GER 1 Mathematics

Students will demonstrate the ability to:

- Interpret and draw inferences from mathematical models such as formulas, graphs, tables, and schematics;
- Represent mathematical information symbolically, visually, numerically, and verbally;
- Employ quantitative methods such as, arithmetic, algebra, geometry, or statistics to solve problems;
- Estimate and check mathematical results for reasonableness; and
- Recognize the limits of mathematical and statistical methods.

The learning outcomes will be assessed by course embedded questions on assessments or final exams for each of the designated math courses. The mathematics department will collect a random sample (20% of students from every class) from these assessments and employ the rubrics proposed by the "Discipline Panel in Mathematics – (09/08/05)" as the assessment tool.

Care will be taken by the mathematics department to ensure that sufficient and useful information will be gathered for this assessment by jointly developing and piloting the assessment questions to address the five student learning outcomes as specified by SUNY. Assessment will be conducted by members of the mathematics department.

The mathematics department assessment team will conduct a training session on the use of the rubrics and will establish guidelines for levels of competence according to the SUNY discipline panel's rubric levels: "Completely Correct/Exceeding" = 3 points, "Generally Correct/Meeting" = 2 points, "Partially Correct"/Approaching" = 1 point, and "Incorrect/Not meeting" = 0 points (see attached rubric). The actual grading process will be completed by each member of the mathematics department in each of their respective GER1 courses. Papers will be scored as defined by the rubric and success will be determined per outcome if 70% of participants score 2 or 3.

SUNY Canton will compile and keep percentages to determine changes that should be made to improve students' mastery of the outcomes. Analyses and recommended changes will be completed as needed. The mathematics department will devise a plan of action that ensures changes have been implemented. The mathematics department will collectively continue to add to the pool of questions for assessment utilizing the state's rubrics.

Standards and Rubrics for Assessing General Education in Mathematics. Written by the Discipline Panel in Mathematics – (09/08/05)
Revised 11/02/06 to show SUNY Canton's scoring

	Learning Outcome #1: Students will demonstrate the ability to interpret and draw inferences from mathematical models such as formulas, graphs, tables, and schematics.	**Learning Outcome #2:** Students will demonstrate the ability to represent mathematical information symbolically, visually, numerically and verbally.
Completely Correct (CC) **3 points**	● The student demonstrates the ability to interpret the variables, parameters, and/or other specific information given in the model. ● The student uses the model to draw inferences about the situation being modeled in a manner that is correct and evident. ● The interpretation(s) and inference(s) completely and accurately represent the model or answers the question(s).	● The student fully understands the mathematical information and employs the appropriate representation(s) to display the mathematical information. ● The student correctly and accurately employs all the appropriate and required aspects of the representation to display the information. ● The representation of the given information is correct and accurate. The student uses the correct format, mathematical terminology, and/or language. Variables are clearly defined, graphs are correctly labeled and scaled, and the representation is otherwise complete as required.
Generally Correct (GC) **2 points**	● The student demonstrates the ability to interpret the variables, parameters, and/or other specific information given in the model. The interpretation may contain minor flaws. ● The student uses the model to draw inferences about the situation being modeled in a manner that may contain some minor flaw(s). ● The interpretation(s) and/or inference(s) are incomplete or inaccurate due to a minor flaw, such as a computational or copying error or mislabeling.	● The student understands most of the important aspects of the mathematical information and employs the appropriate representation(s) to display the mathematical information with possibly minor flaws such as a simple misreading of the problem or copying error or mislabeling. ● The student correctly and accurately employs most of the appropriate and required aspects of the representation to display the information. The representation is lacking in a minor way such as a simple misreading of the problem or copying error or mislabeling. ● There is a misrepresentation of the information due to a minor computational/copying error. The student uses mostly correct format, mathematical terminology, and/or language. Variables are clearly defined, graphs are correctly labeled and scaled, but the representation is incomplete in some minor way.
Partially Correct (PC) **1 point**	● The student makes no appropriate attempt to interpret the variables, parameters, and/or other specific information given in the model due to major conceptual misunderstandings. ● The student attempts to use the model to make the required inference(s) and/or interpretation(s) but lacks a clear understanding of how to do so. ● The interpretation(s) and/or inference(s) are incomplete or inaccurate due to a major conceptual flaw.	● The student does not fully understand the important aspects of the mathematical information and employs the appropriate representation(s) to display the mathematical information with major conceptual flaws. ● The student shows some knowledge of how to employ most of the appropriate and required aspects of the representation to display the information. The representation is lacking in a major way. ● The representation(s) show some reasonable relation to the information but contains major flaws. The student uses some correct format, mathematical terminology, and/or language. Variables are clearly defined, graphs are correctly labeled and scaled, but the representation is incomplete in some major conceptual way.
Incorrect Solution (IC) **0 points**	● The student cannot demonstrate an ability to interpret the variables, parameters, and/or other specific information given in the model. ● The student cannot use the model to make the required interpretation(s) and/or inference(s). ● The interpretation(s) and/or inference(s) are missing or entirely inaccurate. ● The student's response does not address the question in any meaningful way ● There is no response at all.	● The student cannot represent the mathematical information in the representation(s) required. ● The student completely misinterprets and/or misrepresents the information. ● The representation(s) is incomprehensible or unrelated to the given information. The process of developing the representation is entirely incorrect. ● The student's response does not address the question in any meaningful way. ● There is no response at all.

	Learning Outcome #3: Students will demonstrate the ability to employ quantitative methods such as, arithmetic, algebra, geometry, or statistics to solve problems.	**Learning Outcome #4:** Students will demonstrate the ability to estimate and check mathematical results for reasonableness	**Learning Outcome #5:** Students will demonstrate the ability to recognize the limits of mathematical and statistical methods.
Completely Correct (CC) **3 points**	● The student demonstrates a full understanding of the problem and/or can identify a specific numeric, algebraic, geometric, or statistical method(s) that is needed to solve the problem. ● The student uses the method(s) to solve the problem. The plan for the solution is clear, logical and evident. ● The solution is accurate and complete.	● The student can estimate and justify a mathematical result to a problem. ● The student can articulate a justification for the estimate and the estimate has been found using a clearly defined, logical plan ● The student's response is complete and accurate.	● Student clearly articulates the assumptions/simplifications made in developing a mathematical/statistical model or implementing method(s) or technique(s). ● Student provides an accurate description how the results from the model might differ from the real life situation it models.
Generally Correct (GC) **2 points**	● The student demonstrates some understanding of the problem and/or can identify the specific arithmetic, algebraic, geometric or statistical method(s) needed to solve the problem. ● The student uses the method(s) to solve the problem. The plan for the solution is clear, logical and evident but is lacking in a minor way such as a simple misreading of the problem or copying error. ● The solution is generally correct but may contain a minor flaw(s).	● The student can estimate and justify a mathematical result to a problem but the estimate or justification contains a minor flaw such as a simple misreading of the problem or computational or copying error or mislabeling. ● The student can articulate a justification for the estimate but the student's justification and/or estimate has been found was lacking in some minor way ● The student's response addresses all aspects of the question but is lacking in some minor way.	● Student articulates most of the assumptions/simplifications made in developing a mathematical/statistical model or implementing method(s) or technique(s) ● Student provides a generally correct description of how the results from the model might differ from the real life situation it models
Partially Correct (PC) **1 point**	● The student demonstrates only a slight understanding of the problem. The student has difficulty identifying the specific arithmetic, algebraic, geometric or statistical method(s) needed to solve the problem. ● The student attempts to use a method(s) that will solve the problem, but the method itself or the implementation of it, is generally incorrect. The plan is not evident or logical. ● The solution contains some correct aspects though there exists major conceptual flaw(s).	● The student can estimate and justify a mathematical result to a problem but the estimate or justification contains a major conceptual flaw. ● The student can articulate a justification for the estimate but the student's justification and/or estimate has been found was lacking in some major conceptual way ● The student's response addresses some aspect of the question correctly but is lacking in a significant way.	● Student articulates only some of the assumptions/simplifications made in developing a mathematical/statistical model or implementing method(s) or technique(s). ● Student indicates that the conclusions drawn from the model differ from real life but is unable to articulate the cause(s).
Incorrect Solution (IC) **0 points**	● The student demonstrates no understanding of the problem and/or he/she cannot identify the specific arithmetic, algebraic, geometric or statistical method(s) needed to solve the problem. ● The student cannot to use a method(s) that will solve the problem. Little or no work is shown that in any way relates to the correct solution of the problem The student's response does not address the question in any meaningful way. ● There is no response at all.	● The student cannot estimate and/or justify a mathematical result to a problem. The student's justification is not supported by any logic plan. ● The student's response does not address the question in any meaningful way. ● There is no response at all.	● Student does not articulate any assumptions/simplifications made in developing a mathematical/statistical model or implementing method(s) or technique(s). ● Student fails to realize that the results are not contextually appropriate. There was no response at all.

GER Assessment Policies

- Faculty and students will periodically be required to engage in assessment activities to ensure that the General Education learning outcomes are being met.
    - GER student learning outcomes are assessed on a three-year cycle through the courses designated as meeting that GER.
    - Any instructor (full-time or adjunct) teaching any course with a GER designator (online or face-to-face) may be called to participate in GER assessment activities.
    - A random sample of GER designated courses are selected by the Office of Institutional Effectiveness during the spring semester preceding the GER assessment year. If a faculty member is teaching two of the same course they have the option of choosing either section for assessment.

- Timeline for GER Assessment:
    - February: Office of Institutional Effectiveness (OIE) notifies GER assessment coordinator of upcoming assessment and calls for methodology revisions (if any)
    - March 1: Methodology changes for upcoming assessment cycle must be submitted to GER Assessment Subgroup
    - Mid-April: OIE selects courses up for GER review the following fall and notifies faculty
    - 1st week of classes (fall): OIE reminds faculty (and notifies new faculty) of GER assessment requirements
    - End of 4th week of classes: Faculty must enter their assessment measures of GER course SLOs into Taskstream.
    - End of 5th week of classes: Faculty update GER coordinator on progress with measure entry in Task Stream.
    - 1 week after final grade submission: Faculty must enter findings to Taskstream measures and submit Data Collection Reports to GER coordinator along with student artifacts.
    - Friday before the first week of classes: faculty will meet to discuss GER findings and strategic plan for improving student learning.
    - March 1: GER Summary Report and GER Campus Report due to GER Assessment Subcommittee for review and recommendations.
    - March 15: GER Assessment Subcommittee presents reports and recommendations to Academic Assessment Committee
    - April 1: Academic Assessment Committee presents reports to Deans' Cabinet for inclusion in budget (if applicable.)

- Protocol for creating a new course for GER approval:
    - For a course to be accepted as a GER course, the GER assessment methodology must be attached to the course proposal as it moves forward to curriculum committee. GER mapping to course SLOs must be present in course proposal.
    - Additional, indicate which course objective will be used to GER assessment.
    - Upon approval, the course objectives must be mapped to the GER the course is approved for

- Protocol for Methodology Revision
    - Faculty who wish to revise their GER methodology must submit proposed methodology to the GER committee by the fifth week of the semester before their assessment cycle begins.
    - The GER committee will review and provide feedback for revision, and if necessary request a meeting with the GER coordinator. They will provide feedback within six weeks.
    - Resubmission of the revised methodology must occur by the last day of the semester prior to the assessment cycle the methodology will be used in.

- If the methodology does not comply with the needs of the campus and SUNY standards, the previous methodology will be employed for the assessment cycle.