

| Colonnade FOUNDATIONS Assessment<br>2023-2024 |                           |
|-----------------------------------------------|---------------------------|
| Ogden College of Science and Engineering      | Department of Mathematics |
| MATH 116/116E College Algebra                 |                           |
| Robin Ayers                                   |                           |

Please select the option(s) that best describe all sections of this course (you may select more than one):

- ☐ Taught 100% face to face
- ☐ Taught 100% online
- ☒ Mix of online and face to face
- ☐ Includes dual credit

| Student Learning Outcome 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                            |                                                                          |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|--------------------------------------------------------------------------|
| <b>Student Learning Outcome</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Students will interpret information presented in mathematical and statistical forms by learning to interpret both graphical and numerical summaries of data.                                                                                                                                                                                                                                                                                                |                                            |                                                                          |
| <b>Measurement Instrument 1</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Students completed a common exam question. This question was evaluated using the “Interpretation” section of the attached Quantitative Reasoning Proposed SLO Assessment Rubric.                                                                                                                                                                                                                                                                            |                                            |                                                                          |
| <b>Criteria for Student Success</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <p>Student achieves at least Milestone level of achievement on the QR rubric.</p> <ul style="list-style-type: none"> <li>4: Skillfully converts relevant information into an insightful mathematical portrayal in a way that contributes to a further or deeper understanding.</li> <li>3: Calculations attempted are essentially all successful and sufficiently comprehensive to solve the problem. Calculations are also presented elegantly.</li> </ul> |                                            |                                                                          |
| <b>Program Success Target for this Measurement</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | At least 70% of students scoring 3 or better.                                                                                                                                                                                                                                                                                                                                                                                                               | <b>Percent of Program Achieving Target</b> | 41% of students scored 3 or better.                                      |
| <b>Methods</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Each MATH 116 student completed an assessment artifact that was embedded into their Exam. Artifacts were collected and randomized by the General Education Committee chair, and 25% of them were randomly sampled. The artifacts were evaluated by a committee of three members of the Committee, and scores were assigned based on the attached rubric.                                                                                                    |                                            |                                                                          |
| <b>Based on your results, highlight whether the program met the goal Student Learning Outcome 1.</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                            | <input type="checkbox"/> Met <input checked="" type="checkbox"/> Not Met |
| <b>Follow-Up</b> (Provide your timeline for follow-up. If follow-up has occurred, describe how the actions above have resulted in program improvement.)                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                            |                                                                          |
| <p>The General Education Committee will meet to determine if a new assessment item can be created to better align with the learning outcomes of the course and the QR Rubric. In this cycle, we used a pre-existing question that will need to be adjusted to fit the course better. There was a slight improvement from the previous year of assessment. The issue of the timing of giving this question or the question itself needs to be addressed within the department, even though there has been improvement. The sample of students from the online course had no students that scored above a 1.</p> |                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                            |                                                                          |

| Student Learning Outcome 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                         |                                            |                                             |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|---------------------------------------------|
| <b>Student Learning Outcome</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Students will illustrate and communicate mathematical and/or statistical information symbolically, visually and/or numerically.                                                                                                                                                                                                                                                                         |                                            |                                             |
| <b>Measurement Instrument 1</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Students completed a common exam question. This question was evaluated using the “Representation” section of the attached Quantitative Reasoning Proposed SLO Assessment Rubric.                                                                                                                                                                                                                        |                                            |                                             |
| <b>Criteria for Student Success</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <p>Student achieves at least Milestone level of achievement on the QR rubric.</p> <ul style="list-style-type: none"> <li>4: Skillfully converts relevant information into an insightful mathematical portrayal in a way that contributes to a further or deeper understanding.</li> <li>3: Competently converts relevant information into an appropriate and desired mathematical portrayal.</li> </ul> |                                            |                                             |
| <b>Program Success Target for this Measurement</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | At least 70% of students scoring 3 or better.                                                                                                                                                                                                                                                                                                                                                           | <b>Percent of Program Achieving Target</b> | 41% of students scored 3 or better.         |
| <b>Methods</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Each MATH 116 student completed an assessment artifact that was embedded into their Exam. Artifacts were collected and randomized by the General Education Committee chair, and 25% of them were randomly sampled. The artifacts were evaluated by a committee of three members of the Committee, and scores were assigned based on the attached rubric.                                                |                                            |                                             |
| <b>Based on your results, circle or highlight whether the program met the goal Student Learning Outcome 2.</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                         | <input type="checkbox"/> Met               | <input checked="" type="checkbox"/> Not Met |
| <b>Follow-Up</b> (Provide your timeline for follow-up. If follow-up has occurred, describe how the actions above have resulted in program improvement.)                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                         |                                            |                                             |
| The General Education Committee will meet to determine if a new assessment item can be created to better align with the learning outcomes of the course and the QR Rubric. In this cycle, we used a pre-existing question that will need to be adjusted to fit the course better. There was a slight improvement from the previous year of assessment. The issue of the timing of giving this question or the question itself needs to be addressed within the department, even though there has been improvement. The sample of students from the online course had no students that scored above a 1. |                                                                                                                                                                                                                                                                                                                                                                                                         |                                            |                                             |

| Student Learning Outcome 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                            |                                             |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|---------------------------------------------|
| <b>Student Learning Outcome</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Students will determine when computations are needed and execute the appropriate computations.                                                                                                                                                                                                                                                                                                                                                                                                                 |                                            |                                             |
| <b>Measurement Instrument 1</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Students completed a common exam question. This question was evaluated using the "Calculation" section of the attached Quantitative Reasoning Proposed SLO Assessment Rubric.                                                                                                                                                                                                                                                                                                                                  |                                            |                                             |
| <b>Criteria for Student Success</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <p>Student achieves at least Milestone level of achievement on the QR rubric.</p> <ul style="list-style-type: none"> <li>4: Calculations attempted are essentially all successful and sufficiently comprehensive to solve the problem. Calculations are also presented elegantly.</li> <li>3: Calculations attempted are essentially all successful and sufficiently comprehensive to solve the problem.</li> <li>3: Provides accurate explanations of information presented in mathematical forms.</li> </ul> |                                            |                                             |
| <b>Program Success Target for this Measurement</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | At least 70% of students scoring 3 or better.                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <b>Percent of Program Achieving Target</b> | 42% of students scored 3 or better.         |
| <b>Methods</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Each MATH 116 student completed an assessment artifact that was embedded into their Final Exam. Artifacts were collected and randomized by the General Education Committee chair, and 25% of them were randomly sampled. The artifacts were evaluated by a committee of three members of the Committee, and scores were assigned based on the attached rubric.                                                                                                                                                 |                                            |                                             |
| <b>Based on your results, circle or highlight whether the program met the goal Student Learning Outcome 3.</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <input type="checkbox"/> Met               | <input checked="" type="checkbox"/> Not Met |
| <b>Follow-Up</b> (Provide your timeline for follow-up. If follow-up has occurred, describe how the actions above have resulted in program improvement.)                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                            |                                             |
| The General Education Committee will meet to determine if a new assessment item can be created to better align with the learning outcomes of the course and the QR Rubric. In this cycle, we used a pre-existing question that will need to be adjusted to fit the course better. There was a slight improvement from the previous year of assessment. The issue of the timing of giving this question or the question itself needs to be addressed within the department, even though there has been improvement. The sample of students from the online course had no students that scored above a 1. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                            |                                             |

| Student Learning Outcome 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                            |                                                    |
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| <b>Student Learning Outcome Measurement Instrument 1</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Students will apply an appropriate model to the problem to be solved.                                                                                                                                                                                                                                                                                                                                                                                 |                                            |                                                    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Students completed a common exam question. This question was evaluated using the “Proposes Solutions/Hypotheses” section of the attached Quantitative Reasoning Proposed SLO Assessment Rubric.                                                                                                                                                                                                                                                       |                                            |                                                    |
| <b>Criteria for Student Success</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Student achieves at least Milestone level of achievement on the QR rubric. <ul style="list-style-type: none"> <li>• 4: Proposes one or more solutions/hypotheses that indicate a deep comprehension of the problem. Solution/hypotheses are sensitive to contextual factors.</li> <li>• 3: Proposes one or more solutions/hypotheses that indicate comprehension of the problem. Solutions/hypotheses are sensitive to contextual factors.</li> </ul> |                                            |                                                    |
| <b>Program Success Target for this Measurement</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | At least 70% of students scoring 3 or better.                                                                                                                                                                                                                                                                                                                                                                                                         | <b>Percent of Program Achieving Target</b> | 40% of students scored 3 or better.                |
| <b>Methods</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Each MATH 116 student completed an assessment artifact that was embedded into their Exam. Artifacts were collected and randomized by the General Education Committee chair, and 25% of them were randomly sampled. The artifacts were evaluated by a committee of three members of the Committee, and scores were assigned based on the attached rubric.                                                                                              |                                            |                                                    |
| <b>Based on your results, circle or highlight whether the program met the goal Student Learning Outcome 4.</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <input type="checkbox"/> <b>Met</b>        | <input checked="" type="checkbox"/> <b>Not Met</b> |
| <b>Follow-Up</b> (Provide your timeline for follow-up. If follow-up has occurred, describe how the actions above have resulted in program improvement.)                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                            |                                                    |
| The General Education Committee will meet to determine if a new assessment item can be created to better align with the learning outcomes of the course and the QR Rubric. In this cycle, we used a pre-existing question that will need to be adjusted to fit the course better. There was a slight improvement from the previous year of assessment. The issue of the timing of giving this question or the question itself needs to be addressed within the department, even though there has been improvement. The sample of students from the online course had no students that scored above a 1. |                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                            |                                                    |

| Student Learning Outcome 5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                            |                                                    |
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| <b>Student Learning Outcome</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Students will make inferences, evaluate assumptions, and assess limitations in estimation modeling and/or statistical analysis.                                                                                                                                                                                                                                                                                                                                                                                           |                                            |                                                    |
| <b>Measurement Instrument 1</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Students completed a common exam question. This question was evaluated using the “Application/Analysis/Assumptions” section of the attached Quantitative Reasoning Proposed SLO Assessment Rubric.                                                                                                                                                                                                                                                                                                                        |                                            |                                                    |
| <b>Criteria for Student Success</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <p>Student achieves at least Milestone level of achievement on the QR rubric.</p> <ul style="list-style-type: none"> <li>4: Uses the quantitative analysis of data as the basis for drawing insightful conclusions. Explicitly describes appropriate assumptions and shows awareness that confidence in final conclusions is limited by the accuracy of the assumptions.</li> <li>3: Uses the quantitative analysis of data as the basis for drawing reasonable conclusions. Explicitly describes assumptions.</li> </ul> |                                            |                                                    |
| <b>Program Success Target for this Measurement</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | At least 70% of students scoring 3 or better.                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <b>Percent of Program Achieving Target</b> | 30% of students scored 3 or better.                |
| <b>Methods</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Each MATH 116 student completed an assessment artifact that was embedded into their Exam. Artifacts were collected and randomized by the General Education Committee chair, and 25% of them were randomly sampled. The artifacts were evaluated by a committee of three members of the Committee, and scores were assigned based on the attached rubric.                                                                                                                                                                  |                                            |                                                    |
| <b>Based on your results, circle or highlight whether the program met the goal Student Learning Outcome 5.</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <input type="checkbox"/> <b>Met</b>        | <input checked="" type="checkbox"/> <b>Not Met</b> |
| <b>Follow-Up</b> (Provide your timeline for follow-up. If follow-up has occurred, describe how the actions above have resulted in program improvement.)                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                            |                                                    |
| The General Education Committee will meet to determine if a new assessment item can be created to better align with the learning outcomes of the course and the QR Rubric. In this cycle, we used a pre-existing question that will need to be adjusted to fit the course better. There was a slight improvement from the previous year of assessment. The issue of the timing of giving this question or the question itself needs to be addressed within the department, even though there has been improvement. The sample of students from the online course had no students that scored above a 1. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                            |                                                    |

**QUANTITATIVE REASONING (QR)**  
**PROPOSED SLO ASSESSMENT RUBRIC**  
Adapted from AAC&U LEAP VALUE Rubrics (Quantitative Literacy, Problem Solving)

| Students will demonstrate the ability to interpret information in mathematical and/or statistical forms.                                                    |                                                                                                                                                                                                                                              |                                                                                                                                                 |                                                                                                                                                                    |                                                                                                                                      |
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|                                                                                                                                                             | <b>Capstone (4)</b>                                                                                                                                                                                                                          | <b>Milestone (3)</b>                                                                                                                            | <b>Milestone (2)</b>                                                                                                                                               | <b>Benchmark (1)</b>                                                                                                                 |
| <b>Interpretation</b>                                                                                                                                       | Provides accurate explanations of information presented in statistical forms. Makes appropriate inferences based on that information.                                                                                                        | Provides accurate explanations of information presented in mathematical forms.                                                                  | Provides somewhat accurate explanations of information presented in mathematical forms, but occasionally makes minor errors related to computations or units.      | Attempts to explain information presented in mathematical forms but draws incorrect conclusions about what the information means.    |
| Students will demonstrate the ability to illustrate and communicate mathematical and/or statistical information symbolically, visually, and/or numerically. |                                                                                                                                                                                                                                              |                                                                                                                                                 |                                                                                                                                                                    |                                                                                                                                      |
|                                                                                                                                                             | <b>Capstone (4)</b>                                                                                                                                                                                                                          | <b>Milestone (3)</b>                                                                                                                            | <b>Milestone (2)</b>                                                                                                                                               | <b>Benchmark (1)</b>                                                                                                                 |
| <b>Representation</b>                                                                                                                                       | Skilfully converts relevant information into an insightful mathematical portrayal in a way that contributes to a further or deeper understanding.                                                                                            | Competently converts relevant information into an appropriate and desired mathematical portrayal.                                               | Completes conversion of information but resulting mathematical portrayal is only partially appropriate or accurate.                                                | Completes conversion of information but resulting mathematical portrayal is inappropriate or inaccurate.                             |
| Students will demonstrate the ability to determine when computations are needed and to execute the appropriate computations.                                |                                                                                                                                                                                                                                              |                                                                                                                                                 |                                                                                                                                                                    |                                                                                                                                      |
|                                                                                                                                                             | <b>Capstone (4)</b>                                                                                                                                                                                                                          | <b>Milestone (3)</b>                                                                                                                            | <b>Milestone (2)</b>                                                                                                                                               | <b>Benchmark (1)</b>                                                                                                                 |
| <b>Calculation</b>                                                                                                                                          | Calculations attempted are essentially all successful and sufficiently comprehensive to solve the problem. Calculations are also presented elegantly.                                                                                        | Calculations attempted are essentially all successful and sufficiently comprehensive to solve the problem.                                      | Calculations attempted are either unsuccessful or represent only a portion of the calculations required to comprehensively solve the problem.                      | Calculations are attempted but are both unsuccessful and are not comprehensive.                                                      |
| Students will demonstrate the ability to apply an appropriate model to the problem to be solved.                                                            |                                                                                                                                                                                                                                              |                                                                                                                                                 |                                                                                                                                                                    |                                                                                                                                      |
|                                                                                                                                                             | <b>Capstone (4)</b>                                                                                                                                                                                                                          | <b>Milestone (3)</b>                                                                                                                            | <b>Milestone (2)</b>                                                                                                                                               | <b>Benchmark (1)</b>                                                                                                                 |
| <b>Proposes Solutions/Hypotheses</b>                                                                                                                        | Proposes one or more solutions/hypotheses that indicate a deep comprehension of the problem. Solution/hypotheses are sensitive to contextual factors.                                                                                        | Proposes one or more solutions/hypotheses that indicate comprehension of the problem. Solutions/hypotheses are sensitive to contextual factors. | Proposes one solution/hypothesis that is “off the shelf” rather than individually designed to address the specific contextual factors of the problem.              | Proposes a solution/hypothesis that is difficult to evaluate because it is vague or only indirectly addresses the problem statement. |
| Students will demonstrate the ability to make inferences, evaluate assumptions, and address limitations in estimation modeling and/or statistical analysis. |                                                                                                                                                                                                                                              |                                                                                                                                                 |                                                                                                                                                                    |                                                                                                                                      |
|                                                                                                                                                             | <b>Capstone (4)</b>                                                                                                                                                                                                                          | <b>Milestone (3)</b>                                                                                                                            | <b>Milestone (2)</b>                                                                                                                                               | <b>Benchmark (1)</b>                                                                                                                 |
| <b>Application/Analysis/Assumptions</b>                                                                                                                     | Uses the quantitative analysis of data as the basis for drawing insightful conclusions. Explicitly describes appropriate assumptions and shows awareness that confidence in final conclusions is limited by the accuracy of the assumptions. | Uses the quantitative analysis of data as the basis for drawing reasonable conclusions. Explicitly describes assumptions.                       | Uses the quantitative analysis of data as the basis for drawing conclusions that are plausible but without inspiration or nuance. Explicitly describes assumptions | Uses the quantitative analysis of data as the basis for tentative or uncertain conclusions. Attempts to describe assumptions.        |

*Evaluators are encouraged to assign a zero to any work that does not meet the benchmark-level performance.*