermometry Rotary Evaporation to Remove Solvent Separation of Mixtures via Precipitation Sonication Extraction of Lipid Biomarkers from Sediment Soxhlet Extraction of Lipid Biomarkers from Sediment The ELISA Method Ultraviolet-Visible (UV-Vis) Spectroscopy Using Differential Scanning Calorimetry to Measure Changes in Enthalow
		• Using a pH Meter
EXPECTATION / TOPIC	SC.PS.6.9.	Describe the factors that affect the rate of chemical reactions

		<u>JoVE</u> • 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
EXPECTATION / TOPIC	SC.PS.6.10.	Explain how atoms bond using valence electrons
	SC DS 6 11	JoVE • An Overview of Alkenone Biomarker Analysis for Paleothermometry • An Overview of bGDGT Biomarker Analysis for Paleoclimatology • Chromatography-Based Biomolecule Purification Methods • Column Chromatography • Conversion of Fatty Acid Methyl Esters by Saponification for Uk'37 Paleothermometry • Detecting Environmental Microorganisms with the Polymerase Chain Reaction and Gel Electrophoresis • Determining the Solubility Rules of lonic Compounds • Electrochemical Measurements of Supported Catalysts Using a Potentiostat/Galvanostat • Extraction of Biomarkers from Sediments - Accelerated Solvent Extraction • Gas Chromatography (GC) with Flame-Ionization Detection • Growing Crystals for X-ray Diffraction Analysis • High-Performance Liquid Chromatography (HPLC) • Ion-Exchange Chromatography • Preparing Anhydrous Reagents and Equipment • Purification of a Total Lipid Extract with Column Chromatography • Purifying Compounds by Recrystallization • Raman Spectroscopy for Chemical Analysis • Removal of Branched and Cyclic Compounds by Urea Adduction for Uk'37 Paleothermometry • Solid-Liquid Extraction • Sonication Extraction of Lipid Biomarkers from Sediment • Uritraviolet-Visible (UV-Vis) Spectroscopy • X-ray Fluorescence (XRF) Describe a variety of chemical reactions
EXPECTATION / TOPIC	36.23.0.11.	Describe a variety of chemical reactions

		JoVE • 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
CONTENT STANDARD / COURSE	HI.SC.PS.	PHYSICAL SCIENCE
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.PS.6.	Physical, Earth and Space Science: NATURE OF MATTER AND ENERGY: Understand the nature of matter and energy, forms of energy (including waves) and energy transformations, and their significance in understanding the structure of the universe
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Energy and its Transformation
EXPECTATION / TOPIC	SC.PS.6.12.	Describe nuclear reactions and how they produce energy <u>JoVE</u> • Nuclear Magnetic Resonance (NMR) Spectroscopy
CONTENT STANDARD / COURSE	HI.SC.BS.	BIOLOGICAL SCIENCE
STANDARD / PERFORMANCE INDICATOR / DOMAIN INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK	SC.BS.1.	The Scientific Process: SCIENTIFIC INVESTIGATION: Discover, invent, and investigate using the skills necessary to engage in the scientific process TOPIC: Scientific Inquiry
EXPECTATION / TOPIC	SC.BS.1.1.	Describe how a testable hypothesis may need to be revised to guide a scientific investigation

		JoVE • The Multi-group Experiment
		• The Simple Experiment: Two-group Design
EXPECTATION / TOPIC	SC.BS.1.2.	Design and safely implement an experiment, including the appropriate use of tools and techniques to organize, analyze, and validate data
		JoVE • Ethics in Psychology Research • Experimentation using a Confederate • From Theory to Design: The Role of Creativity in Designing Experiments • Manipulating an Independent Variable through Embodiment • Observational Research • Pilot Testing • Placebos in Research • Realism in Experimentation • Reliability in Psychology Experiments • The Factorial Experiment • The Multi-group Experiment
		The Simple Experiment: Two-group Design Within subjects Reported measures Design
CONTENT STANDARD / COURSE	HI.SC.BS.	BIOLOGICAL SCIENCE
STANDARD /	SC.BS.1.	The Scientific Process: SCIENTIFIC INVESTIGATION:
PERFORMANCE		Discover, invent, and investigate using the skills
		necessary to engage in the scientific process
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Scientific Knowledge
EXPECTATION / TOPIC	SC.BS.1.8.	Describe the importance of ethics and integrity in scientific investigation
		JoVE
		Ethics in Psychology Research
		 Experimentation using a Confederate From Theory to Design: The Bole of Creativity in
		Designing Experiments
		Manipulating an Independent Variable through
		Embodiment
		Observational Research Pilot Testing
		• Placebos in Research
		 Reliability in Psychology Experiments
		Self-report vs. Behavioral Measures of Recycling
		Ihe Factorial Experiment The Multi-group Experiment
		 The Multi-group Experiment The Simple Experiment: Two-group Design
		Within-subjects Reneated-measures Design

CONTENT STANDARD / COURSE	HI.SC.BS.	BIOLOGICAL SCIENCE
STANDARD / PERFORMANCE	SC.BS.2.	The Scientific Process: NATURE OF SCIENCE: Understand that science, technology, and society are interrelated
INDICATOR / DOMAIN		
INDICATOR / GRADE		TOPIC: Science, Technology, and Society
LEVEL EXPECTATION /		
BENCHMARK		
EXPECTATION / TOPIC	SC.BS.2.1.	Explain how scientific advancements and emerging
		technology have influenced society
		<u>JoVE</u>
		 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 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

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	 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
	• 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 Gare Procedures
	Basic Unick Gare and Maintenance Posic Life Support Port II, Airway (Proofbing and
	• Basic Life Support Part II: Airway/Breathing and
	Pasia Life Support: Cardionulmonary Resuscitation
	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 Assav
	• C. elegans Development and Reproduction
	• C. elegans Maintenance
	Calcium Imaging in Neurons
	• Capillary Electrophoresis (CE)
	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
	Community DNA Extraction from Bacterial Colonies
	Compound Administration I
	Compound Administration II
	Compound Administration III
	Compound Administration IV
	• Compound Administration IV
	• Comprehensive Breast Exam
	• Considerations for Rodent Surgery
	• 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 lowa 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)
	• Electrochemical Measurements of Supported Catalysts
	Using a Potentiostat/Galvanostat
	Embryonic Stem Cell Culture and Differentiation
	 Emergency Tube Thoracostomy (Chest Tube
	Placement)
	Emergent Lateral Canthotomy and Inferior Catholysis
	• Enzyme Assays and Kinetics
	 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
	• Explaint Culture of Neural Tissue
	• Eve Tracking in Cognitive Experiments
	• FM Dyes in Vesicle Becycling
	• Fate Manning
	• 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
	• Growing Crystals for X-ray Diffraction Analysis
	Habituation: Studying Infants Before They Can Talk
	• Hand and wrist Exam
	 Hip Exam Histological Staining of Neural Tissue
	How Children Solve Problems Using Causal Reasoning
	 In ovo Electronoration of Chicken Embryos
	Inattentional 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 Catalysis
	 Introduction to Mass Spectrometry
	 Introduction to Titration
	 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
	• Niee Exam
	- Language: The N400 III Semantic incongruity

	Learning and Memory: The Remember-Know Task
	Live Cell Imaging of Mitosis
	Lower Back Exam
	• Lymph Node Exam
	MALDI-TOF Mass Spectrometry
	Male Rectal Exam
	Manipulating an Independent Variable through
	Embodiment
	Measuring Children's Trust in Testimony
	Measuring Grev Matter Differences with Voxel-based
	Morphometry: The Musical Brain
	Measuring Reaction Time and Donders' Method of
	Subtraction
	Measuring Verbal Working Memory Span
	Measuring Vital Signs
	Memory Development: Demonstrating How Repeated
	Questioning Leads to False Memories
	Mental Rotation
	Metabolic Labeling
	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
	 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
 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
 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
 Realism in Experimentation
 Recombineering and Gene Targeting
 Reliability in Psychology Experiments
 Respiratory Exam I: Inspection and Palpation
 Respiratory Exam II: Percussion and Auscultation
Restriction Enzyme Digests
Rodent Handling and Restraint Techniques
Rodent Identification I
Rodent Identification II
Rodent Stereotaxic Surgery
• SNP Genotyping
Scanning Electron Microscopy (SEM)
• Self-administration Studies
• Self-report vs. Behavioral Measures of Recycling
Sensory Exam Sensory Exam
Separating Protein with SDS-PAGE Characterized Formula
Shoulder Exam I Chauddan Easan II
• Snoulder Exam II
 Solid-Liquía Extraction Solutione and Concentration
Solutions and Concentrations Substitute Constitutions
• Spatial Cueing

	 Spatial Memory Testing Using Mazes
	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 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
	 Using Diffusion Tensor Imaging in Traumatic Brain
	Iniury
	 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
	Whole-Mount In Situ Hybridization
	 Within-subjects Repeated-measures Design

		• Veast Maintenance
		Voast Poproduction
		Veget Transformation and Claring
		• reast transformation and Crohme Handling
		• Zebrahsh Breeding and Empryo Handling
		• Zebratish Maintenance and Husbandry
		Zebrafish Microinjection Techniques
		• Zebrafish Reproduction and Development
		• fMRI: Functional Magnetic Resonance Imaging
EXPECTATION / TOPIC	SC.BS.2.2.	Compare the risks and benefits of potential solutions to technological issues
		JoVE
		Abdominal Exam I: Inspection and Auscultation
		Abdominal Exam IV: Acute Abdominal Pain
		Assessment
		 Algae Enumeration via Culturable Methodology
		An Introduction to Aging and Regeneration
		An Introduction to Behavioral Neuroscience
		An Introduction to Cell Metabolism
		 An Introduction to Cognition
		 An Introduction to Endocytosis and Exocytosis
		 An Introduction to Learning and Memory
		An Introduction to Molecular Developmental Biology
		An Introduction to Motor Control
		 An Introduction to Neuroanatomy
		 An Introduction to Neurophysiology
		An Introduction to Organogenesis
		An Introduction to Saccharomyces cerevisiae
		An Introduction to Stem Cell Biology
		An Introduction to 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 Genetic Analysis
		An Overview of Genetic Engineering
		An Overview of Genetics and Disease
		Arterial Line Placement
		Assembly of a Reflux System for Heated Chemical
		Reactions
		Auscultation
		Bacterial Growth Curve Analysis and its Environmental
		Applications
		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
		• C. elegans Development and Reproduction
		Calcium Imaging in Neurons

	 Capillary Electrophoresis (CE)
	Cardiac Exam II: Auscultation
	 Cardiac Exam III: Abnormal Heart Sounds
	Central Venous Catheter Insertion: Femoral Vein with
	Illtrasound Guidance
	Central Venous Catheter Insertion: Internal Jugular
	with Ultrasound Guidanco
	Control Vanous Cathotox Insertion: Subalavian Vain
	• Central venous Catheter Insertion: Subclavian ven
	Chromatin Immunoprecipitation
	Chromatography-Based Biomolecule Purification
	Methods
	 Co-Immunoprecipitation and Pull-Down Assays
	 Column Chromatography
	 Community DNA Extraction from Bacterial Colonies
	 Coordination Chemistry Complexes
	 Cranial Nerves Exam I (I-VI)
	 Cranial Nerves Exam II (VII-XII)
	 Culturing and Enumerating Bacteria from Soil Samples
	Cyclic Voltammetry (CV)
	Cytogenetics
	DNA Ligation Reactions
	DNA Methylation Analysis
	Decision-making and the lowa Gambling Task
	Decoding Auditory Imagery with Multivoyel Pattern
	Analycic
	Detecting Reactive Ovygen Species
	Detecting neactive Oxygen opecies Detecting neactive Oxygen opecies
	Detection of Dattenophages in Livitonmental Samples Development and Poproduction of the Laboratory
	a Development of the Chiele
	• Development of the Chick
	• Ear Exam
	• Electro-encephalography (EEG)
	• Electrochemical Weasurements of Supported Catalysts
	Using a Potentiostat/Galvanostat
	• Embryonic Stem Cell Culture and Differentiation
	 Emergency Tube Thoracostomy (Chest Tube
	Placement)
	 Emergent Lateral Canthotomy and Inferior Catholysis
	 Enzyme Assays and Kinetics
	 Ethics in Psychology Research
	 Event-related Potentials and the Oddball Task
	 Explant Culture for Developmental Studies
	 Explant Culture of Neural Tissue
	 Expression Profiling with Microarrays
	• Eye Exam
	 Eye Tracking in Cognitive Experiments
	• Fate Mapping
	• Fear Conditioning
	• Fundamentals of Breeding and Weaning
	Gene Silencing with Mornholinos

	 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
	In ovo Electronoration of Chicken Embryos
	Induced Divinctoney
	 Induced Fluipotency Intro extinuor Chaulder Injection for Deduction
	• Intra-articular Shoulder Injection for Reduction
	Following Anterior Shoulder Dislocation
	• Intraosseous Needle Placement
	• Introducing Experimental Agents into the Wouse
	• Introduction to Catalysis
	• Introduction to Mass Spectrometry
	Introduction to Litration
	Invertebrate Lifespan Quantification
	• Isolation of Fecal Bacteria from Water Samples by
	Filtration
	 Language: The N400 in Semantic Incongruity
	 Learning and Memory: The Remember-Know Task
	 Live Cell Imaging of Mitosis
	 MALDI-TOF Mass Spectrometry
	 Measuring Grey Matter Differences with Voxel-based
	Morphometry: The Musical Brain
	 Measuring Vital Signs
	 Metabolic Labeling
	Molecular Cloning
	• Motor Exam II
	Motor Maps
	 Mouse Genotyping
	 Murine In Utero Electroporation
	 Needle Thoracostomy (needle Decompression) for
	Temporizing Tension Pneumothorax Treatment
	 Neuronal Transfection Methods
	 Nose, Sinuses, Oral Cavity and Pharynx Exam
	 Nuclear Magnetic Resonance (NMR) Spectroscopy
	 Nutrients in Aquatic Ecosystems
	 Ophthalmoscopic Examination
	 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

	 Physiological Correlates of Emotion Recognition
	Plasmid Purification
	Primary Neuronal Cultures
	Protein Crystallization
	 Purifying Compounds by Recrystallization
	 Quantifying Environmental Microorganisms and
	Viruses Using qPCR
	• RNA Analysis of Environmental Samples Using RT-PCR
	• RNA-Seq
	RNAi in C. elegans
	 Realism in Experimentation
	 Recombineering and Gene Targeting
	 Reliability in Psychology Experiments
	 Respiratory Exam II: Percussion and Auscultation
	 Restriction Enzyme Digests
	Rodent Stereotaxic Surgery
	SNP Genotyping
	 Scanning Electron Microscopy (SEM)
	Self-administration Studies
	 Self-report vs. Behavioral Measures of Recycling
	 Soil Nutrient Analysis: Nitrogen, Phosphorus, and
	Potassium
	Solid-Liquid Extraction
	 Solutions and Concentrations
	 Surface Plasmon Resonance (SPR)
	 Surgical Cricothyrotomy
	 Tandem Mass Spectrometry
	 Testing For Genetically Modified Foods
	 The ATP Bioluminescence Assay
	The ELISA Method
	• The TUNEL Assay
	 Tissue Regeneration with Somatic Stem Cells
	 Transplantation Studies
	 Two-Dimensional Gel Electrophoresis
	 Using Diffusion Tensor Imaging in Traumatic Brain
	Injury
	 Using TMS to Measure Motor Excitability During Action
	Observation
	 Using a pH Meter
	 Visual Attention: fMRI Investigation of Object-based
	Attentional Control
	 Visualizing Soil Microorganisms via the Contact Slide
	Assay and Microscopy
	 Whole-Mount In Situ Hybridization
	 Yeast Transformation and Cloning
	 Zebrafish Breeding and Embryo Handling
	 Zebrafish Maintenance and Husbandry
	 Zebrafish Microinjection Techniques
	 Zebrafish Reproduction and Development
	 fMRI: Functional Magnetic Resonance Imaging

CONTENT STANDARD / COURSE	HI.SC.BS.	BIOLOGICAL SCIENCE
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.BS.3.	Life and Environmental Sciences: ORGANISMS AND THE ENVIRONMENT: Understand the unity, diversity, and interrelationships of organisms, including their relationship to cycles of matter and energy in the environment
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Cycles of Matter and Energy
EXPECTATION / TOPIC	SC.BS.3.1.	Describe biogeochemical cycles within ecosystems JoVE • Algae Enumeration via Culturable Methodology • An Overview of Alkenone Biomarker Analysis for Paleothermometry • An Overview of bGDGT Biomarker Analysis for Paleoclimatology • Analysis of Earthworm Populations in Soil • Bacterial Growth Curve Analysis and its Environmental Applications • Carbon and Nitrogen Analysis of Environmental Samples • Conversion of Fatty Acid Methyl Esters by Saponification for Uk'37 Paleothermometry • Culturing and Enumerating Bacteria from Soil Samples • Determination Of Nox in Automobile Exhaust Using UV-VIS Spectroscopy • Dissolved Oxygen in Surface Water • Extraction of Biomarkers from Sediments - Accelerated Solvent Extraction • Filamentous Fungi • Fundamentals of Breeding and Weaning • Metabolic Labeling • Nutrients in Aquatic Ecosystems • Purification of a Total Lipid Extract with Column Chromatography • Removal of Branched and Cyclic Compounds by Urea Adduction for Uk'37 Paleothermometry • Soil Nutrient Analysis: Nitrogen, Phosphorus, and Potassium • Sonication Extraction of Lipid Biomarkers from Sediment • Soxhlet Extraction of Lipid Biomarkers from Sediment • Soxhlet Extraction of Lipid Biomarkers from Sediment • Soxhlet Extraction of Lipid Biomarkers from Sediment • Using GIS to Investigate Urban Forestry
EXPECTATION / TOPIC	SC.BS.3.2.	Explain the chemical reactions that occur in photosynthesis and cellular respiration that result in cycling of energy <u>JoVE</u>

		 An Introduction to Cell Metabolism Biofuels: Producing Ethanol from Cellulosic Material Detecting Reactive Oxygen Species The ATP Bioluminescence Assay
EXPECTATION / TOPIC	SC.BS.3.3.	Explain how matter and energy flow through living systems and the physical environment JoVE • 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 • Dissolved Oxygen in Surface Water • 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 • Soil Nutrient Analysis: Nitrogen, Phosphorus, and Potassium • Sonication Extraction of Lipid Biomarkers from Sediment • Soxhlet Extraction of Lipid Biomarkers from Sediment • Using GIS to Investigate Urban Forestry
CONTENT STANDARD	HI.SC.BS.	BIOLOGICAL SCIENCE
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.BS.3.	Life and Environmental Sciences: ORGANISMS AND THE ENVIRONMENT: Understand the unity, diversity, and interrelationships of organisms, including their relationship to cycles of matter and energy in the environment
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		I OPIC: Interdependence
EXPECTATION / TOPIC	SC.BS.3.4.	Explain dynamic equilibrium in organisms, populations, and ecosystems; explain the effect of equilibrium shifts

		JoVE • Algae Enumeration via Culturable Methodology • An Introduction to the Chick: Gallus gallus domesticus • An Introduction to the Laboratory Mouse: Mus musculus • An Introduction to the Zebrafish: Danio rerio • Analysis of Earthworm Populations in Soil • Aseptic Technique in Environmental Science • Bacterial Growth Curve Analysis and its Environmental Applications • Bacterial Transformation: Electroporation • Bacterial Transformation: The Heat Shock Method • Basic Mouse Care and Maintenance • C. elegans Maintenance • C. elegans Maintenance • Culturing and Enumerating Bacteria from Soil Samples • Detection of Bacteriophages in Environmental Samples • Dissolved Oxygen in Surface Water • Drosophila Maintenance • Drosophila melanogaster Embryo and Larva Harvesting and Preparation • Filamentous Fungi • Isolation of Fecal Bacteria from Water Samples by Filtration • Passaging Cells • Plasmid Purification • Quantifying Environmental Microorganisms and Viruses Using qPCR • Yeast Maintenance • Yeast Reproduction
CONTENT STANDARD / COURSE	HI.SC.BS.	BIOLOGICAL SCIENCE
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.BS.4.	Life and Environmental Sciences: STRUCTURE AND FUNCTION IN ORGANISMS: Understand the structures and functions of living organisms and how organisms can be compared scientifically
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Cells, Tissues, Organs, and Organ Systems
EXPECTATION / TOPIC	SC.BS.4.1.	Describe different cell parts and their functions <u>JoVE</u> • 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 Neurobiology

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 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
Cytogenetics
 DNA Ligation Reactions
 Density Gradient Ultracentrifugation
 Detecting Reactive Oxygen Species
 Electro-encephalography (EEG)
 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
Inverse I Transfection
• Neuronal Transfection Methods
rassaging Cells
• Patch Clamp Electrophysiology
Plasmid Purification Primory Neuropel Cultures
Primary Neuronal Cultures Protoin Crystallization
Protein Grystalization Pessembing and Cana Targeting
Recombineering and Gene Targeting Procentitution of Membrane Proteins
Reconstitution of Memorane Proteins
Restriction Enzyme Digests Surface Disemon Percenance (SPP)
• The ATP Rioluminescence Access
• The ATT Dividininescence Assay
The Transwell Migration Assay
• The Western Riot
Tissue Regeneration with Somatic Stem Calls
Whole-Mount In Situ Hybridization
Yeast Maintenance

		Yeast Reproduction
		Yeast Transformation and Cloning
EXPECTATION / TOPIC	SC.BS.4.2.	Yeast Transformation and Cloning Explain how cells are specialized into different tissues and organs JoVE An Introduction to Aging and Regeneration An Introduction to Caenorhabditis elegans An Introduction to Cell Motility and Migration An Introduction to Developmental Genetics
		 An Introduction to Developmental Neurobiology An Introduction to Learning and Memory An Introduction to Molecular Developmental Biology An Introduction to Organogenesis An Introduction to Stem Cell Biology An Overview of Epigenetics An Overview of Gene Expression C. elegans Development and Reproduction Chick ex ovo Culture
		 DNA Methylation Analysis Detecting Reactive Oxygen Species Development and Reproduction of the Laboratory Mouse Development of the Chick
		 Diagnostic Necropsy and Tissue Harvest Drosophila Development and Reproduction Drosophila Larval IHC 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 Engineering of Model Organisms Histological Sample Preparation for Light Microscopy Histological Staining of Neural Tissue In ovo Electroporation of Chicken Embryos Induced Pluripotency
		 Murine In Utero Electroporation RNA-Seq Sterile Tissue Harvest Tissue Regeneration with Somatic Stem Cells Transplantation Studies
		 Whole-Mount In Situ Hybridization Zebrafish Breeding and Embryo Handling Zebrafish Reproduction and Development
EXPECTATION / TOPIC	SC.BS.4.3.	Differentiate between the processes of mitosis and meiosis
		JoVE • An Introduction to Cell Division

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		An Introduction to Saccharomyces cerevisiae
		Cell Cycle Analysis
		Genetic Crosses
		 Live Cell Imaging of Mitosis
		 Recombineering and Gene Targeting
		Yeast Reproduction
		 Yeast Transformation and Cloning
EXPECTATION / TOPIC	SC.BS.4.4.	Describe how homeostatic balance occurs in cells and
		organisms
		JoVE
		 Abdominal Exam I: Inspection and Auscultation
		Abdominal Exam II: Percussion
		 Abdominal Exam III: Palpation
		Abdominal Exam IV: Acute Abdominal Pain
		Assessment
		 An Introduction to Cell Death
		 An Introduction to Cell Division
		 An Introduction to Cell Metabolism
		• An Introduction to Cellular and Molecular Neuroscience
		 An Introduction to Cognition
		 An Introduction to Developmental Neurobiology
		 An Introduction to Endocytosis and Exocytosis
		 An Introduction to Learning and Memory
		 An Introduction to Molecular Developmental Biology
		 An Introduction to Reward and Addiction
		 An Introduction to Stem Cell Biology
		 Anesthesia Induction and Maintenance
		Ankle Exam
		 Annexin V and Propidium lodide Labeling
		Arterial Line Placement
		 Assessing Dexterity with Reaching Tasks
		Auscultation
		 Balance and Coordination Testing
		Basic Care Procedures
		 Basic Life Support Part II: Airway/Breathing and
		Continued Cardiopulmonary Resuscitation
		Basic Life Support: Cardiopulmonary Resuscitation and
		Defibrillation
		 Basic Mouse Care and Maintenance
		 Blood Pressure Measurement
		Blood Withdrawal I
		Blood Withdrawal II
		 C. elegans Development and Reproduction
		 Calcium Imaging in Neurons
		 Cardiac Exam I: Inspection and Palpation
		Cardiac Exam II: Auscultation
		Cardiac Exam III: Abnormal Heart Sounds
		Cell-surface Biotinylation Assay
		Central Venous Catheter Insertion: Femoral Vein with
		Ultrasound Guidance

	Central Venous Catheter Insertion: Internal Jugular
	with Ultrasound Guidance
	 Central Venous Catheter Insertion: Subclavian Vein
	 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)
	Detecting Reactive Oxygen Species
	Diagnostic Necropsy and Tissue Harvest
	• 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
	• Explant Culture of Neural Tissue
	• Eve Exam
	• FM Dyes in Vesicle Becycling
	• Fear Conditioning
	• Foot Exam
	General Approach to the Physical Exam
	Hand and Wrist Evam
	• Hin Evam
	Histological Staining of Neural Tissue
	 In ovo Electronoration of Chicken Embryos
	Induced Pluripotency
	Induced Fullpotency Intra-articular Shoulder Injection for Beduction
	Following Anterior Shoulder Dislocation
	Intracessous Needle Placement
	Isolating Nucleic Acids from Voast
	• Knoo Evom
	• Lymph Node Exam
	• Male Restal Exam
	• Magguring Vital Signs
	• Metasuring vital Signs
	• Motor Exam I
	• Muting In Litera Electronarction
	Murine in Otero Electroporation
	• Neck Exam
	Tomporizing Topsion Proumathoray Treatment
	Noso Sinusso Oral Covity and Pharmy Even
	• Nose, Sinuses, Oral Cavity and Pharynx Exam
	Observation and inspection Onetholmoscopic Everyingtion
	Opinialmoscopic Examination
	• raipation
	• ratch Clamp Electrophysiology

		 Pelvic Exam I: Assessment of the External Genitalia Pelvic Exam II: Speculum Exam Pelvic Exam III: Bimanual and Rectovaginal Exam Percussion Percussion Percutaneous Cricothyrotomy (Seldinger Technique) Pericardiocentesis Peripheral Vascular Exam Peripheral Vascular Exam Using a Continuous Wave Doppler Peripheral Venous Cannulation Physiological Correlates of Emotion Recognition Proper Adjustment of Patient Attire during the Physical Exam Reconstitution of Membrane Proteins Respiratory Exam I: Inspection and Palpation Self-administration Studies Sensory Exam Shoulder Exam II Shoulder Exam II Spatial Memory Testing Using Mazes Sterile Tissue Harvest Surgical Cricothyrotomy The ATP Bioluminescence Assay The TUNEL Assay Thyroid Exam Tissue Regeneration with Somatic Stem Cells Tree Identification: How To Use a Dichotomous Key Using a pH Meter Yeast Maintenance
		Yeast Reproduction
		 Yeast Transformation and Cloning
		 Zebrafish Maintenance and Husbandry
EXPECTATION / TOPIC	SC.BS.4.5.	Describe the components and functions of a variety of macromolecules active in biological systems
		JoVE
		An Introduction to Caenorhabditis elegans
		An Introduction to Cell Death
		An Introduction to Cell Division
		An Introduction to Cell Metabolism An Introduction to Cell Metility and Missetion
		An Introduction to Cell Wothity and Wigration An Introduction to Cellular and Molecular Neuroscience
		An Introduction to Developmental Genetics
		An Introduction to Molecular Developmental Biology
		An Introduction to Saccharomyces cerevisiae
		An Introduction to Transfection
		An Overview of Epigenetics
		An Overview of Gene Expression An Overview of Genetic Analysis
		An Overview of Genetic Engineering
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7
 An Overview of Genetics and Disease
 Annexin V and Propidium Iodide Labeling
 Bacterial Transformation: Electroporation
Bacterial Transformation: The Heat Shock Method
Biofuels: Producing Ethanol from Cellulosic Material
• C. elegans Maintenance
Cell Cycle Analysis
 Cell-surface Biotinylation Assay
Chromatin Immunoprecipitation
 Chromatography-Based Biomolecule Purification
Methods
 Co-Immunoprecipitation and Pull-Down Assays
Column Chromatography
Community DNA Extraction from Bacterial Colonies
Cytogenetics
DNA Gel Electrophoresis
DNA Ligation Reactions
DNA Methylation Analysis
 Density Gradient Ultracentrifugation
Detecting Environmental Microorganisms with the
Polymerase Chain Reaction and Gel Electrophoresis
Detecting Reactive Oxygen Species
Development and Reproduction of the Laboratory
Mouse
Development of the Chick
Dialysis: Diffusion Based Separation
Drosophila Development and Reproduction
• Drosophila Larval IHC
Drosophila melanogaster Embryo and Larva Harvesting
and Preparation
• Electrophoretic Mobility Shift Assay (EMSA)
Embryonic Stem Cell Culture and Differentiation
Fnzyme Assays and Kinetics
Explant Culture for Developmental Studies
Expression Profiling with Microarrays
• FM Dyes in Vesicle Recycling
Förster Resonance Energy Transfer (FRET)
Gel Purification
Gene Silencing with Morpholinos
Genetic Crosses
Genetic Engineering of Model Organisms
Genetic Engineering of Model Organisms Genetic Screens
Generic Streens Generic Streens
In ava Electroporation of Chicken Embryos
 Induced Pluvingtoney
Induced Flumpotency Introduction to Catalysis
 Introduction to Mass Spectrometry
 Introduction to mass spectrometry Invasion Access Hoing 2D Matrices
• Invasion Assay Using 3D Watrices
• Invertebrate Litespan Quantification
Isolating Nucleic Acids from Yeast
Live Cell Imaging of Wiltosis

		 MALDI-TOF Mass Spectrometry Metabolic Labeling Method of Standard Addition Molecular Cloning Mouse Genotyping PCR: The Polymerase Chain Reaction Photometric Protein Determination Plasmid Purification Protein Crystallization Quantifying Environmental Microorganisms and Viruses Using qPCR RNA Analysis of Environmental Samples Using RT-PCR RNA-Seq RNA Analysis of Environmental Samples Using RT-PCR RNA-Seq RNA in C. elegans Recombineering and Gene Targeting Reconstitution of Membrane Proteins Restriction Enzyme Digests Rodent Stereotaxic Surgery SNP Genotyping Separating Protein with SDS-PAGE Spectrophotometric Determination of an Equilibrium Constant Tandem Mass Spectrometry Testing For Genetically Modified Foods The ATP Bioluminescence Assay The ELISA Method The Transwell Migration Assay The Western Blot Two-Dimensional Gel Electrophoresis Ultraviolet-Visible (UV-Vis) Spectroscopy Whole-Mount In Situ Hybridization Yeast Maintenance Yeast Transformation and Cloning Zebrafish Breeding and Embryo Handling Zebrafish Reproduction and Development
CONTENT STANDARD / COURSE	HI.SC.BS.	BIOLOGICAL SCIENCE
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.BS.4.	Life and Environmental Sciences: STRUCTURE AND FUNCTION IN ORGANISMS: Understand the structures and functions of living organisms and how organisms can be compared scientifically
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Classification
EXPECTATION / TOPIC	SC.BS.4.6.	Explain the organization of life on Earth using the modern classification system <u>JoVE</u>

 Algae Enumeration via Culturable Methodology
 An Introduction to Caenorhabditis elegans
 An Introduction to Drosophila melanogaster
 An Introduction to Saccharomyces cerevisiae
An Introduction to the Chick: Gallus gallus domesticus
 An Introduction to the Laboratory Mouse: Mus
musculus
 An Introduction to the Zebrafish: Danio rerio
 Aseptic Technique in Environmental Science
 Bacterial Growth Curve Analysis and its Environmental
Applications
 Basic Chick Care and Maintenance
 Basic Mouse Care and Maintenance
 Biofuels: Producing Ethanol from Cellulosic Material
• C. elegans Chemotaxis Assay
 C. elegans Development and Reproduction
• C. elegans Maintenance
Chick ex ovo Culture
 Culturing and Enumerating Bacteria from Soil Samples
 Detecting Environmental Microorganisms with the
Polymerase Chain Reaction and Gel Electrophoresis
 Detection of Bacteriophages in Environmental Samples
 Determination of Moisture Content in Soil
 Development and Reproduction of the Laboratory
Mouse
 Development of the Chick
 Drosophila Development and Reproduction
Drosophila Larval IHC
Drosophila Maintenance
 Drosophila melanogaster Embryo and Larva Harvesting
and Preparation
 Filamentous Fungi
Genetic Crosses
 Genetic Engineering of Model Organisms
 Gram Staining of Bacteria from Environmental Sources
 In ovo Electroporation of Chicken Embryos
 Introducing Experimental Agents into the Mouse
 Isolating Nucleic Acids from Yeast
Mouse Genotyping
RNAi in C. elegans
 Recombineering and Gene Targeting
 Sonication Extraction of Lipid Biomarkers from
Sediment
 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
Yeast Maintenance
Yeast Reproduction
 Yeast Transformation and Cloning
• Zebrafish Breeding and Embryo Handling

		 Zebrafish Maintenance and Husbandry Zebrafish Microinjection Techniques Zebrafish Reproduction and Development
CONTENT STANDARD / COURSE	HI.SC.BS.	BIOLOGICAL SCIENCE
Standard / Performance Indicator / Domain	SC.PS.5.	Life and Environmental Sciences: DIVERSITY, GENETICS, AND EVOLUTION: Understand genetics and biological evolution and their impact on the unity and diversity of organisms
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Biological Evolution
EXPECTATION / TOPIC	SC.BS.5.1.	 Explain the theory of evolution and describe evidence that supports this theory <u>JoVE</u> An Introduction to the Chick: Gallus gallus domesticus An Overview of Genetic Analysis High-Performance Liquid Chromatography (HPLC)
EXPECTATION / TOPIC	SC.BS.5.2.	Explain the theory of natural selection <u>JoVE</u> • An Overview of Genetic Analysis
CONTENT STANDARD / COURSE	HI.SC.BS.	BIOLOGICAL SCIENCE
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.PS.5.	Life and Environmental Sciences: DIVERSITY, GENETICS, AND EVOLUTION: Understand genetics and biological evolution and their impact on the unity and diversity of organisms
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Unity and Diversity
EXPECTATION / TOPIC	SC.BS.5.3.	 Explain the structural properties of DNA and the role of DNA in heredity and protein synthesis JoVE An Introduction to Caenorhabditis elegans An Introduction to Cell Death An Introduction to Cell Division An Introduction to Cellular and Molecular Neuroscience An Introduction to Developmental Genetics An Introduction to Molecular Developmental Biology An Introduction to Transfection An Overview of Epigenetics 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
	 Detecting Reactive Oxygen Species
	 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
	 Photometric Protein Determination
	 Plasmid Purification
	 Protein Crystallization
	 Quantifying Environmental Microorganisms and
	Viruses Using qPCR
	 RNA Analysis of Environmental Samples Using RT-PCR
	• RNA-Seq
	 Recombineering and Gene Targeting
	 Restriction Enzyme Digests
	SNP Genotyping
	 Testing For Genetically Modified Foods
	• The TUNEL Assay
	 Two-Dimensional Gel Electrophoresis
	 Whole-Mount In Situ Hybridization

		Yeast Maintenance
		Yeast Transformation and Cloning
		 Zebrafish Breeding and Embryo Handling
EXPECTATION / TODIC		Eveloin herr Mendelle levre of heredity can be used to
EXPECTATION / TOPIC	50.05.5.4.	Explain now Mendel's laws of nereality can be used to
		determine the traits of possible onspring
		Io//E
		• An Introduction to Developmental Genetics
		• Fundamentals of Breeding and Weaning
		Genetic Crosses
EXPECTATION / TOPIC	SC.BS.5.5.	Explain chromosomal mutations, their possible causes,
		and their effects on genetic variation
		JOVE
		• 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 Zebrafish: Danio rerio
		 An Overview of Epigenetics
		 An Overview of Gene Expression
		 An Overview of Genetic Analysis
		 An Overview of Genetics and Disease
		 Genetic Engineering of Model Organisms
		Genetic Screens
		 Isolating Nucleic Acids from Yeast
		Passaging Cells
		The TUNEL Assay
CONTENT STANDARD	HI.SC.ES.	EARTH SPACE SCIENCE
/ COURSE		
STANDARD /	SC ES 2	The Scientific Process: NATURE OF SCIENCE: Understand
PERFORMANCE	00.20.2.	that science technology and society are interrelated
INDICATOR / DOMAIN		that solenoe, teomology, and solety are interrelated
		TOPIO Osismus Taskaslama and Ossista
		IOPIC: Science, Technology, and Society
LEVEL EXPECTATION /		
BENCHMARK		
EXPECTATION / TOPIC	SC.ES.2.1.	Explain how scientific advancements and emerging
		technology have influenced society
		JoVE
		 An Overview of Alkenone Biomarker Analysis for
		Paleothermometry
		 An Overview of bGDGT Biomarker Analysis for
		Paleoclimatology

		 Analysis of Earthworm Populations in Soil Biofuels: Producing Ethanol from Cellulosic Material Carbon and Nitrogen Analysis of Environmental Samples Conversion of Fatty Acid Methyl Esters by Saponification for Uk'37 Paleothermometry Determination Of Nox in Automobile Exhaust Using UV-VIS Spectroscopy Determining Spatial Orientation of Rock Layers with the Brunton Compass Dissolved Oxygen in Surface Water Extraction of Biomarkers from Sediments - Accelerated Solvent Extraction Fractional Distillation Igneous Volcanic Rock Lead Analysis of Soil Using Atomic Absorption Spectroscopy Making a Geologic Cross Section Measuring Tropospheric Ozone Nutrients in Aquatic Ecosystems Physical Properties Of Minerals I: Crystals and Cleavage Physical Properties Of Minerals II: Polymineralic Analysis Proton Exchange Membrane Fuel Cells 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 Tree Identification: How To Use a Dichotomous Key Tree Survey: Point-Centered Quarter Sampling Method Turbidity and Total Solids in Surface Water Using GIS to Investigate Urban Forestry Using Topographic Maps to Generate Topographic Profiles
EXPECTATION / TOPIC	SC.ES.2.2.	Compare the risks and benefits of potential solutions to technological issues
		<u>JoVE</u> • 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

		 Making a Geologic Cross Section Measuring Tropospheric Ozone Nutrients in Aquatic Ecosystems Proton Exchange Membrane Fuel Cells Turbidity and Total Solids in Surface Water Using GIS to Investigate Urban Forestry Water Quality Analysis via Indicator Organisms
EXPECTATION / TOPIC	SC.ES.2.3.	Explain the impact of humans on the Earth system JoVE • 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 • Making a Geologic Cross Section • 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
EXPECTATION / TOPIC	SC.ES.2.4.	Describe technologies used to collect information about the universe <u>JoVE</u> • Determining Spatial Orientation of Rock Layers with the Brunton Compass • Using GIS to Investigate Urban Forestry
CONTENT STANDARD / COURSE	HI.SC.ES.	EARTH SPACE SCIENCE
STANDARD / PERFORMANCE INDICATOR / DOMAIN INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK	SC.ES.8.	Physical, Earth, and Space Sciences: EARTH AND SPACE SCIENCE: Understand the Earth and its processes, the solar system, and the universe and its contents TOPIC: Forces that Shape the Earth
EXPECTATION / TOPIC	SC.ES.8.1.	Describe how elements and water move through solid Earth, the oceans, atmosphere, and living things as part of geochemical cycles <u>JoVE</u> • An Overview of Alkenone Biomarker Analysis for Paleothermometry • An Overview of bGDGT Biomarker Analysis for Paleoclimatology • Conversion of Fatty Acid Methyl Esters by Saponification for Uk'37 Paleothermometry

		 Determination Of Nox in Automobile Exhaust Using UV-VIS Spectroscopy Dissolved Oxygen in Surface Water Extraction of Biomarkers from Sediments - Accelerated Solvent Extraction Purification of a Total Lipid Extract with Column Chromatography Removal of Branched and Cyclic Compounds by Urea Adduction for Uk'37 Paleothermometry Sonication Extraction of Lipid Biomarkers from Sediment Soxhlet Extraction of Lipid Biomarkers from Sediment Using GIS to Investigate Urban Forestry
EXPECTATION / TOPIC	SC.ES.8.2.	Describe how to estimate geologic time <u>JoVE</u> • Making a Geologic Cross Section
CONTENT STANDARD / COURSE	HI.SC.ES.	EARTH SPACE SCIENCE
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.ES.8.	Physical, Earth, and Space Sciences: EARTH AND SPACE SCIENCE: Understand the Earth and its processes, the solar system, and the universe and its contents
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Forces that Shape the Earth
EXPECTATION / TOPIC	SC.ES.8.4.	Describe how heat and energy transfer into and out of the atmosphere and their involvement in global climate <u>JoVE</u> • Biofuels: Producing Ethanol from Cellulosic Material • Turbidity and Total Solids in Surface Water
EXPECTATION / TOPIC	SC.ES.8.5.	Explain the effects of movements of crustal plates <u>JoVE</u> • Igneous Volcanic Rock
CONTENT STANDARD / COURSE	HI.SC.ES.	EARTH SPACE SCIENCE
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.ES.8.	Physical, Earth, and Space Sciences: EARTH AND SPACE SCIENCE: Understand the Earth and its processes, the solar system, and the universe and its contents
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Earth in the Solar System
EXPECTATION / TOPIC	SC.ES.8.8.	Describe the major internal and external sources of energy on Earth <u>JoVE</u> • Turbidity and Total Solids in Surface Water

CONTENT STANDARD / COURSE	HI.SC.PH.	PHYSICS
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.PH.2.	Nature of Science - Understand that science, technology, and society are interrelated
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Science, Technology, and Society
EXPECTATION / TOPIC	SC.PH.2.1.	Explain how scientific advancements and emerging technologies have influenced society JoVE • Abdominal Exam I: Inspection and Auscultation • Abdominal Exam IV: Acute Abdominal Pain Assessment • An Overview of Alkenone Biomarker Analysis for Paleothermometry • An Overview of bGDGT Biomarker Analysis for Paleoclimatology • Auscultation • Biofuels: Producing Ethanol from Cellulosic Material • Conversion of Fatty Acid Methyl Esters by Saponification for Uk'37 Paleothermometry • Cranial Nerves Exam 1 (I-VI) • Determination Of Nox in Automobile Exhaust Using UV-VIS Spectroscopy • Determining Spatial Orientation of Rock Layers with the Brunton Compass • Ear Exam • Emergent Lateral Canthotomy and Inferior Catholysis • Extraction of Biomarkers from Sediments - Accelerated Solvent Extraction • Eye Exam • Histological Sample Preparation for Light Microscopy • Introduction to Fluorescence Microscopy • Introduction to Fluorescence Microscopy • Introduction to Fluorescence Microscopy • Introduction to Fluorescence Microscopy • MALDI-TOF Mass Spectrometry • Lead Analysis of Soil Using Atomic Absorption Spectroscopy • MALDI-TOF Mass Spectrometry • Nuclear Magnetic Resonance (NMR) Spectroscopy • Nutrients in Aquatic Ecosystems • Object Substitution Masking • Ophthalmoscopic Examination • Percussion • Peripheral Vascular Exam Using a Continuous Wave Doppler • Proton Exchange Membrane Fuel Cells • 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 Surface Plasmon Resonance (SPR) Tandem Mass Spectrometry The Staircase Procedure for Finding a Perceptual Threshold Turbidity and Total Solids in Surface Water X-ray Fluorescence (XRF) fMRI: Functional Magnetic Resonance Imaging
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EXPECTATION / TOPIC	SC.PH.2.2.	Compare the risks and benefits of potential solutions to technological issues
		<u>JoVE</u> Raman Spectroscopy for Chemical Analysis
CONTENT STANDARD / COURSE	HI.SC.PH.	PHYSICS
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.PH.3.	Matter and Energy Conservation - Understand the nature of momentum and energy transformations
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Matter
EXPECTATION / TOPIC	SC.PH.3.1.	Measure or determine physical quantities such as density and mass of samples <u>JoVE</u> • An Introduction to the Micropipettor • Determining the Density of a Solid and Liquid • Introduction to Serological Pipettes and Pipettors • Making Solutions in the Laboratory • Measuring Mass in the Laboratory • Solid-Liquid Extraction • Understanding Concentration and Measuring Volumes
EXPECTATION / TOPIC	SC.PH.3.2.	Differentiate among mass, weight, and inertia <u>JoVE</u> • Determining the Density of a Solid and Liquid • Measuring Mass in the Laboratory
CONTENT STANDARD / COURSE	HI.SC.PH.	PHYSICS
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.PH.3.	Matter and Energy Conservation - Understand the nature of momentum and energy transformations
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Energy and Momentum
EXPECTATION / TOPIC	SC.PH.3.6.	Differentiate between different energy manifestations (e.g., kinetic [KE = 1/2 mv2], gravitational potential [PE =

		mgh], thermal, chemical, nuclear, electromagnetic, or mechanical) <u>JoVE</u> • An Introduction to Cell Metabolism • Detecting Reactive Oxygen Species • The ATP Bioluminescence Assay
CONTENT STANDARD / COURSE	HI.SC.PH.	PHYSICS
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.PH.4.	Force and Motion - Understand the relationship between force, mass, and motion of objects
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Motion
EXPECTATION / TOPIC	SC.PH.4.3.	Solve two-dimensional problems involving balanced forces (i.e., statics) <u>JoVE</u> • Determining Spatial Orientation of Rock Layers with the Brunton Compass • Making a Geologic Cross Section • Using Topographic Maps to Generate Topographic Profiles
EXPECTATION / TOPIC	SC.PH.4.5.	Describe the nature of centripetal force and centripetal acceleration (e.g., the formula a = v2/r), and use these ideas to predict the motion of an object <u>JoVE</u> • An Introduction to the Centrifuge
CONTENT STANDARD / COURSE	HI.SC.PH.	PHYSICS
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.PH.5.	Heat and Thermodynamics - Understand the laws of thermodynamics, and their applications
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Heat and Temperature
EXPECTATION / TOPIC	SC.PH.5.2.	Differentiate between heat, specific heat, and temperature <u>JoVE</u> • Conducting Reactions Below Room Temperature • Freezing-Point Depression to Determine an Unknown Compound • Ideal Gas Law • Regulating Temperature in the Lab: Applying Heat • Regulating Temperature in the Lab: Preserving Samples Using Cold

		 The Ideal Gas Law Using Differential Scanning Calorimetry to Measure Changes in Enthalpy
CONTENT STANDARD / COURSE	HI.SC.PH.	PHYSICS
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.PH.5.	Heat and Thermodynamics - Understand the laws of thermodynamics, and their applications
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Laws of Thermodynamics
EXPECTATION / TOPIC	SC.PH.5.3.	Explain the laws of thermodynamics, and describe some practical applications JoVE • Using Differential Scanning Calorimetry to Measure Changes in Enthalpy
CONTENT STANDARD / COURSE	HI.SC.PH.	PHYSICS
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.PH.6.	Waves - Understand the nature of waves, including the characteristic properties of the electromagnetic spectrum, optics, and sound waves
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Calculations
EXPECTATION / TOPIC	SC.PH.6.2.	Solve problems involving wavelength, frequency, amplitude, speed, absorption, reflection, and refraction <u>JoVE</u> • Raman Spectroscopy for Chemical Analysis
CONTENT STANDARD / COURSE	HI.SC.PH.	PHYSICS
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.PH.6.	Waves - Understand the nature of waves, including the characteristic properties of the electromagnetic spectrum, optics, and sound waves
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: The Electromagnetic spectrum
EXPECTATION / TOPIC	SC.PH.6.4.	Describe the range of the electromagnetic spectrum (e.g., radio waves, microwaves, infrared radiation) <u>JoVE</u> • Ultraviolet-Visible (UV-Vis) Spectroscopy
CONTENT STANDARD / COURSE	HI.SC.PH.	PHYSICS
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.PH.7.	Electric and Magnetic Phenomena - Understand the nature and applications of electricity and magnetism

INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Electrical and Magnetic Fields
EXPECTATION / TOPIC	SC.PH.7.1.	Describe the relationships among charged particles, electrical current, electrical potential, electric fields, and magnetic fields <u>JoVE</u> • Cyclic Voltammetry (CV) • Electrochemical Measurements of Supported Catalysts Using a Potentiostat/Galvanostat • Freezing-Point Depression to Determine an Unknown Compound • High-Performance Liquid Chromatography (HPLC) • Introduction to Mass Spectrometry • Nuclear Magnetic Resonance (NMR) Spectroscopy • fMRI: Functional Magnetic Resonance Imaging
EXPECTATION / TOPIC	SC.PH.7.4.	Describe how electric and magnetic fields contain energy and act as vector force fields <u>JoVE</u> • Introduction to Mass Spectrometry • Nuclear Magnetic Resonance (NMR) Spectroscopy
CONTENT STANDARD / COURSE	HI.SC.PH.	PHYSICS
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.PH.7.	Electric and Magnetic Phenomena - Understand the nature and applications of electricity and magnetism
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Electrical Circuits
EXPECTATION / TOPIC	SC.PH.7.7.	Analyze simple arrangements of components (e.g., resistors, capacitors, transistors) in series or parallel circuits, both quantitatively and qualitatively <u>JoVE</u> • Electrochemical Measurements of Supported Catalysts Using a Potentiostat/Galvanostat
EXPECTATION / TOPIC	SC.PH.7.8.	Predict the current, voltage, and power in simple direct current electric circuits <u>JoVE</u> • Nuclear Magnetic Resonance (NMR) Spectroscopy
CONTENT STANDARD / COURSE	HI.SC.CH.	CHEMISTRY
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.CH.1.	Scientific Investigation - Discover, invent, and investigate using the skills necessary to engage in the scientific process

INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Scientific knowledge
EXPECTATION / TOPIC	SC.CH.1.8.	Describe the importance of ethics and integrity in scientific investigation JoVE • 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 • Gas Chromatography (GC) with Flame-Ionization Detection • High-Performance Liquid Chromatography (HPLC) • Internal Standards • Introduction to Mass Spectrometry • Ion-Exchange Chromatography • Method of Standard Addition • Preparing Anhydrous Reagents and Equipment • Protein Crystallization • Raman Spectroscopy for Chemical Analysis • Sample Preparation for Analytical Preparation • Scanning Electron Microscopy (SEM) • Two-Dimensional Gel Electrophoresis • X-ray Fluorescence (XRF)
CONTENT STANDARD / COURSE	HI.SC.CH.	CHEMISTRY
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.CH.2.	Nature of Science - Understand that science, technology, and society are interrelated
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Science, Technology, and Society
EXPECTATION / TOPIC	SC.CH.2.1.	Explain how scientific advancements and emerging technologies have influenced society JoVE • 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
	Cvclic Voltammetry (CV)
	Degassing Liquids with Freeze-Pump-Thaw Cycling
	Density Gradient Ultracentrifugation
	Determining Bate 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 Bules 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
	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 Differential Scanning Calorimetry to Measure Changes in Enthalpy Using a pH Meter X-ray Fluorescence (XRF)
EXPECTATION / TOPIC	SC.CH.2.2.	Compare the risks and benefits of potential solutions to technological issues
		JoVE • 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
		Cyclic Voltammetry (CV)
		Density Gradient Oltracentrifugation Determining the Solubility Rules of Ionic Compounds
		Determining the Solubility rules of fond compounds Dialysis: Diffusion Based Senaration
		Electrochemical Measurements of Supported Catalysts
		Using a Potentiostat/Galvanostat
		• Electrophoretic Mobility Shift Assay (EMSA)
		Enzyme Assays and Kinetics
		 Freezing-Point Depression to Determine an Unknown Compound
		• Förster Resonance Energy Transfer (FRET)
		 Gas Chromatography (GC) with Flame-Ionization
		Detection
		• High-Performance Liquid Chromatography (HPLC)
		Internal Standards Introduction to Mose Spectrometry
		• Ion-Exchange Chromatography
		Le Châtelier's Principle
		MALDI-TOF Mass Spectrometry
		Metabolic Labeling
		 Method of Standard Addition
		Nuclear Magnetic Resonance (NMR) Spectroscopy
		Photometric Protein Determination
		Protein Crystallization Protein Evolution
		Baman Spectroscopy for Chemical Analysis
		Reconstitution of Membrane Proteins
		• Sample Preparation for Analytical Preparation
		Scanning Electron Microscopy (SEM)
		Solid-Liquid Extraction
		Surface Plasmon Resonance (SPR)

		 Tandem Mass Spectrometry Two-Dimensional Gel Electrophoresis Ultraviolet-Visible (UV-Vis) Spectroscopy Using a pH Meter X-ray Fluorescence (XRF)
CONTENT STANDARD / COURSE	HI.SC.CH.	CHEMISTRY
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.CH.3.	Properties of Matter -Understand different states of matter
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Acids and Bases
EXPECTATION / TOPIC	SC.CH.3.1.	Explain the properties of acids, bases, and salt solutions
		JoVE • Assembly of a Reflux System for Heated Chemical Reactions • Determining the Empirical Formula • Electrochemical Measurements of Supported Catalysts Using a Potentiostat/Galvanostat • Introduction to Titration • Ion-Exchange Chromatography • Le Châtelier's Principle • Two-Dimensional Gel Electrophoresis • Using a pH Meter
EXPECTATION / TOPIC	SC.CH.3.2.	Use the pH scale to characterize acid and base solutions <u>JoVE</u> • High-Performance Liquid Chromatography (HPLC) • Introduction to Titration • Le Châtelier's Principle • Passaging Cells • Using a pH Meter
EXPECTATION / TOPIC	SC.CH.3.3.	Calculate the pH from the hydrogen-ion concentration <u>JoVE</u> • Introduction to Titration • Using a pH Meter
EXPECTATION / TOPIC	SC.CH.3.4.	Explain that buffers stabilize pH in acid-base reactions JoVE • Determining the Mass Percent Composition in an Aqueous Solution • Dialysis: Diffusion Based Separation • Le Châtelier's Principle • Using a pH Meter
CONTENT STANDARD / COURSE	HI.SC.CH.	CHEMISTRY

STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.CH.3.	Properties of Matter -Understand different states of matter
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Gases and their Properties
EXPECTATION / TOPIC	SC.CH.3.5.	Apply gas laws to relationships between pressure, volume, and temperature of any amount of an ideal gas or any mixture of ideal gases using PV = nRT <u>JoVE</u> • Determining Rate Laws and the Order of Reaction • Ideal Gas Law • The Ideal Gas Law
EXPECTATION / TOPIC	SC.CH.3.6.	Explain the diffusion of gases using the Kinetic Molecular Theory of Matter <u>JoVE</u> • Chromatography-Based Biomolecule Purification Methods • Dialysis: Diffusion Based Separation
CONTENT STANDARD / COURSE	HI.SC.CH.	CHEMISTRY
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.CH.4.	Atomic Structure and Bonding - Understand properties of the periodic table, atoms, and bond formation
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Periodic Table
EXPECTATION / TOPIC	SC.CH.4.1.	Explain how columns in the periodic table represent elements with common properties and identify metals, semimetals, nonmetals, and halogens JoVE • Coordination Chemistry Complexes
EXPECTATION / TOPIC	SC.CH.4.3.	Use the periodic table to determine the number of valence electrons of an element <u>JoVE</u> • Coordination Chemistry Complexes
CONTENT STANDARD / COURSE	HI.SC.CH.	CHEMISTRY
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.CH.4.	Atomic Structure and Bonding - Understand properties of the periodic table, atoms, and bond formation
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Nature of Matter

EXPECTATION / TOPIC	SC.CH.4.5.	Explain that spectral lines are the result of transitions of electrons between energy levels and that these lines correspond to photons with a frequency related to the energy spacing between levels by using Planck's relationship (E=hv) <u>JoVE</u> • Coordination Chemistry Complexes • Förster Resonance Energy Transfer (FRET) • Gas Chromatography (GC) with Flame-Ionization Detection • Introduction to Fluorescence Microscopy • Introduction to the Microplate Reader • Lead Analysis of Soil Using Atomic Absorption Spectroscopy • MALDI-TOF Mass Spectrometry • Method of Standard Addition • Nuclear Magnetic Resonance (NMR) Spectroscopy • Raman Spectroscopy for Chemical Analysis • Tandem Mass Spectrometry • X-ray Fluorescence (XRF)
EXPECTATION / TOPIC	SC.CH.4.6.	 Explain that atoms combine to form molecules by sharing the outermost electrons to form covalent, or metallic bonds or by transferring electrons to form ionic bonds JoVE An Overview of Alkenone Biomarker Analysis for Paleothermometry An Overview of bGDGT Biomarker Analysis for Paleoclimatology Conversion of Fatty Acid Methyl Esters by Saponification for Uk'37 Paleothermometry Determining the Solubility Rules of Ionic Compounds Extraction of Biomarkers from Sediments - Accelerated Solvent Extraction Purification of a Total Lipid Extract with Column Chromatography Removal of Branched and Cyclic Compounds by Urea Adduction for Uk'37 Paleothermometry Sonication Extraction of Lipid Biomarkers from Sediment Soxhlet Extraction of Lipid Biomarkers from Sediment Ultraviolet-Visible (UV-Vis) Spectroscopy X-ray Fluorescence (XRF)
EXPECTATION / TOPIC	SC.CH.4.7.	Describe why the chemical bonds between atoms in molecules, such as H2, CH4, NH3, C2H4, N2, Cl2, and many large biological molecules are covalent <u>JoVE</u> • An Overview of Alkenone Biomarker Analysis for

		 Paleothermometry An Overview of bGDGT Biomarker Analysis for Paleoclimatology Conversion of Fatty Acid Methyl Esters by Saponification for Uk'37 Paleothermometry Extraction of Biomarkers from Sediments - Accelerated Solvent Extraction Purification of a Total Lipid Extract with Column Chromatography Removal of Branched and Cyclic Compounds by Urea Adduction for Uk'37 Paleothermometry Sonication Extraction of Lipid Biomarkers from Sediment Soxhlet Extraction of Lipid Biomarkers from Sediment Ultraviolet-Visible (UV-Vis) Spectroscopy
EXPECTATION / TOPIC	SC.CH.4.8.	 Explain the movement and properties of atoms and molecules in liquids JoVE Chromatography-Based Biomolecule Purification Methods Degassing Liquids with Freeze-Pump-Thaw Cycling Dialysis: Diffusion Based Separation Fractional Distillation Growing Crystals for X-ray Diffraction Analysis Purifying Compounds by Recrystallization Schlenk Lines Transfer of Solvents Separation of Mixtures via Precipitation
EXPECTATION / TOPIC	SC.CH.4.10.	Identify and explain physical properties of substances (e.g. melting points, boiling points, and volatility) based on the strength of molecular attractions <u>JoVE</u> • 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 • Common Lab Glassware and Uses • Conducting Reactions Below Room Temperature • Conversion of Fatty Acid Methyl Esters by Saponification for Uk'37 Paleothermometry • Determining the Density of a Solid and Liquid • Determining the Mass Percent Composition in an Aqueous Solution • Extraction of Biomarkers from Sediments - Accelerated Solvent Extraction • Fractional Distillation • Freezing-Point Depression to Determine an Unknown

		Compound • Gas Chromatography (GC) with Flame-Ionization Detection • Growing Crystals for X-ray Diffraction Analysis • Performing 1D Thin Layer Chromatography • Purification of a Total Lipid Extract with Column Chromatography • Purifying Compounds by Recrystallization • Removal of Branched and Cyclic Compounds by Urea Adduction for Uk'37 Paleothermometry • Rotary Evaporation to Remove Solvent • Separation of Mixtures via Precipitation • Sonication Extraction of Lipid Biomarkers from Sediment • Soxhlet Extraction of Lipid Biomarkers from Sediment
CONTENT STANDARD / COURSE	HI.SC.CH.	CHEMISTRY
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.CH.5.	Chemical Reactions - Understand the nature of chemical interactions and solutions
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Molar Definition
EXPECTATION / TOPIC	SC.CH.5.1.	Explain how the quantity of one mole is set (e.g. defining one mole of carbon 12 atoms to have a mass of exactly 12 grams) and describe its properties (e.g. one mole is 6.02 x 1023 particles (atoms or molecules)) JoVE • Ideal Gas Law • The Ideal Gas Law
CONTENT STANDARD / COURSE	HI.SC.CH.	CHEMISTRY
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.CH.5.	Chemical Reactions - Understand the nature of chemical interactions and solutions
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Molar Conversion
EXPECTATION / TOPIC	SC.CH.5.2.	Calculate the number of moles needed to produce a given gas, volume, mass, and/or number of moles of a product given a chemical equation JoVE • Calibration Curves • Capillary Electrophoresis (CE) • Determining Rate Laws and the Order of Reaction • Determining the Mass Percent Composition in an Aqueous Solution

		 Freezing-Point Depression to Determine an Unknown Compound Gas Chromatography (GC) with Flame-Ionization Detection High-Performance Liquid Chromatography (HPLC) Internal Standards Introduction to Titration Introduction to the Microplate Reader Introduction to the Spectrophotometer Le Châtelier's Principle Making Solutions in the Laboratory Photometric Protein Determination Sample Preparation for Analytical Preparation Solutions and Concentrations Spectrophotometric Determination of an Equilibrium Constant Understanding Concentration and Measuring Volumes
EXPECTATION / TOPIC	SC.CH.5.3.	Determine the molar mass of a molecule from its chemical formula and a table of atomic masses and convert the mass of a molecular substance to moles, number of particles, or volume of gas at a standard temperature and pressure JoVE • Calibration Curves • Capillary Electrophoresis (CE) • Determining Rate Laws and the Order of Reaction • Determining the Empirical Formula • Determining the Mass Percent Composition in an Aqueous Solution • Freezing-Point Depression to Determine an Unknown Compound • Gas Chromatography (GC) with Flame-Ionization Detection • High-Performance Liquid Chromatography (HPLC) • Internal Standards • Introduction to Titration • Introduction to the Microplate Reader • Introduction to the Spectrophotometer • Le Châtelier's Principle • Making Solutions in the Laboratory • Photometric Protein Determination • Sample Preparation for Analytical Preparation • Solutions and Concentrations • Spectrophotometric Determination of an Equilibrium Constant • Understanding Concentration and Measuring Volumes
CONTENT STANDARD / COURSE	HI.SC.CH.	CHEMISTRY

STANDARD /	SC.CH.5.	Chemical Reactions - Understand the nature of chemical
PERFORMANCE		interactions and solutions
LEVEL EXPECTATION /		IOPIC: Conservation of Matter and Stoichiometry
BENCHMARK		
EXPECTATION / TOPIC	SC.CH.5.4.	 Write balanced equations to describe chemical reactions JoVE 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 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
EXPECTATION / TOPIC	SC.CH.5.6.	Balance reactions that involve oxidation and reduction <u>JoVE</u> • Cyclic Voltammetry (CV) • Electrochemical Measurements of Supported Catalysts Using a Potentiostat/Galvanostat • Introduction to Titration • Photometric Protein Determination • Proton Exchange Membrane Fuel Cells
CONTENT STANDARD / COURSE	HI.SC.CH.	CHEMISTRY
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.CH.5.	Chemical Reactions - Understand the nature of chemical interactions and solutions
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Solutions
EXPECTATION / TOPIC	SC.CH.5.8.	Distinguish between pure substances and mixtures based on physical properties (e.g. boiling point, melting point, and density) <u>JoVE</u> • Calibration Curves
		 Capillary Electrophoresis (CE)

		Chromatography-Based Biomolecule Purification
		Methods
		Column Chromatography
		• Conducting Reactions Below Room Temperature
		• Cyclic Voltammetry (CV)
		• Degassing Liquids with Freeze-Pump-Thaw Cycling
		Density Gradient Ultracentrifugation
		• Determining the Density of a Solid and Liquid
		• Determining the Mass Percent Composition in an
		Aqueous Solution
		• Dialysis: Diffusion Based Separation
		• Electrochemical ivieasurements of Supported Catalysts
		Using a Potentiostat/Galvanostat
		• Fractional Distillation
		• Freezing-Point Depression to Determine an Unknown
		Compound
		• Gas Chromatography (GC) with Flame-Ionization
		Detection
		High-Performance Liquid Chromatography (HPLC)
		• Internal Standards
		Mothed of Stondard Addition
		Method of Standard Addition Performing 1D Thin Lover Chromotography
		Performing 1D Thin Layer Chromatography Photomotric Protoin Dotormination
		Sample Propagation for Analytical Propagation
		Schlank Lines Transfer of Solvents
		Senaration of Mixtures via Precipitation
		Solid-Liquid Extraction
		Solutions and Concentrations
		Two-Dimensional Gel Electrophoresis
		Calculate the concentration of a calute in terms of
EXPECTATION / TOPIC	50.0п.э.э.	Calculate the concentration of a solute in terms of
		molarity, parts per million, grams per inter, and percent
		composition
		Io//E
		Calibratian Curvas
		Calibration Guives Canillary Electrophoresis (CE)
		Determining Bate Laws and the Order of Beaction
		Determining the Empirical Formula
		Determining the Mass Percent Composition in an
		Aqueous Solution
		• Freezing-Point Depression to Determine an Unknown
		Compound
		Gas Chromatography (GC) with Flame-Ionization
		Detection
		High-Performance Liquid Chromatography (HPLC)
		• Internal Standards
		 Introduction to Mass Spectrometry
		• Introduction to Titration
		 Introduction to the Microplate Reader
		 Introduction to the Spectrophotometer

		 Le Châtelier's Principle MALDI-TOF Mass Spectrometry Making Solutions in the Laboratory Photometric Protein Determination Sample Preparation for Analytical Preparation Solutions and Concentrations Spectrophotometric Determination of an Equilibrium Constant Tandem Mass Spectrometry Understanding Concentration and Measuring Volumes
CONTENT STANDARD / COURSE	HI.SC.CH.	CHEMISTRY
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.CH.6.	Chemical Thermodynamics - Understand and apply the laws of thermodynamics
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Energy and its Transformation
EXPECTATION / TOPIC	SC.CH.6.1.	Explain that chemical processes either absorb (endothermic) or release (exothermic) thermal energy <u>JoVE</u> • Using a pH Meter
EXPECTATION / TOPIC	SC.CH.6.2.	Use known values of specific heat and latent heat of phase change to solve problems involving heat flow and temperature <u>JoVE</u> • Using Differential Scanning Calorimetry to Measure Changes in Enthalpy
CONTENT STANDARD / COURSE	HI.SC.CH.	CHEMISTRY
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.CH.7.	Chemical Reaction Rates - Understand the nature of how reaction rates are affected
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Chemical Changes
EXPECTATION / TOPIC	SC.CH.7.1.	Describe how reaction rates are quantitatively affected by changes of concentration and qualitatively affected by changes of temperature and surface area. JoVE • Conducting Reactions Below Room Temperature • Determining Rate Laws and the Order of Reaction • Electrochemical Measurements of Supported Catalysts Using a Potentiostat/Galvanostat • Enzyme Assays and Kinetics • Introduction to Catalysis

JoVE • Coordination Chemistry Complexes • Determining Rate Laws and the Order of Reaction • Electrochemical Measurements of Supported Catalysts Using a Potentiostat/Galvanostat • ENZPECTATION / TOPIC SC.CH.7.3. Explain the concept of dynamic equilibrium JoVE • Assembly of a Reflux System for Heated Chemical Reactions • Le Châtelier's Principle • Separation of Mixtures via Precipitation • Separation of Mixtures via Precipitation • Separation of Mixtures via Precipitation • Separation of Mixtures via Precipitation • Separation of Mixtures via Precipitation • Separation of Mixtures via Precipitation • Separation of Mixtures via Precipitation • Separation of Mixtures via Precipitation • Separation of Mixtures via Precipitation • Separation of Mixtures via Precipitation • Separation of Mixtures via Precipitation • Separation of Mixtures via Precipitation • Separation of Mixtures via Precipitation • Separation of Mixtures via Precipitation NDICATOR / DOMAIN CHEMISTRY NUDICATOR / GRADE EXPECTATION / EXPECTATION / DEVIC SC.CH.8. Determine the amount of radioactive substance remaining after an integral number of half-lives have passed JoVE • Determining Rate Laws and the Order of Reaction <th>EXPECTATION / TOPIC</th> <th>SC.CH.7.2.</th> <th>Describe how a catalyst increases reaction rates</th>	EXPECTATION / TOPIC	SC.CH.7.2.	Describe how a catalyst increases reaction rates
EXPECTATION / TOPIC SC.CH.7.3. Explain the concept of dynamic equilibrium JoVE • Assembly of a Reflux System for Heated Chemical Reactions • Le Châtelier's Principle • Separation of Mixtures via Precipitation • Spectrophotometric Determination of an Equilibrium Constant CONTENT STANDARD HI.SC.CH. CHEMISTRY / COURSE SC.CH.8. Nuclear Reactions and Energy - Understand the properties of nuclear energy INDICATOR / DOMAIN SC.CH.8. Nuclear Reactions and Energy - Understand the properties of nuclear energy INDICATOR / GRADE EXPECTATION / BENCHMARK TOPIC: Energy Release EXPECTATION / TOPIC SC.CH.8.2. Determine the amount of radioactive substance remaining after an integral number of half-lives have passed JoVE • Determining Rate Laws and the Order of Reaction ENVIRONMENTAL SCIENCE CONTENT STANDARD / COURSE SC.ENV.1. Scientific Investigation - Discover, invent, and investigate using the skills necessary to engage in the scientific process INDICATOR / GRADE TOPIC: Scientific Knowledge TOPIC: Scientific Investigation - Discover, invent, and investigate using the skills necessary to engage in the scientific process INDICATOR / GRADE TOPIC: Scientific Knowledge TOPIC: Scientific Investigation - Discover, invent, and integrity in scientific investigation JoVE <			<u>JoVE</u> • 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
JOVE • Assembly of a Reflux System for Heated Chemical Reactions • Le Châtelier's Principle • Separation of Mixtures via Precipitation NDICATOR / DANAIN INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK EXPECTATION / TOPIC SC.CH.8.2. Determining Rate Laws and the Order of Reaction • Determining Rate Laws and the Order of Reaction CONTENT STANDARD / PORMAIN PERFORMANCE INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK EVPECTATION / TOPIC SC.ENV.1.	EXPECTATION / TOPIC	SC.CH.7.3.	Explain the concept of dynamic equilibrium
CONTENT STANDARD /COURSE HI.SC.CH. CHEMISTRY STANDARD / PERFORMANCE INDICATOR / DOMAIN SC.CH.8. Nuclear Reactions and Energy - Understand the properties of nuclear energy INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK TOPIC: Energy Release TOPIC: Energy Release EXPECTATION / TOPIC SC.CH.8.2. Determine the amount of radioactive substance remaining after an integral number of half-lives have passed JOVE • Determining Rate Laws and the Order of Reaction JOVE • Determining Rate Laws and the Order of Reaction CONTENT STANDARD / COURSE HI.SC.ENV. ENVIRONMENTAL SCIENCE STANDARD / PERFORMANCE INDICATOR / DOMAIN SC.ENV.1. Scientific Investigation - Discover, invent, and investigate using the skills necessary to engage in the scientific process INDICATOR / GRADE LEVEL EXPECTATION / TOPIC SC.ENV.1.8. Describe the importance of ethics and integrity in scientific investigation JOVE • Aseptic Technique in Environmental Science CONTENT STANDARD / BENCHMARK HI SC ENV ENVIRONMENTAL SCIENCE			JoVE • Assembly of a Reflux System for Heated Chemical Reactions • Le Châtelier's Principle • Separation of Mixtures via Precipitation • Spectrophotometric Determination of an Equilibrium Constant
STANDARD / PERFORMANCE INDICATOR / DOMAIN SC.CH.8. Nuclear Reactions and Energy - Understand the properties of nuclear energy INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK TOPIC: Energy Release EXPECTATION / TOPIC SC.CH.8.2. Determine the amount of radioactive substance remaining after an integral number of half-lives have passed JOVE / COURSE HLSC.ENV. ENVIRONMENTAL SCIENCE STANDARD / PERFORMANCE INDICATOR / DOMAIN SC.ENV.1. Scientific Investigation - Discover, invent, and investigate using the skills necessary to engage in the scientific process INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK SC.ENV.1.8. Describe the importance of ethics and integrity in scientific investigation JOVE + Aseptic Technique in Environmental Science	CONTENT STANDARD / COURSE	HI.SC.CH.	CHEMISTRY
INDICATOR / GRADE Image: Topic: Energy Release LEVEL EXPECTATION / Determine the amount of radioactive substance remaining after an integral number of half-lives have passed SC.CH.8.2. Determine the amount of radioactive substance remaining after an integral number of half-lives have passed JoVE • Determining Rate Laws and the Order of Reaction CONTENT STANDARD HI.SC.ENV. YCOURSE SC.ENV.1. STANDARD / SC.ENV.1. PERFORMANCE SC.ENV.1. INDICATOR / GRADE SC.ENV.1. SCENTOR / TOPIC SC.ENV.1. SCENT / DOMAIN Scientific Investigation - Discover, invent, and investigate using the skills necessary to engage in the scientific process INDICATOR / GRADE TOPIC: Scientific Knowledge LEVEL EXPECTATION / Describe the importance of ethics and integrity in scientific investigation JOVE • Aseptic Technique in Environmental Science CONTENT STANDARD HUSC ENV	STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.CH.8.	Nuclear Reactions and Energy - Understand the properties of nuclear energy
EXPECTATION / TOPIC SC.CH.8.2. Determine the amount of radioactive substance remaining after an integral number of half-lives have passed JOVE • Determining Rate Laws and the Order of Reaction CONTENT STANDARD HI.SC.ENV. ENVIRONMENTAL SCIENCE / COURSE SC.ENV.1. Scientific Investigation - Discover, invent, and investigate using the skills necessary to engage in the scientific process INDICATOR / GRADE EVELEXPECTATION / SC.ENV.1.8. EXPECTATION / TOPIC SC.ENV.1.8. Describe the importance of ethics and integrity in scientific investigation - JoVE • Aseptic Technique in Environmental Science HLSC.ENV. ENVIRONMENTAL SCIENCE	INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Energy Release
CONTENT STANDARD / COURSE HI.SC.ENV. ENVIRONMENTAL SCIENCE STANDARD / PERFORMANCE INDICATOR / DOMAIN SC.ENV.1. Scientific Investigation - Discover, invent, and investigate using the skills necessary to engage in the scientific process INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK TOPIC: Scientific Knowledge EXPECTATION / TOPIC SC.ENV.1.8. Describe the importance of ethics and integrity in scientific investigation JOVE / Aseptic Technique in Environmental Science CONTENT STANDARD HLSC.ENV.	EXPECTATION / TOPIC	SC.CH.8.2.	Determine the amount of radioactive substance remaining after an integral number of half-lives have passed <u>JoVE</u> • Determining Rate Laws and the Order of Reaction
STANDARD / PERFORMANCE INDICATOR / DOMAINSC.ENV.1.Scientific Investigation - Discover, invent, and investigate using the skills necessary to engage in the scientific processINDICATOR / GRADE LEVEL EXPECTATION / BENCHMARKTOPIC: Scientific KnowledgeEXPECTATION / TOPICSC.ENV.1.8.Describe the importance of ethics and integrity in scientific investigationJoVE • Aseptic Technique in Environmental Science	CONTENT STANDARD / COURSE	HI.SC.ENV.	ENVIRONMENTAL SCIENCE
INDICATOR / GRADE TOPIC: Scientific Knowledge LEVEL EXPECTATION / BENCHMARK Describe the importance of ethics and integrity in scientific investigation EXPECTATION / TOPIC SC.ENV.1.8. Describe the importance of ethics and integrity in scientific investigation JoVE • Aseptic Technique in Environmental Science	STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.ENV.1.	Scientific Investigation - Discover, invent, and investigate using the skills necessary to engage in the scientific process
EXPECTATION / TOPIC SC.ENV.1.8. Describe the importance of ethics and integrity in scientific investigation JoVE • Aseptic Technique in Environmental Science CONTENT STANDARD HLSC.ENV. ENVIRONMENTAL SCIENCE	INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Scientific Knowledge
CONTENT STANDARD HI SC ENV. ENVIRONMENTAL SCIENCE	EXPECTATION / TOPIC	SC.ENV.1.8.	Describe the importance of ethics and integrity in scientific investigation <u>JoVE</u> • Aseptic Technique in Environmental Science
	CONTENT STANDARD	HI.SC.ENV.	ENVIRONMENTAL SCIENCE

STANDARD /	SC.ENV.2.	Nature of Science - Understand that science, technology,
PERFORMANCE		and society are interrelated
INDICATOR / DOMAIN		
INDICATOR / GRADE		TOPIC: Science, Technology, and Society
LEVEL EXPECTATION /		
BENCHMARK		
	SC ENIV 2.1	Explain how scientific advancements and emerging
	50.LIVV.2.1.	technology have influenced society
		JoVE
		Abdominal Exam I: Inspection and Auscultation
		Abdominal Exam II: Percussion
		 Abdominal Exam III: Palpation
		Abdominal Exam IV: Acute Abdominal Pain
		Assessment
		 Algae Enumeration via Culturable Methodology
		 An Introduction to Aging and Regeneration
		 An Introduction to Behavioral Neuroscience
		 An Introduction to Caenorhabditis elegans
		 An Introduction to Cell Death
		 An Introduction to Cell Division
		An Introduction to Cell Metabolism
		An Introduction to Cell Motility and Migration
		• An Introduction to Cellular and Molecular Neuroscience
		• An Introduction to Cognition
		• An introduction to Developmental Genetics
		• An Introduction to Developmental Neurobiology
		• An Introduction to Endocytosis and Executosis
		• 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
		An Introduction to the Zebratish: Danio rerio
		• An Overview of Epigenetics
		• An Overview of Gene Expression
		• An Overview of Genetic Analysis
		• An Overview of Genetics and Disease
		An Overview of Genetics and Disease Analysis of Farthworm Populations in Soil
		 Analysis of Earthworm Populations in Soil

 Anesthesia Induction and Maintenance
• Ankle Exam
 Annexin V and Propidium lodide 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 lowa 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
 Determination Of Nox in Automobile Exhaust Using
UV-VIS Spectroscopy
 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 lask
• Executive Function in Autism Spectrum Disorder
Experimentation using a Confederate Eventeent Culture for Developmental Otention
• Explant Culture for Developmental Studies
• Explant Culture of Neural Tissue
• Expression Profiling with Microarrays
• Eye Exam
• Eye Tracking in Cognitive Experiments
• FIVI Dyes in vesicie Kecycling
• rate iviapping

	Fear Conditioning
	• Filamentous Fungi
	 Finding Your Blind Spot and Perceptual Filling-in
	• Foot Exam
	 From Theory to Design: The Role of Creativity in
	Designing Experiments
	 Fundamentals of Breeding and Weaning
	Gel Purification
	 Gene Silencing with Morpholinos
	 General Approach to the Physical Exam
	Genetic Crosses
	 Genetic Engineering of Model Organisms
	Genetic Screens
	Genome Editing
	• Gram Staining of Bacteria from Environmental Sources
	Habituation: Studying Infants Before They Can Talk
	Hand and Wrist Exam
	• Hip Exam
	Histological Staining of Neural Tissue
	How Children Solve Problems Using Causal Reasoning
	 In ovo Electroporation of Chicken Embryos
	Inattentional Blindness
	Incidental Encoding
	 Induced Pluripotency
	 Intra-articular Shoulder Injection for Reduction
	Following Anterior Shoulder Dislocation
	Intraosseous Needle Placement
	 Introducing Experimental Agents into the Mouse
	 Invasion Assay Using 3D Matrices
	 Invertebrate Lifespan Quantification
	 Isolating Nucleic Acids from Yeast
	 Isolation of Fecal Bacteria from Water Samples by
	Filtration
	 Just-noticeable Differences
	• Knee Exam
	 Language: The N400 in Semantic Incongruity
	 Learning and Memory: The Remember-Know Task
	 Live Cell Imaging of Mitosis
	Lower Back Exam
	Lymph Node Exam
	Male Rectal Exam
	 Manipulating an Independent Variable through
	Embodiment
	 Measuring Children's Trust in Testimony
	 Measuring Grey Matter Differences with Voxel-based
	Morphometry: The Musical Brain
	 Measuring Reaction Time and Donders' Method of
	Subtraction
	 Measuring Tropospheric Ozone
	 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
	• PCB: The Polymerase Chain Beaction
	Palpation
	• Passaging Cells
	Patch Clamp Electrophysiology
	• Pelvic Exam I: Assessment of the External Genitalia
	• Pelvic Exam II: Speculum Exam
	Pelvic Exam III: Bimanual and Rectovaginal Exam
	• Percussion
	Percutaneous Cricothyrotomy (Seldinger Technique)
	• Pericardiocentesis
	• Peripheral Vascular Exam
	Peripheral Vascular Exam Using a Continuous Wave
	Doppler
	Peripheral Venous Cannulation
	 Perspectives on Cognitive Psychology
	• Perspectives on Experimental Psychology
	Perspectives on Neuropsychology
	• Perspectives on Sensation and Perception
	Physiological Correlates of Emotion Recognition
	Piaget's Conservation Task and the Influence of Task
	Demands
	• Pilot Testing
	Placebos in Research
	Plasmid Purification
	Positive Reinforcement Studies

	Primary Neuronal Cultures
	 Proper Adjustment of Patient Attire during the Physical
	Exam
	Prospect Theory
	Proton Exchange Membrane Fuel Cells
	Quantifying Environmental Microorganisms and
	Viruses Using aPCR
	 RNA Analysis of Environmental Samples Using RT-PCR
	• RNA-Seq
	• RNAi in C. elegans
	Realism in Experimentation
	 Recombineering and Gene Targeting
	 Reliability in Psychology Experiments
	 Respiratory Exam I: Inspection and Palpation
	 Respiratory Exam II: Percussion and Auscultation
	 Restriction Enzyme Digests
	 Rodent Handling and Restraint Techniques
	 Rodent Identification I
	Rodent Identification II
	 Rodent Stereotaxic Surgery
	SNP Genotyping
	 Self-administration Studies
	 Self-report vs. Behavioral Measures of Recycling
	• Sensory Exam
	 Separating Protein with SDS-PAGE
	• Shoulder Exam I
	• Shoulder Exam II
	Spatial Cueing
	Spatial Memory Testing Using Mazes
	• Sterile Tissue Harvest
	• Surgical Cricothyrotomy
	• Lesting For Genetically Modified Foods
	• The Arres Deers
	Ine Ames Room The Attentional Plink
	• The Actentional Dink
	• The ELISA Method
	The Ectorial 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

EXPECTATION / TOPIC	SC.ENV.2.2.	 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 Statistical Learning Visual Statistical Learning Visual Statistical Learning Water Quality Analysis via Indicator Organisms Whole-Mount In Situ Hybridization Within-subjects Repeated-measures Design Yeast Reproduction Yeast Reproduction Yeast Reproduction Zebrafish Breeding and Embryo Handling Zebrafish Breeding and Embryo Handling Zebrafish Reproduction and Development fMRI: Functional Magnetic Resonance Imaging Compare the risks and benefits of potential solutions to technological issues JoVE Biofuels: Producing Ethanol from Cellulosic Material Determination Of Nox in Automobile Exhaust Using UV-VIS Spectroscopy Measuring Tropospheric Ozone Proton Exchange Membrane Fuel Cells Self-report vs. Behavioral Measures of Recycling Using GIS to Investigate Urban Forestry
CONTENT STANDARD	HI.SC.ENV.	ENVIRONMENTAL SCIENCE
COURSE	SC ENV/2	Earth Colonge Understand the physical systems of the
PERFORMANCE INDICATOR / DOMAIN	56.ENV.3.	earth.

INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Forces that shape the earth
EXPECTATION / TOPIC	SC.ENV.3.2.	Compare different erosion processes <u>JoVE</u> • Turbidity and Total Solids in Surface Water
EXPECTATION / TOPIC	SC.ENV.3.4.	Compare different methods of generating electricity (e.g., fossil fuels, nuclear) <u>JoVE</u> • Bacterial Growth Curve Analysis and its Environmental Applications • Biofuels: Producing Ethanol from Cellulosic Material • Determination Of Nox in Automobile Exhaust Using UV-VIS Spectroscopy • Fractional Distillation • Proton Exchange Membrane Fuel Cells • Raman Spectroscopy for Chemical Analysis
CONTENT STANDARD / COURSE	HI.SC.ENV.	ENVIRONMENTAL SCIENCE
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.ENV.4.	Life Science - Understand the interconnections of living systems.
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Systems and Connections
EXPECTATION / TOPIC	SC.ENV.4.1.	Explain how scientists organize the biosphere <u>JoVE</u> • An Overview of Alkenone Biomarker Analysis for Paleothermometry • An Overview of bGDGT Biomarker Analysis for Paleoclimatology • Conversion of Fatty Acid Methyl Esters by Saponification for Uk'37 Paleothermometry • Extraction of Biomarkers from Sediments - Accelerated Solvent Extraction • Purification of a Total Lipid Extract with Column Chromatography • Removal of Branched and Cyclic Compounds by Urea Adduction for Uk'37 Paleothermometry • Sonication Extraction of Lipid Biomarkers from Sediment • Soxhlet Extraction of Lipid Biomarkers from Sediment
EXPECTATION / TOPIC	SC.ENV.4.2.	Explain why populations undergo cyclic fluctuations <u>JoVE</u>

		 An Introduction to the Chick: Gallus gallus domesticus An Introduction to the Laboratory Mouse: Mus musculus
		An Introduction to the Zebrafish: Danio rerio
		Analysis of Earthworm Populations in Soil
		Aseptic Technique in Environmental Science
		Bacterial Growth Curve Analysis and its Environmental
		Applications
		Bacterial Transformation: Electroporation
		Bacterial Transformation: The Heat Shock Method
		Basic Mouse Care and Maintenance
		• C. elegans Maintenance
		• Culturing and Enumerating Bacteria from Soil Samples
		Detection of Bacteriophages in Environmental Samples
		Dissolved Oxygen in Surface Water
		Drosophila Maintenance
		• Drosophila melanogaster Embryo and Larva Harvesting
		and Preparation
		• Filamentous Fungi
		• Isolation of Fecal Bacteria from water Samples by
		Processing Colle
		Passaging Cens Plasmid Purification
		Cuantifying Environmental Microorganisms and
		Viruses Using aPCB
		• Veast Maintenance
		Yeast Reproduction
EXPECTATION / TOPIC	SC FNV 4 3	Explain how ecosystems respond to human activities
	00.LIVV.4.0.	
		JoVE
		Biofuels: Producing Ethanol from Cellulosic Material
		• Determination Of Nox in Automobile Exhaust Using
		UV-VIS Spectroscopy
		• Dissolved Oxygen in Surface Water
		• Lead Analysis of Soli Using Atomic Absorption
		Spectroscopy
		Micasuling Troposphene 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
CONTENT STANDARD	HI.SC.ENV.	ENVIRONMENTAL SCIENCE
/ COURSE		
STANDARD /	SC.ENV.4.	Life Science - Understand the interconnections of living
PERFORMANCE		systems.
INDICATOR / DOMAIN		
INDICATOR / GRADE		TOPIC: Flow of Matter and Energy
LEVEL EXPECTATION /		
BENCHMARK		

EXPECTATION / TOPIC	SC.ENV.4.5.	Explain the relationship between the carbon cycle and fossil fuels
		JoVE • An Overview of Alkenone Biomarker Analysis for Paleothermometry • An Overview of bGDGT Biomarker Analysis for Paleoclimatology • 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 • Extraction of Biomarkers from Sediments - Accelerated Solvent Extraction • Metabolic Labeling • Purification of a Total Lipid Extract with Column Chromatography • Removal of Branched and Cyclic Compounds by Urea Adduction for Uk'37 Paleothermometry • Sonication Extraction of Lipid Biomarkers from Sediment • Soxhlet Extraction of Lipid Biomarkers from Sediment • Using GIS to Investigate Urban Forestry
CONTENT STANDARD / COURSE	HI.SC.ENV.	ENVIRONMENTAL SCIENCE
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.ENV.5.	Interdependence of The Environment and Human Societies - Understand the interdependence between environmental systems and human societies.
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Human Impact
EXPECTATION / TOPIC	SC.ENV.5.1.	Explain how economic and societal decisions affect global and local ecosystems
		JoVE
		 Biofuels: Producing Ethanol from Cellulosic Material Determination Of Nox in Automobile Exhaust Using UV-VIS Spectroscopy Dissolved Oxygen in Surface Water Lead Analysis of Soil Using Atomic Absorption Spectroscopy Measuring Tropospheric Ozone Nutrients in Aquatic Ecosystems Proton Exchange Membrane Fuel Cells Self-report vs. Behavioral Measures of Recycling Turbidity and Total Solids in Surface Water

		JoVE • 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 • Self-report vs. Behavioral Measures of Recycling • 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
EXPECTATION / TOPIC	SC.ENV.5.3.	Explain how population growth and natural resource consumption affect global sustainability <u>JoVE</u> • Biofuels: Producing Ethanol from Cellulosic Material • Nutrients in Aquatic Ecosystems
CONTENT STANDARD / COURSE	HI.SC.ENV.	ENVIRONMENTAL SCIENCE
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.ENV.5.	Interdependence of The Environment and Human Societies - Understand the interdependence between environmental systems and human societies.
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Resource Use
EXPECTATION / TOPIC	SC.ENV.5.4.	Describe the relationship between the environment and the growth rate of a population <u>JoVE</u> • Nutrients in Aquatic Ecosystems
EXPECTATION / TOPIC	SC.ENV.5.5.	Compare the consumption of natural resources by different nations JoVE • Biofuels: Producing Ethanol from Cellulosic Material • Dissolved Oxygen in Surface Water • Igneous Intrusive Rock • 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
EXPECTATION / TOPIC	SC.ENV.5.6.	Explain why recycling and conservation of resources are important

		<u>JoVE</u> • Electrophoretic Mobility Shift Assay (EMSA) • Self-report vs. Behavioral Measures of Recycling
CONTENT STANDARD / COURSE	HI.SC.MS.	MARINE SCIENCE
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.MS.1.	Scientific Investigation - Discover, invent, and investigate using the skills necessary to engage in the scientific process
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Scientific Knowledge
EXPECTATION / TOPIC	SC.MS.1.8.	Describe the importance of ethics and integrity in scientific investigation JoVE • 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 • Reliability in Psychology Experiments • Self-report vs. Behavioral Measures of Recycling • The Factorial Experiment • The Multi-group Experiment • The Simple Experiment: Two-group Design • Within-subjects Repeated-measures Design
CONTENT STANDARD / COURSE	HI.SC.MS.	MARINE SCIENCE
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.MS.2.	Nature of Science - Understand that science, technology, and society are interrelated
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Science, Technology, and Society
EXPECTATION / TOPIC	SC.MS.2.1.	Explain how scientific advancements and emerging technology have influenced society <u>JoVE</u> • 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 li	troduction to Aging and Regeneration
• An li	troduction to Behavioral Neuroscience
• An li	troduction to Caenorhabditis elegans
• An Iı	troduction to Cell Death
• An Iı	troduction to Cell Division
• An I	troduction to Cell Metabolism
• An Iı	troduction to Cell Motility and Migration
• An li	troduction to Cellular and Molecular Neuroscience
• An li	troduction to Cognition
• An li	troduction to Developmental Genetics
• An li	troduction to Developmental Neurobiology
• An li	troduction to Drosophila melanogaster
• An Iı	troduction to Endocytosis and Exocytosis
• An li	troduction to Learning and Memory
• An li	troduction to Modeling Behavioral Disorders and
Stress	
• An li	itroduction to Molecular Developmental Biology
• An li	itroduction to Motor Control
• An li	troduction to Neuroanatomy
• An II	troduction to Neurophysiology
• An II	troduction to Organogenesis
• An II	troduction to Reward and Addiction
• An li	troduction to Stem Cell Biology
• An li	troduction to Transfection
• An li	troduction to the Chick' Gallus gallus domesticus
• An li	troduction to the Laboratory Mouse ⁻ Mus
muscu	lus
• An li	troduction to the Zebrafish: Danio rerio
• An C	verview of Epigenetics
• An C	verview of Gene Expression
• An C	verview of Genetic Analysis
• An C	verview of Genetic Engineering
• An C	verview of Genetics and Disease
• Anal	ysis of Earthworm Populations in Soil
• Anes	thesia Induction and Maintenance
• Ank	e Exam
• Ann	exin V and Propidium lodide Labeling
• Ante	rograde Amnesia
• Anxi	ety Testing
• App	oximate Number Sense Test
• Are	ou Smart or Hardworking? How Praise Influences
Childre	en's Motivation
• Arte	tial Line Placement
• Aser	tic rechnique in Environmental Science
• Asse	ssing Dexterity with Reaching Tasks
■ Auso	uilalion arial Growth Curve Analysis and its Environmental
	ations
Applic	anona arial Transformation: Electroporation
• Bact	erial Transformation: The Heat Shock Method
• Bala	nce 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 Assav
• 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 lowa 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 Bacterionbages 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 Interior Catholysis
 Ethics in Psychology Research Event related Potentials and the Oddhall Teak
• Event-related Fotentials 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 Oal Dwifferstien
Gel Purification Gene Silensing with Marghalines
Gene Silencing with Morpholinos Concept Approach to the Physical Even
General Approach to the Physical Exam Genetic Crosses
Genetic Engineering of Model Organisms
Genetic Engineering of Model Organisms Genetic Screens
Genome Editing
Gram Staining of Bacteria from Environmental Sources
Habituation: Studying Infants Before They Can Talk
• Hand and Wrist Exam
• Hip Exam
Histological Staining of Neural Tissue

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• How Children Solve Problems Using Causal Reasoning
• In ovo Electroporation of Chicken Embryos
Inattentional Blindness
 Incidental Encoding
 Induced Pluripotency
 Intra-articular Shoulder Injection for Reduction
Following Anterior Shoulder Dislocation
 Intraosseous Needle Placement
 Introducing Experimental Agents into the Mouse
 Invasion Assay Using 3D Matrices
 Invertebrate Lifespan Quantification
 Isolating Nucleic Acids from Yeast
 Isolation of Fecal Bacteria from Water Samples by
Filtration
Just-noticeable Differences
• Knee Exam
 Language: The N400 in Semantic Incongruity
Learning and Memory: The Remember-Know Task
Live Cell Imaging of Mitosis
• Lower Back Exam
• Lymph Node Exam
Male Rectal Exam
Manipulating an Independent Variable through
Embodiment
Measuring Children's Trust in Testimony
Measuring Grey Matter Differences with Voxel-based
Morphometry: The Musical Brain
Measuring Reaction Time and Donders' Method of
Subtraction
Measuring Verbal Working Memory Span
Measuring Vital Signs
 Memory Development: Demonstrating How Repeated
Questioning Leads to False Memories
Mental Rotation
 Metacognitive Development: How Children Estimate
Their Memory
Modeling Social Stress
Molecular Cloning
Motion-induced Blindness
Motor Exam I
Motor Exam II
 Motor Learning in Mirror Drawing
Motor Maps
Mouse Genotyping
 Multiple Object Tracking
 Murine In Utero Electroporation
• Mutual Exclusivity: How Children Learn the Meanings
of Words
• Neck Exam
• Needle Thoracostomy (needle Decompression) for
Temporizing Tension Pneumothorax Treatment
• Neuronal Transfection Methods

 Nose, Sinuses, Oral Cavity and Pharynx Exam
 Numerical Cognition: More or Less
 Nutrients in Aquatic Ecosystems
Object Substitution Masking
Observation and Inspection
Observational Research
Ophthalmoscopic Examination
 PCR: The Polymerase Chain Reaction
Palpation
Passaging Cells
 Patch Clamp Electrophysiology
Pelvic Exam I: Assessment of the External Genitalia
Pelvic Exam II: Speculum Exam
Pelvic Exam III: Bimanual and Rectovaginal Exam
Percussion
• Percutaneous Cricothyrotomy (Seldinger Technique)
Pericardiocentesis
Peripheral Vascular Exam
Peripheral Vascular Exam Using a Continuous Wave
Doppler
Peripheral Venous Cannulation
 Perspectives on Cognitive Psychology
 Perspectives on Experimental Psychology
 Perspectives on Neuropsychology
• Perspectives on Sensation and Perception
Physiological Correlates of Emotion Recognition
Piaget's Conservation Task and the Influence of Task
Demands
Pilot Testing
Placebos in Research
Plasmid Purification
Positive Reinforcement Studies
Primary Neuronal Cultures
Proper Adjustment of Patient Attire during the Physical
Exam
Prospect Theory
Proton Exchange Membrane Fuel Cells
 Quantifying Environmental Microorganisms and
Viruses Using qPCR
RNA Analysis of Environmental Samples Using RT-PCR
• RNA-Seq
RNAi in C. elegans
Realism in Experimentation
Recombineering and Gene Targeting
 Reliability in Psychology Experiments
 Respiratory Exam I: Inspection and Palpation
Respiratory Exam II: Percussion and Auscultation
Restriction Enzyme Digests
Rodent Handling and Restraint Techniques
Rodent Identification I
Rodent Identification II
Rodent Stereotaxic Surgery

	SNP Genotyping
	Self-administration Studies
	 Self-report vs. Behavioral Measures of Recycling
	• Sensory Exam
	 Separating Protein with SDS-PAGE
	• Shoulder Exam I
	• Shoulder Exam II
	Spatial Cueing
	 Spatial Memory Testing Using Mazes
	Sterile Tissue Harvest
	Surgical Cricothyrotomy
	 Testing For Genetically Modified Foods
	 The ATP Bioluminescence Assay
	• The Ames Room
	The Attentional Blink
	 The Costs and Benefits of Natural Pedagogy
	The ELISA Method
	The Factorial Experiment
	The Inverted-face Effect
	The McGurk Effect
	The Morris Water Maze
	The Multi-group Experiment
	• The Precision of Visual Working Memory with Delayed
	Estimation
	 The Rouge Test: Searching for a Sense of Self
	The Rubber Hand Illusion
	 The Simple Experiment: Two-group Design
	• The Split Brain
	The Staircase Procedure for Finding a Perceptual
	Threshold
	The TUNEL Assay
	The Transwell Migration Assay
	• The Western Blot
	• Thyroid Exam
	Tissue Regeneration with Somatic Stem Cells
	Transplantation Studies
	 Tree Identification: How To Use a Dichotomous Key
	Tree Survey: Point-Centered Quarter Sampling Method
	Turbidity and Total Solids in Surface Water
	Using Diffusion Tensor Imaging in Traumatic Brain
	Iniurv
	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
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		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
CONTENT STANDARD / COURSE	HI.SC.MS.	MARINE SCIENCE
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.MS.3.	Oceanography - Understand the physical features of the ocean and its influences on weather and climate.
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Physical Characteristics of the Ocean
EXPECTATION / TOPIC	SC.MS.3.2.	Describe the effect of plate tectonics on the topography of the ocean floor <u>JoVE</u> • Igneous Intrusive Rock • Igneous Volcanic Rock
EXPECTATION / TOPIC	SC.MS.3.3.	Explain how the ocean participates in the geochemical cycling of elements <u>JoVE</u> • An Overview of Alkenone Biomarker Analysis for Paleothermometry • An Overview of bGDGT Biomarker Analysis for Paleoclimatology • Conversion of Fatty Acid Methyl Esters by Saponification for Uk'37 Paleothermometry • Determination Of Nox in Automobile Exhaust Using UV-VIS Spectroscopy • Dissolved Oxygen in Surface Water • Extraction of Biomarkers from Sediments - Accelerated Solvent Extraction • Purification of a Total Lipid Extract with Column Chromatography • Removal of Branched and Cyclic Compounds by Urea Adduction for Uk'37 Paleothermometry • Sonication Extraction of Lipid Biomarkers from Sediment • Soxhlet Extraction of Lipid Biomarkers from Sediment • Using GIS to Investigate Urban Forestry
CONTENT STANDARD / COURSE	HI.SC.MS.	MARINE SCIENCE
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STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.MS.4.	Ecological Systems - Understand the locations and characteristics of marine ecosystems.
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Ecosystems
EXPECTATION / TOPIC	SC.MS.4.1.	Differentiate freshwater, brackish, and saltwater ecosystems <u>JoVE</u> • Dissolved Oxygen in Surface Water
		 Nutrients in Aquatic Ecosystems Turbidity and Total Solids in Surface Water Water Quality Analysis via Indicator Organisms Zebrafish Maintenance and Husbandry
CONTENT STANDARD / COURSE	HI.SC.MS.	MARINE SCIENCE
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.MS.5.	Structure, Function, and Interdependence - Understand the structure, function, and interdependence of marine organisms.
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Structure And Function
EXPECTATION / TOPIC	SC.MS.5.1.	Explain how adaptations help animals survive in a marine environment
		JoVE • An Introduction to the Zebrafish: Danio rerio • Zebrafish Breeding and Embryo Handling • Zebrafish Maintenance and Husbandry • Zebrafish Microinjection Techniques • Zebrafish Reproduction and Development
EXPECTATION / TOPIC	SC.MS.5.2.	Compare the characteristics of marine organisms (e.g., planktonic, invertebrate, vertebrate)
		JoVE Algae Enumeration via Culturable Methodology
CONTENT STANDARD / COURSE	HI.SC.MS.	MARINE SCIENCE
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.MS.5.	Structure, Function, and Interdependence - Understand the structure, function, and interdependence of marine organisms.
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Interdependence

EXPECTATION / TOPIC	SC.MS.5.3.	Compare forms of marine symbiosis
		<u>JoVE</u> • An Introduction to the Zebrafish: Danio rerio • Zebrafish Breeding and Embryo Handling • Zebrafish Maintenance and Husbandry • Zebrafish Microinjection Techniques • Zebrafish Reproduction and Development
CONTENT STANDARD / COURSE	HI.SC.MS.	MARINE SCIENCE
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.MS.6.	Interdependence of Humans and the Ocean - Understand the interdependence of humans and the ocean.
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Human Impact
EXPECTATION / TOPIC	SC.MS.6.4.	Explain how human activities and development lead to marine pollution (e.g., point sources, non-point sources)
		<u>JoVE</u> • Dissolved Oxygen in Surface Water • Introduction to Mass Spectrometry • Making a Geologic Cross Section • Nutrients in Aquatic Ecosystems • Turbidity and Total Solids in Surface Water • Water Quality Analysis via Indicator Organisms
EXPECTATION / TOPIC	SC.MS.6.5.	Describe how urbanization has impacted the ocean <u>JoVE</u> • Dissolved Oxygen in Surface Water • Le Châtelier's Principle • Nutrients in Aquatic Ecosystems • Turbidity and Total Solids in Surface Water
CONTENT STANDARD / COURSE	HI.SC.PAH.	PLANTS AND ANIMALS IN HAWAII
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.PAH.1:	Scientific InvestigationDiscover, invent, and investigate using the skills necessary to engage in the scientific process
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Scientific Inquiry
EXPECTATION / TOPIC	SC.PAH.1.1.	Describe how a testable hypothesis may need to be revised to guide a scientific investigation <u>JoVE</u> • The Multi-group Experiment • The Simple Experiment: Two-group Design
EXPECTATION / TOPIC	SC.PAH.1.2.	Design and safely implement an experiment, including the appropriate use of tools and techniques to organize,

		analyze, and validate data <u>JoVE</u> • Ethics in Psychology Research • Experimentation using a Confederate • From Theory to Design: The Role of Creativity in Designing Experiments • Manipulating an Independent Variable through Embodiment • Observational Research • Pilot Testing • Placebos in Research • Realism in Experimentation • Reliability in Psychology Experiments • The Factorial Experiment • The Multi-group Experiment • The Simple Experiment: Two-group Design • Within-subjects Repeated-measures Design
CONTENT STANDARD / COURSE	HI.SC.PAH.	PLANTS AND ANIMALS IN HAWAII
STANDARD / PERFORMANCE INDICATOR / DOMAIN INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK	SC.PAH.1:	Scientific InvestigationDiscover, invent, and investigate using the skills necessary to engage in the scientific process TOPIC: Scientific Knowledge
EXPECTATION / TOPIC	SC.PAH.1.8.	Describe the importance of ethics and integrity in scientific investigation <u>JoVE</u> • 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 • Reliability in Psychology Experiments • Self-report vs. Behavioral Measures of Recycling • The Factorial Experiment • The Multi-group Experiment • The Simple Experiment: Two-group Design • Within-subjects Repeated-measures Design
CONTENT STANDARD / COURSE	HI.SC.PAH.	PLANTS AND ANIMALS IN HAWAII
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.PAH.2:	Nature of ScienceUnderstand that science, technology, and society are interrelated

INDICATOR / GRADE		TOPIC: Science, Technology, and Society
BENCHMARK		
EXPECTATION / TOPIC	SC.PAH.2.1.	Explain how scientific advancements and emerging
		technology have influenced society
		JoVE
		 An Introduction to Aging and Regeneration
		 An Introduction to Drosophila melanogaster
		 An Introduction to Molecular Developmental Biology
		 An Introduction to Organogenesis
		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 Zebransh. Danio reno
		All Overview of Genetic Engineering Bacterial Transformation: Electronoration
		Bacterial Transformation: The Heat Shock Method
		• C. elegans Development and Reproduction
		• Chick ex ovo Culture
		DNA Ligation Reactions
		• Development and Reproduction of the Laboratory
		Mouse
		 Development of the Chick
		 Embryonic Stem Cell Culture and Differentiation
		 Explant Culture for Developmental Studies
		• Fate Mapping
		• Fundamentals of Breeding and Weaning
		• Gene Silencing with Morpholinos
		Genetic Engineering of Wodel Organisms
		• In ovo Electroporation of Chicken Embryos
		 Induced Fluipotency Invertebrate Lifesnan Quantification
		Molecular Cloning
		Molecular Cloning Molecular Cloning
		Nutrients in Aquatic Ecosystems
		Plasmid Purification
		• RNAi in C. elegans
		Restriction Enzyme Digests
		 Soil Nutrient Analysis: Nitrogen, Phosphorus, and
		Potassium
		Solid-Liquid Extraction
		Testing For Genetically Modified Foods
		• The TUNEL Assay
		Issue Regeneration with Somatic Stem Cells
		Iransplantation Studies Visualizing Call Mission and the Call of Call I
		• visualizing Soli ivicroorganisms via the Contact Slide
		Assay and Microscopy • Whole-Mount in Situ Hybridization

		• Zebrafish Breeding and Embryo Handling
		Zebrafish Maintenance and Husbandry
		Zebrafish Microinjection Techniques
		Zebrafish Reproduction and Development
EXPECTATION / TOPIC	SC.PAH.2.2.	Compare the risks and benefits of potential solutions to
		technological issues
		JoVE
		 An Introduction to Aging and Regeneration
		 An Introduction to Drosophila melanogaster
		• An Introduction to Molecular Developmental Biology
		 An Introduction to Organogenesis
		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 Genetic Engineering
		Bacterial Transformation: Electroporation
		Bacterial Transformation: The Heat Shock Method
		• C. elegans Development and Reproduction
		Chick ex ovo Culture
		DNA Ligation Reactions
		 Development and Reproduction of the Laboratory
		Mouse
		Development of the Chick
		 Embryonic Stem Cell Culture and Differentiation
		• Explant Culture for Developmental Studies
		Fate Mapping
		 Fundamentals of Breeding and Weaning
		 Gene Silencing with Morpholinos
		 Genetic Engineering of Model Organisms
		 In ovo Electroporation of Chicken Embryos
		 Induced Pluripotency
		 Invertebrate Lifespan Quantification
		Molecular Cloning
		Mouse Genotyping
		Plasmid Purification
		 RNAi in C. elegans
		 Restriction Enzyme Digests
		 Self-report vs. Behavioral Measures of Recycling
		Solid-Liquid Extraction
		 Testing For Genetically Modified Foods
		• The TUNEL Assay
		• Tissue Regeneration with Somatic Stem Cells
		Transplantation Studies
		 Whole-Mount In Situ Hybridization
		 Zebrafish Breeding and Embryo Handling
		 Zebrafish Maintenance and Husbandry

		 Zebrafish Microinjection Techniques Zebrafish Reproduction and Development
CONTENT STANDARD / COURSE	HI.SC.PAH.	PLANTS AND ANIMALS IN HAWAII
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.PAH.3.	Organisms and the EnvironmentUnderstand the unity, diversity, and interrelationships of organisms, including their relationship to cycles of matter and energy in the environment
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Cycles of Matter and Energy
EXPECTATION / TOPIC	SC.PAH.3.1.	Illustrate biogeochemical cycles within the Hawaiian ecosystem and describe how abiotic and biotic influences have impacted these cycles <u>JoVE</u> • Algae Enumeration via Culturable Methodology • An Overview of Alkenone Biomarker Analysis for Paleothermometry • An Overview of bGDGT Biomarker Analysis for Paleoclimatology • Analysis of Earthworm Populations in Soil • Bacterial Growth Curve Analysis and its Environmental Applications • Carbon and Nitrogen Analysis of Environmental Samples • Conversion of Fatty Acid Methyl Esters by Saponification for Uk'37 Paleothermometry • Culturing and Enumerating Bacteria from Soil Samples • Determination Of Nox in Automobile Exhaust Using UV-VIS Spectroscopy • Dissolved Oxygen in Surface Water • Extraction of Biomarkers from Sediments - Accelerated Solvent Extraction • Filamentous Fungi • Nutrients in Aquatic Ecosystems • Purification of a Total Lipid Extract with Column Chromatography • Removal of Branched and Cyclic Compounds by Urea Adduction for Uk'37 Paleothermometry • Soil Nutrient Analysis: Nitrogen, Phosphorus, and Potassium • Sonication Extraction of Lipid Biomarkers from Sediment • Soxhlet Extraction of Lipid Biomarkers from Sediment
		Using GIS to Investigate Urban Forestry
EXPECTATION / TOPIC	SC.PAH.3.2.	Explain how the chemical reactions that occur in photosynthesis and cellular respiration result in cycling

		of energy within the ecosystem of Hawaii
		<u>JoVE</u> • An Introduction to Cell Metabolism • Biofuels: Producing Ethanol from Cellulosic Material • Detecting Reactive Oxygen Species • The ATP Bioluminescence Assay
EXPECTATION / TOPIC	SC.PAH.3.3.	Explain how matter and energy flow through living systems and the physical environments (e.g., subalpine, rainforest, montane bogs, dryland and mesic forests, subterranean, freshwater, coastal) found in Hawaii JoVE • 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 • Dissolved Oxygen in Surface Water • 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
CONTENT STANDARD / COURSE	HI.SC.PAH.	PLANTS AND ANIMALS IN HAWAII
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.PAH.3.	Organisms and the EnvironmentUnderstand the unity, diversity, and interrelationships of organisms, including their relationship to cycles of matter and energy in the environment

INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Interdependence
EXPECTATION / TOPIC	SC.PAH.3.4.	Explain dynamic equilibrium in populations and the shifts in equilibrium due to abiotic (e.g., changes in climate, soil composition) and biotic (e.g., presence of invasive species such as the brown tree snake, two spotted leaf hopper, feral pigs and goats, nonindigenous grasses, miconia) factors on flora and fauna populations found within Hawaii's land and oceanic environments
		<u>JoVE</u> • Algae Enumeration via Culturable Methodology • An Introduction to the Chick: Gallus gallus domesticus • An Introduction to the Laboratory Mouse: Mus musculus
		 An Introduction to the Zebrafish: Danio rerio Analysis of Earthworm Populations in Soil Aseptic Technique in Environmental Science Bacterial Growth Curve Analysis and its Environmental Applications Bacterial Transformation: Electroporation Bacterial Transformation: The Heat Shock Method
		 Basic Mouse Care and Maintenance C. elegans Maintenance Culturing and Enumerating Bacteria from Soil Samples Detection of Bacteriophages in Environmental Samples Dissolved Oxygen in Surface Water Drosophila Maintenance
		 Drosophila melanogaster Embryo and Larva Harvesting and Preparation Filamentous Fungi Isolation of Fecal Bacteria from Water Samples by Filtration Passaging Cells Plasmid Purification
		 Quantifying Environmental Microorganisms and Viruses Using qPCR Tree Survey: Point-Centered Quarter Sampling Method Visualizing Soil Microorganisms via the Contact Slide Assay and Microscopy Yeast Maintenance Yeast Reproduction
EXPECTATION / TOPIC	SC.PAH.3.6.	Explain how human actions (e.g., conservation, introduction of nonindigenous species, destruction and fragmentation of native habitat, hunting, over harvesting, poor land use practices, stream diversion) have impacted organisms in Hawaii since the first Polynesians
		JoVE • Analysis of Earthworm Populations in Soil

		 Biofuels: Producing Ethanol from Cellulosic Material Determination Of Nox in Automobile Exhaust Using UV-VIS Spectroscopy Dissolved Oxygen in Surface Water Lead Analysis of Soil Using Atomic Absorption Spectroscopy Measuring Tropospheric Ozone Nutrients in Aquatic Ecosystems Tree Identification: How To Use a Dichotomous Key Tree Survey: Point-Centered Quarter Sampling Method Turbidity and Total Solids in Surface Water Water Quality Analysis via Indicator Organisms
CONTENT STANDARD / COURSE	HI.SC.PAH.	PLANTS AND ANIMALS IN HAWAII
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.PAH.4.	Structure and Function in OrganismsUnderstand the structures and functions of living organisms and how organisms can be compared scientifically
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Cells, Tissues, Organs, and Organ Systems
EXPECTATION / TOPIC	SC.PAH.4.1.	Describe different cell parts and their functions JoVE • 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 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 Neurophysiology • An Introduction to Saccharomyces cerevisiae • An Introduction to Stem Cell Biology • An Introduction to Transfection • Annexin V and Propidium Iodide Labeling • 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 • Cytogenetics • DNA Ligation Reactions • Density Gradient Ultracentrifugation • Detecting Reactive Oxygen Species • Electro-encephalography (EEG) • 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
		• Genetic Glosses
		• Histological Staining of Neural Lissue
		 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
		Muring Muring In Litera Electronaration
		• Murine III Otero Electroporation
		• Neuronal Transfection Methods
		Passaging Cells
		 Patch Clamp Electrophysiology
		 Plasmid Purification
		 Primary Neuronal Cultures
		Protein Crystallization
		Recombineering and Gene Targeting
		Beconstitution of Membrane Proteins
		Restriction Enzyme Digests
		• Surface Disamon Deconomics (SPD)
		• Surface Flashion Resonance (SFR)
		• 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
		• Veast Transformation and Cloning
EXPECTATION / TOPIC	SC.PAH.4.2.	Explain how cells are specialized into different tissues
		and organs
		JoVE
		 An Introduction to Aging and Regeneration
		• An Introduction to Caenorhabditis elegans
		An Introduction to Cell Motility and Migration
		• An Introduction to Developmental Genetics
		• An Introduction to Developmental Neurobiology
		• An introduction to Developmental Neuropiology
		• An introduction to Learning and Wemory
		• An Introduction to Molecular Developmental Biology
		 An Introduction to Organogenesis
		 An Introduction to Stem Cell Biology
		An Overview of Epigenetics
		 An Overview of Gene Expression
		• C. elegans Development and Reproduction
		• Chick ex ovo Culture
	L	

		 DNA Methylation Analysis Detecting Reactive Oxygen Species Development and Reproduction of the Laboratory Mouse Development of the Chick Diagnostic Necropsy and Tissue Harvest Drosophila Development and Reproduction Drosophila Larval IHC 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 Engineering of Model Organisms Histological Staining of Neural Tissue In ovo Electroporation of Chicken Embryos Induced Pluripotency Murine In Utero Electroporation RNA-Seq Sterile Tissue Harvest Tissue Regeneration with Somatic Stem Cells Transplantation Studies Whole-Mount In Situ Hybridization Zebrafish Breeding and Embryo Handling Zebrafish Reproduction and Development
EXPECTATION / TOPIC	SC.PAH.4.3.	Differentiate between the processes of mitosis and meiosis <u>JoVE</u> • An Introduction to Cell Division • An Introduction to Saccharomyces cerevisiae • Cell Cycle Analysis • Genetic Crosses • Live Cell Imaging of Mitosis • Recombineering and Gene Targeting • Yeast Reproduction • Yeast Transformation and Cloning
EXPECTATION / TOPIC	SC.PAH.4.4.	Describe how homeostatic balance occurs in cells and organisms (e.g., salt balance) JoVE • Abdominal Exam I: Inspection and Auscultation • Abdominal Exam II: Percussion • Abdominal Exam III: Palpation • Abdominal Exam IV: Acute Abdominal Pain Assessment • An Introduction to Cell Death • An Introduction to Cell Division • An Introduction to Cell Metabolism

	An Introduction to Cellular and Molecular Neuroscience
	 An Introduction to Cognition
	 An Introduction to Developmental Neurobiology
	 An Introduction to Endocytosis and Exocytosis
	 An Introduction to Learning and Memory
	 An Introduction to Molecular Developmental Biology
	 An Introduction to Reward and Addiction
	 An Introduction to Stem Cell Biology
	 Anesthesia Induction and Maintenance
	Ankle Exam
	 Annexin V and Propidium lodide Labeling
	Arterial Line Placement
	 Assessing Dexterity with Reaching Tasks
	Auscultation
	 Balance and Coordination Testing
	Basic Care Procedures
	 Basic Life Support Part II: Airway/Breathing and
	Continued Cardiopulmonary Resuscitation
	Basic Life Support: Cardiopulmonary Resuscitation and
	Defibrillation
	 Basic Mouse Care and Maintenance
	 Blood Pressure Measurement
	Blood Withdrawal I
	Blood Withdrawal II
	 C. elegans Development and Reproduction
	Calcium Imaging in Neurons
	Cardiac Exam I: Inspection and Palpation
	Cardiac Exam II: Auscultation
	Cardiac Exam III: Abnormal Heart Sounds
	Cell-surface Biotinylation Assay
	• Central Venous Catheter Insertion: Femoral Vein with
	Ultrasound Guidance
	• Central Venous Catheter Insertion: Internal Jugular
	With Oltrasound Guidance
	• Central venous Catheter Insertion: Subclavian vein
	Compound Administration I
	Compound Administration III
	Compound Administration IV
	Comprehensive Breast Exam
	Considerations for Bodent Surgery
	• Cranial Nerves Exam I (I-VI)
	• Cranial Nerves Exam II (VII-XII)
	Detecting Reactive Oxygen Species
	Diagnostic Necropsy and Tissue Harvest
	• 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
	Evolant Culture of Neural Tissue
	• EVE Exam
	• Fear Conditioning
	• Foot Exam
	 General Approach to the Physical Exam
	Hand and Wrist Exam
	• Hip Exam
	 Histological Staining of Neural Tissue
	 In ovo Electroporation of Chicken Embryos
	 Induced Pluripotency
	 Intra-articular Shoulder Injection for Reduction
	Following Anterior Shoulder Dislocation
	 Intraosseous Needle Placement
	 Isolating Nucleic Acids from Yeast
	• Knee Exam
	• Lower Back Exam
	• Lymph Node Exam
	• Male Rectal Exam
	Measuring Vital Signs
	• Motor Exam I
	• Motor Exam II
	Murine In Litero Electroporation
	Neck Exam
	Needle Thoracostomy (needle Decompression) for
	Temporizing Tension Pneumothoray Treatment
	Nose Sinuses Oral Cavity and Pharyny Evam
	Observation and Inspection
	Ophthalmoscopic Examination
	Palnation
	Patch Clamp Electrophysiology
	Palvic Evam I: Assessment of the Evternal Cenitalia
	Pelvic Exam II: Speculum Exam
	Polyic Exam III: Bimanual and Bostovaginal Exam
	Poroutonoous Crienthyrotomy (Soldinger Technique)
	Pericardiacentesis
	Periodial Vocaular Evam
	Peripheral Vascular Exam
	Penpheral vascular Exam Osing a Continuous wave
	Porinharal Vanaus Connulation
	Physiological Correlator of Emotion Passanition
	Proper Adjustment of Detient Attive during the Division
	• Proper Adjustment of Patient Ature during the Physical
	EXAIII
	Reconstitution of Wemprane Proteins
	- nespiratory Examil: Inspection and Palpation
	• Respiratory Exam II: Percussion and Auscultation
	• Self-auministration Studies
	• Sensory Exam
	• Shoulder Exam I

		• Shouldor Evom II
		• Shoulder Exam in
		• Spatial Memory Testing Using Mazes
		• Sterile Tissue Harvest
		Surgical Cricothyrotomy
		 The ATP Bioluminescence Assay
		• The TUNEL Assay
		• Thyroid Exam
		 Tissue Regeneration with Somatic Stem Cells
		 Tree Identification: How To Use a Dichotomous Key
		 Using Diffusion Tensor Imaging in Traumatic Brain
		Injury
		• Using a pH Meter
		Yeast Maintenance
		Yeast Reproduction
		 Yeast Transformation and Cloning
		 Zebrafish Maintenance and Husbandry
EXPECTATION (TODIC		Describe the commence and functions of eveninty of
EXPECTATION / TOPIC	ЭС.РАП.4. 5.	Describe the components and functions of a variety of
		macromolecules active in biological systems
		JOVE
		• An introduction to Caenornabolitis 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 Molecular Developmental Biology
		 An Introduction to Saccharomyces cerevisiae
		 An Introduction to Transfection
		 An Overview of Epigenetics
		 An Overview of Gene Expression
		 An Overview of Genetic Analysis
		An Overview of Genetic Engineering
		An Overview of Genetics and Disease
		 Annexin V and Propidium Iodide Labeling
		Bacterial Transformation: Electroporation
		Bacterial Transformation: The Heat Shock Method
		Biofuels: Producing Ethanol from Cellulosic Material
		• C. elegans Maintenance
		• Cell Cycle Analysis
		• Cell-surface Riotinvlation Assav
		Chromatin Immunoprecipitation
		Chromatography-Based Biomolecule Purification
		Methods
		• Co-Immunoprecipitation and Pull-Down Assays
		Column Chromatography
		• Community DNA Extraction from Bacterial Colonies
		Cytogenetics
		DNA Gel Electrophoresis
		DNA Ligation Reactions

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 Quantifying Environmental Microorganisms and Viruses Using qPCR RNA Analysis of Environmental Samples Using RT-PCR RNA-Seq RNAi in C. elegans Recombineering and Gene Targeting Reconstitution of Membrane Proteins Restriction Enzyme Digests 		 Protein Crystallization
Viruses Using qPCR • RNA Analysis of Environmental Samples Using RT-PCR • RNA-Seq • RNAi in C. elegans • Recombineering and Gene Targeting • Reconstitution of Membrane Proteins • Restriction Enzyme Digests		 Quantifying Environmental Microorganisms and
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 Recombineering and Gene Targeting Reconstitution of Membrane Proteins Restriction Enzyme Digests 		• RNAi in C. elegans
Reconstitution of Membrane Proteins Restriction Enzyme Digests		 Recombineering and Gene Targeting
Restriction Enzyme Digests		 Reconstitution of Membrane Proteins
		 Restriction Enzyme Digests

		 Rodent Stereotaxic Surgery SNP Genotyping Separating Protein with SDS-PAGE Spectrophotometric Determination of an Equilibrium Constant Tandem Mass Spectrometry Testing For Genetically Modified Foods The ATP Bioluminescence Assay The ELISA Method The TUNEL Assay The Transwell Migration Assay The Western Blot Two-Dimensional Gel Electrophoresis Ultraviolet-Visible (UV-Vis) Spectroscopy Whole-Mount In Situ Hybridization Yeast Maintenance Yeast Transformation and Cloning Zebrafish Breeding and Embryo Handling Zebrafish Reproduction and Development
CONTENT STANDARD / COURSE	HI.SC.PAH.	PLANTS AND ANIMALS IN HAWAII
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.PAH.4.	Structure and Function in OrganismsUnderstand the structures and functions of living organisms and how organisms can be compared scientifically
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Classification
EXPECTATION / TOPIC	SC.PAH.4.6.	Classify a variety of Hawaiian organisms using the modern classification system and explain the evidence (e.g., structural similarities, fossil record, genetic relationships) that supports the system's organization JoVE • An Introduction to Caenorhabditis elegans • An Introduction to Drosophila melanogaster • An Introduction to Drosophila melanogaster • An Introduction to Saccharomyces cerevisiae • An Introduction to the Chick: Gallus gallus domesticus • An Introduction to the Chick: Gallus gallus domesticus • An Introduction to the Laboratory Mouse: Mus musculus • An Introduction to the Zebrafish: Danio rerio • Aseptic Technique in Environmental Science • Basic Chick Care and Maintenance • Basic Mouse Care and Maintenance • Biofuels: Producing Ethanol from Cellulosic Material • C. elegans Chemotaxis Assay • C. elegans Development and Reproduction • C. elegans Maintenance • Chick ex ovo Culture • Culturing and Enumerating Bacteria from Soil Samples

		 Detection of Bacteriophages in Environmental Samples Development and Reproduction of the Laboratory Mouse Development of the Chick Drosophila Development and Reproduction Drosophila Larval IHC Drosophila Maintenance Drosophila melanogaster Embryo and Larva Harvesting and Preparation Filamentous Fungi Genetic Crosses In ovo Electroporation of Chicken Embryos Introducing Experimental Agents into the Mouse Isolating Nucleic Acids from Yeast Mouse Genotyping RNAi in C. elegans Recombineering and Gene Targeting 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 Yeast Maintenance Yeast Reproduction Yeast Transformation and Cloning Zebrafish Breeding and Embryo Handling Zebrafish Microinjection Techniques Zebrafish Reproduction and Development
CONTENT STANDARD / COURSE	HI.SC.PAH.	PLANTS AND ANIMALS IN HAWAII
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.PAH.5.	Diversity, Genetics, and EvolutionUnderstand genetics and biological evolution and their impact on the unity and diversity of organisms
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Biological Evolution
EXPECTATION / TOPIC	SC.PAH.5.1.	Explain the theory of evolution and describe evidence that supports this theory JoVE • An Introduction to the Chick: Gallus gallus domesticus • An Overview of Genetic Analysis • High-Performance Liquid Chromatography (HPLC)
EXPECTATION / TOPIC	SC.PAH.5.2.	Explain how the theory of natural selection accounts for the development of a wide diversity of some species and lack of others on Hawaii <u>JoVE</u> • An Overview of Genetic Analysis

CONTENT STANDARD / COURSE	HI.SC.PAH.	PLANTS AND ANIMALS IN HAWAII
STANDARD /	SC.PAH.5.	Diversity, Genetics, and EvolutionUnderstand genetics
PERFORMANCE		and biological evolution and their impact on the unity
INDICATOR / DOMAIN		and diversity of organisms
INDICATOR / GRADE		TOPIC: Unity and Diversity
LEVEL EXPECTATION /		
BENCHMARK		
EXPECTATION / TOPIC	SC.PAH.5.3.	Explain the structural properties of DNA and the role of DNA in heredity and protein synthesis
		Jo//F
		• An Introduction to Caenorhabditis elegans
		An Introduction to Cell Death
		An Introduction to Cell Division
		An Introduction to Cellular and Molecular Neuroscience
		 An Introduction to Developmental Genetics
		 An Introduction to Molecular Developmental Biology
		 An Introduction to Saccharomyces cerevisiae
		 An Introduction to Transfection
		 An Overview of Epigenetics
		 An Overview of Gene Expression
		 An Overview of Genetic Analysis
		An Overview of Genetic Engineering
		• An Overview of Genetics and Disease
		Annexin V and Propidium Iodide Labeling
		Bacterial Transformation: Electroporation
		Chromatin Immunonrecipitation
		Community DNA Extraction from Bacterial Colonies
		• Cvtogenetics
		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
		 Drosophila melanogaster Embryo and Larva Harvesting
		and Preparation
		• Electrophoretic Wobility Shift Assay (EWSA)
		• Empryonic Stem Cell Culture and Differentiation
		 Enzyme Assays and Kineucs Evaluat 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
		Photometric Protein Determination
		Plasmid Purification
		Protein Crystallization
		Quantifying Environmental Microorganisms and
		Viruses Using aPCR
		• BNA Analysis of Environmental Samples Using BT-PCB
		• BNA-Seg
		Becombineering and Gene Targeting
		Bestriction Enzyme Digests
		• SND Genetuning
		Tosting For Consticutly Modified Foods
		• The TLINEL Access
		• The TONEL Assay
		• Two-Dimensional Ger Electrophoresis
		• Yeast Maintenance
		• reast transformation and Cioning
		• Zebratish Breeding and Empryo Handling
EXPECTATION / TOPIC	SC.PAH.5.4.	Explain how Mendel's laws of heredity can be used to
		determine the traits of possible offspring
		JoVE
		 An Introduction to Developmental Genetics
		 Fundamentals of Breeding and Weaning
		Genetic Crosses
EXPECTATION / TOPIC	SC PAH 5 5	Explain chromosomal mutations, their possible causes
	00.1 41.0.0.	and their effects on genetic variation
		Jo//F
		• An Introduction to Aging and Begeneration
		• An Introduction to Aging and hegeneration
		• An Introduction to Cell Death
		• An Introduction to Cell Division
		• An Introduction to Developmental Constina
		• An Introduction to Drosonhile melanogester
		• An Introduction to Modeling Pehavioral Disorders and
		Strose
		• An Introduction to Saccharomycos corcuision
		• An Introduction to Transfaction
		• An introduction to Transfection
		• All introduction to the Lebratish: Danio rerio

		 An Overview of Epigenetics An Overview of Gene Expression An Overview of Genetic Analysis An Overview of Genetics and Disease Genetic Engineering of Model Organisms Genetic Screens Isolating Nucleic Acids from Yeast Passaging Cells The TUNEL Assay
/ COURSE	п. эс. пр.	HUMAN PHYSIOLOGY
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.HP.1.	Scientific InvestigationDiscover, invent, and investigate using the skills necessary to engage in the scientific process
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Scientific Inquiry
EXPECTATION / TOPIC	SC.HP.1.1.	Describe how a testable hypothesis may need to be revised to guide a scientific investigation <u>JoVE</u> • The Multi-group Experiment • The Simple Experiment: Two-group Design
EXPECTATION / TOPIC	SC.HP.1.2.	 Design and safely implement an experiment, including the appropriate use of tools and techniques to organize, analyze, and validate data <u>JoVE</u> Ethics in Psychology Research Experimentation using a Confederate From Theory to Design: The Role of Creativity in Designing Experiments Manipulating an Independent Variable through Embodiment Observational Research Pilot Testing Placebos in Research Realism in Experimentation Reliability in Psychology Experiments The Factorial Experiment The Multi-group Experiment The Simple Experiment: Two-group Design Within-subjects Repeated-measures Design
CONTENT STANDARD / COURSE	HI.SC.HP.	HUMAN PHYSIOLOGY
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.HP.1.	Scientific InvestigationDiscover, invent, and investigate using the skills necessary to engage in the scientific process

INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Scientific Knowledge
EXPECTATION / TOPIC	SC.HP.1.8.	Describe the importance of ethics and integrity in scientific investigation JoVE • 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 • Reliability in Psychology Experiments • Self-report vs. Behavioral Measures of Recycling • The Factorial Experiment • The Multi-group Experiment • The Simple Experiment: Two-group Design • Within-subjects Repeated-measures Design
CONTENT STANDARD / COURSE	HI.SC.HP.	HUMAN PHYSIOLOGY
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.HP.2.	Nature of ScienceUnderstand that science, technology, and society are interrelated
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Science, Technology, and Society
EXPECTATION / TOPIC	SC.HP.2.1.	Explain how scientific advancements and emerging technology have influenced society JoVE • Abdominal Exam I: Inspection and Auscultation • Abdominal Exam II: Percussion • Abdominal Exam III: Palpation • Abdominal Exam IV: Acute Abdominal Pain Assessment • Algae Enumeration via Culturable Methodology • An Introduction to Aging and Regeneration • An Introduction to Behavioral Neuroscience • An Introduction to Cell Death • An Introduction to Cell Death • An Introduction to Cell Metabolism • An Introduction to Cell Metabolism • An Introduction to Cell Motility and Migration • An Introduction to Cell Motility and Migration • An Introduction to Cell Motility and Migration • An Introduction to Cellular and Molecular Neuroscience • An Introduction to Cellular and Molecular Neuroscience

	 An Introduction to Developmental Neurobiology
	 An Introduction to Drosophila melanogaster
	 An Introduction to Endocytosis and Exocytosis
	 An Introduction to Learning and Memory
	 An Introduction to Modeling Behavioral Disorders and
	Stress
	 An Introduction to Molecular Developmental Biology
	An Introduction to Motor Control
	 An Introduction to Neuroanatomy
	 An Introduction to Neurophysiology
	 An Introduction to Organogenesis
	 An Introduction to Reward and Addiction
	 An Introduction to Saccharomyces cerevisiae
	 An Introduction to Stem Cell Biology
	An Introduction to Transfection
	 An Introduction to the Chick: Gallus gallus domesticus
	 An Introduction to the Laboratory Mouse: Mus
	musculus
	 An Introduction to the Zebrafish: Danio rerio
	 An Overview of Epigenetics
	An Overview of Gene Expression
	An Overview of Genetic Analysis
	An Overview of Genetic Engineering
	 An Overview of Genetics and Disease
	 Analysis of Earthworm Populations in Soil
	 Anesthesia Induction and Maintenance
	• Ankle Exam
	 Annexin V and Propidium Iodide Labeling
	Anterograde Amnesia
	Anxiety Testing
	 Approximate Number Sense Test
	• Are You Smart or Hardworking? How Praise Influences
	Children's Motivation
	 Arterial Line Placement
	 Aseptic Technique in Environmental Science
	 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
 Capillary Electrophoresis (CE)
 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
 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
Coordination Chemistry Complexes
• Cranial Nerves Exam I (I-VI)
• Cranial Nerves Exam II (VII-XII)
• Crowaing
• Culturing and Enumerating Bacteria from Soil Samples
• Cyclic Voltammetry (CV)
Cytogenetics DNA Cal Electrophorenia
DNA Gel Electrophoresis DNA Ligation Possitions
DIVA Ligation Reactions DIVA Methylation Analysis
Diva Weutylation Analysis Decision-making and the lowe Combling Tesk
Decision-making and the lowa Gamping Task Deciding Auditory Imageny with Multivoyal Pattorn
Analysis
Detecting Environmental Microorganisms with the
Polymerase Chain Reaction and Gal Flactronhoresis
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
Discolved Oxygen in Surface Water
Dissolved Oxygen in Surface Water A Dresenhile Development and Perroduction
Drosophila Development and Reproduction
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
 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 Besearch
• Event-related Potentials and the Oddhall Task
• Event-related rotentials and the Dimonsional Change Card
• Executive Function and the Dimensional Change Card
SULLIASK
• 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 Engineering of Model Organisms Genetic Screens
Generic Occerns Generic Editing
• Genome calling
• 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
	• Hip Exam
	 Histological Staining of Neural Tissue
	How Children Solve Problems Using Causal Reasoning
	 In ovo Electroporation of Chicken Embryos
	 Inattentional 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 Catalysis
	 Introduction to Mass Spectrometry
	Introduction to Titration
	 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
	MALDI-TOF Mass Spectrometry
	Male Rectal Exam
	 Manipulating an Independent Variable through
	Embodiment
	Measuring Children's Trust in Testimony
	Measuring Grev Matter Differences with Voxel-based
	Morphometry: The Musical Brain
	Measuring Reaction Time and Donders' Method of
	Subtraction
	 Measuring Verbal Working Memory Span
	Measuring Vital Signs
	Memory Development: Demonstrating How Repeated
	Questioning Leads to False Memories
	Mental Rotation
	Metabolic Labeling
	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
 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
 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
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
	 Realism in Experimentation
	 Recombineering and Gene Targeting
	 Reliability in Psychology Experiments
	 Respiratory Exam I: Inspection and Palpation
	 Respiratory Exam II: Percussion and Auscultation
	 Restriction Enzyme Digests
	 Rodent Handling and Restraint Techniques
	 Rodent Identification I
	 Rodent Identification II
	 Rodent Stereotaxic Surgery
	SNP Genotyping
	 Scanning Electron Microscopy (SEM)
	 Self-administration Studies
	 Self-report vs. Behavioral Measures of Recycling
	Sensory Exam
	 Separating Protein with SDS-PAGE
	Shoulder Exam I
	Shoulder Exam II
	 Solutions and Concentrations
	Spatial Cueing
	 Spatial Memory Testing Using Mazes
	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 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
	I hreshold
	• The TUNEL Assay
	Ine Transwell Migration Assay
	• The Western Blot
	• Inyrold Exam
	Issue Regeneration with Somatic Stem Cells
	 Transplantation Studies

 Tree Identification: How To L 	lse a Dichotomous Key
• Tree Survey: Point-Centered	Quarter Sampling Method
Turbidity and Tatal Solida in	Surface Water
• Turbidity and Total Solids in	Surface water
Two-Dimensional Gel Electro	phoresis
Using Diffusion Tensor Imagi	ng in Traumatic Brain
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Ilsing GIS to Investigate Lin	an Forestry
Liging TMS to Messure Meta	r Evoitability During Action
	r Excitability During Action
Observation	
Using Your Head: Measuring	Infants' Rational Imitation
of Actions	
• Using a pH Meter	
• Vorbal Priming	
• Visual Attention: fiviRI Invest	igation of Object-based
Attentional Control	
 Visual Search for Features ar 	d Conjunctions
Visual Statistical Learning	-
Visualizing Soil Microorganic	ms via the Contact Slide
Assay and Microscopy	
Water Quality Analysis via In	dicator Organisms
Whole-Mount In Situ Hybridi	zation
Within-subjects Repeated-me	easures Design
Yeast Maintenance	0
Voast Poproduction	
• Yeast Transformation and Cl	oning
Zebrafish Breeding and Embr	yo Handling
 Zebrafish Maintenance and H 	usbandry
 Zebrafish Microinjection Tech 	nniques
• Zebrafish Reproduction and	Development
• fMRI: Eunstional Magnetic R	sonance Imaging
EXPECTATION / TOPIC SC.HP.2.2. Compare the risks and benefits	of potential solutions to
technological issues	
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lo\/E	
Abdeminel French beneration	
• Abdominal Exam I: Inspectio	h and Auscultation
Abdominal Exam IV: Acute A	bdominal Pain
Assessment	
Algae Enumeration via Cultu	rable Methodology
An Introduction to Aging and	Regeneration
• An Introduction to Rehaviors	I Neuroscience
• An introduction to Cell Meta	JUIISIII
An Introduction to Cognition	
An Introduction to Endocyto	sis and Exocytosis
An Introduction to Learning a	and Memory
• An Introduction to Motor Co	ntrol
• An Introduction to Neuroana	tomy
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• An Introduction to Organoge	siology
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 An Overview of Genetic Analysis
 An Overview of Genetic Engineering
 An Overview of Genetics and Disease
Arterial Line Placement
 Assembly of a Reflux System for Heated Chemical
Reactions
Auscultation
 Bacterial Growth Curve Analysis and its Environmental
Applications
 Basic Life Support: Cardiopulmonary Resuscitation and
Defibrillation
Blood Pressure Measurement
Calcium Imaging in Neurons
Capillary Electrophoresis (CE)
• Cardiac Exam II: Auscultation
Cardiac Exam III: Abnormal Heart Sounds
Central Venous Catheter Insertion: Femoral Vein with
Ultrasound Guidance
Central Venous Catheter Insertion: Internal Jugular
with Illtrasound Guidance
Central Venous Catheter Insertion: Subclavian Vein
Chromatin Immunonrecipitation
Chromatography-Based Biomolecule Purification
Methods
Co-Immunoprecipitation and Pull-Down Assays
Column Chromatography
Community DNA Extraction from Bacterial Colonies
Coordination Chemistry Complexes
• Cranial Nerves Exam I (I-VI)
• Cranial Nerves Exam II (VII-XII)
Culturing and Enumerating Bacteria from Soil Samples
Cyclic Voltammetry (CV)
• Cytogenetics
DNA Ligation Reactions
DNA Eigetion Reactions DNA Methylation Analysis
Dive methylation Analysis Dive methylation Analysis Dive methylation Analysis
Decision-making and the lowa Gambing Task Decoding Auditory Imagery with Multivoyel Pattern
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Detecting Reactive Ovygen Species
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• Far Evam
• Electro-encenhalography (EEG)
 Electrochemical Measurements of Supported Catalysts
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Fmbryonic Stam Cell Culture and Differentiation
Emergency Tube Thorscostomy (Chest Tube
Placement)
Fmergent Lateral Canthotomy and Inferior Catholysis
• Enzyme Assave and Kinatics
Fvent-related Potentials and the Oddhall Task

• Expression Profiling with Microarrays
• Eye Exam
 Eye Tracking in Cognitive Experiments
 Fate Mapping
 Fear Conditioning
 General Approach to the Physical Exam
Genetic Crosses
Genetic Screens
Genome Editing
 Gram Staining of Bacteria from Environmental Sources
 Growing Crystals for X-ray Diffraction Analysis
Induced Pluripotency
 Intra-articular Shoulder Injection for Reduction
Following Anterior Shoulder Dislocation
Intraosseous Needle Placement
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Introducting Experimental Agents into the modes
Introduction to Mass Spectrometry
 Introduction to Titration
 Isolation of Fecal Bacteria from Water Samples by
Filtration
• Language: The N400 in Semantic Incongruity
• Learning and Memory: The Remember-Know Task
• Live Cell Imaging of Mitosis
MALDLTOF Mass Spectrometry
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Mornhometry: The Musical Brain
Measuring Vital Signs
Metabolic Labeling
Molecular Cloning
Motor Exam II
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Needle Thoracostomy (needle Decompression) for
Temporizing Tension Pneumothoray Treatment
Nosa Sinusae Oral Cavity and Pharyny Evam
Nuclear Magnetic Personance (NMP) Spectroscony
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Pateb Clamp Electrophysiology
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Pelvic Exam III: Speculum Exam Pelvic Exam III: Pimanual and Postovaginal Exam
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Percutaneous Cricothyrotomy (Seldinger Technique)
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• Perinheral Vascular Evam Using a Continuous Ways
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		 Quantifying Environmental Microorganisms and Viruses Using qPCR RNA-Seq Recombineering and Gene Targeting Respiratory Exam II: Percussion and Auscultation Rodent Stereotaxic Surgery SNP Genotyping Scanning Electron Microscopy (SEM) Solutions and Concentrations Surface Plasmon Resonance (SPR) Surgical Cricothyrotomy Tandem Mass Spectrometry The ATP Bioluminescence Assay The ELISA Method The TUNEL Assay Tissue Regeneration with Somatic Stem Cells Two-Dimensional Gel Electrophoresis Using Diffusion Tensor Imaging in Traumatic Brain Injury Using TMS to Measure Motor Excitability During Action Observation Using a pH Meter Visual Attention: fMRI Investigation of Object-based Attentional Control fMRI: Functional Magnetic Resonance Imaging
CONTENT STANDARD / COURSE	HI.SC.HP.	HUMAN PHYSIOLOGY
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.HP.3.	Structure and FunctionUnderstand cells, tissues, and orientation.
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Cancer and Homeostasis
EXPECTATION / TOPIC	SC.HP.3.1.	Analyze, using evidence, the process of cellular division as it relates to human physiology <u>JoVE</u> • 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 Cell Motility and Migration • An Introduction to Cell Motility and Migration • An Introduction to Organogenesis • An Introduction to the Chick: Gallus gallus domesticus • An Introduction to the Chick: Gallus gallus domesticus • An Overview of Genetic Engineering • An Overview of Genetics and Disease • Cell Cycle Analysis • Chick ex ovo Culture • Coordination Chemistry Complexes • DNA Methylation Analysis

		 Detecting Reactive Oxygen Species Ear Exam Expression Profiling with Microarrays Genome Editing Introducing Experimental Agents into the Mouse Invasion Assay Using 3D Matrices Live Cell Imaging of Mitosis Lymph Node Exam Male Rectal Exam Mouse Genotyping Passaging Cells Pelvic Exam III: Speculum Exam Plevic Exam III: Bimanual and Rectovaginal Exam The TUNEL Assay The Transwell Migration Assay
EXPECTATION / TOPIC	SC.HP.3.2.	Explain how cells, tissues, and organs maintain homeostasis through cellular transport mechanisms JoVE • An Introduction to Endocytosis and Exocytosis • An Introduction to Neurophysiology • An Introduction to Transfection • Calcium Imaging in Neurons • Cell-surface Biotinylation Assay • Detecting Reactive Oxygen Species • FM Dyes in Vesicle Recycling • In ovo Electroporation of Chicken Embryos • Patch Clamp Electrophysiology • Reconstitution of Membrane Proteins • The TUNEL Assay • Using Diffusion Tensor Imaging in Traumatic Brain Injury • Yeast Transformation and Cloning
CONTENT STANDARD / COURSE	HI.SC.HP.	HUMAN PHYSIOLOGY
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.HP.3.	Structure and FunctionUnderstand cells, tissues, and orientation.
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Tissues and Orientation
EXPECTATION / TOPIC	SC.HP.3.3.	Classify the various types of human tissue (e.g., muscle, epithelial, connective, nervous) by structure and function JoVE • An Introduction to Aging and Regeneration • An Introduction to Behavioral Neuroscience • An Introduction to Cellular and Molecular Neuroscience • An Introduction to Cognition • An Introduction to Developmental Neurobiology

An Introduction to Endocytosis and Exocytosis
 An Introduction to Modeling Behavioral Disorders and
Stress
 An Introduction to Motor Control
 An Introduction to Neuroanatomy
 An Introduction to Neurophysiology
 An Introduction to Reward and Addiction
 An Introduction to Stem Cell Biology
 An Overview of Gene Expression
Ankle Exam
Anterograde Amnesia
 Balance and Coordination Testing
Calcium Imaging in Neurons
Color Afterimages
 Cranial Nerves Exam I (I-VI)
 Cranial Nerves Exam II (VII-XII)
Crowding
 Detecting Reactive Oxygen Species
• Ear Exam
• Elbow Exam
 Electro-encephalography (EEG)
 Embryonic Stem Cell Culture and Differentiation
 Emergent Lateral Canthotomy and Inferior Catholysis
 Event-related Potentials and the Oddball Task
 Explant Culture of Neural Tissue
• Eye Exam
 FM Dyes in Vesicle Recycling
 Finding Your Blind Spot and Perceptual Filling-in
• Foot Exam
• Hand and Wrist Exam
• Hip Exam
Histological Staining of Neural Tissue
Inattentional Blindness
Induced Pluripotency
• Just-noticeable Differences
• Knee Exam
Lower Back Exam
• MALDI-TOF Mass Spectrometry
• Measuring Grey Matter Differences with Voxel-based
Morphometry: The Musical Brain
Motion-induced Blindness
• Wotor Exam I
• Motor Exam II
• Iviurine in Utero Electroporation
• IVECK EXAM
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		Bodent Stereotaxic Surgery
		Self-administration Studies
		• Sensory Evam
		• Shoulder Exam
		• Shoulder Exam I
		• Spatial Cueing
		 Tandem Mass Spectrometry
		• The Ames Room
		The Attentional Blink
		The ELISA Method
		The Inverted-face Effect
		The McGurk Effect
		 The Rubber Hand Illusion
		• The Split Brain
		• The Staircase Procedure for Finding a Perceptual
		Threshold
		• The TLINEL Assay
		Ticsue Regeneration with Somatic Stem Cells
		Initial Diffusion Tensor Imaging in Troumatic Brain
		injury A Heirer TMC to Manager Matter Freitability Device Action
		• Using TMS to Measure Motor Excitability During Action
		Observation
		 fMRI: Functional Magnetic Resonance Imaging
EXPECTATION / TOPIC	SC.HP.3.4.	Use correct terminology (e.g., proximal, dorsal, medial,
		lateral, visceral, superficial, deep) to describe the
		orientation of body parts and regions
		······································
		JoVF
		Abdominal Exam I: Inspection and Auscultation
		Abdominal Exam II: Paraussion
		Abdominal Exam III: Palnation
		Abdominal Exam IV: Acute Abdominal Pain
		Abdominial Examity. Acute Abdominial Fam
		Assessment
		An Introduction to Benavioral Neuroscience
		• An Introduction to Cellular and Molecular Neuroscience
		An Introduction to Cognition
		 An Introduction to Developmental Neurobiology
		 An Introduction to Learning and Memory
		 An Introduction to Modeling Behavioral Disorders and
		Stress
		 An Introduction to Motor Control
		 An Introduction to Neuroanatomy
		 An Introduction to Neurophysiology
		An Introduction to Reward and Addiction
		Ankle Exam
		Anterograde Amnesia
		• Anxiety Testing
		Annroximate Number Sense Test
		• Arterial Line Placement
		Accessing Devterity with Reaching Tasks
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 Balance and Coordination Testing
 Basic Life Support Part II: Airway/Breathing and
Continued Cardiopulmonary Resuscitation
Basic Life Support: Cardiopulmonary Resuscitation and
Defibrillation
Binocular Bivalry
Blood Pressure Measurement
Calcium Imaging in Neurons
Cardian Exam I: Inspection and Palastion
• Cardiac Exam II. Associated in a
• Cardiac Exam II: Auscultation
• Cardiac Exam III: Abnormal Heart Sounds
• Central venous Catheter Insertion: Femoral vein with
Ottrasound Guidance
• Central Venous Catheter Insertion: Internal Jugular
with Offrasound Guidance
• Central Venous Catheter Insertion: Subclavian Vein
• Co-Immunoprecipitation and Pull-Down Assays
Color Afterimages
• Comprehensive Breast Exam
Cranial Nerves Exam I (I-VI)
Cranial Nerves Exam II (VII-XII)
• Crowding
 Decision-making and the lowa Gambling Task
 Decoding Auditory Imagery with Multivoxel Pattern
Analysis
Dichotic Listening
• Ear Exam
• Elbow Exam
 Electro-encephalography (EEG)
 Emergency Tube Thoracostomy (Chest Tube
Placement)
 Emergent Lateral Canthotomy and Inferior Catholysis
 Event-related Potentials and the Oddball Task
• Executive Function and the Dimensional Change Card
Sort Task
 Executive Function in Autism Spectrum Disorder
 Explant Culture of Neural Tissue
• Eye Exam
 Eye Tracking in Cognitive Experiments
Fear Conditioning
 Finding Your Blind Spot and Perceptual Filling-in
• Foot Exam
 General Approach to the Physical Exam
 Habituation: Studying Infants Before They Can Talk
 Hand and Wrist Exam
• Hip Exam
 Histological Staining of Neural Tissue
Inattentional Blindness
 Incidental Encoding
 Intra-articular Shoulder Injection for Reduction
Following Anterior Shoulder Dislocation

	 Intraosseous Needle Placement 	
	 Just-noticeable Differences 	
	• Knee Exam	
	 Language: The N400 in Semantic Incongruity 	
	 Learning and Memory: The Remember-Know Task 	
	Lower Back Exam	
	Lymph Node Exam	
	Male Rectal Exam	
	 Measuring Grey Matter Differences with Voxel-based 	
	Morphometry: The Musical Brain	
	 Measuring Reaction Time and Donders' Method of 	
	Subtraction	
	 Measuring Verbal Working Memory Span 	
	 Measuring Vital Signs 	
	Mental Rotation	
	 Modeling Social Stress 	
	 Motion-induced Blindness 	
	Motor Exam I	
	• Motor Exam II	
	 Motor Learning in Mirror Drawing 	
	Motor Maps	
	 Multiple Object Tracking 	
	 Murine In Utero Electroporation 	
	Mutual Exclusivity: How Children Learn the Meanings	
	of Words	
	Neck Exam	
	 Needle Thoracostomy (needle Decompression) for 	
	Temporizing Tension Pneumothorax Treatment	
	Neuronal Transfection Methods	
	Nose, Sinuses, Oral Cavity and Pharynx Exam	
	Object Substitution Masking	
	• Observation and Inspection	
	Ophtnaimoscopic Examination	
	Patch Clamp Electrophysiology	
	Pelvic Exam I: Assessment of the External Genitalia	
	Pelvic Exam II: Speculum Exam Pelvic Exam III: Pimenuel and Postovoginal Exam	
	Pervic Exam in: Dimanual and Rectovaginal Exam	
	Percutaneous Cricothyrotomy (Seldinger Technique)	
	Pericardiocentesis	
	Perinheral Vascular Evam	
	Perinheral Vascular Exam Some Lising a Continuous Wave	
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	Perinheral Venous Cannulation	
	Physiological Correlates of Emotion Recognition	
	Primary Neuronal Cultures	
	Proper Adjustment of Patient Attire during the Physical	
	Exam	
	Prospect Theory	
	 Respiratory Exam I: Inspection and Palpation 	
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		 Respiratory Exam II: Percussion and Auscultation Rodent Stereotaxic Surgery Self-administration Studies Sensory Exam Shoulder Exam I Shoulder Exam II Spatial Cueing Spatial Memory Testing Using Mazes Surgical Cricothyrotomy The Ames Room The Attentional Blink The Inverted-face Effect The McGurk Effect The Morris Water Maze The Precision of Visual Working Memory with Delayed Estimation The Rubber Hand Illusion The Split Brain The Staircase Procedure for Finding a Perceptual Threshold Thyroid Exam Using Diffusion Tensor Imaging in Traumatic Brain Injury Using TMS to Measure Motor Excitability During Action Observation Verbal Priming Visual Attention: fMRI Investigation of Object-based Attentional Control Visual Statistical Learning Within-subjects Repeated-measures Design fMRI: Functional Magnetic Resonance Imaging
CONTENT STANDARD / COURSE	HI.SC.HP.	HUMAN PHYSIOLOGY
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.HP.4.	Organ SystemsUnderstand the functions of various organ systems.
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Circulatory and Respiratory systems
EXPECTATION / TOPIC	SC.HP.4.1.	Evaluate the function of the various structures within the circulatory system in transportation and cellular support JoVE • An Introduction to Cell Motility and Migration • Arterial Line Placement • Basic Life Support Part II: Airway/Breathing and Continued Cardiopulmonary Resuscitation • Basic Life Support: Cardiopulmonary Resuscitation and Defibrillation

		 Blood Pressure Measurement Cardiac Exam I: Inspection and Palpation Cardiac Exam II: Auscultation Cardiac Exam III: Abnormal Heart Sounds Central Venous Catheter Insertion: Femoral Vein with Ultrasound Guidance Central Venous Catheter Insertion: Internal Jugular with Ultrasound Guidance Central Venous Catheter Insertion: Subclavian Vein Eye Exam Intraosseous Needle Placement Invasion Assay Using 3D Matrices MALDI-TOF Mass Spectrometry Measuring Vital Signs Ophthalmoscopic Examination Peripheral Vascular Exam Peripheral Vascular Exam Using a Continuous Wave Doppler Peripheral Venous Cannulation Physiological Correlates of Emotion Recognition The Transwell Migration Assay
EXPECTATION / TOPIC	SC.HP.4.2.	 Determine the function of the various structures of the respiratory system in gas exchange JoVE Basic Life Support Part II: Airway/Breathing and Continued Cardiopulmonary Resuscitation Cardiac Exam I: Inspection and Palpation Cardiac Exam II: Auscultation Cardiac Exam III: Abnormal Heart Sounds Emergency Tube Thoracostomy (Chest Tube Placement) Measuring Vital Signs Needle Thoracostomy (needle Decompression) for Temporizing Tension Pneumothorax Treatment Percutaneous Cricothyrotomy (Seldinger Technique) Respiratory Exam II: Percussion and Auscultation
CONTENT STANDARD / COURSE	HI.SC.HP.	HUMAN PHYSIOLOGY
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.HP.4.	Organ SystemsUnderstand the functions of various organ systems.
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Nutrition, Digestion, and Excretion
EXPECTATION / TOPIC	SC.HP.4.3.	Evaluate the structure and function of the digestive system in transportation and absorption of nutrients

		<u>JoVE</u> • Abdominal Exam I: Inspection and Auscultation • Abdominal Exam II: Percussion • Abdominal Exam III: Palpation • Abdominal Exam IV: Acute Abdominal Pain Assessment • Male Rectal Exam
EXPECTATION / TOPIC	SC.HP.4.4.	Explain how the excretory system regulates body wastes JoVE • Abdominal Exam I: Inspection and Auscultation • Abdominal Exam II: Percussion • Abdominal Exam III: Palaetion
		Abdominal Examin: Falpation Abdominal Exam IV: Acute Abdominal Pain Assessment Male Rectal Exam
CONTENT STANDARD / COURSE	HI.SC.HP.	HUMAN PHYSIOLOGY
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.HP.4.	Organ SystemsUnderstand the functions of various organ systems.
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Muscular, Skeletal, and Integumentary systems
EXPECTATION / TOPIC	SC.HP.4.5.	Explain how the muscular system functions (e.g., locations, origins, insertions, muscle groups, types of muscles) JoVE • An Introduction to Cell Motility and Migration • An Introduction to Motor Control • Ankle Exam • Elbow Exam • Foot Exam • Hand and Wrist Exam • Hand and Wrist Exam • Hip Exam • Invasion Assay Using 3D Matrices • Knee Exam • Lower Back Exam • Motor Exam I • Motor Exam I • Neck Exam • Shoulder Exam I • Shoulder Exam II • The Transwell Migration Assay
EXPECTATION / TOPIC	SC.HP.4.6.	Explain how the skeletal system functions to support and protect the body <u>JoVE</u>

		 An Introduction to Motor Control Ankle Exam Elbow Exam Foot Exam Hand and Wrist Exam Hip Exam Intra-articular Shoulder Injection for Reduction Following Anterior Shoulder Dislocation Intraosseous Needle Placement Knee Exam Lower Back Exam Motor Exam I Motor Exam II Neck Exam Shoulder Exam I Shoulder Exam II
EXPECTATION / TOPIC	SC.HP.4.7.	Relate the structure of the integumentary system to its functions JoVE • Abdominal Exam I: Inspection and Auscultation • Abdominal Exam IV: Acute Abdominal Pain Assessment • Observation and Inspection • Peripheral Vascular Exam • Peripheral Vascular Exam • Peripheral Vascular Exam Using a Continuous Wave Doppler • Sensory Exam • The Rubber Hand Illusion
CONTENT STANDARD / COURSE	HI.SC.HP.	HUMAN PHYSIOLOGY
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.HP.4.	Organ SystemsUnderstand the functions of various organ systems.
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Nervous System
EXPECTATION / TOPIC	SC.HP.4.8.	Trace and describe the pathway of a neural impulse <u>JoVE</u> • An Introduction to Behavioral Neuroscience • An Introduction to Cellular and Molecular Neuroscience • An Introduction to Cognition • An Introduction to Developmental Neurobiology • An Introduction to Modeling Behavioral Disorders and Stress • An Introduction to Motor Control • An Introduction to Neuroanatomy • An Introduction to Neurophysiology • An Introduction to Reward and Addiction

Ankle Exam
Anterograde Amnesia
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Color Afterimages
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 FM Dyes in Vesicle Recycling
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 Inattentional Blindness
 Just-noticeable Differences
• Knee Exam
Lower Back Exam
 Measuring Grey Matter Differences with Voxel-based
Morphometry: The Musical Brain
 Motion-induced Blindness
Motor Exam I
Motor Exam II
 Murine In Utero Electroporation
Neck Exam
 Neuronal Transfection Methods
 Object Substitution Masking
 Ophthalmoscopic Examination
 Patch Clamp Electrophysiology
 Physiological Correlates of Emotion Recognition
 Primary Neuronal Cultures
 Rodent Stereotaxic Surgery
 Self-administration Studies
• Sensory Exam
Shoulder Exam I
• Shoulder Exam II
Spatial Cueing
• The Ames Room
 The Attentional Blink
The Inverted-face Effect
The McGurk Effect
The Rubber Hand Illusion
The Split Brain

		 The Staircase Procedure for Finding a Perceptual Threshold Using Diffusion Tensor Imaging in Traumatic Brain Injury Using TMS to Measure Motor Excitability During Action Observation fMRI: Functional Magnetic Resonance Imaging
EXPECTATION / TOPIC	SC.HP.4.9.	Explain how the central nervous system functions in regulating physiological activities
		JoVE • An Introduction to Behavioral Neuroscience • An Introduction to Cellular and Molecular Neuroscience • An Introduction to Cognition • An Introduction to Developmental Neurobiology • An Introduction to Neuroanatomy • An Introduction to Neurophysiology • Anssessing Dexterity with Reaching Tasks • Balance and Coordination Testing • Color Afterimages • Cranial Nerves Exam I (I-VI) • Cranial Nerves Exam I (VII-XII) • Crowding • Detecting Reactive Oxygen Species • Electro-encephalography (EEG) • Finding Your Blind Spot and Perceptual Filling-in • Histological Staining of Neural Tissue • Inattentional Blindness • Just-noticeable Differences • Motion-induced Blindness • Object Substitution Masking • Rodent Stereotaxic Surgery • Spatial Memory Testing Using Mazes • The Ames Room • The Attentional Blink • The Inverted-face Effect • The McGurk Effect • The McGurk Effect • The Staircase Procedure for Finding a Perceptual Threshold • Tissue Regeneration with Somatic Stem Cells • Motion Events I Surgery • Spatial Leueng
EXPECTATION / TOPIC	SC.HP.4.10.	Describe the relationship between the peripheral nervous system and how the body responds to maintain a stable
		internal environment <u>JoVE</u> • An Introduction to Motor Control
		 An Introduction to Neuroanatomy An Introduction to Neurophysiology

		 Ankle Exam Elbow Exam Foot Exam Hand and Wrist Exam Hip Exam Knee Exam Knee Exam Lower Back Exam Motor Exam I Motor Exam II Neck Exam Rodent Stereotaxic Surgery Shoulder Exam II
CONTENT STANDARD / COURSE	HI.SC.HP.	HUMAN PHYSIOLOGY
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.HP.4.	Organ SystemsUnderstand the functions of various organ systems.
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Reproductive and Endocrine Systems
EXPECTATION / TOPIC	SC.HP.4.11.	Compare the reproductive organs in the male and female body in terms of structure and function <u>JoVE</u> • Comprehensive Breast Exam • Male Rectal Exam • Pelvic Exam I: Assessment of the External Genitalia • Pelvic Exam II: Speculum Exam • Pelvic Exam III: Bimanual and Rectovaginal Exam
EXPECTATION / TOPIC	SC.HP.4.12.	Determine the role of the reproductive system in human growth and development <u>JoVE</u> • Comprehensive Breast Exam • Male Rectal Exam • Pelvic Exam I: Assessment of the External Genitalia • Pelvic Exam II: Speculum Exam • Pelvic Exam III: Bimanual and Rectovaginal Exam
EXPECTATION / TOPIC	SC.HP.4.13.	Trace the development of a human from the formation of gametes, fertilization, embryonic development, and gestation JoVE • An Introduction to Aging and Regeneration • An Introduction to Cell Motility and Migration • An Introduction to Cell Motility and Migration • An Introduction to Organogenesis • An Introduction to Stem Cell Biology • Cytogenetics • Embryonic Stem Cell Culture and Differentiation • Fate Mapping

		 Invasion Assay Using 3D Matrices Passaging Cells The Transwell Migration Assay
		 Tissue Regeneration with Somatic Stem Cells Transplantation Studies
EXPECTATION / TOPIC	SC.HP.4.14.	Determine the role of hormones and feedback loops in bodily functions
		<u>JoVE</u> • Anxiety Testing • Modeling Social Stress • Thyroid Exam
CONTENT STANDARD / COURSE	HI.SC.HP.	HUMAN PHYSIOLOGY
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.HP.5.	Interdependence of Body SystemsUnderstand the interdependence of body systems and the hazards associated with system failure and aging.
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Interdependence
EXPECTATION / TOPIC	SC.HP.5.1.	Analyze the interdependence of various body systems to each other JoVE • An Introduction to Behavioral Neuroscience • An Introduction to Cellular and Molecular Neuroscience • An Introduction to Learning and Memory • An Introduction to Neuroanatomy • An Introduction to Neuroanatomy • An Introduction to Neurophysiology • Ankle Exam • Anterograde Amnesia • Anxiety Testing • Assessing Dexterity with Reaching Tasks • Balance and Coordination Testing • Calcium Imaging in Neurons • Decoding Auditory Imagery with Multivoxel Pattern Analysis • Elbow Exam • Foot Exam • Histological Staining of Neural Tissue • Knee Exam • Learning and Memory: The Remember-Know Task • Lower Back Exam • Modeling Social Stress • Motor Exam II • Motor Exam II • Motor Exam II • Motor Exam II • Motor Learning in Mirror Drawing

		 Motor Maps Neck Exam Patch Clamp Electrophysiology Physiological Correlates of Emotion Recognition Rodent Stereotaxic Surgery Shoulder Exam I Shoulder Exam II The Split Brain fMRI: Functional Magnetic Resonance Imaging
EXPECTATION / TOPIC	SC.HP.5.2.	Determine the relationship between the skeletal and muscular systems JoVE
		 Ankle Exam Assessing Dexterity with Reaching Tasks Balance and Coordination Testing Elbow Exam Foot Exam Hand and Wrist Exam Hip Exam Knee Exam Knee Exam Lower Back Exam Motor Exam I Motor Exam II Neck Exam Shoulder Exam I Shoulder Exam II
CONTENT STANDARD / COURSE	HI.SC.HP.	HUMAN PHYSIOLOGY
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.HP.5.	Interdependence of Body SystemsUnderstand the interdependence of body systems and the hazards associated with system failure and aging.
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: System Failure and Aging
EXPECTATION / TOPIC	SC.HP.5.3.	Identify potential system failures due to the effects of aging JoVE • An Introduction to Cognition • An Introduction to Learning and Memory • Are You Smart or Hardworking? How Praise Influences Children's Motivation • Balance and Coordination Testing • Categories and Inductive Inferences • Children's Reliance on Artist Intentions When Identifying Pictures • Executive Function and the Dimensional Change Card Sort Task
		 Eye Tracking in Cognitive Experiments

		 Habituation: Studying Infants Before They Can Talk How Children Solve Problems Using Causal Reasoning Language: The N400 in Semantic Incongruity Measuring Children's Trust in Testimony Memory Development: Demonstrating How Repeated Questioning Leads to False Memories Metacognitive Development: How Children Estimate Their Memory Mutual Exclusivity: How Children Learn the Meanings of Words Numerical Cognition: More or Less Piaget's Conservation Task and the Influence of Task Demands The Costs and Benefits of Natural Pedagogy The Rouge Test: Searching for a Sense of Self Using Your Head: Measuring Infants' Rational Imitation of Actions
EXPECTATION / TOPIC	SC.HP.5.4.	Explain how a disorder in any major organ system affects normal body function JoVE Abdominal Exam I: Inspection and Auscultation Abdominal Exam IV: Acute Abdominal Pain Assessment An Introduction to Aging and Regeneration An Introduction to Behavioral Neuroscience An Introduction to Caenorhabditis elegans An Introduction to Cell Death An Introduction to Cell Death An Introduction to Cell Metabolism An Introduction to Cell Motility and Migration An Introduction to Cell Motility and Migration An Introduction to Cell Motility and Migration An Introduction to Developmental Neurobiology An Introduction to Endocytosis and Exocytosis An Introduction to Modeling Behavioral Disorders and Stress An Introduction to Neuroanatomy An Introduction to Neurophysiology An Introduction to Stem Cell Biology An Introduction to Stem Cell Biology An Introduction to the Chick: Gallus gallus domesticus An Introduction to the Chick: Gallus gallus domesticus An Introduction to the Chick: Gallus gallus domesticus An Introduction to the Zebrafish: Danio rerio An Introduction to the Zebrafish: Danio rerio An Overview of Gene Expression An Overview of Genetic Engineering An Overview of Genetic Engineering An Overview of Genetics and Disease Ankle Exam

	 Anterograde Amnesia
	 Anxiety Testing
	Arterial Line Placement
	 Assessing Dexterity with Reaching Tasks
	 Balance and Coordination Testing
	 Basic Life Support Part II: Airway/Breathing and
	Continued Cardiopulmonary Resuscitation
	 Basic Life Support: Cardiopulmonary Resuscitation and
	Defibrillation
	 Blood Pressure Measurement
	• C. elegans Chemotaxis Assav
	 Cardiac Exam I: Inspection and Palpation
	Cardiac Exam II: Auscultation
	Cardiac Exam III: Abnormal Heart Sounds
	Cell Cycle Analysis
	• Chick ex ovo Culture
	Chromatin Immunoprecipitation
	Chromatography-Based Biomolecule Purification
	Methods
	Co-Immunoprecipitation and Pull-Down Assays
	Coordination Chemistry Complexes
	• Cranial Nerves Exam I (I-VI)
	• Cranial Nerves Exam II (VII-XII)
	• Crowding
	• Culturing and Enumerating Bacteria from Soil Samples
	• Cytogenetics
	DNA Methylation Analysis
	Decision-making and the lowa Gambling Task
	Decoding Auditory Imagery with Multivoxel Pattern
	Analysis
	Detecting Reactive Oxygen Species
	Detection of Bacteriophages in Environmental Samples
	Dichotic Listening
	• Ear Exam
	• Elbow Exam
	Embryonic Stem Cell Culture and Differentiation
	Emergent Lateral Canthotomy and Inferior Catholysis
	• Executive Function and the Dimensional Change Card
	Sort Task
	Executive Function in Autism Spectrum Disorder
	• Expression Profiling with Microarrays
	• Eve Exam
	• Eve Tracking in Cognitive Experiments
	• Fear Conditioning
	• Foot Exam
	Gene Silencing with Morpholinos
	Genetic Crosses
	Genetic Screens
	• Genome Editing
	Gram Staining of Bacteria from Environmental Sources
	• Hand and Wrist Exam

 I tip Exam Incidental Encoding Introducing Experimental Agents into the Mouse Invasion Assay Using 3D Matrices Isolation of Fecal Bacteria from Water Samples by Filtration Knee Exam Learning and Memory: The Remember-Know Task Live Cell Imaging of Mitosis Lower Back Exam Male Rectal Exam Male Rectal Exam Measuring Grey Matter Differences with Voxel-based Morphometry: The Musical Brain Measuring Verbal Working Memory Span Modeling Social Stress Motor Exam II Motor Exam II Motor Exam II Motor Kam II Motor Kam II Motor Kam II Motor Exam III: Speculum Exam Periote Exam III: Speculum Exam Periote Exam III: Speculum Exam Peripheral Vascular Exam Prospect Theory<th></th><th></th>		
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 The Staircase Procedure for Finding a Perceptual Threshold The TUNEL Assav 		The Split Brain
Threshold • The TUNEL Assav		The Staircase Procedure for Finding a Perceptual
The TUNEL Assav		Threshold
······		• The TUNEL Assay

		 The Transwell Migration Assay Thyroid Exam Tissue Regeneration with Somatic Stem Cells Using Diffusion Tensor Imaging in Traumatic Brain Injury Using a pH Meter Verbal Priming Visual Search for Features and Conjunctions Whole-Mount In Situ Hybridization fMRI: Functional Magnetic Resonance Imaging
CONTENT STANDARD / COURSE	HI.SC.Z.	ZOOLOGY
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.Z.1.	Scientific InvestigationDiscover, invent, and investigate using the skills necessary to engage in the scientific process.
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Scientific Inquiry
EXPECTATION / TOPIC	SC.Z.1.1.	Describe how a testable hypothesis may need to be revised to guide a scientific investigation <u>JoVE</u> • The Multi-group Experiment • The Simple Experiment: Two-group Design
EXPECTATION / TOPIC	SC.Z.1.2.	 Design and safely implement an experiment, including the appropriate use of tools and techniques to organize, analyze, and validate data JoVE Ethics in Psychology Research Experimentation using a Confederate From Theory to Design: The Role of Creativity in Designing Experiments Manipulating an Independent Variable through Embodiment Observational Research Pilot Testing Placebos in Research Realism in Experimentation Reliability in Psychology Experiments The Factorial Experiment The Multi-group Experiment The Simple Experiment: Two-group Design Within-subjects Repeated-measures Design
CONTENT STANDARD / COURSE	HI.SC.Z.	ZOOLOGY
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.Z.1.	Scientific InvestigationDiscover, invent, and investigate using the skills necessary to engage in the scientific process.

INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Scientific Knowledge
EXPECTATION / TOPIC	SC.Z.1.8.	Describe the importance of ethics and integrity in scientific investigation JoVE • 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 • Reliability in Psychology Experiments • Self-report vs. Behavioral Measures of Recycling • The Factorial Experiment • The Multi-group Experiment • The Simple Experiment: Two-group Design • Within-subjects Repeated-measures Design
CONTENT STANDARD / COURSE	HI.SC.Z.	ZOOLOGY
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.Z.2.	Nature of ScienceUnderstand that science, technology, and society are interrelated.
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Science, Technology, and Society
EXPECTATION / TOPIC	SC.Z.2.1.	Explain how scientific advancements and emerging technology have influenced society JoVE • An Introduction to Aging and Regeneration • An Introduction to Drosophila melanogaster • An Introduction to Molecular Developmental Biology • An Introduction to Organogenesis • An Introduction to Organogenesis • An Introduction to Stem Cell Biology • An Introduction to Stem Cell Biology • An Introduction to Transfection • An Introduction to the Chick: Gallus gallus domesticus • An Introduction to the Chick: Gallus gallus domesticus • An Introduction to the Laboratory Mouse: Mus musculus • An Introduction to the Zebrafish: Danio rerio • An Overview of Genetic Engineering • Bacterial Transformation: Electroporation • Bacterial Transformation: The Heat Shock Method • C. elegans Development and Reproduction • Chick ex ovo Culture • DNA Ligation Reactions

		Development and Perroduction of the Laboratory
		Nouse
		• Embryonic Stem Cell Culture and Differentiation
		• Explant Culture for Developmental Studies
		Fate Mapping
		 Fundamentals of Breeding and Weaning
		 Gene Silencing with Morpholinos
		 Genetic Engineering of Model Organisms
		 In ovo Electroporation of Chicken Embryos
		 Induced Pluripotency
		 Invertebrate Lifespan Quantification
		Molecular Cloning
		Mouse Genotyping
		Plasmid Purification
		• BNAi in C. elegans
		Bestriction Enzyme Digests
		• The TLINEL Assay
		Tissue Regeneration with Somatic Stem Cells
		Transplantation Studies
		• Whole Mount In Situ Hybridization
		Whole-Mount in Situ Hybridization
		• Zebransh breeding and Embryo Handling
		• Zebrafish Miantenance and Husbandry
		• Zebratisn Microinjection Techniques
		• Zebrafish Reproduction and Development
EXPECTATION / TOPIC	SC.Z.2.2.	Compare the risks and benefits of potential solutions to technological issues
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EXPECTATION / TOPIC	SC.Z.2.2.	Compare the risks and benefits of potential solutions to technological issues <u>JoVE</u> • An Introduction to Aging and Regeneration
EXPECTATION / TOPIC	SC.Z.2.2.	Compare the risks and benefits of potential solutions to technological issues <u>JoVE</u> • An Introduction to Aging and Regeneration • An Introduction to Drosophila melanogaster
EXPECTATION / TOPIC	SC.Z.2.2.	Compare the risks and benefits of potential solutions to technological issues <u>JoVE</u> • An Introduction to Aging and Regeneration • An Introduction to Drosophila melanogaster • An Introduction to Molecular Developmental Biology
EXPECTATION / TOPIC	SC.Z.2.2.	Compare the risks and benefits of potential solutions to technological issues <u>JoVE</u> • An Introduction to Aging and Regeneration • An Introduction to Drosophila melanogaster • An Introduction to Molecular Developmental Biology • An Introduction to Organogenesis
EXPECTATION / TOPIC	SC.Z.2.2.	Compare the risks and benefits of potential solutions to technological issues <u>JoVE</u> • An Introduction to Aging and Regeneration • An Introduction to Drosophila melanogaster • An Introduction to Molecular Developmental Biology • An Introduction to Organogenesis • An Introduction to Stem Cell Biology
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EXPECTATION / TOPIC	SC.Z.2.2.	Compare the risks and benefits of potential solutions to technological issues <u>JoVE</u> • An Introduction to Aging and Regeneration • An Introduction to Drosophila melanogaster • An Introduction to Molecular Developmental Biology • An Introduction to Organogenesis • An Introduction to Organogenesis • An Introduction to Stem Cell Biology • An Introduction to Transfection • An Introduction to the Chick: Gallus gallus domesticus • An Introduction to the Chick: Gallus gallus domesticus • An Introduction to the Laboratory Mouse: Mus musculus • An Introduction to the Zebrafish: Danio rerio • An Overview of Genetic Engineering • Bacterial Transformation: Electroporation • Bacterial Transformation: The Heat Shock Method
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EXPECTATION / TOPIC	SC.Z.2.2.	Compare the risks and benefits of potential solutions to technological issues <u>JoVE</u> • An Introduction to Aging and Regeneration • An Introduction to Drosophila melanogaster • An Introduction to Molecular Developmental Biology • An Introduction to Organogenesis • An Introduction to Organogenesis • An Introduction to Stem Cell Biology • An Introduction to Transfection • An Introduction to the Chick: Gallus gallus domesticus • An Introduction to the Chick: Gallus gallus domesticus • An Introduction to the Laboratory Mouse: Mus musculus • An Introduction to the Zebrafish: Danio rerio • An Overview of Genetic Engineering • Bacterial Transformation: Electroporation • Bacterial Transformation: The Heat Shock Method • C. elegans Development and Reproduction • Chick ex ovo Culture
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EXPECTATION / TOPIC	SC.Z.2.2.	Compare the risks and benefits of potential solutions to technological issues <u>JoVE</u> • An Introduction to Aging and Regeneration • An Introduction to Drosophila melanogaster • An Introduction to Molecular Developmental Biology • An Introduction to Molecular Developmental Biology • An Introduction to Organogenesis • An Introduction to Stem Cell Biology • 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 Genetic Engineering • Bacterial Transformation: Electroporation • Bacterial Transformation: The Heat Shock Method • C. elegans Development and Reproduction • Chick ex ovo Culture • DNA Ligation Reactions • Development and Reproduction of the Laboratory Mouse
EXPECTATION / TOPIC	SC.Z.2.2.	Compare the risks and benefits of potential solutions to technological issues <u>JoVE</u> • An Introduction to Aging and Regeneration • An Introduction to Drosophila melanogaster • An Introduction to Molecular Developmental Biology • An Introduction to Molecular Developmental Biology • An Introduction to Organogenesis • An Introduction to Stem Cell Biology • An Introduction to Stem Cell Biology • An Introduction to Transfection • An Introduction to the Chick: Gallus gallus domesticus • An Introduction to the Chick: Gallus gallus domesticus • An Introduction to the Laboratory Mouse: Mus musculus • An Introduction to the Zebrafish: Danio rerio • An Overview of Genetic Engineering • Bacterial Transformation: Electroporation • Bacterial Transformation: The Heat Shock Method • C. elegans Development and Reproduction • Chick ex ovo Culture • DNA Ligation Reactions • Development and Reproduction of the Laboratory Mouse • Development of the Chick
EXPECTATION / TOPIC	SC.Z.2.2.	Compare the risks and benefits of potential solutions to technological issues <u>JoVE</u> • An Introduction to Aging and Regeneration • An Introduction to Drosophila melanogaster • An Introduction to Molecular Developmental Biology • An Introduction to Organogenesis • An Introduction to Organogenesis • An Introduction to Stem Cell Biology • An Introduction to Transfection • An Introduction to the Chick: Gallus gallus domesticus • An Introduction to the Chick: Gallus gallus domesticus • An Introduction to the Laboratory Mouse: Mus musculus • An Introduction to the Zebrafish: Danio rerio • An Overview of Genetic Engineering • Bacterial Transformation: Electroporation • Bacterial Transformation: The Heat Shock Method • C. elegans Development and Reproduction • Chick ex ovo Culture • DNA Ligation Reactions • Development and Reproduction of the Laboratory Mouse • Development of the Chick • Embryonic Stem Cell Culture and Differentiation
EXPECTATION / TOPIC	SC.Z.2.2.	Compare the risks and benefits of potential solutions to technological issues <u>JoVE</u> • An Introduction to Aging and Regeneration • An Introduction to Drosophila melanogaster • An Introduction to Molecular Developmental Biology • An Introduction to Organogenesis • An Introduction to Organogenesis • An Introduction to Stem Cell Biology • An Introduction to Transfection • An Introduction to the Chick: Gallus gallus domesticus • An Introduction to the Chick: Gallus gallus domesticus • An Introduction to the Laboratory Mouse: Mus musculus • An Introduction to the Zebrafish: Danio rerio • An Overview of Genetic Engineering • Bacterial Transformation: Electroporation • Bacterial Transformation: The Heat Shock Method • C. elegans Development and Reproduction • Chick ex ovo Culture • DNA Ligation Reactions • Development and Reproduction of the Laboratory Mouse • Development of the Chick • Embryonic Stem Cell Culture and Differentiation • Explant Culture for Developmental Studies

		 Fundamentals of Breeding and Weaning Gene Silencing with Morpholinos Genetic Engineering of Model Organisms In ovo Electroporation of Chicken Embryos Induced Pluripotency Invertebrate Lifespan Quantification Molecular Cloning Mouse Genotyping Plasmid Purification RNAi in C. elegans Restriction Enzyme Digests The TUNEL Assay Tissue Regeneration with Somatic Stem Cells Transplantation Studies Whole-Mount In Situ Hybridization Zebrafish Breeding and Embryo Handling Zebrafish Maintenance and Husbandry Zebrafish Reproduction and Development
CONTENT STANDARD / COURSE	HI.SC.Z.	ZOOLOGY
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.Z.3.	Structure and function in AnimalsUnderstand the relationship between the structure and function of an animal's body.
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Patterns of Organization
EXPECTATION / TOPIC	SC.Z.3.2.	Evaluate the different levels of bodily organization (e.g., unicellular, diploblastic, triploblastic) and the body plans associated with each (e.g., acoelomate, pseudocoelomate, coelomate) JoVE • An Introduction to Caenorhabditis elegans • An Introduction to Cell Division • An Introduction to Cell Motility and Migration • An Introduction to Cell Motility and Migration • An Introduction to Developmental Neurobiology • An Introduction to Drosophila melanogaster • An Introduction to Saccharomyces cerevisiae • An Introduction to the Chick: Gallus gallus domesticus • An Introduction to the Chick: Gallus gallus domesticus • An Introduction to the Laboratory Mouse: Mus musculus • An Introduction to the Zebrafish: Danio rerio • Anesthesia Induction and Maintenance • Bacterial Growth Curve Analysis and its Environmental Applications • Basic Chick Care and Maintenance • Basic Mouse Care and Maintenance • Blood Withdrawal I

		• C. elegans Chemotaxis Assav
		• C. elegans Development and Reproduction
		• C. elegans Maintenance
		• Chick ex ovo Culture
		Compound Administration I
		Compound Administration II
		• Compound Administration II
		• Compound Administration III
		Compound Administration IV
		Considerations for Rodent Surgery
		• Development and Reproduction of the Laboratory
		Mouse
		 Development of the Chick
		 Diagnostic Necropsy and Tissue Harvest
		 Drosophila Development and Reproduction
		• Drosophila Larval IHC
		Drosophila Maintenance
		 Drosophila melanogaster Embryo and Larva Harvesting
		and Preparation
		 Explant Culture for Developmental Studies
		 Explant Culture of Neural Tissue
		 Fundamentals of Breeding and Weaning
		Gene Silencing with Morpholinos
		Genetic Crosses
		Genetic Engineering of Model Organisms
		In ovo Electroporation of Chicken Embryos
		• Introducing Experimental Agents into the Mouse
		Invertebrate Lifespan Quantification
		Isolating Nucleic Acids from Veast
		Mouse Genetyping
		Muring In Litera Electroporation
		Murine III Otero Electroporation
		Primary Neuronal Cultures
		• RIVALIN C. elegans
		• Rodent Handling and Restraint Techniques
		Rodent Identification I
		Rodent Identification II
		Sterile Tissue Harvest
		• The Morris Water Maze
		 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
EXPECTATION / TOPIC	SC.Z.3.3.	Compare vertebrates and invertebrates
		JoVE
		• An Introduction to Aging and Regeneration
		An Introduction to Caenorhabditis elegans

		 An Introduction to Drosophila melanogaster 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 Basic Chick Care and Maintenance Basic Mouse Care and Maintenance C. elegans Chemotaxis Assay C. elegans Development and Reproduction C. elegans Maintenance Chick ex ovo Culture 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 Explant Culture for Developmental Studies In ovo Electroporation of Chicken Embryos Introducing Experimental Agents into the Mouse Invertebrate Lifespan Quantification Mouse Genotyping RNAi in C. elegans Transplantation Studies Whole-Mount In Situ Hybridization Zebrafish Maintenance and Husbandry Zebrafish Microinjection Techniques Zebrafish Microinjection Techniques
CONTENT STANDARD / COURSE	HI.SC.Z.	ZOOLOGY
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.Z.3.	Structure and function in AnimalsUnderstand the relationship between the structure and function of an animal's body.
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Physiology and Life Cycles
EXPECTATION / TOPIC	SC.Z.3.4.	 Trace the development of genetically identical stem cells into specialized cells (e.g., skin, liver, muscle, nerve) JoVE An Introduction to Aging and Regeneration An Introduction to Caenorhabditis elegans An Introduction to Cell Motility and Migration An Introduction to Cellular and Molecular Neuroscience An Introduction to Developmental Genetics

		An Introduction to Drosophila melanogaster
		An Introduction to Molecular Developmental Biology
		An Introduction to Organogenesis
		• An Introduction to Stem Cell Biology
		• An Introduction to the Chick: Gallus gallus domesticus
		• An Introduction to the Laboratory Mouse: Mus
		musculus
		• An introduction to the Zebratish: Danio rerio
		• An Overview of Epigenetics
		 An Overview of Gene Expression
		 Basic Chick Care and Maintenance
		• C. elegans Development and Reproduction
		Chick ex ovo Culture
		Cytogenetics
		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 Prenaration
		Embryonic Stom Call Culture and Differentiation
		Evident Culture for Developmental Studios
		• Explant Culture of Neurol Tissue
		• Explaint Culture of Neural Tissue
		• Expression Profiling with Microarrays
		Gene Silencing with Morpholinos
		Genetic Engineering of Model Organisms
		In ovo Electroporation of Chicken Embryos
		 Induced Pluripotency
		 Invertebrate Lifespan Quantification
		Metabolic Labeling
		 Murine In Utero Electroporation
		Passaging Cells
		• RNA-Seq
		Tissue Regeneration with Somatic Stem Cells
		 Transplantation Studies
		Whole-Mount In Situ Hybridization
		 Zebrafish Breeding and Embryo Handling
		Zebrafish Microiniection Techniques
		 Zebrafish Reproduction and Development
	SC 7 2 5	Trace the life evalue of various groups of enimels /s.g.
EXPECTATION / TOPIC	SU.Z.3.5.	Trace the life cycles of various groups of animals (e.g.,
		plasmodium, chidarians, nematodes, insects, tunicates,
		anurans)
		JOVE
		 An Introduction to Aging and Regeneration
		 An Introduction to Caenorhabditis elegans
		 An Introduction to Drosophila melanogaster
		• An Introduction to the Chick: Gallus gallus domesticus

		• An Introduction to the Laboratory Mouse: Mus
		• All introduction to the Laboratory mouse. Mus
		• An introduction to the Zebratish: Danio rerio
		• C. elegans Development and Reproduction
		• C. elegans Maintenance
		 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
		Fundamentals of Breeding and Weaning
		Invertebrate Lifespan Quantification
		• Invertebrate Litespan Quantification
		• Zebratish Microinjection Techniques
		 Zebrafish Reproduction and Development
EXPECTATION / TOPIC	SC.Z.3.6.	Compare the physiology of the nine major phyla of the
		animal kingdom
		5
		JoVE
		• An Introduction to Aging and Regeneration
		• An Introduction to Caenorhabditis elegans
		• An Introduction to Developmental Neuropiology
		• An introduction to Developmental Neurobiology
		• An introduction to Drosophila melanogaster
		• An introduction to iveuroanatomy
		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
		 Anesthesia Induction and Maintenance
		Basic Care Procedures
		 Basic Chick Care and Maintenance
		 Basic Mouse Care and Maintenance
		Blood Withdrawal I
		Blood Withdrawal II
		• C. elegans Chemotaxis Assav
		• C. elegans Development and Reproduction
		• C. elegans Maintenance
		Calcium Imaging in Neurons
		Chick ev ovo Culture
		Compared Administration I
		Compound Administration II
		Compound Administration III
		Compound Administration III
		Compound Administration IV
		Considerations for Rodent Surgery
		• Development and Reproduction of the Laboratory
		Mouse
		 Development of the Chick

		 Diagnostic Necropsy and Tissue Harvest Drosophila Development and Reproduction Drosophila Larval IHC Drosophila Maintenance Drosophila melanogaster Embryo and Larva Harvesting and Preparation Explant Culture for Developmental Studies Explant Culture of Neural Tissue Fate Mapping Fundamentals of Breeding and Weaning Gene Silencing with Morpholinos Histological Staining of Neural Tissue In ovo Electroporation of Chicken Embryos Introducing Experimental Agents into the Mouse Mouse Genotyping Murine In Utero Electroporation Patch Clamp Electrophysiology RNAi in C. elegans Rodent Identification I Rodent Identification II Rodent Stereotaxic Surgery Sterile Tissue Harvest The Morris Water Maze Transplantation Studies Whole-Mount In Situ Hybridization Zebrafish Breeding and Embryo Handling Zebrafish Maintenance and Husbandry Zebrafish Meroproduction and Development
CONTENT STANDARD / COURSE	HI.SC.Z.	ZOOLOGY
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.Z.4.	Animals and the EnvironmentUnderstand the interaction of animals with their environment.
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Behavior and Symbiosis
EXPECTATION / TOPIC	SC.Z.4.1.	Explain how animals' behavior (e.g., parental care, division of labor, niche, innate hive behavior in insects) may enhance the species' chances of survival <u>JoVE</u> • An Introduction to Caenorhabditis elegans • An Introduction to Learning and Memory • An Introduction to Modeling Behavioral Disorders and Stress • An Introduction to Motor Control • An Introduction to Reward and Addiction • An Introduction to the Laboratory Mouse: Mus

EXPECTATION / TOPIC	SC.Z.4.2.	musculus An Introduction to the Zebrafish: Danio rerio Anesthesia Induction and Maintenance Anxiety Testing Assessing Dexterity with Reaching Tasks Balance and Coordination Testing Basic Care Procedures Basic Chick Care and Maintenance Basic Mouse Care and Maintenance C. elegans Chemotaxis Assay Considerations for Rodent Surgery Development and Reproduction of the Laboratory Mouse Development of the Chick Diagnostic Necropsy and Tissue Harvest Drosophila Development and Reproduction Drosophila Development and Reproduction Prosophila Development and Reproduction Prosophila Maintenance Drosophila Maintenance Prosophila Bereding and Weaning Filamentous Fungi Fundamentals of Breeding and Weaning Modeling Social Stress Positive Reinforcement Studies RNAi in C. elegans Rodent Handling and Restraint Techniques Self-administration Studies Sterile Tissue Harvest The Morris Water Maze Zebrafish Breeding and Embryo Handling Zebrafish Reproduction and Development Determine how species enhance their rate of survival by using symbiosis (e.g., mutualism, commensalism, parasitism) and mimicry JOVE C. elegans Development and Reproduction Genetic Crosses Recombineering and Gene Targeting Visualizing Soil Microorganisms via the Contact Slide Assay and Microscopy
CONTENT STANDARD	HI.SC.Z.	ZOOLOGY
/ COURSE		
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.Z.5.	Genetics and EvolutionUnderstand the relationship between genetics and evolution.

INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Genetics
EXPECTATION / TOPIC	SC.Z.5.2.	Describe how evolution depends on variation with individuals, population genetics, and the species gene pool <u>JoVE</u> • An Introduction to the Chick: Gallus gallus domesticus • An Overview of Genetic Analysis
CONTENT STANDARD / COURSE	HI.SC.Z.	ZOOLOGY
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.Z.5.	Genetics and EvolutionUnderstand the relationship between genetics and evolution.
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Evolution
EXPECTATION / TOPIC	SC.Z.5.4.	Explain how the adaptations of the different phyla enhance their survival JoVE • An Introduction to Caenorhabditis elegans • An Introduction to Cognition • An Introduction to Drosophila melanogaster • An Introduction to Drosophila melanogaster • An Introduction to Learning and Memory • An Introduction to the Chick: Gallus gallus domesticus • An Introduction to the Chick: Gallus gallus domesticus • An Introduction to the Laboratory Mouse: Mus musculus • An Introduction to the Zebrafish: Danio rerio • Basic Chick Care and Maintenance • Basic Mouse Care and Maintenance • C. elegans Chemotaxis Assay • Development of the Chick • Drosophila Development and Reproduction • Drosophila Maintenance • Fear Conditioning • Positive Reinforcement Studies • Spatial Memory Testing Using Mazes • Yeast Maintenance
EXPECTATION / TOPIC	SC.Z.5.5.	Use evidence (e.g., molecular, anatomical, fossil) to determine the phylogeny of a species <u>JoVE</u> • An Introduction to the Chick: Gallus gallus domesticus • An Introduction to the Zebrafish: Danio rerio
CONTENT STANDARD / COURSE	HI.SC.B.	BOTANY

STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.B.1.	Scientific InvestigationDiscover, invent, and investigate using the skills necessary to engage in the scientific process.
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Scientific Inquiry
EXPECTATION / TOPIC	SC.B.1.1.	Describe how a testable hypothesis may need to be revised to guide a scientific investigation <u>JoVE</u> • The Multi-group Experiment • The Simple Experiment: Two-group Design
EXPECTATION / TOPIC	SC.B.1.2.	Design and safely implement an experiment, including the appropriate use of tools and techniques to organize, analyze, and validate data <u>JoVE</u> • Ethics in Psychology Research • Experimentation using a Confederate • From Theory to Design: The Role of Creativity in Designing Experiments • Manipulating an Independent Variable through Embodiment • Observational Research • Pilot Testing • Placebos in Research • Realism in Experimentation • Reliability in Psychology Experiments • The Factorial Experiment • The Simple Experiment • The Simple Experiment: Two-group Design • Within-subjects Repeated-measures Design
CONTENT STANDARD / COURSE	HI.SC.B.	ΒΟΤΑΝΥ
Standard / Performance Indicator / Domain	SC.B.1.	Scientific InvestigationDiscover, invent, and investigate using the skills necessary to engage in the scientific process.
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Scientific Knowledge
EXPECTATION / TOPIC	SC.B.1.8.	Describe the importance of ethics and integrity in scientific investigation <u>JoVE</u> • 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 Reliability in Psychology Experiments Self-report vs. Behavioral Measures of Recycling The Factorial Experiment The Multi-group Experiment The Simple Experiment: Two-group Design Within-subjects Repeated-measures Design
CONTENT STANDARD / COURSE	HI.SC.B.	BOTANY
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.B.2.	Nature of ScienceUnderstand that science, technology, and society are interrelated.
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Science, Technology, and Society
EXPECTATION / TOPIC	SC.B.2.1.	Explain how scientific advancements and emerging technology have influenced society <u>JoVE</u> • An Introduction to Organogenesis • An Introduction to Saccharomyces cerevisiae • An Overview of Genetic Engineering • Embryonic Stem Cell Culture and Differentiation • Ethics in Psychology Research • Nutrients in Aquatic Ecosystems • Passaging Cells • Realism in Experimentation • Reliability in Psychology Experiments • Self-administration Studies • Soil Nutrient Analysis: Nitrogen, Phosphorus, and Potassium • Solid-Liquid Extraction • Testing For Genetically Modified Foods • Visualizing Soil Microorganisms via the Contact Slide Assay and Microscopy
EXPECTATION / TOPIC	SC.B.2.2.	Compare the risks and benefits of potential solutions to technological issues <u>JoVE</u> • An Introduction to Organogenesis • An Introduction to Saccharomyces cerevisiae • An Overview of Genetic Engineering • Embryonic Stem Cell Culture and Differentiation • Ethics in Psychology Research • Nutrients in Aquatic Ecosystems • Passaging Cells • Realism in Experimentation • Reliability in Psychology Experiments

		 Self-administration Studies Soil Nutrient Analysis: Nitrogen, Phosphorus, and Potassium Solid-Liquid Extraction Testing For Genetically Modified Foods Visualizing Soil Microorganisms via the Contact Slide Assay and Microscopy
CONTENT STANDARD / COURSE	HI.SC.B.	ΒΟΤΑΝΥ
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.B.3.	Plant Structure and FunctionUnderstand the metabolism, anatomy, and physiology of plants.
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Cells, Tissues and Metabolism
EXPECTATION / TOPIC	SC.B.3.1.	Determine the relationship between cell structure and function in photosynthetic organisms <u>JoVE</u> • An Introduction to Cell Metabolism • Density Gradient Ultracentrifugation • Reconstitution of Membrane Proteins
EXPECTATION / TOPIC	SC.B.3.2.	Evaluate the function of various plant tissues (e.g., stem, root, leaf) in terms of transport of materials, waste disposal, protein synthesis, energy capture and release, information feedback, movement, and homeostasis <u>JoVE</u> • Tree Identification: How To Use a Dichotomous Key • Tree Survey: Point-Centered Quarter Sampling Method • Using GIS to Investigate Urban Forestry
EXPECTATION / TOPIC	SC.B.3.3.	Trace the pathway of plant metabolism including the role of pigments in the light-dependent reactions and oxygen in the light-independent reactions <u>JoVE</u> • An Introduction to Cell Metabolism • Reconstitution of Membrane Proteins
CONTENT STANDARD / COURSE	HI.SC.B.	ΒΟΤΑΝΥ
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.B.4.	Plants and the Environment Understand interactions between plants, the environment, and humans.
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Interaction with the environment
EXPECTATION / TOPIC	SC.B.4.1.	Describe how plant products (e.g., drugs, timber, spices, herbs, fossil fuels, fibers) impact human life

		JoVE • An Overview of Genetic Engineering • Biofuels: Producing Ethanol from Cellulosic Material • Testing For Genetically Modified Foods • Tree Identification: How To Use a Dichotomous Key • Tree Survey: Point-Centered Quarter Sampling Method • Using GIS to Investigate Urban Forestry
EXPECTATION / TOPIC	SC.B.4.2.	Evaluate the effect of biotic and abiotic factors (e.g., succession, competition, human influences) on plant stability within the environment <u>JoVE</u> • An Overview of Genetic Engineering • Biofuels: Producing Ethanol from Cellulosic Material • Testing For Genetically Modified Foods
EXPECTATION / TOPIC	SC.B.4.3.	Compare the form and function of various plants as producers in biomes <u>JoVE</u> • Algae Enumeration via Culturable Methodology
CONTENT STANDARD / COURSE	HI.SC.B.	ΒΟΤΑΝΥ
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.B.5.	Plant Genetics and EvolutionUnderstand plant classification, genetics, and evolution.
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Genetics
EXPECTATION / TOPIC	SC.B.5.1.	Evaluate the impact of plant genetics (e.g., monohybrid and dihybrid crosses, molecular manipulation of genes, biotechnology) on society <u>JoVE</u> • An Overview of Genetic Engineering • Solid-Liquid Extraction • Testing For Genetically Modified Foods
CONTENT STANDARD / COURSE	HI.SC.B.	ΒΟΤΑΝΥ
STANDARD / PERFORMANCE INDICATOR / DOMAIN	SC.B.5.	Plant Genetics and EvolutionUnderstand plant classification, genetics, and evolution.
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		TOPIC: Evolution and classification
EXPECTATION / TOPIC	SC.B.5.3.	Compare the major plant divisions <u>JoVE</u> • Tree Identification: How To Use a Dichotomous Key

	• Tree Survey: Point-Centered Quarter Sampling Method
	 Using GIS to Investigate Urban Forestry

Grade: 9 - Adopted: 2010

CONTENT STANDARD / COURSE	HI.CC.RST.9- 10.	Reading Standards for Literacy in Science and Technical Subjects
STANDARD / PERFORMANCE INDICATOR / DOMAIN		Craft and Structure
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK	RST.9-10.4.	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.
		JoVE • Abdominal Exam I: Inspection and Auscultation • Abdominal Exam II: Percussion • Abdominal Exam III: Palpation • Abdominal Exam IV: Acute Abdominal Pain Assessment • Algae Enumeration via Culturable Methodology
		 An Introduction to Aging and Regeneration An Introduction to Behavioral Neuroscience An Introduction to Caenorhabditis elegans An Introduction to Cell Death An Introduction to Cell Division An Introduction to Cell Metabolism An Introduction to Cell Motility and Migration An Introduction to Cellular and Molecular Neuroscience An Introduction to Developmental Genetics An Introduction to Developmental Neurobiology
		 An Introduction to Drosophila melanogaster An Introduction to Endocytosis and Exocytosis An Introduction to Learning and Memory An Introduction to Modeling Behavioral Disorders and Stress An Introduction to Molecular Developmental Biology An Introduction to Motor Control An Introduction to Neuroanatomy An Introduction to Neurophysiology An Introduction to Organogenesis An Introduction to Reward and Addiction An Introduction to Saccharomyces cerevisiae
		 An Introduction to Stem Cell Biology An Introduction to Transfection An Introduction to Working in the Hood An Introduction to the Centrifuge An Introduction to the Chick: Gallus gallus domesticus An Introduction to the Laboratory Mouse: Mus musculus

 An Introduction to the Micropipettor
 An Introduction to the Zebrafish: Danio rerio
• An Overview of Alkenone Biomarker Analysis for
Paleothermometry
 An Overview of Epigenetics
 An Overview of Gene Expression
An Overview of Genetic Analysis
An Overview of Genetic Engineering
 An Overview of Genetics and Disease
 An Overview of bGDGT Biomarker Analysis for
Paleoclimatology
 Analysis of Earthworm Populations in Soil
 Anesthesia Induction and Maintenance
• Ankle Exam
Annexin V and Propidium Iodide Labeling
• Anterograde Amnesia
• Anxiety Testing
Annrovimate Number Sense Test
• Are You Smart or Hardworking? How Praise Influences
Children's Mativation
Arterial Line Discoment
• Acceptia Technique in Environmental Science
• Aseptic Technique in Environmental Science
• Assembly of a nemux System for Heated Chemical
Accessing Devterity with Beaching Teaks
• Assessing Dextently 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
Biotuels: 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 Beliance on Artist Intentions When
Identifying Pictures
Chromatin Immunonrecipitation
Chromatography-Based Biomolecule Purification
Methode
Co-Immunoprecipitation and Pull-Down Assays
Color Afterimages
Column Chromotography
• Common Leb Closeware and Llose
Common Lab Glassware and Uses 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 lowa 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
a From Theory to Designs The Dela of Creativity in
• From Theory to Design: The Role of Creativity in
Designing Experiments
• Fundamentals of Breeding and Weaning
 Förster Resonance Energy Transfer (FRET)
 Gas Chromatography (GC) with Flame-Ionization
Detection
Gel Purification
 Gene Silencing with Morpholinos
 General Approach to the Physical Exam
Genetic Crosses
 Genetic Engineering of Model Organisms
Genetic Screens
Genome Editing
 Gram Staining of Bacteria from Environmental Sources
 Growing Crystals for X-ray Diffraction Analysis
 Habituation: Studying Infants Before They Can Talk
Hand and Wrist Exam
 High-Performance Liquid Chromatography (HPLC)
• Hip Exam
 Histological Sample Preparation for Light Microscopy
Histological Staining of Neural Tissue
How Children Solve Problems Using Causal Reasoning
Ideal Gas Law
Igneous Intrusive Rock
Igneous Volcanic Rock
 In ovo Electroporation of Chicken Embryos
Inattentional Blindness
Incidental Encoding
 Induced Pluripotency
Internal Standards
 Intra-articular Shoulder Injection for Reduction
Following Anterior Shoulder Dislocation
Intraosseous Needle Placement
 Introducing Experimental Agents into the Mouse
 Introduction to Catalysis
 Introduction to Fluorescence Microscopy
 Introduction to Light Microscopy
 Introduction to Mass Spectrometry
 Introduction to Serological Pipettes and Pipettors
 Introduction to Titration
 Introduction to the Bunsen Burner
 Introduction to the Microplate Reader
 Introduction to the Spectrophotometer
 Invasion Assay Using 3D Matrices
 Invertebrate Lifespan Quantification
Ion-Exchange Chromatography
 Isolating Nucleic Acids from Yeast
 Isolation of Fecal Bacteria from Water Samples by
Filtration
Just-noticeable Differences
• Knee Exam

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

	 Observational Research
	 Ophthalmoscopic Examination
	 PCR: The Polymerase Chain Reaction
	Palpation
	• Passaging Cells
	Patch Clamp Electrophysiology
	Pelvic Exam I: Assessment of the External Genitalia
	Pelvic Evam II: Speculum Evam
	Polyic Evam III: Bimanual and Bostovaginal Evam
	Poroussion
	• Percussion
	• Percutaneous Cricothyrotomy (Selanger Technique)
	• Periorning 1D Thin Layer Chromatography
	Pericardiocentesis Deviational Via evalue France
	• 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 Evam I
	• Shoulder Exam II
	Soil Nutrient Analysis: Nitrogen Phoenborus and
	Potaccium
	Solid-Liquid Extraction
	Solutions and Concentrations
	Solutions and concentrations Solutions Extraction of Linid Piomarkars from
	Solication Extraction of Lipid Biomarkers from
	• Covultat Extraction of Linid Diamorkara from Codiment
	Soxinet Extraction of Lipid Biomarkers from Sedment
	Spatial Guerry Testing Lising Mazos
	Spatial Memory Testing Using Mazes Spatta Memory Testing Osing Mazes
	• Spectrophotometric Determination of an Equilibrium
	Constant
	• Sterile Tissue Harvest
	• Surrace Plasmon Resonance (SPR)
	• Surgical Cricothyrotomy
	• Tandem Wass Spectrometry
	• Testing For Genetically Woolfied Foods
	• The Arres Beerry
	• The Ames Room
	• The Attentional Blink
	• The Costs and Benefits of Natural Pedagogy
	• The ELISA Method
	• The Factorial Experiment
	• The Ideal Gas Law
	• I ne inverted-tace Lifect
	• I ne Worris Water Waze
	• The Precision of Visual Working Memory with Delayed
	Estimation
	• The Rouge Test: Searching for a Sense of Self
	• The Rubber Hand Illusion

		The Simple Experiment: Two-group Design
		The Split Brain
		 The Staircase Procedure for Finding a Perceptual
		Threshold
		The TUNEL Assay
		 The Transwell Migration Assay
		• The Western Blot
		• Thyroid Exam
		Tissue Regeneration with Somatic Stem Cells
		Transplantation Studies
		 Tree Identification: How To Use a Dichotomous Key
		Tree Survey: Point-Centered Quarter Sampling Method
		Turbidity and Total Solids in Surface Water
		Two-Dimensional Gel Electrophoresis
		• Ultraviolet-Visible (UV-Vis) Spectroscopy
		Understanding Concentration and Measuring Volumes
		Using Differential Scanning Calorimetry to Measure
		Changes in Enthalpy
		Using Diffusion Tensor Imaging in Traumatic Brain
		Injury
		 Using GIS to Investigate Urban Forestry
		 Using TMS to Measure Motor Excitability During Action
		Observation
		 Using Topographic Maps to Generate Topographic
		Profiles
		Using Your Head: Measuring Infants' Rational Imitation
		of Actions
		• Using a pH Meter
		Verbal Priming
		 Visual Attention: fMRI Investigation of Object-based
		Attentional Control
		 Visual Search for Features and Conjunctions
		 Visual Statistical Learning
		 Visualizing Soil Microorganisms via the Contact Slide
		Assay and Microscopy
		Water Quality Analysis via Indicator Organisms
		Whole-Mount In Situ Hybridization
		Within-subjects Repeated-measures Design
		• X-ray Fluorescence (XRF)
		Yeast Maintenance
		Yeast Reproduction
		• Yeast Transformation and Cloning
		Zebratish Breeding and Embryo Handling
		• Zebratish Miantenance and Husbandry
		• Zebratish Wilcroinjection Techniques
		Lebratish Reproduction and Development More the Decenaries Interview
		• TIVIKI: FUNCTIONAL WAGNETIC RESONANCE IMAGING
INDICATOR / GRADE	RST.9-10.5.	Analyze the structure of the relationships among
LEVEL EXPECTATION /		concepts in a text, including relationships among key
BENCHMARK		terms (e.g., force, friction, reaction force, energy).
JoVE		
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Abdominal Exam I: Inspection and Auscultation		
 Abdominal Exam II: Percussion 		
 Abdominal Exam III: Palpation 		
 Abdominal Exam IV: Acute Abdominal Pain 		
Assessment		
 Algae Enumeration via Culturable Methodology 		
 An Introduction to Aging and Regeneration 		
An Introduction to Behavioral Neuroscience		
 An Introduction to Caenorhabditis elegans 		
 An Introduction to Cell Death 		
 An Introduction to Cell Division 		
 An Introduction to Cell Metabolism 		
 An Introduction to Cell Motility and Migration 		
 An Introduction to Cellular and Molecular Neuroscience 		
 An Introduction to Cognition 		
 An Introduction to Developmental Genetics 		
 An Introduction to Developmental Neurobiology 		
An Introduction to Drosophila melanogaster		
 An Introduction to Endocytosis and Exocytosis 		
 An Introduction to Learning and Memory 		
• An Introduction to Modeling Behavioral Disorders and		
Stress		
 An Introduction to Molecular Developmental Biology 		
An Introduction to Motor Control		
 An Introduction to Neuroanatomy 		
 An Introduction to Neurophysiology 		
 An Introduction to Organogenesis 		
 An Introduction to Reward and Addiction 		
 An Introduction to Saccharomyces cerevisiae 		
 An Introduction to Stem Cell Biology 		
 An Introduction to Transfection 		
 An Introduction to Working in the Hood 		
 An Introduction to the Centrifuge 		
 An Introduction to the Chick: Gallus gallus domesticus 		
 An Introduction to the Laboratory Mouse: Mus 		
musculus		
 An Introduction to the Micropipettor 		
 An Introduction to the Zebrafish: Danio rerio 		
 An Overview of Alkenone Biomarker Analysis for 		
Paleothermometry		
An Overview of Epigenetics		
An Overview of Gene Expression		
An Overview of Genetic Analysis		
• An Overview of Genetic Engineering		
• An Overview of Genetics and Disease		
• An Overview of bGDG1 Biomarker Analysis for		
Paleoclimatology		
Analysis of Earthworm Populations in Soil Anactheoic Induction and Maintenance		
Anestnesia induction and Waintenance Andres Exercise		
• 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 Assav
• C elegans Development and Reproduction
• C. elegans Maintenance
Calcium Imaging in Neurons
Calibration Curves
Canillary Electrophoresis (CE)
Carbon and Nitrogen Analysis of Environmental
Samples
Cardiac Exam I: Inspection and Palnation
• 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
Illtrasound 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 Bodent Surgery
Conversion of Fatty Acid Methyl Esters by
Sanonification for Llk/27 Paleothermometry
Coordination Chemistry Complexes
Coordination Chemistry Complexes
Cranial Nerves Exam II (1-VI) Cranial Nerves Exam II (1/II VII)
• Crowding
• Culturing and Enumerating Bacteria from Soil Samples
• Cyclic Voltammetry (CV)
• Cytogenetics
• DNA Gel Electrophoresis
• DNA Ligation Reactions
• DINA Methylation Analysis
• Decision-making and the lowa 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
	Drosonhila melanogaster Embryo and Larva Harvesting
	and Dronaration
	• 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
	• Executive Function in Autom Opectrum Disorder
	• Explant Culture for Developmental Studios
	• Explant Gulture 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 Bole of Creativity in
	Designing Experiments
	• Fundamentals of Preading and Weaping
	• Fundamentais of Diccumy and Weathing
	• Cos Chromotography (CC) with Elementarization
	• Gas Unromatography (GU) With Flame-Ionization
	• 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 Electronoration of Chicken Embryos
	Inattentional Blindness
	• Incidental Encoding
	Induced Pluripotency
	• Internal Standards
	Intra-articular Shoulder Injection for Reduction
	Following Anterior Shoulder Dislocation
	Intraosseous Needle Placement
	Introducing Experimental Agents into the Mouse
	 Introduction to Catalysis
	 Introduction to Fluorescence Microscopy
	 Introduction to Light Microscopy
	 Introduction to Mass Spectrometry
	 Introduction to Serological Pipettes and Pipettors
	Introduction to Titration
	 Introduction to the Bunsen Burner
	 Introduction to the Microplate Reader
	 Introduction to the Spectrophotometer
	 Invasion Assay Using 3D Matrices
	 Invertebrate Lifespan Quantification
	 Ion-Exchange Chromatography
	 Isolating Nucleic Acids from Yeast
	 Isolation of Fecal Bacteria from Water Samples by
	Filtration
	 Just-noticeable Differences
	• Knee Exam
	 Language: The N400 in Semantic Incongruity
	• Le Châtelier's Principle
	 Lead Analysis of Soil Using Atomic Absorption
	Spectroscopy
	 Learning and Memory: The Remember-Know Task
	Live Cell Imaging of Mitosis
	• Lower Back Exam
	Lymph Node Exam
	MALDI-TOF Mass Spectrometry
	 Making Solutions in the Laboratory

	 Making a Geologic Cross Section
	Male Rectal Exam
	 Manipulating an Independent Variable through
	Embodiment
	 Measuring Children's Trust in Testimony
	 Measuring Grey Matter Differences with Voxel-based
	Morphometry: The Musical Brain
	 Measuring Mass in the Laboratory
	Measuring Reaction Time and Donders' Method of
	Subtraction
	Measuring Tropospheric Ozone
	Measuring Verbal Working Memory Span
	Measuring Vital Signs
	Memory Development: Demonstrating How Repeated
	Questioning Leads to False Memories
	Mental Rotation
	Metabolic Labeling
	Metacognitive Development: How Children Estimate
	Their Memory
	Method of Standard Addition
	Modeling Social Stress
	Molecular Cloning
	Molecular oforming Molecular of offing
	• Motor Evam I
	• Motor Exam I
	Motor Learning in Mirror Drawing
	• Motor Mans
	• Mouse Genotyping
	Multiple Object Tracking
	Multiple Object Hacking Multiple In Litero Electronoration
	• Mutual Evolucivity: How Children Learn the Meanings
	of Words
	e Neck Exam
	• Needle Thoracostomy (needle Decompression) for
	Tomposizing Toppion Provide Decompression, for
	A Neuropal Transfortion Methods
	Neuronal Transfection Methods
	• Nose, Sinuses, Oral Cavity and Fildrynx Exam
	• Nuclear Magnetic Resonance (NWR) Spectroscopy
	Numerical Cognition. More of Less
	Nutrients in Aquatic Ecosystems Object Substitution Masking
	Object Substitution Wasking Observation and Increation
	Observation and inspection
	Observational Research One the language is Examination
	Ophthalmoscopic Examination
	• PUR: The Polymerase Unain Reaction
	• Paipation
	• 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

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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 • Prospect Theory • 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 • RNA -Seq • Raman Spectroscopy for Chemical Analysis • Reconstitution of Membrane Proteins • Regulating Temperature in the Lab: Applying Heat • Regulating Temperature in the Lab: Applying Heat • Regulating Temperature in the Lab: Preserving	 Peripheral Vascular Exam Using a Continuous Wave
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 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 Analysis of Environmental Samples Using RT-PCR RNA-Seq RNA in C. elegans Readism 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 	Exam
 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 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 Respiratory Exam II: Percussion and Auscultation 	 Prospect Theory
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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 • Pordent Handling and Brestraint Tochniques	Purification of a Total Lipid Extract with Column
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 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 	RIVALINI C. Elegans Analysis
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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 • Podent Handling and Pestraint Techniques	Regulating Temperature in the Lab: Apprying from
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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 Podent Handling and Pestraint Techniques	Beliability in Psychology Experiments
Adduction for Uk'37 Paleothermometry • Respiratory Exam I: Inspection and Palpation • Respiratory Exam II: Percussion and Auscultation • Restriction Enzyme Digests • Redent Handling and Restraint Techniques	Removal of Branched and Cyclic Compounds by Urea
Respiratory Exam I: Inspection and Palpation Respiratory Exam II: Percussion and Auscultation Restriction Enzyme Digests Redent Handling and Restraint Techniques	Adduction for Uk'37 Paleothermometry
Respiratory Exam II: Percussion and Auscultation Restriction Enzyme Digests Redent Handling and Restraint Techniques	Respiratory Exam I: Inspection and Palpation
Restriction Enzyme Digests Redent Handling and Restraint Techniques	Respiratory Exam II: Percussion and Auscultation
Bodent Handling and Restraint Techniques	Restriction Enzyme Digests
	Rodent Handling and Restraint Techniques
Rodent Identification I	Rodent Identification I
Rodent Identification II	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 Becycling
	• Soncony Exam
	· Sensory Exam
	• Separating Protein with SDS-PAGE
	• Separation of Wixtures Via Precipitation
	• Shoulder Exam I
	• Shoulder Exam II
	• Soil Nutrient Analysis: Nitrogen, Phosphorus, and
	Potassium
	 Solid-Liquid Extraction
	 Solutions and Concentrations
	 Sonication Extraction of Lipid Biomarkers from
	Sediment
	 Soxhlet Extraction of Lipid Biomarkers from Sediment
	Spatial Cueing
	 Spatial Memory Testing Using Mazes
	 Spectrophotometric Determination of an Equilibrium
	Constant
	Sterile Tissue Harvest
	 Surface Plasmon Resonance (SPR)
	 Surgical Cricothyrotomy
	 Tandem Mass Spectrometry
	 Testing For Genetically Modified Foods
	 The ATP Bioluminescence Assay
	The Ames Room
	The Attentional Blink
	 The Costs and Benefits of Natural Pedagogy
	The ELISA Method
	The Factorial Experiment
	• The Ideal Gas Law
	The Inverted-face Effect
	The McGurk Effect
	The Morris Water Maze
	 The Multi-group Experiment
	• The Precision of Visual Working Memory with Delayed
	Estimation
	 The Rouge Test: Searching for a Sense of Self
	The Rubber Hand Illusion
	 The Simple Experiment: Two-group Design
	• The Split Brain
	The Staircase Procedure for Finding a Perceptual
	Threshold
	• The TUNEL Assay
	The Transwell Migration Assay
	• The Western Blot

		 Thyroid Exam Tissue Regeneration with Somatic Stem Cells Transplantation Studies Tree Identification: How To Use a Dichotomous Key Tree Survey: Point-Centered Quarter Sampling Method Turbidity and Total Solids in Surface Water Two-Dimensional Gel Electrophoresis Ultraviolet-Visible (UV-Vis) Spectroscopy Understanding Concentration and Measuring Volumes Using Differential Scanning Calorimetry to Measure Changes in Enthalpy Using Diffusion Tensor Imaging in Traumatic Brain Injury Using GIS to Investigate Urban Forestry Using TMS to Measure Motor Excitability During Action Observation Using Topographic Maps to Generate Topographic Profiles Using Your Head: Measuring Infants' Rational Imitation of Actions Using a pH Meter Verbal Priming Visual Attention: fMRI Investigation of Object-based Attentional Control Visual Search for Features and Conjunctions Visual Statistical Learning Visual Statistical Learning Visual Statistical Learning Wisual Statistical Learning Wisual Statistical Learning Wisual Statistical Learning Visual Statistical Learning <li< th=""></li<>
CONTENT STANDARD / COURSE	HI.CC.RST.9- 10.	Reading Standards for Literacy in Science and Technical Subjects
STANDARD / PERFORMANCE INDICATOR / DOMAIN		Integration of Knowledge and Ideas
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK	RST.9-10.7.	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
		JoVE

	 Algae Enumeration via Culturable Methodology
	 An Introduction to Aging and Regeneration
	 An Introduction to Behavioral Neuroscience
	 An Introduction to Caenorhabditis elegans
	An Introduction to Cell Division
	 An Introduction to Cell Metabolism
	 An Introduction to Cognition
	 An Introduction to Developmental Neurobiology
	An Introduction to Drosophila melanogaster
	 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 Beactions Below Boom Temperature
Conversion of Eastly Acid Mathyl Estars by
Conversion of Fally Actu Melliyi Esters by
Saponification for Ok 37 Paleothermometry
• Coordination Chemistry Complexes
• Crowding
• Culturing and Enumerating Bacteria from Soil Samples
• Cyclic Voltammetry (CV)
DIVA Methylation Analysis Devision methods and the large Completing Task
• Decision-making and the lowa 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
SUFL LASK • Executive Eurotion in Autiem Spectrum Discreter
• Executive runction in Autism Spectrum Disorder
• Expression Profiling with Microarrays
• Expression Froming with Microalians
Solvent Extraction
Fye 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 Chatemer's Principle
	Spectroscopy
	• Learning and Memory: The Remember-Know Task
	• MAI DI-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. Rehavioral Measures of Recycling
	• Senaration of Mixtures via Precipitation
	• Separation of Mixtures via Frecipitation
	• Son 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
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	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 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) Yeast Maintenance fMRI: Functional Magnetic Resonance Imaging
CONTENT STANDARD / COURSE	HI.CC.WHST.9- 10.	Writing Standards for Literacy in Science and Technical Subjects
STANDARD / PERFORMANCE INDICATOR / DOMAIN		Text Types and Purposes
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK	WHST.9-10.1.	Write arguments focused on discipline-specific content.
EXPECTATION / TOPIC	WHST.9- 10.1(a)	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. <u>JoVE</u> • The Multi-group Experiment • The Simple Experiment: Two-group Design
CONTENT STANDARD / COURSE	HI.CC.WHST.9- 10.	Writing Standards for Literacy in Science and Technical Subjects
STANDARD / PERFORMANCE INDICATOR / DOMAIN		Text Types and Purposes
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK	WHST.9-10.2.	Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

EXPECTATION / TOPIC	WHST.9-	Introduce a topic and organize ideas, concepts, and
	10.2(a)	information to make important connections and
		distinctions; include formatting (e.g., headings), graphics
		(e.g., figures, tables), and multimedia when useful to
		aiding comprehension.
		JoVE
		The Multi-group Experiment
		The Simple Experiment: Two-group Design
EXPECTATION / TOPIC	WHST 9-	Use precise language and domain-specific vocabulary to
	10.2(d)	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.
		JoVE
		 Abdominal Exam I: Inspection and Auscultation
		Abdominal Exam II: Percussion
		 Abdominal Exam III: Palpation
		 Abdominal Exam IV: Acute Abdominal Pain
		Assessment
		 Algae Enumeration via Culturable Methodology
		 An Introduction to Aging and Regeneration
		An Introduction to Behavioral Neuroscience
		An Introduction to Caenorhabditis elegans
		An Introduction to Cell Death
		An Introduction to Cell Division
		• An Introduction to Cell Wetabolism
		• An introduction to Cell Wotility and Welevaler Neuroscience
		• An introduction to Cenular and Molecular Neuroscience
		• An Introduction to Cognition
		• An Introduction to Developmental Neurobiology
		• An Introduction to Drosonbila melanogaster
		An Introduction to Endocytosis and Exocytosis
		• An Introduction to Learning and Memory
		• An Introduction to Modeling Behavioral Disorders and
		Stress
		 An Introduction to Molecular Developmental Biology
		An Introduction to Motor Control
		 An Introduction to Neuroanatomy
		 An Introduction to Neurophysiology
		 An Introduction to Organogenesis
		 An Introduction to Reward and Addiction
		An Introduction to Saccharomyces cerevisiae
		An Introduction to Stem Cell Biology
		An Introduction to Transfection
		An Introduction to Working in the Hood An Introduction to the Quantificant
		An introduction to the Centrifuge An introduction to the Chick Colling rolling domestication
		• An introduction to the Unick: Gallus gallus domesticus
		• All introduction to the Laboratory Wouse: Wus
		musculus

 An Introduction to the Micropipettor
 An Introduction to the Zebrafish: Danio rerio
An Overview of Alkenone Biomarker Analysis for
Paleothermometry
An Overview of Epigenetics
An Overview of Gene Expression
An Overview of Genetic Analysis
An Overview of Genetic Engineering
• An Overview of Genetics and Disease
• An Overview of bGDGT Biomarker Analysis for
Palaoclimatology
Analysis of Earthwarm Panulations in Sail
• Analysis of Earthworld Populations in Soli
Anestnesia induction and maintenance Anelle Freem
Annexin V and Propidium lodide 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 Assav
• C. elegans Development and Reproduction
• C. elegans Maintenance
Calcium Imaging in Neurons
Calibration Curves
Capillary Electrophoresis (CF)
Carbon and Nitrogen Analysis of Environmental
Samples
oumpies

	 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 Beliance on Artist Intentions When
	Identifying Pictures
	Chromatin Immunonrecipitation
	Chromatin minunoprecipitation Chromatagraphy Based Biomelecule Burification
	Motheda
	A Co. Immunonyosinitation and Bull Down Assays
	• Co-inimulioprecipitation and Pull-Down Assays
	• Color Atterimages
	• 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'3/ 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 lowa 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 Lavers with
	the Brunton Compass
	Determining the Density of a Solid and Liquid
	Determining the Empirical Formula
	Determining the Empirical Formula
	Aguagua Solution
	Aqueous Solution
	• Determining the Solubility Rules of Ionic Compounds
	• Development and Reproduction of the Laboratory
	Nouse
	Development of the Chick Disgregation Negroup and Tissue Hermost
	• Diagnostic Necropsy and Tissue Harvest
	• Dialysis: Diffusion Based Separation
	• Dichotic Listening
	• Dissolved Oxygen in Surface Water
	Drosophila Development and Reproduction
	• Drosophila Larval IHC
	Drosophila Maintenance
	Drosophila melanogaster Embryo and Larva Harvesting
	and Preparation
	• Ear Exam
	• Elbow Exam
	 Electro-encephalography (EEG)
	• Electrochemical Measurements of Supported Catalysts
	Using a Potentiostat/Galvanostat
	 Electrophoretic Mobility Shift Assay (EMSA)
	 Embryonic Stem Cell Culture and Differentiation
	 Emergency Tube Thoracostomy (Chest Tube
	Placement)
	• Emergent Lateral Canthotomy and Inferior Catholysis
	• Enzyme Assays and Kinetics
	 Ethics in Psychology Research
	 Event-related Potentials and the Oddball Task
	 Executive Function and the Dimensional Change Card
	Sort Task
	 Executive Function in Autism Spectrum Disorder
	 Experimentation using a Confederate
	 Explant Culture for Developmental Studies
	 Explant Culture of Neural Tissue
	 Expression Profiling with Microarrays
	• Extraction of Biomarkers from Sediments - Accelerated
	Solvent Extraction
	• Eye Exam
	 Eye Tracking in Cognitive Experiments
	 FM Dyes in Vesicle Recycling
	Fate Mapping
	 Fear Conditioning
	 Filamentous Fungi
	 Finding Your Blind Spot and Perceptual Filling-in

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

 Isolation of Fecal Bacteria from Water Samples by Filtration
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 Laver Chromatography
Paricardiocantasis
Parinharal Vaccular Evam
• I Chipheral Vascular Exam Lleing a Continuous Ways
Penpheral vascular Exam Using a Continuous Wave
Doppier
• 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
Ouantifying Environmental Microorganisms and
RNA Analysis of Environmental Samples Using PT BCD
RIVA Analysis of Environmental Samples Using RT-PCR PNIA-Sog
• DNA: in C closene
 nival III C. elegans Demon Spectroscopy for Chaminal Analysis
 Raman Spectroscopy for Chemical Analysis Dealism in Emerging for the
 Kealism 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
	Bemoval of Branched and Cyclic Compounds by Urea
	Adduction for LIK'27 Palaothermometry
	Adduction for OK 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 Linid Biomarkers from
	Sediment
	Soxhlet Extraction of Lipid Biomarkers from Sediment
	Snatial Cueing
	Snatial Memory Testing Using Mazes
	Spectronhotometric Determination of an Equilibrium
	Constant
	• Sterile Tissue Harvest
	• Surface Plasmon Besonance (SPB)
	Surgical Cricothyrotomy
	Tandem Mass Spectrometry
	Testing For Genetically Modified Foods
	• The ATP Bioluminescence Assay
	• The Ames Boom
	• The Attentional Blink
	• The Costs and Renafits of Natural Padagagy
	The COSIS and Benefits of Natural Fedagogy
	• The ELISA Method
	• The Ideal Cas Low
	• The Ideal Gas Law
	 I ne 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: Weasuring Infants' Rational Imitation
	UI ACHUNS
	• Using a pri lileter
	• Verbal Priming
	• Visual Attention: Investigation of Object-based
	Attentional Control
	• Visual Statistical Learning
	• Visualizing Soil Microorganisms via the Contact Slide
	Assay and Microscopy
	Assay and Microscopy • Water Quality Analysis via Indicator Organisms
	• Whole Mount In Situ Hybridization
	Within-subjects Repeated-measures Design
	• X-ray Fluorescence (XRF)
	• Veast Maintenance
	Yeast Reproduction
	Veast Transformation and Cloning
	• Zebrafish Breeding and Embryo Handling
	• Zebrafish Maintenance and Husbandry

		 Zebrafish Microinjection Techniques Zebrafish Reproduction and Development
		 fMRI: Functional Magnetic Resonance Imaging
CONTENT STANDARD / COURSE	HI.CC.WHST.9- 10.	Writing Standards for Literacy in Science and Technical Subjects
STANDARD / PERFORMANCE INDICATOR / DOMAIN		Text Types and Purposes
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK	WHST.9-10.3.	(See note; not applicable as a separate requirement)
EXPECTATION / TOPIC	WHST.9- 10.3(a)	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. JoVE • Ethics in Psychology Research • Experimentation using a Confederate • From Theory to Design: The Role of Creativity in Designing Experiments • Manipulating an Independent Variable through Embodiment • Observational Research • Pilot Testing • Placebos in Research • Realism in Experimentation • Reliability in Psychology Experiments • The Factorial Experiment • The Multi-group Experiment • The Simple Experiment • The Simple Experiment: Two-group Design

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