Quantitative Reasoning

Course Description:
The Quantitative Reasoning course incorporates problem solving, critical thinking, and oral and writing communication fluency. Approaches and methods used in the course include choosing and using appropriate mathematical models, the use of data, and the use of real-world applications.

Quantitative Reasoning courses have been designed typically for students seeking a Bachelor's of Arts degree requiring a liberal arts mathematics course. In the era of co-requisite mathematics courses and alternative pathways, a Quantitative Reasoning course is often the most appropriate mathematics course for many majors.

A transferrable Quantitative Reasoning or "liberal arts" mathematics course is often taken by students to satisfy general education requirements. The course should stress critical thinking with a quantitative basis as its primary general education outcome. As cited in the 2015 CUPM Curriculum Guide, the six core competencies for quantitative reasoning identified by Boersma, Diefenderfer, Dingman, and Madison (2011) should also be addressed.

"1**. Interpretation:** Ability to glean and explain mathematical information presented in various forms (e.g., equations, graphs, diagrams, tables, words).

2. **Representation:** Ability to convert information from one mathematical form (e.g., equations, graphs, diagrams, tables, words) into another.

3. **Calculation:** Ability to perform arithmetical and mathematical calculations.

4. **Analysis/Synthesis:** Ability to make and draw conclusions based on quantitative analysis.

5. **Assumptions:** Ability to make and evaluate important assumptions in estimation, modeling, and data analysis.

6. **Communication:** Ability to explain thoughts and processes in terms of what evidence is used, how it is organized, presented, and contextualized." (pg. 74)

Boersma, S., Diefenderfer, C.L., Dingman, S.W., & Madison, B.L. (2011).Quantitative reasoning in the contemporary world, 3: Assessing student learning. *Numeracy 4*(2), Article 8.

Course objectives will stem from these essential topics:

Logical Reasoning

- Inductive and Deductive Reasoning
- Interpreting Statements using Logical Connectors
- Recognize Standard Forms of Valid and Invalid Arguments
- Applications using Set Concepts and Venn Diagrams Including Subsets of Real Numbers

Descriptive Statistics

- Measures of Central Tendency and Dispersion
- Measures of Relative Standing: Percentiles and Quartiles
- Applications of Normal Distribution
- Reading, Interpreting, Creating Graphical Representations Using Data

Probability

- Theoretical and Empirical Probability
- Counting Principles Including Permutations and Combinations
- Compound Probabilities involving And, Not, Or
- Odds

Number Sense

- Putting Numbers into Perspective (scientific notation, estimation, accuracy and precision, units)
- Units of Measure (conversion, dimensional analysis, area and volume)
- Linear and Exponential Models, Including Financial Math Topics

Optional Topics May Include

- Additional Statistical Topics
- Applied Geometric Topics
- At Least One
- Conditional Probability
- Direct and Inverse Variation
- Divisibility Rules, Prime / Composite
- Expected Value
- Flow Charts
- Intermediate Algebra Topics
- Logarithmic Models
- Patterns / Sequences
- Sampling Methods
- Vertex Edge Graphs
- Voting Methods - Apportionment
- Other

****NOTE:** At least 70% of the course time must be spent on the essential topics. All essential topics must be addressed. The course must be at least a 3-credit hour course. If the course is more than 3 hours credit, then the essential topics comprise 70% of the three-hour portion of the class. The remaining 1-2 credit hours may be used for optional topics as part of the co-requisite portion of the course.

Template for Course Inventory

Please fill out the following table and submit attachment(s). Approved courses must be resubmitted every 5 years.

Please attach the following materials:

- Current working syllabus and lab syllabus that contains instructional goals and/or objectives
- Comprehensive final; in the absence of a comprehensive final no more than 5 sample assessments

Course #			
Course Title			
Beginning Term (when is/was it first offered?)	If more than five years, check box ☐		
	If less than five years, enter date:		
Credit Hours (including the entire course, lecture/lab)	Course:		
Co-/Pre-requisite (test scores for placement)		Test	Score
	Co-Requisite		
	Pre-Requisite		
Successor Course:			
Catalog Description			
All Textbook(s)/Lab Manual	ISBN: Title: Publisher: Author: Edition: Copyright Year:	ISBN: Title: Publisher: Author: Edition: Copyright Year:	

Indicate the percent time spent on each learning objective (should add up to 100%). To indicate where evidence of each learning objective is located in this submission, please check all boxes that apply.

S – Syllabus T – Topics list C – Catalog Description A – Assessment O – other attachment

Indicate the typical percentage of time spent on each learning outcome/topic	**Learning Objective**	**% Time**	**S**	**T**	**C**	**A**	**O**
	1. Inductive and Deductive Reasoning						
	2. Interpreting Statements using Logical Connectors						
	3. Recognize Standard Forms of Valid and Invalid Arguments						
	4. Applications using Set Concepts and Venn Diagrams Including Subsets of Real Numbers						
	5. Measures of Central Tendency and Dispersion						
	6. Measures of Relative Standing: Percentiles and Quartiles						
	7. Applications of Normal Distribution						
	8. Reading, Interpreting, Creating Graphical Representations Using Data						
	9. Theoretical and Empirical Probability						
	10. Counting Principles Including Permutations and Combinations						
	11. Compound Probabilities involving And, Not, Or						
	12. Odds						
	13. Putting Numbers into Perspective (scientific notation, estimation, accuracy and precision, units)						
	14. Units of Measure (conversion, dimensional analysis, area and volume)						
	15. Linear and Exponential Models, Including Financial Math Topics						
Non-essential topics (may not be covered at all)	16. Additional Statistical Topics						
	17. Applied Geometric Topics						
	18. At Least One						
	19. Conditional Probability						
	20. Direct and Inverse Variation						
	21. Divisibility Rules, Prime/Composite						
	22. Expected Value						
	23. Flow Charts						

	24. Intermediate Algebra Topics		
	25. Logarithmic Models		
	26. Patterns/Sequence		
	27. Sampling Methods		
	28. Vertex Edge Graphs		
	29. Voting Methods – Apportionment		
	30. Other:		
Additional Comments:			

Name of individual submitting:_____Date:_____

Email address:_____

Please contact WVHEPC, Academic Affairs with questions