Programme	BS in Sociology	Course Code		Credit Hours	3
Course Title	Quantitative Reasoning-I				

Course Introduction

Quantitative Reasoning-I is an introductory-level undergraduate course that focuses on the fundamentals related to the quantitative concepts and analysis. The course is designed to familiarize students with the basic concepts of mathematics and statistics and to develop students' abilities to analyze and interpret quantitative information. Through a combination of theoretical concepts and practical exercises, this course will also enable students cultivate their quantitative literacy and problem-solving skills while effectively expanding their academic horizon and breadth of knowledge of their specific major field of study.

Learning Outcomes

On the completion of the course, the students will:

1. Fundamental numerical literacy to enable them work with numbers, understand their meaning and present data accurately;
2. Understanding of fundamental mathematical and statistical concepts;
3. Basic ability to interpret data presented in various formats including but not limited to tables, graphs, charts, and equations etc.

Course Content		Assignments/Readings
Week 1	**Chap 1: Numerical Literacy** • Number system and basic arithmetic operations	Reading: Bennett & Briggs (2022), Chapter 1 (Thinking Critically) & Chapter 2 (Approaches to Problem Solving). Assignment: Exercise set on number properties and order of operations.
Week 2	• Units and their conversions, area, perimeter and volume	Reading: Madison & Steen (2003), Chapter on Units and Measures. Assignment: Practical problem set involving unit conversions (metric vs. imperial) and geometric calculations.
Week 3	• Rates, ratios, proportions and percentages • Types and sources of data	Reading: Bennett & Briggs (2022), Chapter 3 (Numbers in the Real World). Assignment: Solve word problems involving percentage change and ratios. Bring a dataset example (news article) to class.

Week 4	• Measurement scales	Reading: Ellis & Gulick (1999), Section on Measurement Theory. Assignment: Identify variables in a sociological survey and classify them by measurement scale (Nominal, Ordinal, Interval, Ratio).
Week 5	• Tabular and graphical presentation of data	Reading: Rosen (2019), Chapter on Discrete Probability Distributions (Graphing section). Assignment: Create a frequency table and histogram using provided raw data.
Week 6	• Quantitative reasoning exercises using number knowledge	Reading: Review Bennett & Briggs Chapters 1-3. Assignment: Quiz 1: Numeracy and basic data presentation.
Week 7	**Chap 2: Fundamental Mathematical Concepts** • Basics of geometry (lines, angles, circles, polygons etc.)	Reading: Ellis & Gulick (1999), Chapter on Geometry. Assignment: Prove basic geometric theorems and solve area problems for composite shapes.
Week 8	• Sets and their operations	Reading: Rosen (2019), Chapter 2 (Sets, Functions, Sequences). Assignment: Solve problems involving Union, Intersection, and
		Complement using Venn diagrams.
Week 9	• Relations, functions, and their graphs	Reading: Rosen (2019), Chapter 2 (Functions). Assignment: Identify domain and range of functions; graph linear functions.
Week 10	• Exponents, factoring and simplifying algebraic expressions	Reading: Ellis & Gulick (1999), Chapter on Algebraic Expressions. Assignment: Problem set on simplifying complex algebraic fractions and factoring polynomials.

Week 11	• Algebraic and graphical solutions of linear and quadratic equations and inequalities	Reading: Madison & Steen (2003), Chapter on Mathematical Models. Assignment: Solve systems of linear equations graphically and algebraically.
Week 12	• Quantitative reasoning exercises using fundamental mathematical concepts	Reading: Review Rosen Chapter 2. Assignment: Quiz 2: Algebra and Functions. Submission of a short report modeling a real-world scenario using linear equations.
Week 13	**Chap 3: Fundamental Statistical Concepts** • Population and sample; Graphical presentation of data	Reading: Bennett & Briggs (2022), Chapter 5 (Visual Displays of Data). Assignment: Differentiate between population parameters and sample statistics. Construct a pie chart from provided data.
Week 14	• Summarizing data; Measures of central tendency, dispersion and their applications; • Rules of counting (multiplicative, permutation and combination)	Reading: Rosen (2019), Chapter 6 (Counting Rules); Bennett & Briggs (2022), Chapter 6 (Describing Data). Assignment: Calculate
		Mean, Median, Mode, and Standard Deviation for a dataset. Solve permutation/combination problems.
Week 15	• Basic concept of probability; Applications of a priori and relative frequency approach	Reading: Bennett & Briggs (2022), Chapter 7 (Probability). Assignment: Calculate probabilities of independent and dependent events.
Week 16	• Quantitative reasoning exercises using fundamental statistical concepts	Reading: Review Statistical Concepts chapters. Assignment: Final Quiz: Statistics and Probability applications.

Textbooks and Reading Material

Madison, B. L., & Steen, L. A. (Eds.). (2003). *Quantitative reasoning: Tools for today's informed citizen*. National Council on Education and the Disciplines.

Madison, B. L., & Brusca, D. M. (2001). *Quantitative reasoning for the information age*. Mathematical Association of America.

Ellis, W., & Gulick, D. (1999). *Fundamentals of mathematics*. Addison-Wesley.

Zaslow, E. (2013). *Quantitative reasoning: Thinking in numbers*. Great Courses.

Bueno de Mesquita, E., & Fowler, A. (2021). *Thinking clearly with data: A guide to quantitative reasoning and analysis*. Princeton University Press.

Bennett, J. O., & Briggs, W. L. (2022). *Using and understanding mathematics: A quantitative reasoning approach* (8th ed.). Pearson.

Rosen, K. H. (2019). *Discrete mathematics and its applications* (8th ed.). McGraw-Hill Education.

Teaching Learning Strategies

1. Interactive lectures to introduce and explain key concepts
2. Guided class discussions to foster critical thinking and deeper understanding
3. Collaborative group work to encourage peer learning and practical application of concepts
4. Emphasis on active student engagement throughout the course

Assignments: Types and Number with Calendar

The sessional work will be a combination of written assignments, class quizzes, presentations, and class participation/attendance.