BLUE RIDGE COMMUNITY COLLEGE

Department of Mathematics

Course Number/Section:	MTH 154-48-48A/MDE 54-48A
Name of Course:	Quantitative Reasoning
Semester:	Spring Semester, 2024
Meeting Times for MTH 154-48-48A:	Tuesdays and Thursdays: 9:30 am - 10:52 am
Meeting Venue for MTH 154-48-48A:	E-108 Classroom
Meeting Times for MDE 54-48A:	Tuesdays and Thursdays: 11:00 am - 12:22 pm
Meeting Venue for MDE 54-48A:	D-115 Computer Lab
Course website:	https://quantitativereasoning.appspot.com/
Instructor's Name:	**Samuel Chukwuemeka** B.Eng., A.A.T, M.Ed, M.S
BRCC/VCCS E-Mail:	chukwuemekas@brcc.edu
Office Location:	F-105A
Student Engagement Hours:	Mondays: 3:00 pm - 5:00 pm
	Tuesdays and Thursdays: 1:00 pm - 5:00 pm
BRCC Phone Number:	(540) 453-2367 (On Campus: Call)
Alternate(Google Voice) Phone Number:	(256) 365-7048 (Off Campus: Text anytime)
Personal Quote:	"The Joy of a Teacher is the Success of his Students." - Samuel Chukwuemeka

I. **COURSE DESCRIPTION:**

Presents topics in proportional reasoning, modeling, financial literacy and validity studies (logic and set theory). Focuses on the process of taking a real-world situation, identifying the mathematical foundation needed to address the problem, solving the problem and applying what is learned to the original situation. This is a Passport and UCGS transfer course. Lecture 3 hours. Total 3 hours per week. 3 credits.

General Course Purpose

The Quantitative Reasoning course is organized around big mathematical concepts. The course's nontraditional treatment of content will help students develop conceptual understanding by supporting them in making connections between concepts and applying previously learned material to new contexts. The course will help to prepare students for success in future courses, gain skills

for the workplace, and participate as productive citizens in our society. * Encourage students to do mathematics with real data. This includes recognizing the real world often has less than perfect data, ambiguities and multiple possible solutions. It also means equipping students to be intelligent consumers of quantitative data and reports. * Encourage students to engage in productive struggle to learn mathematics and make connections to the world in which they live.

Course Prerequisites/Corequisites

Prerequisites: Competency in MTE 1-5 as demonstrated through placement or unit completion or equivalent or Corequisite: MCR 4: Learning Support for Quantitative Reasoning

II.   <u>**COURSE OBJECTIVES:**</u>

Upon completion of this course, the student should be able to do these measurable objectives for each topic.

- Communication
  - Interpret and communicate quantitative information and mathematical and statistical concepts using language appropriate to the context and intended audience.
    - Use appropriate mathematical language in oral, written and graphical forms.
    - Read and interpret real world advertisements, consumer information, government forms and news articles containing quantitative information.
    - Use quantitative information from multiple sources to make or critique an argument.
- Problem Solving
  - Share strategies to find solutions to life application problems to make sense of the mathematical content and persevere in solving them.
    - Apply strategies for solving open-ended questions requiring analysis and synthesis of multiple calculations, data summaries, and/or models.
    - Apply problem solving strategies to applications requiring multiple levels of engagement.
- Reasoning
  - Reason, model, and draw conclusions or make decisions with quantitative information.

- Draw conclusions or make decisions in quantitatively based situations that are dependent upon multiple factors. Students will analyze how different situations would affect the decisions.
- Present written or verbal justifications of decisions that include appropriate discussion of the mathematics involved.
- Recognize when additional information is needed.
- Recognize the appropriate ways to simplify a problem or its assumptions.
- Evaluation
  - Critique and evaluate quantitative arguments that utilize mathematical, statistical, and quantitative information.
    - Evaluate the validity and possible biases in arguments presented in real world contexts based on multiple sources of quantitative information - for example; advertising, internet postings, consumer information, political arguments.
- Technology
  - Use appropriate technology in a given context.
    - Use a spreadsheet to organize quantitative information and make repeated calculations using simple formulas.
    - Search for and apply internet-based tools appropriate for a given context - for example, an online tool to calculate credit card interest or a scheduling software package.
- Financial Literacy
  - Simple Interest
    - Define interest and its related terminology.
    - Develop simple interest formula.
    - Use simple interest formulas to analyze financial issues
  - Compound Interest
    - Compare and contrast compound interest and simple interest.
    - Explore the mechanics of the compound interest formula addressing items such as why the exponent and $(1+r/n)$ is used by building the concept of compounding interest through manual computation of a savings or credit account.
    - Apply compound interest formulas to analyze financial issues

- - - Create a table or graph to show the difference between compound interest and simple interest.
    - ○ Borrowing
      - - Compute payments and charges associated with loans.
      - - Identify the true cost of a loan by computing APR
      - - Evaluate the costs of buying items on credit
      - - Compare total loan cost using varying lengths and interest rates.
    - ○ Investing
      - - Calculate the future value of an investment and analyze future value and present value of annuities (Take into consideration possible changes in rate, time, and money.)
      - - Compare two stocks and justify your desire to buy, sell, or hold stock investment.
      - - Explore different types of investment options and how choices may impact one's future such as in retirement.
- ● Perspective Matters - Number, Ratio, and Proportional Reasoning
  - ○ Solve real-life problems that include interpretation and comparison of summaries which extend beyond simple measures, such as weighted averages, indices, or ranking and evaluate claims based on them.
  - ○ Solve real-life problems requiring interpretation and comparison of various representations of ratios (i.e., fractions, decimals, rates, and percentages including part to part and part to whole, per capita data, growth and decay via absolute and relative change).
  - ○ Distinguish between proportional and non-proportional situations and, when appropriate, apply proportional reasoning leading to symbolic representation of the relationship. Recognize when proportional techniques do not apply.
  - ○ Solve real-life problems requiring conversion of units using dimensional analysis.
  - ○ Apply scale factors to perform indirect measurements (e.g., maps, blueprints, concentrations, dosages, and densities).
  - ○ Order real-life data written in scientific notation. The data should include different significant digits and different magnitudes.
- ● Modeling
  - ○ Observation

- Through an examination of examples, develop an ability to study physical systems in the real world by using abstract mathematical equations or computer programs
- Collect measurements of physical systems and relate them to the input values for functions or programs.
- Compare the predictions of a mathematical model with actual measurements obtained
- Quantitatively compare linear and exponential growth
- Explore behind the scenes of familiar models encountered in daily life (such as weather models, simple physical models, population models, etc.)
  - Mathematical Modeling and Analysis
    - Collect measurements and data gathered (possibly through surveys, internet, etc.) into tables, displays, charts, and simple graphs.
    - Create graphs and charts that are well-labeled and convey the appropriate information based upon chart type.
    - Explore interpolation and extrapolation of linear and non-linear data. Determine the appropriateness of interpolation and/or extrapolation.
    - Identify and distinguish linear and non-linear data sets arrayed in graphs. Identifying when a linear or non-linear model or trend is reasonable for given data or context.
    - Correctly associate a linear equation in two variables with its graph on a numerically accurate set of axes
    - Numerically distinguish which one of a set of linear equations is modeled by a given set of (x,y) data points
    - Identify a mathematical model's boundary values and limitations (and related values and regions where the model is undefined). Identify this as the domain of an algebraic model.
    - Using measurements (or other data) gathered, and a computer program (spreadsheet or GDC) to create different regressions (linear and non-linear), determine the best model, and use the model to estimate future values.
  - Application
    - Starting with a verbally described requirement, generate an appropriate

mathematical approach to creating a useful mathematical model for analysis

- Explore the graphical solutions to systems of simultaneous linear equations, and their real world applications
- Numerically analyze and mathematically critique the utility of specific mathematical models: instructor-provided, classmate generated, and self-generated

- Validity Studies
  - Identify logical fallacies in popular culture: political speeches, advertisements, and other attempts to persuade
  - Analyze arguments or statements from all forms of media to identify misleading information, biases, and statements of fact.
  - Develop and apply a variety of strategies for verifying numerical and statistical information found through web searches.
  - Apply the use of basic symbolic logic, truth values, and set theories to justify decisions made in real-life applications, such as if-then-else statements in spreadsheets, Venn Diagrams to organize options, truth values as related to spreadsheet and flow-chart output. (Students must have experience with both symbolic logic and basic truth tables to meet this standard.)

III. **EVALUATION AND REQUIREMENTS:**

A. **Grade Determination**: Student evaluation will be based on performance on the following assessments:

MyLab Math Assignments	= 70%
3 Tests @ 5% each	= 15%
Project	= 10%
Final exam	= 5%
…………………………………………………..	
TOTAL	= 100%

Method of Grading: The Weighted Average method is used to compute your grades. Grades will be posted in the Canvas course management system.

Grades: Letter grades are assigned using this scale:

[90, 100]	[80, 90)	[70, 80)	[60, 70)	[0, 60)
A	B	C	D	F

Here is an example to calculate the final grade:

Assessments	Weight (%)	Your Score (%)	Weighted Score
MyLab Math Assignments	70	90	6300
Test 1	5	95	475
Test 2	5	85	425
Test 3	5	80	400
Project	10	100	1000
Final Exam	5	70	350
$\Sigma Weight = 100$		$\Sigma Weighted\ Score = 8950$	

$$\text{Final Grade} = \frac{Sum\ of\ Weighted\ Scores}{Sum\ of\ Weights} = \frac{8950}{100} = 89.5\% \simeq 90\% = A$$

Please NOTE:

(1.) The final grade is <u>rounded to the nearest integer only one time</u>.

A grade of 79.5000001% is rounded to an 80% which is a B, while a grade of 79.499999 is rounded to a 79% which is a C.

(2.) At least a final grade of 70% (C) is required to pass the course.

(3.) There is no extra credit or bonus point or curving grades for the course.

B. **LATE WORK/MAKE UP POLICY:**
==Please review the **Tentative Class Schedule** for specific dates.==

MyLab Math Assignments: All MLM assignments were released to you on the first day of class. There are two due dates for each section of the assignment as noted in the Tentative Class Schedule. After the initial due date, you may continue to work on any section you did not complete, up until the final due date without any penalty. After the final due date, no MLM assignment may be done.

Tests: Make-up tests are given for any missed test up until the date noted in the Tentative Class Schedule at the Testing Center. You are required to meet me during Student Engagement Hours before that date/day to discuss your make-up test. After that date, there will not be any make-up for any missed test. Please note that the tests taken in the class will have a Choose-and-Answer format for the sections/chapters. The make-up test will not have that option. Hence, it is highly recommended to take the tests at the scheduled dates.

Project: You are encouraged to submit a draft for the project. Then review and do the corrections based on my feedback and keep working with me until I give you the "*green light*" for the main submission. Draft submissions/reviews/corrections should be done by the final due date for draft submissions. Even if you do not submit your draft for review, please make sure you submit your project in the Canvas course by the final due date for project submissions. After the final due date, no project is accepted.

Final Exam: If you know that you may miss the final exam, please come and see me during Student Engagement Hours so we can arrange for you to take it earlier. If you miss the final exam, you are required to meet with me ahead of time in the Office to discuss your make-up exam before you take it at the Testing Center.

IV. **COURSE ATTENDANCE AND PARTICIPATION POLICY:**

Attendance will be taken for every class session. It is important you attend class. But please note that attending class will not give you any point. Not attending class will not deduct any point from you. Remember that I do not believe in extra credit or bonus points. I believe in giving all my students a lot of opportunities to succeed.

Be it as it may, it is very important that you attend class regularly. If you are absent for any class session for any reason, please note that you are completely responsible for everything that was covered in your absence. You are required to review the MyLab Math eBook resources and the instructor's resources. You are always welcome to meet me during Student Engagement Hours and ask questions regarding what you have reviewed.

V. **COURSE ETIQUETTE:**

It is my responsibility to promote a safe and conducive learning environment. I assume that you

know what is right and what is wrong. In that regard, I ask that you behave accordingly and be respectful at all times. The use of cell phones and other applicable electronic equipment besides computers should be done outside the classroom. Please note that cell phones and other applicable equipment will not be allowed during tests/exams.   Students are expected to uphold the core values of academic integrity which include honesty, trust, fairness, respect and responsibility. These core values, combined with finding one's purpose and passion and applying them in and out of classroom learning, produce students who become extraordinary citizens.

VI. **INSTRUCTOR SPECIFIC HONESTY/PLAGIARISM POLICY:**

As a BRCC student, it is your responsibility to be informed about what constitutes academic misconduct, how to avoid it and what happens if you decide to engage in it.

Examples of academic misconduct include (but are not limited to):

- plagiarism (turning in work of another person and not giving them credit)
- stealing an exam or course materials
- copying another student's homework, paper, exam
- cheating on an exam (copying from another student, etc.)
- falsifying academic documents

Please note that violations of academic misconduct may result in a failing grade in the assessment, a failing grade in the course, and/or a report to the college administration among others.

VII. **ARTIFICIAL INTELLIGENCE (AI) STATEMENT:**

A. **BRCC AI Procedure**:   All work submitted in BRCC courses must be your own. Contributions from anyone or anything else, including AI sources, must be properly quoted and cited every time they are used. Failure to do so constitutes an academic integrity violation and the Statement on the Honor Code and Behavior Violations, and Disciplinary and Appeal Procedures will be implemented. Students are discouraged from using AI tools UNLESS under direct instruction from your instructor to do so. Contact your instructor if you are unsure or have questions BEFORE using AI for any assignment.

B. **Course level procedure**: If the need arises, we shall discuss in class the ways in which students are permitted to use AI for our assignments in an acceptable manner."

VIII. **INSTRUCTIONAL MATERIALS/TEXT:**

    A. REQUIRED

        (1.) MyLab Math (MLM) Access for the online assignments (has the eBook). The eBook has notes, videos, audiovisual resources and several learning aids. This is required. Please log into the Canvas course, click the **Modules** link on the Left Hand Side (LHS) of the course homepage. Then click the **MyLab Math Assignments** link and follow the links/directions to access the assignments. Also, please review the eText and the Multimedia (Video and Resource) library.

        (2.) Course website is required.

        (3.) Pens, Graphing Calculator (TI-83 Plus or TI-84 Plus or TI-84 Plus CE or TI-Nspire CX II only). The use of any other calculator requires my approval. These are required.

        (4.) Access to a Personal Computer or Mackintosh or any electronic device with internet and email capabilities, and updated internet browsers are required. You may use the computers in the School Computer Labs., School Library, or the Public Library.

    B. RECOMMENDED

        (1.) Graph Book, Ruler, Pencils.

        (2.) The audiovisual resources and learning aids in the MyLab Math Access.

        (3.) Other resources that may be provided by the instructor.

    C. NOT REQUIRED: Using and Understanding Mathematics: A Quantitative Reasoning Approach. (8th Edition; ©2023); Jeffrey O. Bennett and William L. Briggs; PEARSON ISBN-13: 9780137575336 (The hard copy of the textbook is not required).

IX. **COURSE SCHEDULE AND SEQUENCE OF INSTRUCTION:**

Method of Teaching: Synchronous (Lecture). I do, You do, We do, Y'all do.

Tutoring: Please attend tutoring at either or all of these sites:

(1.)   During Student Engagement Hours at my office

(2.)   The Center for Academic Vision and Excellence (The CAVE)

Tentative Class Schedule: Spring Semester, 2024

Class Session	Day/Date	Sections(Textbook)/ Topics (Instructor)	Assessments Due
1	Tuesday / January 16	Course Syllabus Section 1A	(Initial Due) Section 1A-1st
2	Thursday / January 18	Section 1A	(Initial Due) Section 1A-2nd
3	Tuesday / January 23	Section 1E	(Initial Due) Section 1E-1st Section 1E-2nd
4	Thursday / January 25	Sections 1B	(Initial Due) Section 1B-1st Section 1B-2nd Section 1B-3rd
5	Tuesday / January 30	Section 1D	(Initial Due) Section 1D-1st Section 1D-2nd
6	Thursday / February 01	Section 1C	Last Day to Drop with Refund (Initial Due) Section 1C-1st Section 1C-2nd
7	Tuesday / February 06	Sections 1C	(Initial Due) Section 1C-3rd
8	Thursday / February 08	Section 2A	(Initial Due) Section 2A-1st Section 2A-2nd Section 2A-3rd
9	Tuesday / February 13	Section 2B	(Initial Due) Section 2B-1st Section 2B-2nd
10	Thursday / February 15	Section 2B	(Initial Due) Section 2B-3rd Section 2B-4th
11	Tuesday / February 20	Section 2C	(Initial Due) Section 2C-1st Section 2C-2nd

12	Thursday / February 22	Study Guide for Test 1 Project Draft	(Initial Due) Project Draft
13	Tuesday / February 27	**Test 1**: Chapters 1 and 2 Project	**Test 1**: Chapters 1 and 2 (Initial Due) Project
14	Thursday / February 29	Section 3A	(Initial Due) Section 3A-1st Section 3A-2nd Section 3A-3rd Section 3A-4th
15	Tuesday / March 05	Section 3B	(Initial Due) Section 3B-1st Section 3B-2nd Section 3B-3rd
16	Thursday / March 07	Section 3C	(Initial Due) Section 3C-1st Section 3C-2nd
17	Tuesday / March 12	Section 3D Spring Break: No Classes: Yes Assignments	(Initial Due) Section 3D-1st Section 3D-2nd
18	Thursday / March 14	Section 3E Spring Break: No Classes: Yes Assignments	(Initial Due) Section 3E
19	Tuesday / March 19	Section 4A	(Initial Due) Section 4A-1st Section 4A-2nd Section 4A-3rd
20	Thursday / March 21	Section 4B	(Initial Due) Section 4B-1st Section 4B-2nd Section 4B-3rd Section 4B-4th
		Monday: March 25: Last Day to Withdraw with "W"	
21	Tuesday / March 26	Section 4C Section 4D	(Initial Due) Section 4C-1st Section 4C-2nd Section 4D-1st

22	Thursday / March 28	Section 4D Section 4E Review for Test 2	(Initial Due) Section 4D-2nd Section 4E-1st Section 4E-2nd
23	Tuesday / April 02	**Test 2**: Chapters 3 and 4	**Test 2**: Chapters 3 and 4
24	Thursday / April 04	Section 5A	(Initial Due) Section 5A-1st Section 5A-2nd Section 5A-3rd
25	Tuesday / April 09	Section 5B Section 5C	(Initial Due) Section 5B-1st Section 5B-2nd Section 5C-1st
26	Thursday / April 11	Section 5C Section 5D	(Initial Due) Section 5C-2nd Section 5D-1st Section 5D-2nd
27	Tuesday / April 16	Section 5E	(Initial Due) Section 5E-1st Section 5E-2nd
28	Thursday / April 18	Section 8A Review for Test 3	Section 8A (Flipped Classroom, Not Graded) (Final Due) Project Draft
29	Tuesday / April 23	**Test 3**: Chapter 5	**Test 3**: Chapter 5
30	Thursday / April 25	Section 9A Section 9B Section 9C	(Flipped Classroom, Not Graded) Section 9A-1st Section 9A-2nd Section 9B-1st Section 9B-2nd Section 9C-1st Section 9C-2nd (Final Due) Test 1 Make-up Test 2 Make-up Test 3 Make-up

			Project
31	Tuesday / April 30	**Comprehensive Final Exam** (Chapters 1, 2, 3, 4, 5)	**Comprehensive Final Exam** (Chapters 1, 2, 3, 4, 5)
32	Thursday / May 02	Make-up for the Comprehensive Final Exam (Chapters 1, 2, 3, 4, 5, 8, and 9)	Make-up for the Comprehensive Final Exam (Chapters 1, 2, 3, 4, 5, 8, and 9)
	Monday / May 06		(Final Due) All MyLab Math Assignments

BRCC Student Resources: https://learn.vccs.edu/courses/161353

Email Policy: Please use your school email address (…@brcc.edu) for all communications relating to this course.

Legal Name: Please **use only your registered names (First Name and Last Name in the Canvas course)** for **all work done in this course**.

Rights to change: I reserve the right to change the information contained in this syllabus with notice. The institution reserves the right to do so, with or without notice.

Tips to Succeed in the Course.

Please:

❖ Do not procrastinate. Procrastination is inimical to time. Begin your MyLab Math assignments immediately. Complete at least 20 questions daily. Do not wait until the section is covered in the class before you complete it. MyLab Math has learning aids that you can use right away. Ask questions on any concept you do not understand.

❖ Flipped Classroom Learning: Review each topic to be taught in the Instructor's Resources, and in your textbook (eBook), the videos and other multimedia resources in your MyLab Math software prior to coming to class. Please ask questions.

❖ Attend class sessions regularly. Participate in the review sessions.

❖ This course will require a lot of your time. <mark>You will do a lot of work.</mark> Please be determined to work very hard. The good thing is that I am here to help you. Please ask questions. I am here to help you.

❖ Other information will be provided and/or discussed as applicable. (Tutoring, Peer Learning, Everyday Math Learning, etc.)

X. **Required Supplement to Syllabus:**

In addition to what is outlined on this syllabus, more required policies and procedures are found here: www.brcc.edu/syllabus.