

Research Abilities (SLO) – The graduate is able to collect and process data, information and knowledge to answer specific questions or generate new conceptual models and hypotheses. The graduate evaluates these models and hypotheses using the appropriate experimental, mathematical and statistical approaches.

Learning Indicators	Level 4	Level 3	Level 2	Level 1
	Master	Proficient	Apprentice	Novice
1.0 Ability to make observations and devise hypotheses to explain those observations	Able to make original observations and/or connections between diverse ideas; Forms testable hypothesis or thesis based upon observations; Develops test implications from hypothesis	Able to make an independent observation or connection between diverse ideas; Forms testable hypothesis or thesis based upon observations.	Able to make observation or connection between diverse ideas with prompting; Forms hypothesis or thesis based upon the observations that shows limited testability.	Unable to make observations or recognize connections between diverse ideas even with prompting; Cannot develop testable hypotheses based upon own observations or observations of others.
2.0 Ability to use library and online resources for research purposes	Regularly uses library and online resources; Exceeds minimum requirements for references in classroom papers and projects; Asks questions based upon outside sources and actively seeks out more than minimum required knowledge	Uses library and online resources; Meets minimum requirements for references in classroom papers and projects; Occasionally asks questions based on outside sources.	Uses library and online resources if directed to do so; Does not always meet minimum standards for references in classroom activities; Seldom asks questions based upon outside resources	Is unable to effectively use library or online resources; Seldom meets minimum standards for references in classroom activities; Never asks questions based upon outside resources
3.0 Ability to design an experiment to test a hypothesis	Appropriately links design with hypothesis; Able to identify and account for critical variables; Number of trials and/or sample sizes are appropriately to test implications; Uses accepted or appropriate technology to gather and analyze data; Recognizes sources of error and/or bias and attempts to correct for them.	Links design with hypothesis; Able to identify and account for most critical variables; Number of trials and/or sample size appears reasonable; Uses accepted/appropriate technology/tools to gather and analyze data; Recognizes some sources or error and/or bias	Links design with hypothesis; Able to identify some critical variables and accounts for a subset of those variables; Number of trials and/or sample size may not be appropriate; Uses correct tools/technology; Recognizes that some sources of error and/or bias may exist but makes no attempt to identify or account for them in the design.	Experimental design is not clearly linked to hypothesis; Many critical variables left unaccounted for; Does not use appropriate tools/technology; Number of trials or sample size clearly inappropriate; Appears unaware of any possible bias or sources of error.
4.0 Ability to conduct experiments	Understands relationship between experiment and hypothesis; Uses correct methods/equipment; Records observations in organized and easily interpretable manner; Practices laboratory safety; Cleans and maintains laboratory and equipment	Understands relationship between experiment and hypothesis; Uses correct methods/equipment with some assistance; Records most observations but may miss some important data; Practices laboratory safety; Reasonably clean and organized	Has difficulty relating hypothesis with experiment; Requires direction in choice of methods/equipment; Poor record keeping, misses important observations. Practices laboratory safety; Moderately disorganized, does not clean up adequately	Cannot relate hypothesis to experiment; Makes mistakes in choice of equipment/methods despite assistance; Does not record observations; Disorganized; Practices laboratory safety when forced; Does not clean up after experiments.
5.0 Ability to analyze experiments using statistical, mathematical and/or computational methods	Creatively interprets hypothesis in light of results; Uses mathematical or computational approach and at least 1 statistical test for data analysis; Creates graphs and charts which reflect analysis; Makes clear observations	Relates hypothesis to results; Uses mathematical, computational or statistical test for data analysis; Summarizes data; Makes reasonable observations	Attempts to relates hypothesis to results; Uses mathematical, computational or statistical approach for data analysis but is incomplete; Data summarized but also incomplete. Some observations offered.	Does not attempt to relate experimental results to hypothesis. Mathematical, computational and/or statistical analysis missing or inaccurate; Data summary poor or missing. No new observations offered