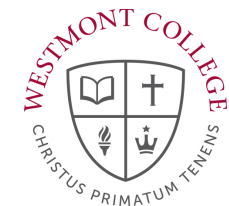# WESTMONT PHYSICS LABORATORY EXPERIENCE VALUE RUBRIC

Definition

All physics majors in the Department of Physics and Engineering are required to complete a three-course laboratory sequence (PHY–022, 024, and 026) at the beginning of their major coursework. This rubric assesses the students' work and understanding as demonstrated longitudinally throughout this laboratory sequence. *Evaluators are encouraged to assign a zero to any work sample or collection of work that does not meet the benchmark (cell one) level performance, or use N/A.*

	Capstone 4	Milestones 3	Milestones 2	Benchmark 1
Understanding the Purpose of the Experiment *Ability to appreciate why the experiment is performed and what will be learned from it*	Correctly **identifies** and **articulates** the relevant physical concepts and **adapts** and **applies** these concepts to generate new ideas related to the questions at hand. Sees the big picture and not just the details/calculations, yet is cognizant of nuances and assumptions. Able to identify and discuss how results add to or reinforce previous works about the topic under study.	Correctly **identifies** and **articulates** the relevant physical concepts and **applies** these concepts to the questions at hand. Sees the big picture and not just the details/calculations.	**Identifies** many of the relevant physical concepts and **correlates** these concepts to the measurements being performed.	Demonstrates a basic understanding of the physics ideas related to the experiment, but perhaps incompletely and/or with some errors.
Quality of the Data *Ability to perform careful measurements and obtain meaningful results*	Designs and effectively implements appropriate measurement methods or numerical calculations to collect or generate high-quality data that can be processed for further analysis and interpretation.	Measurement methods or numerical calculations allow students to collect or generate **high-quality** data that can be processed for further analysis and interpretation.	Measurement methods or numerical calculations allow students to collect or generate reasonable data that can be processed for further analysis and interpretation.	Measurements contain errors that are not recognized or accounted for.
Quality and Sophistication of Data Analysis *Ability to analyze data correctly using appropriate methods and strategies*	Analyzes data appropriately and thoroughly. Carefully considers and analyzes potential sources of systematic and random error and mediates the sources to the extent possible. Sophisticated methods (such as computer coding) are used to provide appropriate quantitative estimates of the degree of random error.	Analyzes data appropriately. Considers and analyzes potential sources of systematic and random error. Properly infers indirect measurements (with their uncertainties) from graphs. Data tables are properly organized and labeled, and data values have appropriate significant figures based on the estimated measurement precision.	Data analysis includes some quantitative error analysis (such as the determination of the degree of random error) and graphs with appropriate titles, axes labels, units, and curve fits. Data tables are properly organized with appropriate column labels.	Data analysis is simplistic, incomplete, and/or contains several mistakes.
Interpretation of the Results *Ability to correctly discuss the meaning and significance of the results.*	Discussion of the significance of the results is clear, compelling, correct, complete and sophisticated. Interpretations and conclusions convey a deep understanding of the topic under study, and may point toward insightful improvements if the experiment was repeated.	Discussion of the significance of the results is clear, correct and complete. Interpretations and conclusions convey a solid understanding of the topic under study.	Discussion of the significance of the results is largely correct, but may be incomplete. Interpretations and conclusions suggest the student understands most of the topic under study.	Interpretations and conclusions are basic, and may be incomplete and/or may contain misunderstandings or errors.