

BIOLOGY Grade-IX (SSC I)

List of PRACTICAL/SLOs

NCP SLOs Description

[SLO: B-09-10-X-01] Students should be able to simple measurements in SI Units of:

- volumes of gases or solutions/liquids
- masses
- temperatures
- times
- lengths

[SLO: B-09-10-X-02] Students should be able to carry out simple experiments of:

- diffusion
- osmosis
- food tests
- rates of enzyme-catalysed reactions
- pH and the use of hydrogen carbonate indicator, litmus and universal indicator
- photosynthesis (rate and limiting factors)
- heart rate and breathing rate
- effect of mineral ions on plant growth
- Respiration
- Nervous responses
- transpiration
- tropic responses
- observation and dissection of seeds and flowers
- germination
- continuous and discontinuous variation
- sampling techniques

[SLO: B-09-10-X-03] Should be able to use of a microscope to examine biological specimens

[SLO: B-09-10-X-04] Calculating the magnification of biological specimens

[SLO: B-09-10-X-05] Students should be able to:

- select and safely use techniques, apparatus and materials
- identify apparatus from diagrams or descriptions
- draw, complete or label diagrams of apparatus and biological specimens
- use, or explain the use of common techniques, apparatus and materials
- select the most appropriate apparatus or method for the task and justify the choice made
- describe food tests
- describe tests to determine the pH of solutions and substances using a universal indicator
- describe and explain techniques
- describe and explain hazards and identify safety precautions
- to ensure the accuracy of observations and data

[SLO: B-09-10-X-06] Students should be able to understand for:

- safety measurements and precautions
- understand the need to wear PPE
- tie up long hair
- wear goggles when dealing with caustic materials

[SLO: B-09-10-X-07] Students are able to Understand and express scientific ideas using the below terms:

-True value: the value that would be obtained in an ideal measurement -Measurement error the difference between a measured value and the true value of a quantity

-Accuracy: a measurement result is described as accurate if it is close to the true value -Precision, how close the measured values of a quantity are to each other

-Repeatability a measurement is repeatable if the same or similar result is obtained when the measurement is repeated under the same conditions, using the same method, within the same experiment

- Reproducibility: a measurement is reproducible if the same or similar result is obtained when the measurement is made under either different conditions or by a different method or in a different experiment - Validity of experimental design:

an experiment is valid if the experiment tests what it says it will test. The experiment must be a fair test where only the independent variable and dependent variable may change, and controlled variables are kept constant -Range: the maximum and minimum value of the independent or dependent variables

- Anomaly: an anomaly is a value in a set of results that appears to be outside the general pattern of the results, i.e. an extreme value that is either very high or very low in comparison to others

-Independent variables: independent variables are the variables that are changed in a scientific experiment by the scientist. Changing an independent variable may cause a change in the dependent variable

-Dependent variables, dependent variables are the variables that are observed or measured in a scientific experiment. Dependent variables may change based on changes made to the independent variables

[SLO: B-09-10-X-08] Students are able to:

- a. Identify the independent variable and dependent variable
 - b. describe how and explain why variables should be controlled
 - c. suggest an appropriate number and range of values for the independent variable
 - d. suggest the most appropriate apparatus or technique and justify the choice made
 - e. describe experimental procedures
 - f. identify risks and suggest appropriate safety precautions
 - g. describe how to record the results of an experiment
 - h. describe how to process the results of an experiment to form a conclusion or to evaluate a prediction make reasoned predictions of expected results
- take readings from apparatus (analogue and digital) or from diagrams of apparatus
 - take readings with appropriate precision, reading to the nearest halfscale division where required
 - correct for zero errors where required
 - make observations, measurements or estimates that are in agreement with expected results or values
 - take sufficient observations or measurements
 - repeat observations or measurements where appropriate
 - record qualitative observations from tests
 - record observations and measurements systematically, for example in a suitable table, to an appropriate degree of precision and using appropriate units
 - process data, including for use in further calculations or for graph plotting, using a calculator as appropriate
 - present data graphically, including the use of best-fit lines where appropriate
 - analyse and interpret observations and data, including data presented graphically
 - use interpolation and extrapolation graphically to determine a gradient or intercept
 - form conclusions justified by reference to observations and data and with appropriate explanation
 - evaluate the quality of observations and data, identifying any anomalous results and taking appropriate action

- comment on and explain whether results are equal within the limits of experimental accuracy (assumed to be + 10% at this level of study) — evaluate experimental arrangements, methods and techniques, including the control of variables
- identify sources of error, including measurement error, random error and systematic error
- identify possible causes of uncertainty in data or in a conclusion — suggest possible improvements to the apparatus, experimental arrangements, methods or techniques