Analytical Skills

University Learning Outcome: Students will use quantitative reasoning/critical thinking skills to draw conclusions and/or solve problems.

Critical Thinking Skills Goal: Students will use critical thinking skills to identify problems/issues and develop solutions/analysis.

Objectives:

- **Students will identify a problem or issue.**
- **Students will research, evaluate, and compare information from varying sources in order to evaluate authority, accuracy, recency, and bias relevant to the problems/issues.**
- **Students will generate solutions/analysis of problems/issues evaluated.**
- **Students will assess and justify the solutions and/or analysis.**

Element	Below Expectation	Developing	Proficient	Exemplary
Problem identification	Unable to identify a problem/issue.	Able to identify a problem/issue, but problem/issue is illdefined.	Able to identify a problem/issue, clearly define a problem/issue, and dissect the problem/issue into sub-problems or pieces.	Able to identify and clearly define a problem/issue, dissectit into sub-problems or pieces, and formulate possible solutions.
Access the needed information	Accesses information randomly, retrieving information that lacks relevance and quality.	Accesses information using simple search strategies, retrieving relevant information from limited/similar sources.	Accesses information using a variety of search strategies; demonstrates ability to refine search, retrieving relevant information from a variety of sources.	Accesses information using effective, sophisticated search strategies, retrieving targeted information from a variety of reliable/credible sources.
Evaluate information and its sources critically	Evaluates a limited number of sources using a restricted set of criteria (such as key words).	Evaluates a limited type of sources using a basic set of criteria (such as relevance to research question and currency).	Evaluates a variety of sources that are appropriate to the scope of the research question using multiple criteria (such as relevance to the research question, currency, authority, reliability).	Evaluates a variety of sources appropriate to the scope and discipline of the research question.

Summarize and evaluate information	Propose solution/analysis for problem/issue.	Solution/analysis isnot clearly articulated and/or does not clearly relate to the problem/issue.	Solution/analysis is clearly articulated and tailored/customized to the specific problem/issue at hand.	Multiple solutions/analyses provided that are clearly articulated, tailored/customizedto the specific problem/issue at hand, and demonstrate in-depthawareness of multiple contextual factors related to the problem/issue.
Problem solving	Able to articulate a solution/analysis, but not assess or provide justification for solution/analysis.	Able to articulate a solution/analysis and provide justification for the solution/analysis.	Able to articulate a solution/analysis, provide justification for the solution /analysis, and analyze the implications of the solution/analysis.	Able to articulate multiple solution/analyses, provide justifications for the solutions/analyses, analyze the implications of the solutions/analyses, and assess the preferred solution/analysis based on situational/contextual factors.

Analytical Skills

University Learning Outcome: Students will use quantitative reasoning/critical thinking skills to draw conclusions and/or solve problems.

Quantitative Reasoning Skills Goal: ULO: Students will assign and use numbers, read and analyze data, create models, draw inferences, and support conclusions based on sound mathematical reasoning.

Objectives:

- **Students will apply appropriate mathematical models to solve problems.**
- **Students will represent mathematical information symbolically, visually, numerically and verbally and will interpret models and datawith appropriate technology in order to draw inferences.**
- **Students will recognize the limitations of quantitative analysis.**

Element	Below Expectation	Developing	Proficient	Exemplary
Identifies alternate quantitative model and technology and selects the appropriate model to fit the problem	Identifies a set of models that fits a particular discipline specific problem.	Selects and accurately applies the correct model to a particular discipline specific problem.	Draws conclusions from the correct model.	Provides sound rationale and justification for the model that they selected.
Constructs or implements acomplete solution to authentic, discipline specific problems.	Reproduces a known solution.	Produces solutions to problems similar to known examples.	Generalizes solutions to types of problems and applies the generalization to other classes of problems.	Adapts knowledge to createsolutions to previously unseen or modified problems.
Communicates results of mathematical analysis in appropriate formats. (graphically, verbally, symbolically)	Understands and restates results given in the appropriate format.	Presents their results in multiple and appropriate formats.	Explains the linkage between the different formats.	Discusses the various methods of communicating the results and defend or validate their choice of format.
Interprets data and judges whether the information is useful or not in solving authentic, discipline specific problems.	Understands that data is needed to solve the problem.	Determines if a given data set is appropriate or collects the appropriate data set for a problem.	Examines data sets determining if they are appropriate for a given problem.	Correctly justifies or denounces the choice of data and proposes alternate choices for the problem.

Explains why a particular quantitative model does or does not apply to a given set of data.	Recognizes the different types of models.	Examines the model to see if it fits the data.	Determines the limitations of a particular model.	Critiques the use of a model and suggests alternative models for the appropriate framework.
Identifies underlying quantitative assumptions and challenges the validity of those assumptions within a given context.	Identifies different assumptions of the model.	Articulates the limitations of the model.	Verifies whether the assumptions are or are not met by the model.	Challenges the validity of the assumptions, critiques or defends the use of the model in the context of the problem, and suggests alternative models when necessary.