

MATH 109 General Education Proposal

- 1. A sample syllabus for this course is attached.**
- 2. Statement of how your course meets the Colonnade Plan's learning objectives.**

MATH 109: General Mathematics (3 hours) meets the five learning objectives included in the Quantitative Reasoning section of the Colonnade Plan. MATH 109 students will learn to interpret, illustrate, and communicate mathematical and/or statistical ideas. Further, students will learn to model and solve problems. Students with a Math ACT of 26 or higher will receive 3 hours credit for this requirement.

MATH 109 specifically meets the five learning objectives as detailed below:

Learning Objective 1: Interpret information presented in mathematical and/or statistical forms.

Students in MATH 109 learn to interpret information presented in mathematical and/or statistical form by learning to interpret probabilities, statistical measures, geometry and finance presented in equations, tables, diagrams, figures and text. Students learn to accurately interpret and use this information in the context of a given problem.

Specifically, students learn to:

- Recognize data sets as samples and populations
- Identify the individuals and variables in a data set
- Distinguish between quantitative and qualitative data
- Identify different sampling methods
- Analyze how sampling methods, study types and confounding variables can affect study results
- Identify explanatory and response variables
- Interpret the information in a histogram and describe its shape and center
- Recognize a boxplot and identify the 5-number summary
- Recognize a scatterplot and identify the relationship as positive or negative and estimate the strength of the relationship
- Recognize stemplots, bar graphs, line graphs and circle graphs and interpret the information presented
- Recognize the normal distribution and interpret the normal curve
- Distinguish between combinations and permutations
- Recognize table and tree diagrams and accurately construct the sample space

- Recognize, identify and categorize polygons, circles, prisms, cylinders, pyramids, cones, spheres and platonic solids
- Recognize arithmetic and geometric sequences
- Distinguish between simple and compound interest and identify the principle, rate and term of a loan or investment

Learning Objective 2: Illustrate and communicate mathematical and/or statistical information symbolically, visually and/or numerically.

Students in MATH 109 learn to illustrate and communicate mathematical and/or statistical information symbolically by learning when and how to use mathematical and/or financial expressions, equations or formulas to express quantitative information.

Students in MATH 109 learn to illustrate and communicate mathematical and/or statistical information visually by learning to:

- Create statistical graphs such as histograms, stemplots, boxplots, scatterplots and/or circle graphs
- Create tables/and or charts showing loan amortizations, installment payments and growth of investments
- Draw nets of three-dimensional shapes

Students in MATH 109 learn to illustrate and communicate mathematical and/or statistical information numerically by learning when and how to use lists and/or tables to express quantitative information.

Learning Objective 3: Determine when computations are needed and execute the appropriate computations.

Students in MATH 109 learn to determine when mathematical and/or statistical computations are needed and execute the appropriate computations through exercises that develop skill in carrying out mathematical and/or statistical procedures accurately and efficiently to solve problems.

Specifically, students learn to:

- Calculate the measures of central tendency such as mean, median, mode and midrange

- Calculate the measures of variation such as range, standard deviation and variance
- Calculate z-scores and percentiles
- Calculate the correlation coefficient
- Find the regression line and use it to make predictions
- Compute simple and compound probabilities, odds and expected values
- Compute perimeter, area, surface area and volume
- Compute permutations and combinations
- Solve linear equations
- Solve proportions
- Calculate simple and compound interest, effective interest rate and annual percentage rate

Learning Objective 4: Apply an appropriate model to the problem to be solved.

Students in MATH 109 learn to apply an appropriate model to the problem to be solved by exercises designed to teach recognition of which mathematical and/or statistical procedure appropriately models a given problem in statistics, probability, geometry and finance and develops skill in performing such applications.

Learning Objective 5: Make inferences, evaluate assumptions, and assess limitations in estimation modeling and/or statistical analysis.

Students in MATH 109 learn to make inferences, evaluate assumptions and assess limitations in estimation modeling and/or statistical analysis by application exercises from finance, education, business, science and the social sciences which require imposing “real-world” assumptions and/or limitations on the procedures selected and inferences made from the results.

Specifically, students learn to:

- Analyze which measure of central tendency best represents a data set
- Evaluate measures of variation and position to compare data sets
- Use probability and odds to understand the lottery and games of chances
- Assess interest rates, rates of returns and repayment options to make appropriate financial decisions

3. Brief description of how your department will assess this course's effectiveness.

For MATH 109, assessment will occur at the end of the semester. To assess the course objectives, each student will complete a problem that addresses the five learning objectives. A committee of at least three faculty members will select a sample and evaluate the common assessment problem that addresses the skills and concepts as stated in the learning outcomes. The committee will randomly collect 25% to 30% of the sample across all sections of MATH 109 to help assess students' mastery of the learning outcomes. The following criterion will be used to assess student learning outcomes:

Each test question will be scored on scale of 0 to 5, using a scoring guide developed by the committee in conjunction with the department. A common rubric (5 - Excellent ; 4 - Good; 3 - Satisfactory; 2 - Poor; 0 and 1- Fail).

The goals will be as follows:

Satisfactory = at least 70% of students scored 3 or better

Unsatisfactory = under 70% of students scored 3 or better

4. If necessary, a list of any proposed revisions needed to bring your course in line with the Colonnade Plan.

MATH 109 will be re-evaluated at the end of each academic year to determine if the learning objectives are being met, and will be updated accordingly.

Sample Syllabus Statement

MATH 109: General Mathematics

The following items will be included in all MATH 109 syllabi.

Course Description:

MATH 109 is a terminal course for nonscience majors. This course provides students with the ability to understand and apply skills and concepts from topics including introduction to probability and statistics, geometry and finance. MATH 109 students will be able to: use fundamental reasoning principles; interpret information presented in tables or graphical displays; use graphical, symbolic, and numeric methods to solve practical problems and apply an appropriate mathematical model to the problem to be solved. Emphasis is given to real-world application problems.

Learning Objectives:

This course fulfills the Quantitative Reasoning requirement in the Foundations category of WKU's Colonnade program. As part of that program, MATH 109 has the following learning objectives:

Students will demonstrate the ability to:

1. Interpret information presented in mathematical and/or statistical forms.
2. Illustrate and communicate mathematical and/or statistical information symbolically, visually and/or numerically.
3. Determine when computations are needed and execute the appropriate computations.
4. Apply an appropriate model to the problem to be solved.
5. Make inferences, evaluate assumptions, and assess limitations in estimation modeling and/or statistical analysis.

Types of Assessments:

The following assessments are used in this course: Exams, quizzes, homework assignments (may include projects), and in-class activities.

Rubric for MATH 109: General Mathematics

Score	Scoring Criteria
0	Student gives no response or response is completely irrelevant
1	Student gives one correct responses, with appropriate work shown (if applicable)
2	Student gives two correct responses, with appropriate work shown (if applicable)
3	Student gives three correct responses, with appropriate work shown (if applicable)
4	Student gives four correct responses, with appropriate work shown (if applicable)
5	Student gives five correct responses, with appropriate work shown (if applicable)