Core Capacity Subcommittee Worksheet

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PLEASE SEED CAPACITY FEEDBACK FROM PROGRAMS:

https://docs.google.com/spreadsheets/d/10rUpRAvDF-3oo_LVtga3gFwD1jkZkNXj5pA049kSAzc/edit?usp=sharing

Subcommittee Charge

The purpose of this subcommittee is to refine and develop your assigned core capacity, including a recommended **capacity** description, 3-5 **measurable proficiencies**, and a **developmental rubric** to be used in assessing student learning (see **glossary** below). Your subcommittee will complete this work while considering feedback from academic programs and make recommendations to the Transforming General Education Task Force by February 26. Working from your recommendations, the Task Force will finalize a proposal to move forward to Faculty Senate.

Please note: *while students have not been assigned to the subcommittees, faculty are welcome and encouraged to invite student involvement.*

Your assigned capacity is:

NUMERICAL LITERACY

> **The capacity for Numerical Literacy enables students to appropriately extract, interpret, evaluate, construct, communicate, and use quantitative information (e.g., numerical data, equations, graphs, diagrams, tables) and methods to solve problems, evaluate claims, and support decisions in students' everyday professional, civic, and personal lives.**

As you work on your capacity, its proficiencies, and its rubric for assessment, please keep the following in mind:

First, it is not expected that our general education program alone will give students sufficient opportunities to develop this capacity to their fullest potential. Indeed, our general education program will be designed to introduce students to the importance of this capacity and provide

them with the tools necessary to continue to develop their capacity throughout their college education and their lives.

Second, as you develop the proficiencies that are necessary to your capacity, remember that all of those proficiencies will need to be addressed in each approved capacity course. Please try to be realistic about what can be achieved in general education courses.

Third, when setting rubric benchmarks, the "skillfully developed" and "exceptionally developed" capacity goals should describe our aspirations for students as they mature into lifelong learners beyond their undergraduate career at SOU, not necessarily the achievement we expect to see in general education assessment. Developmental rubrics should recognize that students will enter general education courses with varying levels of capacity development. Some may even enter with advanced skills.

Glossary

CAPACITY — ***a student's ability to learn, retain, apply, and continuously refine a framework of cross-disciplinary knowledge, skills, and/or dispositions***.

CROSS-DISCIPLINARY — ***not particular to a specific discipline***.

DEVELOPMENTAL RUBRIC — ***a measurement tool utilizing clear level descriptions to convey proficiency development, with standards for each desired proficiency***.

DISPOSITIONS — ***the learned habits of mind that shape the way students receive, respond to, value, organize, internalize, and act upon information and ideas***.

MEASURABLE — ***able to be evaluated as "not developed," "developing," "developed," "skillfully developed," or "exceptionally developed" based on the collection of quantitative or qualitative data drawn from student work***.

PROFICIENCY — ***measurable knowledge, skills, and/or dispositions within a broader capacity ("students will be able to …")***.

Subcommittee Tasks

1. Refine the name, definition, and description of your assigned capacity, informed by feedback from programs across campus.

2. Identify and define 3-5 measurable proficiencies required to demonstrate the capacity as you have defined it. These proficiencies will need to be developed and assessed in all approved capacity courses.

3. Using the template provided, draft a developmental rubric that could be used to assess your 3-5 measurable proficiencies.

4. Consider additional questions assigned by the Transforming General Education Task Force, submitted by university faculty, or raised in subcommittee discussions.

5. Develop a glossary for any capacity-specific terms that should be defined for students and faculty alike.

6. Submit your recommendations to the Transforming General Education Task Force no later than February 26.

Additional Direction & Capacity-Specific Questions

The Transforming General Education Task Force asks this subcommittee to consider the following issues as you complete your work:

> **The Task Force notes that there is considerable resistance from many students to numerical/quantitative courses, and we encourage the subcommittee to consider language that is inviting to students. There was considerable debate within the Task Force about the words "numerical" and "quantitative" and what best to call this capacity, but the subcommittee should note that we do not see this as merely a synonym for *mathematics*. We want students to appreciate the value and power of numerical literacy and be able to apply purposefully in their lives.**
>
> **Without watering it down, there was significant interest in proficiencies developed for this capacity that could be taught in many academic disciplines, not just the Math department. However, as a pragmatic concern, the subcommittee should consider the prerequisite level of mathematical preparation (for instance, from high school) students would need before developing this capacity at SOU?**
>
> **Early in Winter term, the Task Force will provide your subcommittee with additional feedback from academic programs to consider.**

Please Complete This Sheet & Return by 02/26/2021

A. Recommended Capacity Name: Numerical Literacy

B. Please write a recommended definition/description of the capacity in no more than one paragraph: The capacity in Numerical Literacy develops a

student's ability to reason and solve quantitative problems situated within a variety of disciplinary and interdisciplinary contexts. Students learn to ask mathematical questions about their world, identify appropriate methods to interpret data, and clearly communicate their results in a variety of formats.

C. In a clear manner, as if writing to a student advisee, explain why this subcommittee believes this capacity is important for students to develop and exhibit in life:

The Numerical Literacy capacity exposes you to the concepts and skills of using quantities (numbers) to perform investigations. Using these skills will allow you to come to conclusions that you otherwise wouldn't be able to accomplish. For example, on an everyday level you will learn the skills needed to calculate the amount of paint you should buy to cover a wall, room, or house. Beyond decorating your home, learning to use numerical skills is a basis for becoming a critical reader and thinker. Is the difference between two groups significant or just a matter of chance? Math is used by all disciplines in all languages and cultures, a universal language.

Even though you might not incorporate numerical skills into your everyday life, you will have become aware that numerical concepts exist. So, when it comes time to paint that wall and you don't remember how to calculate an area, you will at least know that there is a formula out there you can look up.

D. Please list no fewer than 3 and no more than 5 measurable proficiencies that should be developed in order to demonstrate this capacity.

Students will be able to:

1. ...show proficiency with number systems, mathematical operations, mathematical properties and logical arguments/proofs.
2. ...describe where data comes from, describe and differentiate types of data, show an understanding of the limitations and analysis of both data and sampling.
3. ...communicate concepts through mathematical notation, mathematical methods, logical reasoning, visual representations, or algorithmic procedures.
4. ...analyze and interpret the results of their mathematical inquiries and make decisions based on quantitative data.
5. ...communicate concepts and findings associated with proficiencies 1-4, construct viable arguments and critique the reasoning of others.

E. Please complete fill-in this rubric template:

This rubric is not intended for assignment grading but for developing general education courses and assessing student portfolios.

	Not Developed - 0	Developing - 1	Developed - 2	Skillfully Developed - 3	Exceptionally Developed - 4
Proficiency 1 **Description:** Students will be able to show proficiency with number systems, mathematical operations, mathematical properties and logical arguments/proofs.	Demonstrates little or no understanding of mathematical operations and properties within number systems as well as writes logical arguments and/or proofs with significant errors or gaps.	Demonstrates a limited understanding of mathematical operations and properties within number systems as well as writes logical arguments and/or proofs with errors or gaps.	Demonstrates an understanding of mathematical operations and properties within number systems as well as writes logical arguments and/or proofs with minimal to no errors or gaps.	Demonstrates a thorough understanding of mathematical operations and properties within number systems as well as writes logical arguments and/or proofs.	Demonstrates an exceptional understanding of mathematical operations and properties within number systems as well as writes logical arguments and/or proofs. An exceptional distinction is able to extrapolate from course content and write insightful logical arguments and/or proofs.
Proficiency 2 **Description:** Students will be able to describe where data comes from and the importance of	Demonstrates little or no understanding of where data comes from or the importance of units, struggles to	Demonstrates a limited understanding of where data comes from and the importance of units, describes	Demonstrates a basic understanding of where data comes from and the importance of units, describes	Demonstrates a thorough understanding of where data comes from and the importance of units, describes	Demonstrates an exceptional understanding of where data comes from and the importance of units, describes

units, describe and differentiate types of data, show an understanding of the limitations and analysis of both data and sampling.	describe and differentiate types of data or show an understanding of the limitations and analysis of both data and sampling.	and differentiates types of data, shows a limited understanding of the limitations and analysis of both data and sampling.	and differentiates types of data, shows an understanding of the limitations and analysis of both data and sampling.	and differentiates types of data, shows an understanding of the limitations and analysis of both data and sampling.	and differentiates types of data, shows a deep understanding of the limitations and analysis of both data and sampling.
Proficiency 3 **Description:** Students will be able to communicate concepts through mathematical notation, mathematical methods, logical reasoning, visual representations, or algorithmic procedures.	Unable to communicate concepts through mathematical notation, mathematical methods, logical reasoning, visual representations, or algorithmic procedures.	Communicates concepts through mathematical notation, mathematical methods, logical reasoning, visual representations, or algorithmic procedures with significant gaps and/or errors in reasoning.	Communicates concepts through mathematical notation, mathematical methods, logical reasoning, visual representations, or algorithmic procedures with minor errors or gaps along a clear and coherent path.	Communicates concepts through mathematical notation, mathematical methods, logical reasoning, visual representations, or algorithmic procedures with minimal to no gaps or errors along a clear and coherent path.	Clearly and effectively communicates concepts through mathematical notation, mathematical methods, logical reasoning, visual representations, or algorithmic procedures following a clear and coherent path.
Proficiency 4 **Description:** Students will be able to analyze and interpret the results of their mathematical inquiries and make decisions based on quantitative data.	Unable to demonstrate the ability to analyze and interpret the results of their mathematical inquiries and make decisions based on quantitative data.	Evidence of significant flaws in the ability to analyze and interpret the results of their mathematical inquiries and make decisions based on quantitative data.	Demonstrates a basic ability to analyze and interpret the results of their mathematical inquiries and make decisions based on quantitative data.	Thoroughly demonstrates an ability to analyze and interpret the results of their mathematical inquiries and make decisions based on quantitative data.	Exceptionally demonstrates an ability to analyze and interpret the results of their mathematical inquiries and make decisions based on quantitative data. An exceptional distinction takes in-class content and makes connections to other classes or content.
Proficiency 5 **Description:** Students will be able to communicate proficiencies 1-4,	Lacks an ability to communicate concepts and findings associated with proficiencies 1-4,	Struggles with an ability to communicate concepts and findings associated with	Demonstrates an ability to communicate concepts and findings associated with	Demonstrates an ability to communicate concepts and findings associated with	Demonstrates exceptional ability to communicate concepts and findings associated with

construct viable arguments and critique the reasoning of others.	constructs viable arguments with significant gaps and errors and/or struggles with critiquing the reasoning of others.	proficiencies 1-4, constructs viable arguments with gaps or errors and/or struggles with critiquing the reasoning of others.	proficiencies 1-4, construct viable arguments and critique the reasoning of others with minor errors.	proficiencies 1-4, effectively construct viable arguments and critique the reasoning of others with minimal to no errors.	proficiencies 1-4, constructs viable arguments and critiques the reasoning of others.

F. Does the subcommittee recommend any specific professional development opportunities be made available for faculty charged with teaching this capacity?

The committee worked hard to encourage Numerical Literacy classes from across all disciplines. We recognized that faculty from disciplines not traditionally taught with a numerical literacy lens may need professional development to identify possible areas where Numerical Literacy could be incorporated, as well as assistance in developing curriculum. This could include subject specific conferences, collaboration with other institutions, as well as collaboration across Disciplines within SOU. The committee felt strongly that there is a need for cross-curricular professional development to help discipline specific professors pull content and help students make meaningful connections as well as math professors able to point out meaningful content in a general mathematics course. The committee recommends a workshop, similar to the Transparent Assignment Design academy offered by CATL, where faculty pairs work to collaborate on curriculum.

G. Please share any additional recommendations, questions, or unresolved debates your subcommittee has for this capacity:

The subcommittee believes that this capacity could be met by courses in a number of different disciplines, not solely by traditional math courses. Courses that explore this capacity while applying the proficiencies to disciplinary practices are welcomed. We discussed the possibility of requiring two courses, a more broad, general knowledge numerical literacy course as well as one developed specifically for different majors, this would increase the connection between mathematical and logical reasoning and future careers as well as ensure that upper division courses in certain majors were able to cover pre-requisite knowledge at an appropriate depth.

H. GLOSSARY

algorithms - A description of generalized steps used to solve a problem.

critique the reasoning of others - The intent is to produce a constructive dialogue between students regarding the reasoning of one student or a group of students. For example, students might reflect on the reasoning communicated by another student or group, decide whether the reasoning makes sense, and then ask useful questions to clarify or improve the reasoning.

data - Symbolic representations of real-world phenomena that can be processed by mathematical or algorithmic methods. Data can be represented quantitatively or qualitatively.

evaluate - To calculate the numerical value.

logical arguments - One or more premises followed by one or more conclusions. In the case of proofs, the argument is always true. For example, if y-4 does not equal 0, y cannot equal 4.

limitations - Qualities that impact the acceptance of data or applicability of a data set or study. For example, the data collected may have missing values or come from more than one source and thereby introduce inherent error. Or, the data might only apply to a subset of a group, meaning that an interpretation of its results can only apply to that subset.

mathematical operations - Defined ways of combining one or more numbers. Examples include addition, subtraction, multiplication, and division.

mathematical properties - The behavior of individual operations and the relationship between different operations. Example 1. A+B=B+A for any value of A and B, but A-B does not equal B-A unless A=B. Example 2. A*(B+C) = A*B + A*C.

mathematical reasoning - Using mathematics, logical arguments, and/or proofs to form conclusions.

number systems - A collection of numbers together with operations, properties of the operations, and a system of representing these numbers. Examples include the familiar base-ten system, which consists of ten digits and follows the normal rules of arithmetic, and the binary system, which consists of two digits and is important in computer programming.

proofs - The use of a logical argument to show that a statement is always true.

qualitative data - Data which is non-numerical, or if numerical cannot produce meaningful results when mathematical operations are applied without conversion.

quantitative data - Numerical data.

sampling - Selecting a portion, or subset, of a larger population and analyzing that portion—the sample—to gain information about the population.

units - A standard quantity used in measurement. Examples: meters and feet are units of length, pounds and kilograms are units of weight, seconds and hours are units of time, and Fahrenheit and Celsius are units of temperature. Without a unit for a measurable physical attribute, the meaning is often useless. For example, if a length is expressed as only a number, such as 3, it is unclear as to whether the value represents a length in meters, feet, miles, etc. This is important because each unit represents a different measure of length, meaning that, for example, 3 meters is very different from 3 miles.

visual representation - Information organized in a way that clearly communicates trends or results. Examples include function graphs, pie charts, histograms, and tables.