

Aligning Your Assignment Instructions to ILO Quantitative Reasoning Categories

Using your Assignment for ILO QR Assessment

An assignment in your course section is being used to assess undergraduate student work as part of university-wide Institutional Learning Outcomes (ILO) assessment of upper division quantitative reasoning (QR). The use of your assignment for institutional assessment is a valuable contribution to the University's ongoing commitment to continuously improve how we help students improve their quantitative reasoning skills.

What will Be Assessed

The quantitative ILO assessment will use the rubric included below. The rubric was developed, piloted, adopted, implemented, assessed, and revised by CSUEB faculty across disciplines. You may refine your assignment instructions to align to **at least four of the six** rubric categories for assessment.

- **Problem Formulation:** Translation of the disciplinary/real-world problem with quantitative data/information into a QR context.
- **Representation/Visualization:** Depiction of quantitative information such as visual and non-visual
- **Quantitative Analysis:** Use of analytical methods.
- **Interpretation:** Description of the meaning of the results obtained from the quantitative analysis in the context of the original problem formulation.
- **Implications:** Extension of potential application/impact to broader contexts.
- **Limitations:** Articulation of limitations (e.g. data analysis methods, characteristics of data, or underlying assumptions) in interpretation, implication, and conclusion.

It is highly encouraged for you to share the elements of the ILO rubric you will use with your students. Your assignment may include multiple elements that move beyond this rubric, however it is valuable for students to understand the importance of the ILOs the university has committed to for their future success.

Sample Assignment Instructions

Some or all of the sentences below could be added to your existing assignment. They help guide students to address rubric categories in their assignment.

Category being assessed	Assignment Instruction Examples
Problem Formulation	<i>Example 1: What is the objective (or problem definition/hypothesis)?</i> <i>Example 2: What are the input and output variables of your model?</i>
Representation/ Visualization	<i>Example 1: Analyze the data using figures, charts and/or tables.</i> <i>Example 2: Illustrate the relationship between variable X and Y using scatter plot (or other such visual tools)</i>

Quantitative Analysis	<i>Example 1: Calculate the mean, median, mode and standard deviation for your dataset. Example 2: Build a (multi variable) regression model that predicts the variable of interest.</i>
Interpretation	<i>Example 1: Interpret the coefficients in your regression analysis in the context of your problem statement. Example 2: What does the p-value suggest about the relationship between the variables being tested?</i>
Implications	<i>Example 1: What are some conclusions and implications of your final output to the stakeholder? Example 2: Based on your chart (or analysis), discuss potential implications of this knowledge to the chosen discipline (or field or department, as appropriate).</i>
Limitations	<i>Example 1: What are the limitations of your analytical approach that could affect the generalizability of your conclusions? Example 2: What potential limitations should you consider when interpreting these findings?</i>

ILO Quantitative Reasoning Rubric to be used for assessments

<p>CSU East Bay Revised ILO Quantitative Reasoning Rubric <i>Senate approved 11-17-22 /President approved 2-21-23</i></p> <p>Description: Quantitative Reasoning (QR) is competency in working with numerical data to reason about and/or solve quantitative problems. It involves understanding and applying mathematics/statistics to analyze and interpret real-world quantitative information in a disciplinary context and the ability to clearly communicate them.</p>				
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<p>Problem Formulation Translation of the disciplinary/real-world problem with quantitative data/information into a QR context (e.g., writing a hypothesis, a math model, quantitative instrumentation).</p>	Formulation of the problem is comprehensive and placed in an appropriate quantitative context.	Formulation of the problem is adequate and placed in an appropriate quantitative context.	Formulation of the problem is limited; explanation of the context is somewhat incorrect or incomplete.	Formulation of the problem is incorrect or missing; explanation of the context is incorrect or incomplete.
<p>Representation/Visualization Depiction of quantitative information such as visual (e.g., figures, charts, tables, equations) and non-visual (e.g., audio, ADA accessible formats) using academic vocabulary with symbols, units, scale, etc.</p>	Accurate and appropriate display of quantitative information.	Mostly accurate and appropriate display of quantitative information. May contain minor errors.	Somewhat accurate and/or appropriate display of quantitative information. May contain major errors.	Inaccurate, inappropriate, or missing display of quantitative information. May contain major errors.

<p>Quantitative Analysis Use of analytical methods (e.g., data analysis, solution technique).</p>	Appropriate and accurate use of analytical methods.	Mostly appropriate and accurate use of analytical methods.	Somewhat appropriate and/or somewhat accurate use of analytical methods.	Inappropriate and inaccurate use of analytical methods.
<p>Interpretation Description of the meaning of the results obtained from the quantitative analysis in the context of the original problem formulation</p>	Appropriate and comprehensive explanation of the results and context.	Mostly appropriate explanation of the results and context.	Somewhat incorrect or incomplete explanation of the results and/or context.	Incorrect or incomplete or missing explanation of the results and/or context.
<p>Implications Extension of potential application/impact to broader contexts (e.g., predictive values, future directions, ramifications, clinical prognosis, professional and/or civic responsibilities).</p>	Clearly identifies and explains substantive implications.	Adequately identifies and explains substantive implications.	Unclear or limited explanation of substantive implications.	Inappropriate or missing explanation of substantive implications.
<p>Limitations Articulation of limitations in interpretation, implication, and conclusion. Limitations could stem from underlying assumptions, data analysis methods, and/or characteristics of the data (e.g., sample size, skewness, bias).</p>	Accurate and thorough articulation of limitations.	Mostly accurate and/or mostly thorough articulation of limitations.	Somewhat inaccurate and/or limited articulation of limitations.	Inaccurate or missing articulation of limitations.