

**SLOs for Assessment Key:**

1. Assessible / Attainable - (Not included in drop down list)
2. **Ambiguous (assessable in longer run) - (BOLD White)**
3. Not assessable in Summative - (Grey)
4. Repetitive (with in same grade) - (Grey)
5. Repetitive (with in same learning level) - (Grey)

Domains	Standards	Benchmarks	Topic/Title	NC SLO #	NCP (2022) - SLO	Status of SLOs	SLOs for	Cognitive
Nervous System	<p>Describe the structure and function of the nervous system, including the central and peripheral nervous systems.</p> <p>Explain the role of neurons in transmitting and processing information.</p> <p>Describe the process of neurotransmission and how it affects the functioning of the nervous system.</p> <p>Explain how the nervous system regulates and coordinates body functions, including the role of reflex arcs.</p> <p>Describe the structure and function of the human endocrine system, including the role of hormones in regulating body functions.</p> <p>Explain the process of hormone secretion, including the role of the hypothalamus and pituitary gland.</p> <p>Describe the effects of hormones on various target tissues, including the growth and development of cells and tissues.</p> <p>Explain the role of hormones in regulating metabolism and energy balance, including the regulation of glucose and insulin levels</p>	<p><b>Benchmark 1:</b> Explain the functions of the nervous system, including the structure and function of neurons and nerve impulses and synapses.</p> <p><b>BENCHMARK 2:</b> Describe the roles of hormones and the endocrine system in maintaining homeostasis in the human body. <b>BENCHMARK3:</b> Explain how different sensory receptors work and the effect of drugs on these receptors and the nervous system.</p>	Nervous System	[SLO: B-12-G-01]	Recognize receptors as transducers sensitive to various stimuli.	Matched SLO		Remember
				[SLO: B-12-G-02]	Trace the path of a message transmitted to the CNS (central nervous system) for processing.	Matched SLO		Remember
				[SLO: B-12-G-03]	Identify the three neurons (sensory, intermediate, motor) involved in nervous transmission.	Matched SLO		Remember
				[SLO: B-12-G-04]	Identify muscles and glands as the effectors.	Matched SLO		Remember
				[SLO: B-12-G-05]	Annotate the detailed structure of a sensory neuron, associative and a motor neuron	Modified (Split) SLO		Understand
				[SLO: B-12-G-06]	Relate the structure of neurons with functions.	Modified (Split) SLO		Apply
				[SLO: B-12-G-07]	Differentiate between myelinated and non-myelinated neurons.	Matched SLO		Understand
				[SLO: B-12-G-08]	Explain the function of the three types of neurons with the help of a reflex arc.	Matched SLO		Understand
				[SLO: B-12-G-09]	Define nerve impulse.	Matched SLO		Remember
				[SLO: B-12-G-10]	Describe the generation and transmission of nerve impulse.	Matched SLO		Understand
				[SLO: B-12-G-11]	Name the factors responsible for the resting membrane potential of neuron.	Matched SLO		Remember

[SLO: B-12-G-12]	Evaluate from a graph the phenomena of polarization, depolarization and hyperpolarization of membrane.	Matched SLO		Understand
[SLO: B-12-G-13]	Compare the velocities of nerve impulse in the axon membrane and in the synaptic cleft.	Matched SLO		Understand
[SLO: B-12-G-14]	Describe the role of local circuits in saltatory conduction of nerve impulse.	New SLO		Understand
[SLO: B-12-G-15]	Outline the structure of synapse.	Modified(rephrased) SLO		
[SLO: B-12-G-16]	Explain synaptic transmission of nerve impulse.	Matched SLO		Understand
[SLO: B-12-G-17]	Classify neurotransmitters as inhibitory and excitatory and list some common examples.	Matched SLO		Understand
[SLO: B-12-G-18]	Identify the main components of the nervous system.	Matched SLO		Remember
[SLO: B-12-G-19]	Explain briefly the major parts functions of major divisions of the brain and its functions of brain.	Modified(rephrased) SLO		Understand
[SLO: B-12-G-20]	Describe the architecture of human brain	Modified (Split) SLO		Understand
[SLO: B-12-G-21]	Describe cranial and spinal nerves in man.	Matched SLO		Understand
[SLO: B-12-G-22]	Explain the structure, types and functions of the autonomic of autonomic nervous system.	Matched SLO		Understand
[SLO: B-12-G-23]	State the role of hormones as chemical messengers.	New SLO	<b>Ambiguous</b>	Remember
[SLO: B-12-G-24]	Describe the chemical nature of hormones and correlate it with important hormones.	New SLO	<b>Ambiguous</b>	Understand
[SLO: B-12-G-25]	Locate the endocrine glands in human body name the hormones they release and their functions ; (pituitary, thyroid, parathyroid, pancreas, adrenal, gonads.)	New SLO	<b>Ambiguous</b>	Understand

[SLO: B-12-G-26]	Relate the problems associated with the imbalance of these hormones.	New SLO	<b>Ambiguous</b>	Apply
[SLO: B-12-G-27]	Explain the neurosecretory role of hypothalamus.	New SLO	<b>Ambiguous</b>	Understand
[SLO: B-12-G-28]	Outline the concept of Feedback mechanism of hormones and .Describe positive feedback with reference to Oxytocin and negative feedback with reference to Insulin and Glucagon	New SLO	<b>Ambiguous</b>	Understand
[SLO: B-12-G-29]	Explain the structure and functioning of the receptors for smell, taste and touch / pain.	Matched SLO		Understand
[SLO: B-12-G-30]	Define narcotic drugs as agents that interact with the normal nervous activity.	New SLO	<b>Ambiguous</b>	Remember
[SLO: B-12-G-31]	Compare the use and abuse of drugs with respect to heroine, <i>Cannabis</i> , nicotine, alcohol and inhalants like nail polish remover and glue.	New SLO	<b>Ambiguous</b>	Understand
[SLO: B-12-G-32]	Explain the terms; drug addiction and drug tolerance with reference to caffeine and nicotine and their adverse effects.	Modified(rephrased) SLO		Understand
[SLO: B-12-G-33]	Associate the effects of drug addiction and tolerance with the functioning of the nervous system.	Matched SLO		Understand
[SLO: B-12-G-34]	Describe the way how pain medicines can reduce or numb pain in the human body.	New SLO	<b>Ambiguous</b>	Understand
[SLO: B-12-G-35]	Discuss that certain pain medications are addictive.	New SLO	<b>Ambiguous</b>	Understand
[SLO: B-12-G-36]	Classify nervous disorders into vascular, infectious, structural, functional and degenerative disorders	Matched SLO		Understand

				[SLO: B-12-G-37]	Describe the causes, symptoms and treatment of one type of each category of disorders outlined above (e.g., stroke as vascular, meningitis as infectious, brain tumor as structural, headache as functional, and Alzheimer disease as degenerative disorder).	Matched SLO		Understand
				[SLO: B-12-G-38]	Explain the principles of the important diagnostic tests for nervous disorders i.e. EEG, CT scan and MRI	Matched SLO		Understand
	<p>Describe the causes of diseases, including infectious and non-infectious diseases.</p> <p>Explain the role of pathogens, including viruses, bacteria, fungi, and parasites, in causing disease.</p> <p>Describe the body's immune response to pathogens, including the role of white blood cells, antibodies, and the complement system.</p> <p>Explain how vaccines work and the importance of herd immunity.</p> <p>Describe how genetic factors can affect susceptibility to disease and describe examples of inherited diseases.</p> <p>Explain the mechanisms of immune tolerance and autoimmunity and their impact on human health.</p> <p>Describe the role of vaccines in preventing disease and the mechanism of action of various vaccine types, including live attenuated, inactivated, and subunit vaccines.</p>	<p>Benchmark 1: Students should be able to explain the functioning and interplay of the various components of the immune system and human body in identifying and combating pathogens.</p> <p>Benchmark 2: Describe the types of vaccines, their mechanisms of action and the types of acquired immunity.</p>		[SLO: B-12-I-01]	List the structural features of human skin that make it an impenetrable barrier against invasion by microbes. (1st line of defense)	Grade 11 SLO		Remember
			[SLO: B-12-I-02]	Explain how oil and sweat glands within the epidermis inhibit the growth and also kill microorganisms. (1st line of defense)	Grade 11 SLO		Understand	
			[SLO: B-12-I-03]	Recognize the role of the acids of the digestive tract as killing bacteria present in food.	Grade 11 SLO		Remember	
			[SLO: B-12-I-04]	State the role of the ciliated epithelium of the nasal cavity and the mucous of the bronchi and bronchioles in trapping airborne microorganisms.	Grade 11 SLO		Remember	
			[SLO: B-12-I-05]	Describe the role of macrophages and neutrophils in killing bacteria.	Grade 11 SLO		Understand	
			[SLO: B-12-I-06]	Explain how Natural Killer (NK) cells kill cells infected by microbes and cancer cells.	Grade 11 SLO		Understand	

Disease and Immunity

[SLO: B-12-I-07]	State the way proteins of the complement system kill bacteria and that interferons inhibit viruses from infecting cells.	Grade 11 SLO		Remember
[SLO: B-12-I-08]	State the events of the inflammatory response as a generalized, nonspecific defense.	Grade 11 SLO		Remember
[SLO: B-12-I-09]	Outline the release of pyrogens by microbes and their effect on the hypothalamus to boost the body's temperature.	Grade 11 SLO		Understand
[SLO: B-12-I-10]	List the ways that fever affects microbes.	Grade 11 SLO		Remember
[SLO: B-12-I-11]	Define the specific immune system as providing specific defense and acting as the most powerful means of resisting infection.	Grade 11 SLO		Remember
[SLO: B-12-I-12]	Identify monocytes, T-cells, and B-cells as components of the immune system.	Grade 11 SLO		Remember
[SLO: B-12-I-13]	State inborn and acquired immunity as the two basic types of immunity.	Grade 11 SLO		Remember
[SLO: B-12-I-14]	Differentiate between active and passive immunity as the two types of acquired immunity.	Grade 11 SLO		Understand
[SLO: B-12-I-15]	Describe the role of T-cells in cell-mediated immunity.	Grade 11 SLO		Understand
[SLO: B-12-I-16]	Describe the role of B-cells in antibody-mediated immunity.	Grade 11 SLO		Understand
[SLO: B-12-I-17]	Discuss the role of T-cells and B-cells in transplant rejections.	Grade 11 SLO		Understand
[SLO: B-12-I-18]	Evaluate the discovery of monoclonal antibodies and justify how this accomplishment revolutionized many aspects of biological research.	Grade 11 SLO		Analyse

				[SLO: B-12-I-19]	Identify the process of vaccination as a means to develop active acquired immunity.	Grade 11 SLO		Remember
				[SLO: B-12-I-20]	Draw the structural model of an antibody molecule.	Grade 11 SLO		Apply
				[SLO: B-12-I-21]	Explain the role of memory cells in long-term immunity.	Grade 11 SLO		Understand
				[SLO: B-12-I-22]	Define allergies and correlate the symptoms of allergies with the release of histamines.	Grade 11 SLO		Remember
				[SLO: B-12-I-23]	Describe the autoimmune diseases with examples.	Grade 11 SLO		Understand
Biotechnology	Describe the application of biotechnology in various fields, including medicine, agriculture, and industry. Explain the principles of genetic engineering and recombinant DNA technology, including gene cloning, PCR, and sequencing. Describe the process of gene cloning and how it is used in biotechnology. Describe the use of biotechnology in producing therapeutic proteins, including vaccines, monoclonal antibodies, and growth hormones. Explain the principles of synthetic biology, including metabolic engineering, gene circuit design, and biosensors.	Benchmark 1: Describe the role of biotechnology in addressing global issues, including organ transplant, healthcare and environment.		[SLO: B-12-J-01]	Introduce genetic engineering	New SLO	<b>Ambiguous</b>	Understand
				[SLO: B-12-J-02]	Explain polymerase chain reaction (PCR)	New SLO	<b>Ambiguous</b>	Understand
				[SLO: B-12-J-03]	Outline the Function of Restriction Enzymes	New SLO	<b>Ambiguous</b>	Understand
				[SLO: B-12-J-04]	Describe plasmid as vector prokaryotes and Explain how recombinant plasmids can be formed	New SLO	<b>Ambiguous</b>	Understand
				[SLO: B-12-J-05]	Define Genetically modified organism	New SLO	<b>Ambiguous</b>	Remember
				[SLO: B-12-J-06]	Explain the formation of human insulin protein in bacteria	New SLO	<b>Ambiguous</b>	Understand
				[SLO: B-12-J-07]	Describe how vertical food farms (soil free) work.	New SLO	<b>Ambiguous</b>	Understand
				[SLO: B-12-J-08]	Compare and contrast the advantages of vertical food farms with general agricultural practices prevalent in Pakistan.	New SLO	<b>Ambiguous</b>	Understand
	Define biostatistics and explain its role in biology. Explain the process of collecting, organizing, and analyzing data in biology. Describe various statistical methods used in biology, including descriptive statistics, inferential statistics, and hypothesis testing.	Benchmark 1: Analyze data and apply statistical techniques to make sense of it better, use different plotting techniques to graph the data, and carry out different statistical tests relevant for the nature of data.		[SLO: B-12-K-01]	Define biostatistics and its use.	New SLO	<b>Ambiguous</b>	Remember
				[SLO: B-12-K-02]	Define mean, median, mode, standard deviation, range, percentile.	New SLO	<b>Ambiguous</b>	Remember
				[SLO: B-12-K-03]	Calculate mean, median, mode, standard deviation, range, percentile from a given set of data.	New SLO	<b>Ambiguous</b>	Apply

Biostatistics and Data Handling	Explain the importance of proper data management, including data accuracy and data security. Describe how data can be represented graphically, including bar graphs, histograms, and scatterplots.		[SLO: B-12-K-04]	Sketch a bar chart for a given set of data.	New SLO	Ambiguous	Apply
			[SLO: B-12-K-05]	Sketch error bars based off of range or standard deviation for a given set of data on a bar chart.	New SLO	Ambiguous	Apply
			[SLO: B-12-K-06]	Evaluate the appropriate type of figure or chart for a given set of data and/or experiment (bar chart, pie chart, x-y axis data figure etc).	New SLO	Ambiguous	Understand
			[SLO: B-12-K-07]	Make the appropriate chart with proper title, labeled axes, legend, axes units.	New SLO	Ambiguous	Apply
			[SLO: B-12-K-08]	Design an appropriate experiment with a control group and dependent, independent and control variables.	New SLO	Ambiguous	Apply
Structural Biology and Computational B	Describe the study of the three-dimensional structures of biological molecules, including proteins, DNA, and RNA. Explain the techniques used in structural biology, including X-ray crystallography, nuclear magnetic resonance spectroscopy, and cryo-electron microscopy. Describe the role of structural biology in understanding biological function and disease. Define computational biology and explain its role in biology. Describe the application of	Benchmark 1: Students will be able to explain the molecular basis of biological structure and function and different techniques used to estimate these structures. Benchmark 2: Students should develop an understanding of computational applications, and its applications in understanding structural biology, evolution, genomics, proteomics, and biological structures in addition to its role in agriculture and industry.	[SLO: B-12-L-01]	Define structural biology.	New SLO	Ambiguous	Remember
			[SLO: B-12-L-02]	Explain that structure determination of biomolecules are important	New SLO	Ambiguous	Understand
			[SLO: B-12-L-03]	Describe how X-ray crystallography works.	New SLO	Ambiguous	Understand
			[SLO: B-12-L-04]	Outline the online databases where biomolecule structures are available.	New SLO	Ambiguous	Understand
			[SLO: B-12-L-05]	Describe computational Biology.	New SLO	Ambiguous	Understand
			[SLO: B-12-L-06]	Define Sequence Homology	New SLO	Ambiguous	Remember
			[SLO: B-12-L-07]	Define Structural Homology	New SLO	Ambiguous	Remember
	Describe the structure and function of the various systems of the human body, including the skeletal, muscular, respiratory, circulatory, digestive, urinary, and nervous systems. Explain the role of hormones in regulating body functions and describe the endocrine system. Describe the processes of cellular respiration and energy production and their relationship to human	Benchmark 1: Identify and explain the functions of the major organs of the respiratory system in the human body. Benchmark 2: Identify and explain the functions of the major organs of the Urinary system in the human body. Benchmark 3: Identify and explain the functions of the major organs of the digestive system in the human body.	[SLO: B-12-R-01]	Define the respiratory surface and list its properties	Matched SLO		Remember
			[SLO: B-12-R-02]	Describe the main structural features and functions of the components of human respiratory system.	Matched SLO		Understand
			[SLO: B-12-R-03]	Explain the ventilation mechanism in humans.	Modified(rephrased) SLO		Understand
			[SLO: B-12-R-04]	Discuss the transport of oxygen and carbon dioxide through blood.	Matched SLO		Understand

health.  
 Explain how the human body maintains homeostasis and the role of feedback mechanisms.  
 Describe how the different systems of the body interact to maintain health and respond to disease and injury.

[SLO: B-12-R-05]	Outline the role of respiratory pigments.	Modified(rephrased) SLO		Understand
[SLO: B-12-R-06]	State the causes, symptoms and treatment of upper Respiratory Tract Infections (sinusitis, otitis media)and lower Respiratory Tract Infections (pneumonia, pulmonary tuberculosis).	Matched SLO		Remember
[SLO: B-12-R-07]	Describe the disorders of lungs (emphysema and COPD)	Matched SLO		Understand
[SLO: B-12-R-08]	List the effects of smoking on respiratory system	Matched SLO		Remember
[SLO: B-12-R-09]	List various nitrogenous compounds excreted during the process of excretion.	Matched SLO		Remember
[SLO: B-12-R-10]	Explain the nature of excretory products in relation to habitat.	Matched SLO		Understand
[SLO: B-12-R-11]	outline different organs of the urinary system.	Modified(rephrased) SLO		Understand
[SLO: B-12-R-12]	Describe the structure of kidney	Modified (Split) SLO		Understand
[SLO: B-12-R-13]	Relate the structure of the kidney with its function.	Modified (Split) SLO		Apply
[SLO: B-12-R-14]	Explain the detailed structure of a nephron.	Matched SLO		Understand
[SLO: B-12-R-15]	Explain the processes of glomerular filtration, selective re-absorption and tubular secretion as the events in kidney functioning.	Matched SLO		Understand
[SLO: B-12-R-16]	Explain regulatory mechanism involved in concentration of urine	Modified(rephrased) SLO		Understand
[SLO: B-12-R-17]	Justify the functioning of kidneys as both excretion and osmoregulation.	Matched SLO		Understand
[SLO: B-12-R-18]	Compare the function of two major capillary beds in kidneys i.e. glomerular capillaries and peritubular capillaries.	Matched SLO		Analyse
[SLO: B-12-R-19]	List urinary tract infections and the bacteria responsible.	Matched SLO		Remember



[SLO: B-12-R-20]	Explain the causes and treatments of kidney stones.	Matched SLO		Understand
[SLO: B-12-R-21]	Outline the causes of kidney failure.	Matched SLO		Understand
[SLO: B-12-R-22]	Explain in detail the mechanism and problems related to dialysis.	New SLO	<b>Ambiguous</b>	Understand
[SLO: B-12-R-23]	Describe the principles and the problems associated with kidney transplant.	New SLO	<b>Ambiguous</b>	Understand
[SLO: B-12-R-24]	Describe the mechanical and chemical digestion in the oral cavity.	Grade 11 SLO		Understand
[SLO: B-12-R-25]	Explain swallowing and peristalsis.	Grade 11 SLO		Understand
[SLO: B-12-R-26]	Illustrate with a diagram the structure of the stomach and relate each component with the mechanical and chemical digestion in the stomach.	Grade 11 SLO		Apply
[SLO: B-12-R-27]	Identify the role of the nervous system and gastrin hormone on the secretion of gastric juice.	Grade 11 SLO		Remember
[SLO: B-12-R-28]	Describe the major actions carried out on food in the three regions of the small intestine.	Grade 11 SLO		Understand
[SLO: B-12-R-29]	Trace the absorption of digested products from the small intestine lumen to the blood capillaries and lacteals of the villi.	Grade 11 SLO		Analyse
[SLO: B-12-R-30]	Describe the component parts of large intestine with their respective roles.	Grade 11 SLO		Understand
[SLO: B-12-R-31]	Correlate the involuntary reflex for egestion in infants and the voluntary control in adults.	Grade 11 SLO		Analyse
[SLO: B-12-R-32]	Explain the storage and metabolic role of the liver.	Grade 11 SLO		Understand
[SLO: B-12-R-33]	Describe composition of bile and relate the constituents with respective roles.	Grade 11 SLO		Understand

[SLO: B-12-R-34]	Outline the structure of pancreas and explain its function as an exocrine gland.	Grade 11 SLO		Apply
[SLO: B-12-R-35]	Relate the secretion of bile and pancreatic juice with the secretin hormone.	Grade 11 SLO		Analyse
[SLO: B-12-R-36]	State the location of heart in the body and define the role of pericardium.	Grade 11 SLO		Understand
[SLO: B-12-R-37]	Describe the structure of the walls of heart and rationalize the thickness of the walls of each chamber.	Grade 11 SLO		Understand
[SLO: B-12-R-38]	Trace the flow of blood through the heart as regulated by the valves.	Grade 11 SLO		Apply
[SLO: B-12-R-39]	State the phases of heartbeat.	Grade 11 SLO		Remember
[SLO: B-12-R-40]	Explain the role of SA node, AV node and Purkinje fibers in controlling the heartbeat.	Grade 11 SLO		Understand
[SLO: B-12-R-41]	List the principles and uses of Electrocardiogram.	Grade 11 SLO		Remember
[SLO: B-12-R-42]	Describe the detailed structure of arteries, veins and capillaries.	Grade 11 SLO		Understand
[SLO: B-12-R-43]	Describe the role of arterioles in vasoconstriction and vasodilation.	Grade 11 SLO		Understand
[SLO: B-12-R-44]	Describe the role of precapillary sphincters in regulating the flow of blood through capillaries.	Grade 11 SLO		Understand
[SLO: B-12-R-45]	Trace the path of the blood through the pulmonary and systemic circulation (coronary, hepatic-portal and renal circulation).	Grade 11 SLO		Apply
[SLO: B-12-R-46]	Compare the rate of blood flow through arteries, arterioles, capillaries, venules and veins.	Grade 11 SLO		Analyse

[SLO: B-12-R-47]	Define blood pressure and explain its periods of systolic and diastolic pressure.	Grade 11 SLO		Remember
[SLO: B-12-R-48]	State the role of baroreceptors and volume receptors in regulating the blood pressure.	Grade 11 SLO		Remember
[SLO: B-12-R-49]	Define the term thrombus and differentiate between thrombus and embolus.	Grade 11 SLO		Remember
[SLO: B-12-R-50]	Identify the factors causing atherosclerosis and arteriosclerosis.	Grade 11 SLO		Remember
[SLO: B-12-R-51]	Categorize Angina pectoris, heart attack, and heart failure as the stages of cardiovascular disease development.	Grade 11 SLO		Understand
[SLO: B-12-R-52]	State the congenital heart problem related to the malfunctioning of cardiac valves.	Grade 11 SLO		Remember
[SLO: B-12-R-53]	Describe the principles of angiog	Grade 11 SLO		Understand
[SLO: B-12-R-54]	Outline the main principles of coronary bypass, angioplasty and open-heart surgery.	Grade 11 SLO		Apply
[SLO: B-12-R-55]	Define hypertension and describe the factors that regulate blood pressure and can lead to hypertension and hypotension.	Grade 11 SLO		Remember
[SLO: B-12-R-56]	List the changes in lifestyles that can protect man from hypertension and cardiac problems.	Grade 11 SLO		Remember
[SLO: B-12-R-57]	Describe the formation, composition and function of intercellular fluid.	Grade 11 SLO		Understand
[SLO: B-12-R-58]	Compare the composition of intercellular fluid with that of lymph.	Grade 11 SLO		Understand
[SLO: B-12-R-59]	State the structure and role of lymph capillaries, lymph vessels and lymph trunks.	Grade 11 SLO		Remember

[SLO: B-12-R-60]	Describe the functions of lymph nodes and state the role of spleen as containing lymphoid tissue.'	Grade 11 SLO		Understand
[SLO: B-12-R-61]	Describe the structure of bone and compare it with that of cartilage.	Matched SLO		Understand
[SLO: B-12-R-62]	Explain the functions of osteoblasts, osteoclasts and osteocytes.	Matched SLO		Understand
[SLO: B-12-R-63]	Identify the main divisions of the human skeleton. and List the bones of the appendicular and axial skeleton of man.	Matched SLO		Remember
[SLO: B-12-R-64]	Describe three types of joints i.e. fibrous joints, cartilaginous joints and synovial joints and give example of each.	Matched SLO		Understand
[SLO: B-12-R-65]	Describe the disorders of human skeleton (disc-slip, spondylosis, sciatica, arthritis, osteoporosis) and their causes.	Matched SLO		Understand
[SLO: B-12-R-66]	State different types of fractures (simple, compound and complicated) and describe the repair process of simple fractures.	Matched SLO		Remember
[SLO: B-12-R-67]	Describe the injuries in joints (dislocation and sprain) and their first aid treatment.	Matched SLO		Understand
[SLO: B-12-R-68]	Compare smooth muscles, cardiac muscles and skeletal muscles.	Matched SLO		Understand
[SLO: B-12-R-69]	Annotate the ultrastructure of the skeletal muscle.	Matched SLO		Analyse
[SLO: B-12-R-70]	Explain the sliding filaments model of muscle contraction.	Matched SLO		Understand
[SLO: B-12-R-71]	Describe the action of antagonistic muscles in the movement of knee joint.	Matched SLO		Understand
[SLO: B-12-R-72]	Explain muscle fatigue, cramps and tetany.	Matched SLO		Understand

				[SLO: B-12-R-73]	Differentiate between tetanus and muscle tetany.	Matched SLO		Understand
				[SLO: B-12-R-74]	Define thermoregulation and explain its needs.	Matched SLO		Remember
				[SLO: B-12-R-75]	Classify animals on the basis of the source of body heat i.e. ectotherms and endotherms.	Matched SLO		Understand
				[SLO: B-12-R-76]	Classify the animals on the basis of the ability to thermoregulate i.e. poikilotherms and homeotherms.	Matched SLO		Understand
				[SLO: B-12-R-77]	Describe the regulatory strategies in man for thermoregulation.	Matched SLO		Understand
				[SLO: B-12-R-78]	Describe three elements i.e. receptors, control center and effectors which operate homeostatic mechanisms.	New SLO	<b>Ambiguous</b>	Understand
				[SLO: B-12-R-79]	Relate the homeostatic mechanisms with the negative and positive feedback systems.	New SLO	<b>Ambiguous</b>	Analyse
				[SLO: B-12-R-80]	Differentiate between osmoconformers and osmoregulators.	Matched SLO		Understand
				[SLO: B-12-R-81]	Define osmoregulation.	Matched SLO		Remember
				[SLO: B-12-R-82]	Explain the problems faced by osmoregulators.	Matched SLO		Understand
				[SLO: B-12-R-83]	Explain the different methods of osmoregulation found in freshwater, marine water and terrestrial	Matched SLO		Understand
<b>Pharmacological Drugs</b>	Describe the mechanism of action of various drug classes, including pain relievers, antidepressants, and antibiotics. Explain the factors that determine drug efficacy and toxicity, including dose, route of administration, and pharmacokinetics. Describe the side effects and potential drug interactions of various drugs. Explain the principles of drug	<b>Benchmark 1: Explain the role of pharmacological drugs in treating diseases like HIV and Hepatitis C and understand their mechanisms of action, side effects, and drug interactions.</b>		[SLO: B-12-T-01]	Explain the drug discovery and d	New SLO	<b>Ambiguous</b>	Understand
				[SLO: B-12-T-02]	Define 4 classes of antibiotics (penicillins, Tetracyclins, Fluriquinolones and Sulfonamides) and describe their mode of action	New SLO	<b>Ambiguous</b>	Remember
				[SLO: B-12-T-04]	Define antivirals and antiretrovir	New SLO	<b>Ambiguous</b>	Remember
				[SLO: B-12-T-05]	Describe advantages of monoclonal antibodies enjoy compared to other drug classes.	New SLO	<b>Ambiguous</b>	Understand



Students should be understand the essence of scientific experimentation and carry out the necessary steps of understanding the terminology, taking general lab precautions, understanding the lab equipment, recording data and providing suggestions on improving the experimental techniques.

**Benchmark 1: Plan the experiment and clearly convey the reasons for the experimental technique to follow.**  
**Benchmark 3: Evaluate and interpret the recorded data and display the calculations and reasoning.**  
**Benchmark 4: Analyze the results of the experiment and provide conclusions.**

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[SLO: B-12-X-01]

Using the context provided, students should be able to:

- state a relevant prediction, either in words or in the form of a sketch graph showing the expected result, and link this to an underlying hypothesis
- identify the independent and dependent variables
- identify which key variables must be standardised in order to test a hypothesis. (Variables expected to have a minimal effect, such as variation between test-tubes of the same type, do not need to be standardised.)

New SLO

Remember

[SLO: B-12-X-02]

Methods  
 [SLO: B-12-X-02]  
 Using the context provided, students should be able to:

- describe how to vary the independent variable
- describe how to measure the values of the independent and dependent variables accurately and to an appropriate precision
- describe how to standardise each of the other key variables
- describe, where appropriate, suitable volumes and concentrations of reagents. Concentrations may be specified in % (w/v), or mol dm<sup>-3</sup>
- describe how different concentrations would be prepared by serial dilution or proportional dilution
- describe appropriate control experiments

New SLO

Understand

Experiment					<p>should be able to:</p> <ul style="list-style-type: none"> <li>• use tables and graphs to show the key points in quantitative data</li> <li>• sketch or draw suitable graphs, displaying the independent variable on the x-axis and the dependent variable on the y-axis including, where required, confidence limit error bars</li> <li>• decide which calculations are necessary in order to draw conclusions</li> <li>• carry out appropriate calculations to simplify or explain data, including means, percentages and rates of change</li> <li>• carry out calculations in order to compare data, including percentage gain or loss</li> <li>• use values of standard deviation or standard error, or graphs with standard error bars,</li> </ul>	New SLO		
				[SLO: B-12-X-03]	<p>Type of variable Type of data</p> <p>Qualitative  categoric nominal, i.e. values or observations belonging to it can be sorted according to category, e.g. colour of flowers</p> <p>ordered ordinal, where values can be placed in an order or rank and the interval between them may not be equal, e.g. the order in which test-tubes containing starch and iodine become colourless after adding amylase</p> <p>Quantitative continuous, which can have any value within a specific range, e.g. body mass, leaf length (Modified)</p>	Modified(rephrased) SLO		
				[SLO: B-12-X-04]				



				<p><b>[SLO: B-12-X-05]</b></p>	<p>Conclusions Students should be able to:</p> <ul style="list-style-type: none"> <li>• summarise the main conclusions from the results</li> <li>• identify key points of the raw data and processed data, including graphs and statistical test results</li> <li>• discuss the extent to which a given hypothesis is supported by experimental data and the strengths and weaknesses of the evidence</li> <li>• give detailed scientific explanations of the conclusions</li> <li>• make further predictions and hypotheses based on the conclusions.</li> </ul>	Modified(rephrased) SLO		Understand
				<p><b>[SLO: B-12-X-06]</b></p>	<p>Students should be able to:</p> <ul style="list-style-type: none"> <li>• identify anomalous values in a table or graph of data and suggest how to deal with anomalies</li> <li>• suggest possible explanations for anomalous readings</li> <li>• assess whether the results have been replicated sufficiently</li> <li>• assess whether the range of values of the independent variable and the intervals between the values were appropriate</li> <li>• assess whether the method of measuring is appropriate for the dependent variable</li> <li>• assess the extent to which selected variables have been effectively controlled</li> <li>• make informed judgements about: <ul style="list-style-type: none"> <li>– the validity of the investigation</li> <li>– the extent to which the data</li> </ul> </li> </ul>	New SLO		Analyse