Foundational Component Area: Mathematics

In the box below, describe how this course meets the Foundational Component Area description for Mathematics. Courses in this category focus on quantitative literacy in logic, patterns, and relationships. Courses involve the understanding of key mathematical concepts, and the application of appropriate quantitative tools to everyday experience.

The proposed course must contain all elements of the Foundational Component Area. How does the proposed course specifically address the Foundational Component Area definition above?

This course is focused on quantitative literacy in mathematics found in everyday life. Upon successful completion of this course, students will be able to:

- Understand and apply the rules of logic and sets.
- Recognize patterns in order to understand the principles of probability and counting and apply these concepts to a variety of problems; for instance, finding the probability of drawing a particular hand from a deck of cards.
- Identify types of random variables and be able to calculate probabilities and statistics for these random variables.
- Apply the concepts of finance to everyday experiences, such as paying off mortgages and saving for retirement.
- Understand matrices and their relationships to applications including solving systems of linear equations and solving problems involving Markov processes and game theory.

Core Objectives

Describe how the proposed course develops the required core objectives below by indicating how each learning objective will be addressed, what specific strategies will be used for each objective and how student learning of each objective will be evaluated.

The proposed course is required to contain each element of the Core Objective.

Critical Thinking (to include creative thinking, innovation, inquiry, and analysis, evaluation and synthesis of information):

The following critical thinking skills will be assessed on in-class quizzes and exams.

- Students will create a truth table for (nontrivial) compound statements.
- Students will analyze the given information about sets to find the number of elements in particular subsets.
- Students will synthesize information to determine whether or not events are independent.
- Students will evaluate probabilities involving Venn diagrams, tree diagrams, and independent events.
- Students will differentiate between basic and conditional probability including knowing when Bayes' theorem is appropriate.
- Students will carefully examine and interpret statements to determine the equivalent mathematical notation or equation.
- Students will understand the difference between odds and the probability of an event and be able to determine one from the other.
- Students will innovatively use counting techniques (multiplication principle, permutations, combinations) to determine the number of ways a task can be completed and to find the probability that the task occurs.
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- Students will use inquiry to resolve whether or not an experiment is binomial.
- Students will classify random variables as finite discrete, infinite discrete, or continuous and give all the possible values it may assume.
- Students will calculate probabilities of binomial and normal random variables.
- Students will understand the difference between simple and compound interest and when to use each.
- Students will think creatively in order to set up a system of equations and solve a word problem.
- Students will understand what an inverse matrix is and its relationship with an identity matrix.
- Students will synthesize data from a word problem to set up a transition matrix of a Markov process.

Communication (to include effective development, interpretation and expression of ideas through written, oral and visual communication):

The following communication skills will be assessed on in-class quizzes, exams and in lecture.
- Students will develop an understanding of the relationship between mathematical symbols of logic and their English language counterpart.
- Students will effectively communicate information about sets and experiments using written symbolic notation.
- Students will visually display experiments and associated probabilities using tree diagrams.
- Students will express mathematical concepts both abstractly with equations and in writing.
- Students will communicate statistics through probability distributions and graphically through histograms.
- Students will explain why a matrix operation is possible or not and interpret the meaning of the entries of the resulting matrix when the operation makes sense.
- Students will answer questions during lecture concerning topics discussed in class.

Empirical and Quantitative Skills (to include the manipulation and analysis of numerical data or observable facts resulting in informed conclusions):

The following empirical and quantitative skills will be assessed on in-class quizzes and exams.
- Students will describe numerical data sets by finding relevant statistics, such as expected value, median, mode, standard deviation and variance.
- Students will use statistics to make informed conclusions about real-world problems including determining the premium for an insurance policy.
- Students will analyze financial information to make decisions regarding everyday applications, such as loan payments, annuities, amortizations, and sinking funds.
- Students will use effective interest rates to select the best loan or savings option.
- Students will create empirical probability distributions based on a given set of data.

Please be aware that instructors should be prepared to submit samples/examples of student work as part of the future course recertification process.